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Volume 3

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How to use the MICROPAEDIA

The 12 volumes of the MICROPAEDIA contain tens of thousands of shorter articles on specific persons, places, things, and ideas, arranged in alphabetical order. The MICROPAEDIA can be used as an information resource on its own; and it can function as support for the longer articles in the MACROPAEDIA (to which it refers whenever appropriate). The MICROPAEDIA in turn is supported by references in the INDEX and by the lists of suggested readings in the PROPAEDIA. Finally, the MICROPAEDIA is the portion of the *Encyclopædia Britannica* best suited for the reader who wishes to browse among the countless subjects in all fields of human learning and history in all times and places.

Alphabetization

Entry titles are alphabetized according to the English alphabet, A to Z. All diacritical marks (such as in ö, ł, or ñ) and foreign letters without parallels in English (such as ayin [ʿ] and hamza [ʾ]) are ignored in the alphabetization. Apostrophes likewise are ignored. Titles beginning with numbers, such as **1812, War of**, are alphabetized as if the numbers were written out (**Eighteen-twelve, War of**).

Alphabetization proceeds according to the "word-by-word" principle. Thus, **Mount Vernon** precedes **mountain**; any **John** entry precedes **John Henry**, which in turn precedes **Johne's disease**. Any character or string of characters preceding a space, hyphen, or dash is treated as a word and alphabetized accordingly. Thus, **De Broglie** precedes **debenture**, and **jack-o'-lantern** precedes **jackal**. Titles with identical spellings are arranged in the following order: (1) persons, (2) places, (3) things.

For many rulers and titled nobility, chronological order, as well as alphabetical order, governs placement. Rulers of the same given name (*e.g.,* William) may be grouped together, separate from other entries, and indicated by the symbol •. They may be subgrouped alphabetically by country and, within each country, arranged chronologically (**William I, William II**, etc.). Nobility or peers of the same titled name (*e.g.,* **Essex,** EARLS OF) are similarly grouped together, separate from other entries; they are indicated by the symbol • and arranged chronologically.

Places with identical names are arranged in the alphabetical order of the countries where they are located. Identical place-names in the same country are alphabetized according to the alphabetical order of the state, province, or other political subdivision where they are found.

Entry arrangement

The titles of entries are arranged according to the forms commonly found in indexes and dictionaries, with some special conventions.

Entry titles for certain physical features, institutions, structures, events, and concepts are ordinarily inverted to place the substantive word first. Thus, the Bay of Bengal is entered as **Bengal, Bay of**; the Bank of England as **England, Bank of**; the Tower of London as **London, Tower of**; the Siege of Vienna as **Vienna, Siege of**; and the balance of power as **power, balance of**. If the name of a physical feature, institution, structure, event, or concept has two or more descriptors, it is entered under the descriptor appearing first. Thus, the Episcopal Church in Scotland is entered as **Episcopal Church in Scotland** (not **Scotland, Episcopal Church in**); the Leaning Tower of Pisa as **Leaning Tower of Pisa**; and the kinetic theory of gases as **kinetic theory of gases**.

The entries for most Western persons are arranged so that one can read a name in correct order by beginning after the first comma, proceeding to the end of the boldface type, returning to the beginning word or words, and proceeding forward to the first comma. Thus, the entry **March, Patrick Dunbar, 2nd Earl of**, is read "Patrick Dunbar, 2nd Earl of March"; the entry **Orléans, Louis, duc d'**, is read "Louis, duc d'Orléans." Names of Far Eastern origin are given in Oriental order, with the surname preceding the personal name (*e.g.,* **Tōjō Hideki, Deng Xiaoping, Nguyen Cao Ky**).

Cross-references

Some cross-reference entries appear in the MICROPAEDIA for the purpose of leading a reader from names that are familiar to alternate names that may not be. Cross-references also appear frequently within or at the ends of standard entries, where they are identified by *see, see also, see under, q.v.* (*quod vide,* "which see"), or *qq.v.* (*quae vide,* "which see," plural).

Certain entries serve both as relatively brief essays on general subjects and as cross-references to the same subjects treated at greater length and in greater depth in the MACROPAEDIA. Such an entry (*e.g.,* **igneous rock**) begins with a definition of the subject and then provides the following cross-reference: "A brief treatment of igneous rocks follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

Entries on certain broad subjects (*e.g.,* **music**) direct the reader to several relevant articles in the MACROPAEDIA and also to the PROPAEDIA for listings of related articles in the MICROPAEDIA.

Abbreviations

Abbreviations used in the MICROPAEDIA are given in a list that appears at the end of every MICROPAEDIA volume.

Territorial boundaries

In articles and maps indicating disputed geopolitical boundaries and territories, the attribution of sovereignty or administrative subordination to any specific area does not imply recognition of the status claimed by an administering power.

Ceará, *estado* ("state") of northeastern Brazil. It is bounded on the north by the Atlantic Ocean, on the east by the Atlantic and the states of Rio Grande do Norte and Paraíba, on the south by the state of Pernambuco, and on the west by the state of Piauí. It covers an area of 57,150 square miles (148,016 square km). The capital, Fortaleza, is the principal cultural, commercial, and seaboard shipping centre. Other principal towns are Juazeiro do Norte, Sobral, Crato, Iguatu, and Crateus. The seaboard, the mountains and mesas, and the backlands are the main topographic regions of the state.

The state lies partly upon the northeastern slope of the great Brazilian Highlands and partly upon the sandy coastal plain. Its surface is a succession of great terraces, facing north and northeast, formed by the erosion of an ancient sandstone plateau; the terraces are seamed by watercourses, and their valleys are broken by hills and ranges of highlands. The sandy coastal plain is nearly bare of vegetation; behind it is an elevated region with sandy soil that is amenable to cultivation and produces fruit, cotton, and many tropical products. The soil of the backlands is thin and porous.

The long dry season turns the backlands into a barren wasteland, or *sertão,* relieved by vegetation only along riverbanks and on mountains; spiny, stunted groves of caatinga, or scrub forest, the trees of which lose all their leaves in the dry season and turn gray, are typical.

Ceará is semiarid, precipitation ranging from 63 inches (1,600 mm) on the seaboard and in the mountains to 16 inches (400 mm) in the backlands. Regardless of the amount, the rainfall is almost wholly concentrated in the three months of March, April, and May, so that there is a long dry period during which all rivers and streams eventually become dry beds. Occasionally the rains may fail altogether, and then severe droughts cause famine, economic disruption, and migrations of rural peoples. Average temperatures year-round range from 79° to 82° F (26° to 28° C) but may peak to 86° or 90° F (30° or 32° C) in the backlands during the dry season, thus aggravating the aridity.

Like other states of northeastern Brazil, Ceará was settled as a "captaincy," or fief, of the Portuguese crown, its economy in the 18th century centring on sugar plantations worked by black slaves. Ceará in 1884 became the first state in Brazil to free all its slaves. As early as the 18th century cattle were introduced to the *sertões,* and in the 19th century long-staple cotton was planted and thrived. Ceará is one of the largest producers of cotton in Brazil. With a few million head of cattle, it has one of the largest herds in northeastern Brazil. Sugarcane, though now less important, is still grown. Other commercial crops include cashew nuts, cassava, carnauba wax, oiticica oil, fruits, and vegetables. Cotton is grown and cattle are raised on the great estates, which support sharecroppers, whereas the large population of smallholders are restricted to a life of subsistence farming.

There are some mineral resources in the state, but prospecting has not proceeded far enough to establish their economic potential. Gypsum, limestone, copper, and manganese are produced in modest quantities.

The cities of Ceará have developed as centres for collecting, processing, and marketing the regional products, particularly cotton. Trade has been accompanied by industrial activity, involving the production of textiles, food, chemicals, and pharmaceuticals. Fortaleza is the site of the Federal University of Ceará (founded 1954). Pop. (1989 est.) 6,356,100.

cease-fire, a total cessation of armed hostilities, regulated by the same general principles as those governing armistice. In contemporary diplomatic usage the term implies that the belligerents are too far apart in their negotiating positions to permit the conclusion of a formal armistice agreement. *See also* armistice.

Ceauşescu, Nicolae (b. Jan. 26, 1918, Scornicești, Rom.—d. Dec. 25, 1989, near Bucharest), Communist official who was leader of Romania from 1965 until he was overthrown and killed in a revolution in 1989.

A prominent member of the Romanian Communist youth movement during the early 1930s, Ceauşescu was imprisoned in 1936 and again in 1940 for his Communist Party activities. In 1939 he married Elena Petrescu (b. Jan. 7, 1919, Oltenia region, Rom.—d. Dec. 25, 1989, near Bucharest), a devout Communist. While in prison Ceauşescu became a protégé of his cell mate, the Communist leader Gheorghe Gheorghiu-Dej, who would become the Communist leader of Romania beginning in 1952. Escaping prison in August 1944 shortly before the Soviet occupation of Romania, Ceauşescu subsequently served as secretary of the Union of Communist Youth (1944–45). After the Communists' full accession to power in Romania in 1947, he first



Ceauşescu
Pictorial Parade—EB Inc.

headed the nation's ministry of agriculture (1948–50), and from 1950 to 1954 he served as deputy minister of the armed forces with the rank of major general. Under Gheorghiu-Dej, Ceauşescu eventually came to occupy the second highest position in the party hierarchy, holding important posts in the Politburo and Secretariat.

With the death of Gheorghiu-Dej in March 1965, Ceauşescu succeeded to the leadership of Romania's Communist Party as first secretary (general secretary from July 1965); and with his assumption of the presidency of the State Council (December 1967), he became head of state as well. He soon won popular support for his independent, nationalistic political course, which openly challenged the dominance of the Soviet Union over Romania. In the 1960s Ceauşescu virtually ended Romania's active participation in the Warsaw Pact military alliance, and he condemned the invasion of Czechoslovakia by Warsaw Pact forces (1968) and the invasion of Afghanistan by the Soviet Union (1979). Ceauşescu was elected to the newly created post of president of Romania in 1974.

While following an independent policy in foreign relations, Ceauşescu adhered ever more closely to the communist orthodoxy of centralized administration at home. His secret police maintained rigid controls over free speech and the media and tolerated no internal dissent or opposition. In an effort to pay off the large foreign debt that his government had accumulated through its mismanaged industrial ventures in the 1970s, Ceauşescu in 1982 ordered the export of much of the country's agricultural and industrial production. The resulting drastic shortages of food, fuel, energy, medicines, and other basic necessities drove Romania from a state of relative economic well-being to near starvation. Ceauşescu also instituted an extensive personality cult and appointed his wife, Elena, and many members of his extended family to high posts in the government and party. Among his grandiose and impractical schemes was a plan to bulldoze thousands of Romania's villages and move their residents into new apartment buildings.

Ceauşescu's regime collapsed after he ordered his security forces to fire on antigovernment demonstrators in the city of Timisoara on Dec. 17, 1989. The demonstrations spread to Bucharest, and on December 22 the Romanian army defected to the demonstrators. That same day Ceauşescu and his wife fled the capital in a helicopter but were captured and taken into custody by the armed forces. On December 25 the couple were hurriedly tried and convicted by a special military tribunal on charges of mass murder and other crimes. Ceauşescu and his wife were then shot by a firing squad.

Ceawlin (d. 593), king of the West Saxons, or Wessex, from 560 to 592, who drove the Britons from most of southern England and carved out a kingdom in the southern Midlands.

Ceawlin helped his father, King Cynric, defeat the Britons at Beranbyrg (Barbury) in 556. In 568, eight years after he assumed the West Saxon kingship, Ceawlin and his brother Cutha severely defeated King Aethelberht I of Kent. Ceawlin's victory over the Britons at Deorham (Dyrham) in 577 led to the capture of Gloucester, Cirencester, and Bath. The valley of the lower Severn River was thereby opened to West Saxon colonists, and the Britons of Wales were cut off from their kinsmen on England's southwestern peninsula.

Nevertheless, a king named Ceol seized at least part of Ceawlin's lands in 591. After being defeated by Ceol at Woddesbeorg (or Wodnesbeorg; now Adam's Grave in Wiltshire) in 592, Ceawlin was driven into exile. He was killed the next year. The 8th-century historian Bede included him in his list of seven successive rulers who were overlords (bretwaldas) of all the lands south of the Humber.

Cebidae, family of agile, forest-dwelling platyrrhine, or New World, monkeys; they range from Mexico in the north to Argentina in the south. The family includes the durukuli, uakari, saki, howling monkey, capuchin monkey, squirrel monkey, spider monkey, woolly monkey, and woolly spider monkey (*qq.v.*).

Cebu, island, central Philippines. It is the centre of Visayan-Cebuano culture and has preserved a strong Spanish tradition in its cultural life. Attracted by the island's focal position, the Portuguese navigator Ferdinand Magellan landed there and converted the ruler and chiefs to Christianity. He later was killed on nearby Mactan Island. There are numerous relics of the event in Cebu City.

The island of Cebu is 122 miles (196 km) long and has an area of 1,707 square miles (4,422 square km); nowhere does it exceed 20 miles (32 km) in width. The surrounding waters are the Visayan Sea (north), Tanon Strait (west), Bohol Strait (southeast), and Camotes Sea (east). Bisected by a range of low volcanic hills, the island has very little level land except for the Bogo Plain in the far north, which is mainly a commercial sugarcane area. There are few harbours, and the settlement pattern is one of numerous small agricultural villages that grow corn (maize), coconuts, yams, agave, and tobacco. Cebu suffers from both overpopulation and soil depletion. There was extensive timber cutting for the building of Spanish galleons on the historic Manila–Acapulco route, and the land was further impaired by the erosive powers of the island's short, rapid rivers and by poor agricultural methods. The Central Cebu National Park (1937), encompassing a triangular area (38,049 acres

[15,394 hectares]) between Balamban, Toledo City, and Cebu City, constitutes the only remaining forest on the island. The island also has a game and bird sanctuary.

Cebu was probably the first Philippine island to cultivate corn on a widespread basis after that plant's introduction by the Spaniards. Coarse-ground corn remains the staple food, though grain is imported from Mindanao, for Cebu is not agriculturally self-sufficient. Cebu's manufacturing industries are limited primarily to food processing. Coal, copper, limestone, gold, and silver are mined in the central hill country of the island. In addition to Cebu City, the major settlements on Cebu are Danao, Lapu-Lapu (formerly Opon), Toledo, and Mandaue. Pop. (1990 prelim.) Cebu and smaller adjacent islands, 2,646,000.

Cebu City, city, Cebu Island, south-central Philippines. Located on Cebu Island's eastern coast, it is protected by offshore Mactan Island and by the inland Cordillera Central. It is one of the nation's largest cities and a bustling port. Its harbour is provided by the sheltered strait between Mactan Island and the coast.

The nation's oldest settlement, it is also one of its most historic and retains much of the flavour of its long Spanish heritage. A thriving port occupied the site when Ferdinand Magellan, the Portuguese navigator, landed there on April 7, 1521. He sealed a blood compact with Humabon, the chief of Cebu, but was killed later by Chief Lapulapu of nearby Mactan Island. On April 27, 1565, Miguel López de Legazpi and the friar Andrés de Urdaneta arrived on Cebu and founded the first Spanish settlement and Catholic mission in the Philippine archipelago. For six years, until Legazpi's removal to Manila, Cebu was the Spanish colonial capital. It remained the primary Spanish bastion in the southern part of the Philippines.

The cultural and commercial core of the central Visayan region, Cebu was opened to foreign trade in 1860. It was chartered as a city in 1936. Although it imports few foreign goods, it is the main collection centre for such interisland commodities as copra, abaca, sugar, timber, and fish. Cebu is a major point of passenger traffic by air and sea and is served by an airport at Lahug and an international airport across the harbour on Mactan Island.

Many Manila-based industrial and commercial firms maintain branches in Cebu City. Warehousing and assembly plants for wholesale trade are important to the economy. Textiles, footwear, processed foods, vegetable oil, furniture, and chemicals are leading products. Other manufactures include cosmetics, candles, pearl and aquamarine jewelry, and *sistas* (guitars and ukuleles), the latter primarily made on Mactan Island. The city is easily accessible from all points on Cebu Island. A coastal railway reaches from Cebu City north to Danao and south to Carcar, and highways cross the nearby Cordillera Central. The city was almost destroyed by the Japanese in May 1942, but the port was left intact. The city was subsequently rebuilt and enlarged. Its layout follows the configuration of the shoreline, with the main business district adjoining the port area. Urban residents are concentrated nearby, and population influx has contributed to a housing shortage. Suburbs are located to the north and south along the coastal plain.

Cebu City is a Roman Catholic archbishopric and is a centre of education. It is the site of five major universities: the University of San Carlos (1595), Cebu Institute of Technology (1946), Southwestern University (1946), University of the Southern Philippines (1927), and University of the Visayas (1919). The ruins of the Spanish Fort San Pedro are near the harbour. Pop. (1990 prelim.) 610,000.

Cebuano, also called CEBUAN, or SUGBUHANON, the largest cultural-linguistic group in the Philippines, numbering about 14,600,000 in the late 20th century. They speak an Austronesian (Malayo-Polynesian) language and are sometimes grouped with the Hiligaynon and Samaran under the generic name of Visayan (Bisayan) peoples. The Cebuano inhabit the islands of Cebu, Siquijor, and Bohol, as well as eastern Negros, western Leyte, southern Masbate, and northern Mindanao.

Most Cebuano follow a traditional way of life, tilling the soil and fishing the seas. The typical Cebuano village consists of bamboo and wooden dwellings of two or three rooms built on pilings and thatched with palm. The diet is mainly rice and fish, with some vegetables and fruits. In Cebu and eastern Negros, however, ground cornmeal replaces rice as the staple cereal. Social life centres on baptisms, marriages, funerals, school programs, annual fiestas, and the Roman Catholic religious calendar. The major Cebuano urban centre is Cebu City, situated in the most densely populated island of the Philippines, Cebu.

Cebuano language, also spelled SEBUANO, also called SUGBUHANON, member of the Western, or Indonesian, branch of the Austronesian (Malayo-Polynesian) language family. It was spoken in the late 20th century by as many as 14,600,000 persons in the Philippines (speakers are spread over eastern Negros, Cebu, Bohol, western Leyte, the Camotes Islands, and the northern and western coasts of Mindanao). Cebuano is closely related to the Hiligaynon (Ilongo) and Waray languages, with which it is sometimes grouped as dialects of a Visayan (Bisayan) language.

Native Cebuano speakers constitute about one-fourth of the population of the Philippines and as such comprise the largest linguistic and cultural group in the country. Despite its spoken frequency, Cebuano is little used as a literary language, although newspapers and films both use the language.

Cech, Thomas Robert (b. Dec. 8, 1947, Chicago, Ill., U.S.), American biochemist and molecular biologist who, with Sidney Altman, was awarded the 1989 Nobel Prize for Chemistry.

Cech attended Grinnell College in Grinnell, Iowa (B.A., 1970), and the University of California at Berkeley (Ph.D., 1975, in chemistry). After serving as a National Cancer Institute fellow at the Massachusetts Institute of Technology (1975–77), he joined the Department of Chemistry at the University of Colorado in 1978, becoming a full professor in 1983. Concurrently he was an investigator for the National Institutes of Health from 1978 and for the Howard Hughes Medical Institute from 1988.

Cech and Altman received a Nobel Prize for their independent discoveries that RNA, traditionally considered to be only a passive messenger of genetic information, can also take on an enzymatic role in which it catalyzes, or facilitates, intracellular chemical reactions essential to life. Before their discoveries, enzymatic activity had been attributed exclusively to proteins. Cech was the first person to show that an RNA molecule could catalyze a chemical reaction, and he published his findings in 1982. Altman, whose earlier research had pointed strongly to such a conclusion, conclusively demonstrated such enzymatic activity by an RNA molecule in 1983.

Cecchetti, Enrico (b. June 21, 1850, Rome, Papal States [Italy]—d. Nov. 13, 1928, Milan), Italian ballet dancer and teacher noted for his method of instruction and for his part in training many distinguished artists.

Both of Cecchetti's parents were dancers, and he was born in a dressing room at the Tordinona Theatre in Rome. A pupil of Giovanni Lepri, who had studied under Carlo Blasis, Cecchetti developed a brilliant technique and was noted for his pirouettes. Popular throughout Europe, he appeared with great success at La Scala in Milan and in London. In 1887 he went to the Mariinsky Theatre, St. Petersburg (now the Kirov State Academic Theatre of Opera and Ballet), where he created the roles of the Bluebird and Carabosse in Peter Ilich Tchaikovsky's *Sleeping Beauty.*

Between 1890 and 1902 he taught many dancers of the Imperial Russian Ballet and its associated school, including Olga Preobrajenska, Tamara Karsavina, and Vaslav Nijinsky. From 1910 to 1918 Cecchetti was the official instructor of Sergey Diaghilev's Ballets Russes but left in 1913 to tour with his world-famous private pupil, Anna Pavlova. In 1918 he and his wife, the dancer Giuseppina de Maria, opened a school in London, where Alicia Markova and Serge Lifar were among his pupils. From 1925 he directed the ballet



Cecchetti
Dance News

school at La Scala; he continued to teach until the day before he died.

The Cecchetti method of ballet training prescribes a strict exercise routine using the five positions and seven basic movements of classical ballet. It is widely used both in England, where the Cecchetti Society (now incorporated in the Imperial Society of Teachers of Dancing) was founded in 1922, and in the United States, where the Cecchetti Council of America was established in 1939.

Cecil FAMILY, originally also spelled SITSILT, SYSSELL, or SEISILL, one of England's most famous and politically influential families, represented by two branches, holding respectively the marquessates of Exeter and Salisbury, both descended from William Cecil, Lord Burghley, Elizabeth I's lord treasurer. Burghley's elder son, Thomas, was created Earl of Exeter, and his descendant the 10th Earl was made a marquess in 1801. This line has remained seated at Burghley House in Northamptonshire, the great mansion built by Lord Burghley. Burghley's second son, Robert, created Earl of Salisbury in 1605, built a new house at Hatfield, the seat of his descendants the earls (later marquesses) of Salisbury, who in the 19th and 20th centuries were prominently connected with the British Conservative Party.

Cecil, Lord David, in full LORD EDWARD CHRISTIAN DAVID GASCOYNE CECIL (b. April 9, 1902, London, Eng.—d. Jan. 1, 1986, Cranborne, Dorset), English biographer, literary critic, and educator, best known for his discerning, sympathetic, and elegantly written studies of many literary figures.

Lord Cecil was the younger son of the 4th marquess of Salisbury. Educated at Oxford, he was a fellow of Wadham College (1924–30) and of New College (1939–69). He served as Goldsmiths' professor of English literature at Oxford University from 1948 to 1969.

Among his subjects for biography were the poet William Cowper (*The Stricken Deer,* 1929), *Jane Austen* (1935), Lord Melbourne (*The Young Melbourne,* 1939), *Hardy, the*

Novelist (1943), the 17th-century letter writer Dorothy Osborne, the poet Thomas Gray (*Two Quiet Lives*, 1948), and the writer and caricaturist Sir Max Beerbohm (*Max*, 1964). *Library Looking-glass* (1975) was a personal anthology, tracing his intellectual history.

Cecil, Robert: *see* Salisbury, Robert Cecil, 1st earl of; Salisbury, Robert (Arthur Talbot Gascoyne-)Cecil, 3rd marquess of.

Cecil, Robert (Arthur Talbot Gascoyne-): *see* Salisbury, Robert (Arthur Talbot Gascoyne-)Cecil, 3rd marquess of.

Cecil, Lord Robert: *see* Cecil of Chelwood, (Edgar Algernon) Robert Gascoyne-Cecil, 1st Viscount.

Cecil (of Essendine), Robert Cecil, Baron: *see* Salisbury, Robert Cecil, 1st earl of.

Cecil (of Chelwood), (Edgar Algernon) Robert Gascoyne-Cecil, 1st Viscount, also called (until 1923) LORD ROBERT CECIL (b. Sept. 14, 1864, London—d. Nov. 24, 1958, Tunbridge Wells, Kent, Eng.), British statesman and winner of the Nobel Peace Prize in 1937, one of the principal draftsmen of the League of Nations Covenant in 1919 and one of the most loyal workers for the League until its supersession by the United Nations in 1945.

The third son of the 3rd marquess of Salisbury, who three times was British prime minister, Lord Robert, during World War I, was successively under secretary of state for foreign affairs, minister of blockade, and assistant secretary of state for foreign affairs. As early as 1916 he began to draw up an international peace-keeping agreement, and in 1919, when he was sent to the peace conference in Paris, his ideas proved generally compatible with



Cecil, detail of an oil painting by John Mansbridge; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

those of United States Pres. Woodrow Wilson and South African Field Marshal Jan Christian Smuts, the other prominent advocates of the League. Like Smuts, Lord Robert believed in a world order determined by the white nations; he successfully opposed a provision for absolute racial equality among League member states.

As the principal British delegate to the disarmament conference at Geneva (1926–27), Cecil disagreed with the instructions given him and resigned from Prime Minister Stanley Baldwin's government. During the 1930s he unsuccessfully argued for League measures against aggression by Japan in Manchuria and by Italy in Ethiopia. He was one of the few in Parliament to vote against concessions made to Nazi Germany at Munich in 1938.

Cecil, William, 1ST BARON BURGHLEY, Burghley also spelled BURLEIGH, also called (1551–71) SIR WILLIAM CECIL (b. Sept. 13, 1520, Bourne, Lincolnshire, Eng.—d. Aug. 5, 1598, London), principal adviser to England's Queen Elizabeth I through most of her reign. Cecil was a master of Renaissance statecraft, whose talents as a diplomat, politician, and



William Cecil, oil painting attributed to M. Gheeraerts; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

administrator won him high office and a peerage.

Life. By service to the Tudors and marriage to local heiresses Cecil's father and grandfather acquired wealth, office, and the status of gentry. In childhood William served as a page of the robes at court, where his father was a groom of the wardrobe. In 1535 he entered St. John's College, Cambridge, where he studied classics under the versatile humanist John Cheke and came under Protestant influence. At the age of 20 he fell in love with Cheke's sister, Mary. They were married in 1541, but she died in 1543, leaving him a son, Thomas.

In 1542, for defending royal policy, William was rewarded by Henry VIII with a place in the Court of Common Pleas. A year later he first entered Parliament. Through his second marriage, to the learned and pious Mildred Cooke in 1545, he joined an influential Protestant circle at court; it included his father-in-law, Sir Anthony Cooke, his former brother-in-law, John Cheke, the future protector, Edward Seymour (Lord Hertford and duke of Somerset), and the queen consort Catherine Parr, for whom Cecil edited a devotional tract. When Edward VI succeeded, Cecil joined the protector Somerset's household and in 1548 became his secretary. On Somerset's first fall from power, in 1549, Cecil was briefly imprisoned in the Tower of London. By acting as go-between for Somerset and his rival, John Dudley, earl of Warwick, Cecil regained favour and became in 1550 a councillor and one of the two secretaries to the King, alongside William Petre. After Somerset's final fall, in 1551, Cecil was knighted by the victorious Warwick, who assumed the dukedom of Northumberland. Cecil was committed to Northumberland; but, when the Duke proposed to alter the succession, Cecil, though fearing for his life and contemplating flight, sided with the judges in opposition. He capitulated to Northumberland only on royal command. Ever loyal to the Tudors, Cecil deserted Northumberland after Edward VI's death. He approached the triumphant Mary Tudor as representative of the council, winning her approval as "a very honest man."

As junior secretary, Cecil had had little scope under Edward VI. He shared neither the social idealism nor the iconoclastic urge of the more extreme reformists at court. He did share in the spoils of a corrupt government; but he established himself as an able bureaucrat, a moderate with a sense of legal propriety, and, like his ally the archbishop of Canterbury Thomas Cranmer, a gradualist in religious reform. Yet, although offered employment on Mary's accession, he, unlike most of his colleagues, withdrew from the Catholic court. On Elizabeth's accession, in 1558, Cecil was appointed her sole secretary. His first major diplomatic achievement was to persuade a reluctant queen to intervene in Scotland and conclude the Treaty of Edinburgh (1560), which removed French forces from Scotland. His gift for compromise facilitated the church settlement in 1559; his financial sense, the recoinage in 1561. Elizabeth's flirtation with John Dudley's son Robert, however, weakened Cecil's position. Despite threats of resignation and opposition to Robert Dudley, Cecil retained Elizabeth's trust and was rewarded with the lucrative mastership of the Court of Wards in 1561.

Decision on the succession was necessary to settle policies. While Cecil intrigued to thwart Dudley, he sympathized with Protestant efforts in Parliament to make Elizabeth marry. He resisted Mary Stuart's claims to succeed but recommended the Habsburg suitor, the archduke Charles. Dudley, capturing the initiative, backed an ill-fated expedition to France to aid the Huguenots, which ended in the Treaty of Troyes, became a councillor, and in 1564 became earl of Leicester. On the defensive, Cecil restored the balance by introducing Thomas Howard, 4th duke of Norfolk, into the council. But the consequences of Mary Stuart's marriage to Lord Darnley in 1565 worked to Cecil's disadvantage; Cecil's hopes of drawing England and Scotland together were threatened.

Mary Stuart's flight to England in 1568 embarrassed Cecil; although it opened diplomatic opportunities in Scotland, it led to Norfolk's plan to marry the widowed queen of Scots. Norfolk opposed Cecil over Mary's fate, over secret aid to the Huguenots, and over policy toward Spain. Resenting the threat of the Duke of Alba's Spanish army in the Netherlands, Cecil nearly precipitated war in December 1568 by instigating the seizure of ships carrying bullion to Alba, who retaliated by closing Antwerp to English trade. Leicester joined Norfolk, and they prepared to oust Cecil; but they faltered before the Queen's support for her secretary.

His challengers defeated, Cecil was created a peer, 1st Baron Burghley, in 1571, and in 1572 he became a knight of the Garter and lord treasurer; he now shared royal favour on equal terms with Leicester. Meanwhile, the papal bull of 1570, deposing Elizabeth, confirmed Cecil in his defense of the Elizabethan church, in which he cooperated with his nominee, Archbishop Matthew Parker. The intrigue called the Ridolfi Plot, a planned Spanish invasion of England to put Mary Stuart on the throne, led to Norfolk's execution in 1572 and discredited Mary Stuart and the pro-Spanish interest. Burghley's rebuff to Spain was underlined by the Treaty of Blois with France in 1572. Neither French influence in the Netherlands nor the St. Bartholomew's Day Massacre (1572) deterred Burghley from the French alliance; but he also soothed Spain, and the embargo on trade with Antwerp was lifted. In Scotland he settled the regency; but he failed to persuade the Scots to try to depose their queen, who remained a focus of Catholic intrigue in her English prison.

In the 1570s Leicester, supported by Francis Walsingham, who became a secretary in 1573, courted Puritan support; agitated for aid to William of Orange, Protestant leader of the rebels in the Netherlands; and favoured negotiations with France. Burghley, restraining the French and trying to avoid open commitment to the rebels, pursued a policy that, in advocating nominal Spanish suzerainty over a Netherlands enjoying its traditional liberties, ignored Philip II's obvious intentions. Failing

to gain a settlement in 1576, Burghley finally joined Leicester in urging Elizabeth to act on behalf of Orange. Rather than fight openly, Elizabeth tried to utilize French influence in the Netherlands by marriage negotiations with the Duke of Anjou. Burghley accepted royal policy, but Puritan opposition prevented a definite conclusion to the Anjou affair.

Although his hopes for moderate reform collapsed when his chosen archbishop, Edmund Grindal, was made powerless following a quarrel with the Queen, Burghley could not afford to weaken the Puritan militants against aggressive Catholicism. A Jesuit mission and papal intervention in Ireland in 1580 roused Burghley to anti-Catholic action and to alarm over the intentions of Catholic Spain. The assassination of William of Orange in 1584 and the knowledge of a planned French landing at Arundel led Burghley to take measures to protect the Queen's life and to incline toward war against Spain. His hesitation over the costs of war and the peace feelers he extended to Alessandro Farnese, the 3rd duke of Parma, the Spanish commander in the Netherlands, created ill will with Leicester. But by 1585 Burghley supported Leicester's expedition to the Netherlands and Sir Francis Drake's voyage to the Caribbean. In 1586, on Walsingham's revelation of the Babington plot—a plan by Anthony Babington, once page to Mary Stuart, to assassinate Elizabeth—Burghley pressed to ensure the trial of Mary Stuart and her execution in 1587. His initiative put him in brief disgrace with the diplomatically outraged Elizabeth. Under the growing threat of the Spanish Armada in 1587, Burghley parleyed with Parma, courted Henry of Navarre and James VI of Scotland, and kept a sharp eye on the Irish and English Catholics. His diplomatic, military, naval, and financial preparations proved just adequate in 1588 to defeat the Armada. He exploited victory with propaganda, and his fame as principal councillor of Elizabeth spread through Europe.

After the failure of the Armada, Leicester died (1588), but Burghley survived to preside over the politics of a new generation. He coached his son Robert, born in 1563, for the secretaryship, which he obtained for him in 1596; Robert had taken over its responsibilities after Walsingham's death in 1590. Despite ill health, Burghley remained active, performing his official duties, writing memorandums, and dealing with suits. But he devised no new policies to check declining prosperity. Instead, he intensified a program of retrenchment and pressed the Commons for grants. In foreign affairs he supported campaigns waged against Spain in France and the Netherlands and naval expeditions by Drake and Essex. But finally he urged peace with Spain, fearing a Franco-Spanish settlement and the strain of prolonged war. He died before the negotiations were concluded.

Assessment. As a statesman Burghley saw that his duty was to give the Queen his best advice and then to carry out whatever policy seemed expedient to her. His loyalty in this task won Elizabeth's confidence. A master of discretion, Burghley as a royal servant assumed an official mask and learned "to walk invisible." His contribution to policy-making was his intuitive appreciation of the national interest, which he strove to convey to the Queen. The inspiration of the "common cause" of European Protestantism did not lead him to subordinate insular national interests; he reduced the ideological ends of international Protestantism to the more practical aims of secular patriotism. Preferring diplomacy to war on practical grounds, he exploited informal contacts, rebels, and factions among foreign enemies. In economic affairs he tried to maintain England's security by conventional statecraft. In agriculture and industry he encouraged self-sufficiency; in commerce, those trades that amassed bullion. His pragmatism as an administrator usually overcame any tendency as an intellectual and lawyer to indulge in balanced appreciations and legalistic argument rather than in action. His removal of Mary Stuart, the Catholic pretender, secured the Protestant succession, and his preparations enabled England to survive the Armada. But he failed to induce Elizabeth to marry or to reform her church; and his policy over the Netherlands was unrealistic and in the end led to open conflict with Spain. Often Burghley was frustrated by the equivocations of the Queen, but he came to accept her good fortune as the care of Providence for Protestant England.

Burghley's recommendation was his diligence and competence in handling the administration. No eager innovator, he fought corruption and made the existing system work. His patronage in church and state enabled him to harness the clergy, the gentry, and the nobility to the tasks of administration. His attendance in council and Parliament was constant, and he understood how to manage both. He directed censorship, propaganda, and an intelligence network at home and abroad.

As lord treasurer he maintained solvency until the overwhelming war expenditure of the late 1580s. Convinced of the damaging political and constitutional effects of heavy taxation on the Queen's relations with her people and on Parliament, he pursued retrenchment and economy rather than expansion of revenues. Through financial control of the royal household and of the military and naval establishments, he increased their efficiency. In the conciliar and departmental courts he gained a reputation for probity as a judge. His handling of royal finance and justice was scrupulous. His personal fortune derived from the unofficial opportunities for profit that attached to office in the 16th century; but in exploiting fees and gifts Burghley was careful not to go beyond the limits of contemporary public morality. He presided over one of the least oppressive and most efficient administrations in 16th-century Europe.

As chancellor of the University of Cambridge from 1559, he influenced discipline rather than the curriculum, but he made his household a resort of scholars and an educational centre for the Queen's wards and the young aristocracy. His intellectual interests, like his italic handwriting, were formed in the advanced humanist circle of John Cheke. His artistic eclecticism, developed under Somerset and Northumberland, was revealed in his personal planning for his three houses—Burghley House at Stamford, Cecil House in the Strand, and Theobalds in Hertfordshire; their decoration, furnishings, collections of pictures, coins, and "things of workmanship," and their gardens, supervised by the botanist John Gerard, won universal admiration. Burghley made a creative contribution to the Elizabethan architectural achievement.

Burghley has always been a controversial figure. The hostility of his Catholic victims, foreign ambassadors, disappointed suitors, and rivals started a critical tradition that was perpetuated by Catholic historians. The favourable treatment of Lord Burghley by Protestant historians was begun by Francis Bacon and William Camden. Inevitably, religious partisanship affected Burghley's reputation as a statesman and as a man. The estimates of his responsibility for policy have depended on the roles in government assigned by historians to the Queen and to his colleagues. The assessments of his professional competence have emerged from studies of Elizabethan administration, finance, faction politics, and diplomacy. The lineaments of Burghley's public role and of his characteristics as a man of his time are becoming clearer, but the depths of his individuality remain difficult to probe.

(B.W.B./Ed.)

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Cecilia, SAINT, Cecilia also spelled CECILY (fl. 2nd or 3rd century, Rome; feast day November 22), patroness of music, one of the most famous Roman martyrs of the early church, and historically one of the most discussed. According to a late 5th-century legend, she was a noble Roman who had vowed her virginity to God as a child. When she was married against her will to the future St. Valerian, then a pagan, she told him that an angel of God wished her to remain a virgin. He promised to respect this wish if he were allowed to see the angel. She replied that he would if he were baptized. On his return from Baptism he found Cecilia talking to the angel. She then converted his brother Tiburtius, who also saw the angel. Both men were martyred before she was. She distributed her possessions to the poor, which enraged the prefect Almachius, who ordered her to be burned. When the flames did not harm her, she was beheaded. Cecilia was buried in the catacomb of St. Callistus, near Rome. At the beginning of the 9th century, Pope St. Paschal I discovered her relics in the catacomb of St. Praetextatus and had them moved to Rome. She became the patron saint of musicians and music and is often represented in art playing the organ.

Cecrops, traditionally the first king of Attica in ancient Greece. He was said to have instituted the laws of marriage and property and a new form of worship. The introduction of bloodless sacrifice, the burial of the dead, and the invention of writing were also attributed to him. He acted as arbiter during the dispute between the deities Athena and Poseidon for the possession of Attica. As one of the aborigines of Attica, Cecrops was represented as human in the upper part of his body, while the lower part was shaped like a snake.

cecum, also spelled CAECUM, pouch or large tubelike structure in the lower abdominal cavity that receives undigested food material from the small intestine and is considered the first region of the large intestine. It is separated from the ileum (the final portion of the small intestine) by the ileocecal valve (also called Bauhin's valve), which limits the rate of food passage into the cecum and may help prevent material from returning to the small intestine.

In humans, the cecum's main functions are to absorb fluids and salts that remain after completion of intestinal digestion and absorption and to mix its contents with a lubricating substance, mucus. The cecum's internal wall is composed of a thick mucous membrane through which water and salts are absorbed. Beneath this lining is a deep layer of muscle tissue that produces churning and kneading motions.

The structure and function of the cecum varies in other animals. Vertebrates such as rabbits and horses, which live on a diet composed only of plant life, have a larger cecum

that is an important organ of absorption and contains bacteria that help digest cellulose. Animals that eat only meat have a reduced or absent cecum. In cats and dogs, muscle contractions of the cecum are much more vigorous and are reversible. Materials already passed to the next region of the large intestine can be brought back to the cecum for mixing with new food substances. *See also* appendix.

cedar, any of four species of ornamental and timber evergreen conifers of the genus *Cedrus* (family Pinaceae), three native to mountainous areas of the Mediterranean region and one to the western Himalayas. Many other coniferous trees known as "cedars" resemble true cedars in being evergreen and in having aromatic, often red or red-tinged wood that in many cases is decay-resistant and insect-repellent. The giant arborvitae, incense cedar, and some junipers (*viz.*, red cedar; *q.v.*) provide the familiar "cedarwood" of pencils, chests, closet linings, and fence posts; an oil distilled from the wood is used in many toiletries.

The Atlas cedar (*C. atlantica*), the Cyprus cedar (*C. brevifolia*), the deodar (*C. deodara*), and the cedar of Lebanon (*C. libani*) are the true cedars. They are tall trees with large trunks and massive, irregular heads of spreading branches. Young trees are covered with smooth, dark-gray bark that becomes brown, fissured, and scaly with age. The needlelike, three-sided, rigid leaves are scattered along the long shoots and clustered in dense tufts at the ends of short spurs. Each leaf bears two resin canals and remains on the tree three to six years. The large, barrel-shaped, resinous female cones, greenish or purplish, are borne on short stalks; they are covered by broad, thin, closely overlapping woody scales, each with a clawlike projection.

Cedarwood is light, soft, resinous, and durable, even when in contact with soil or moisture. It is an important structural timber in native regions but is infrequently used elsewhere. Distillation of the wood releases an aromatic oil. Many varieties of the Atlas cedar and the deodar are popular ornamentals in North America, especially along the Pacific and Gulf coasts.

Distinctions between the four species of true cedar are often difficult to define. Interbreeding occurs, and some authorities consider the four to be geographical variants of one species, usually the cedar of Lebanon.





Cedar of Lebanon (*Cedrus libani*) showing (top) form and (bottom) leaves and cone

G.E. Hyde from the Natural History Photographic Agency—EB Inc.

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cedar-apple rust, common disease in North America of red cedar (*Juniperus virginiana*), related *Juniperus* species, apple, and crab apple, caused by the fungus *Gymnosporangium juniperi-virginianae*. Both hosts, the junipers and the apples, are required for completion of the rust life cycle. Greenish-brown to chocolate-brown galls (cedar apples) that are round to kidney-shaped and up to two inches (5 centimetres) in diameter form on red cedar and other juniper twigs. In rainy spring weather, the galls are covered with jellylike, yellow to orange-brown spore horns up to two inches long. A single gall may produce several billion spores (basidiospores or sporidia). The windborne spores infect young leaves and fruits of apple and crab apple. Pale yellow to orange-yellow spots that develop sticky centres and minute, black fruiting bodies (pycnia) form on the leaves and usually near the calyx end of fruit. Orange, tubelike structures (aecia) later develop on the undersides of leaves and on fruits, which drop early. Spores produced in the aecia (aeciospores) are wind-borne in late summer to junipers on which leaf infections occur. Galls do not produce spores until the second spring, completing the two-year life cycle.



Cedar-apple rust

John H. Gerard

Control is by eradication of either host or by timely application of a fungicide, in spring for junipers and in summer for apples.

Cedar Breaks National Monument, national monument consisting of a vast natural amphitheatre (10 sq mi [26 sq km]) eroded in a limestone escarpment (Pink Cliffs) 2,000 ft (600 m) thick, in southwestern Utah, U.S., 15 mi (24 km) southeast of Cedar City. Once a part of Sevier (now Dixie) National Forest, it was established in 1933. It is situated on the Markagunt Plateau at elevations reaching 10,700 ft. Iron and manganese oxide impurities in the limestone cliff formations produce an amazing variety of colours that change constantly with the angles of the Sun's rays. When the spring snows melt, many colourful flowers (including the marsh marigold, buttercup, larkspur, gentian, lupine, and sunflower) appear on the slopes and meadows. Wildlife includes mule deer, chipmunks, squirrels, badgers, and a variety of birds.

Cedar City, city, Iron county, southwestern Utah, U.S., on the scarp of the Hurricane Fault, 5,800 ft (1,768 m) above sea level. Founded in 1851, following the discovery of iron ore, it was named for the abundance of cedar trees in the locality. Part of an earlier Mormon colony then moved from Parowan (17 mi [27 km] northeast) to Cedar City. Completion in 1923 of a branch line of the Union Pacific Railroad from Lund stimulated development of the community. The economy is based on tourism, mining, farming, and livestock raising. The city's Iron Mission State Historical Monument is the site of the first blast furnace west of the Mississippi. Cedar City is the headquarters for the nearby Dixie National Forest. Also nearby are Cedar Breaks National Monument and Bryce Canyon and Zion national parks (*qq.v.*).

Southern Utah State College (established 1897) is the site of the summer Utah Shakespearean Festival. The Palmer Memorial Museum contains Paiute Indian relics. Inc. 1868. Pop. (1990) 13,443.

Cedar Falls, city, Black Hawk county, east central Iowa, U.S., on the Cedar River, adjacent to Waterloo (east). Settled in 1845 by William Sturgis and laid out in 1853, it was named for the cedar trees along the river. It boomed as a shipping point for grain, livestock, and lumber and served as the county seat from 1852 to 1855. Now primarily residential, it has some light manufactures, including rotary pumps and farm equipment. It is the home of the University of Northern Iowa (founded as the Iowa State Normal School in 1876). Inc. 1857. Pop. (1990) city, 34,298; Waterloo–Cedar Falls MSA, 146,611.

Cedar Rapids, city, seat (1833) of Linn county, east central Iowa, U.S., astride the Cedar River, in the middle of the Corn Belt, adjoining the city of Marion (northeast), 112 mi (180 km) north-northeast of Des Moines. The east bank, settled in the 1830s and surveyed in 1841, was called Rapids City for the rapids that supplied abundant waterpower. It was renamed when incorporated as a town in 1849. With the advent of the railroads in 1859, it developed as a grain and livestock market. Kingston (on the west bank) was annexed in 1870, and Kenwood Park in 1926. The economy, now well diversified, represents in particular farming and related industries (cereals, packaged meats, farm implements, stock feeds, and milk-processing machinery); the manufacture of electronic equipment is also important. May's Island in the river's main channel is the hub of the city's civic plan. The large Quaker Oats plant is a riverside landmark. The Bohemian culture of early immigrants still marks the city's urban life. Cedar Rapids is the home of Coe College (1851), Mt. Mercy College (1928), and Kirkwood Community College (1966). The city's Masonic Library and Grand Lodge Office



Civic building on May's Island, Cedar Rapids, Iowa

Milt and Joan Mann from CameraMann

Building houses one of the largest collections of Masonic material in the world. Inc. city, 1856. Pop. (1990) city, 108,751; Cedar Rapids MSA, 168,767.

Cedar River, nonnavigable stream in the north-central United States, flowing from southeastern Minnesota southeasterly across Iowa and joining the Iowa River about 20 miles (32 km) from the Mississippi River. Over the river's 329-mile (529-kilometre) course, it descends 740 feet (226 m). The Cedar River's 7,819-square-mile (20,251-square-kilometre) drainage basin is mostly fertile farmland. There are several small hydroelectric dams on the river.

The river passes through Austin, Minn., and Charles City, Cedar Falls, Waterloo, and Cedar Rapids, Iowa. Its principal tributaries are the Little Cedar and the Shell Rock rivers. The river is named for the stands of red cedar along its lower course.

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Ceduna, town and port, west-central South Australia. It lies on Denial Bay along the Great Australian Bight, 340 miles (550 km) northwest of Adelaide. It was founded in 1896. Its name is of Aboriginal derivation and means "resting place," referring to a nearby waterhole. It is situated on the Eyre Highway east of the Nullarbor Plain, has a rail link to Port Lincoln, and specializes in the catching and packing of fish. Nearby is the Isles of St. Francis Conservation Park, home for a variety of fauna, including the rare Cape Barren goose. Pop. (1986) 2,877.

Cefalù, town and episcopal see, Palermo *provincia,* northern Sicily, Italy. It lies at the foot of a 1,233-foot (376-metre) promontory along the Tyrrhenian Sea, east of Palermo city. It originated as the ancient Cephalaedium, which was probably founded as an outpost of the Greek city of Himera and first appeared in history about 395 BC as an ally of the Carthaginian leader Himilco. Valued for its strategic position on the height of the promontory, the ancient town was in turn conquered by the Syracusan tyrants Dionysius I the Elder and Agathocles and by the Carthaginians, from whom the Romans seized it in 254 BC. A new town was founded at the foot of the promontory by the Norman king Roger II in AD 1131, the year in which Cefalù's famous cathedral was begun. The exterior of the cathedral is well preserved, with massive four-story towers on each side of the facade. The cathedral's interior was considerably restored in the 16th and 17th centuries. The Byzantine-style mosaics in the apse and in the first spaces between the arches of the choir (1148) are among the most beautiful in Sicily. Among ancient remains in the area are included the so-called temple of Diana, a pre-Hellenic sanctuary of megalithic construction (9th or 8th century BC) on the promontory site of the ancient city, and portions of a megalithic wall dating from the 6th century BC. The Mandralisca Museum contains archaeological and art collections.



Norman cathedral, Cefalù, Sicily
SCALA—Art Resource

A port and road and rail junction, Cefalù is a tourist centre. Grapes, olives, and citrus fruits are cultivated. Fishing is important, and there is a canning industry. Pop. (1991 prelim.) mun., 13,791.

Cegled, also spelled CZEGLÉD, town, Pest *megye* (county), central Hungary. It is a characteristic peasant community of the Great Alfold, or Great Hungarian Plain. The town is a long-established agricultural marketplace for a wide area to the south in which vegetables, fruit, poultry, and livestock are raised for the markets of Budapest, 45 miles (72 km) northwest. Two famous historical speeches were delivered in the market square—one by a Hungarian revolutionary leader, György Dózsa, in 1514 and the second by Lajos Kossuth in 1848. At Cegled the main railway line from Budapest divides, one branch running south to Szeged and the other east to Szolnok, Debrecen, and Romania. The principal road from Budapest through eastern Hungary also passes through Cegled. Pop. (1991 est.) 37,013.

Ceglie Messapico, town, Brindisi *provincia,* Puglia (Apulia) *regione,* southern Italy, northeast of Taranto. It is an agricultural-trading centre and has a medieval castle with cylindrical towers. In the surrounding area are numerous *trulli* (one-room houses built from local limestone, without the use of mortar, and topped by conical roofs). Pop. (1991 prelim.) mun., 20,699.

ceiba (fibre): *see* kapok.

ceiling, the overhead surface or surfaces covering a room, and the underside of a floor or a roof. Ceilings are often used to hide floor and roof construction. They have been favourite places for decoration from the earliest times: either by painting the flat surface, by emphasizing the structural members of roof or floor, or by treating it as a field for an overall pattern of relief.

Little is known of ancient Greek ceilings, but Roman ceilings were rich with relief and painting, as is evidenced by the vault soffits of Pompeian baths. During the Gothic period, the general tendency to use structural elements decoratively led to the development of the beamed ceiling, in which large cross-girders support smaller floor beams at right angles to them, beams and girders being richly chamfered and molded and often painted in bright colours.

In the Renaissance, ceiling design was developed to its highest pitch of originality and variety. Three types were elaborated. The first was the coffered ceiling, in the complex design of which the Italian Renaissance architects far outdid their Roman prototypes. Circular, square, octagonal, and L-shaped coffers abounded, with their edges richly carved and the field of each coffer decorated with a rosette. The second type consisted of ceilings wholly or partially vaulted, often with arched intersections, with painted bands emphasizing the architectural design and with pictures filling the remainder of the space. The loggia of the Farnesina villa in Rome, decorated by Raphael and Giulio Romano, is a good example of this. In the Baroque period, fantastic figures in heavy relief, scrolls, cartouches, and garlands were also used to decorate ceilings of this type. The Pitti Palace in Florence and many French ceilings in the Louis XIV style illustrate this. In the third type, which was particularly characteristic of Venice, the ceiling became one large framed picture, as in the Doges' Palace.

In modern architecture ceilings may be divided into two major classes—the suspended (or hung) ceiling and the exposed ceiling. With ceilings hung at some distance below the structural members, some architects have sought to conceal great amounts of mechanical and electrical equipment, such as electrical conduits, air-conditioning ducts, water pipes, sewage lines, and lighting fixtures. Most suspended ceilings use a lightweight metal grid suspended from the structure by wires or rods to support plasterboard sheets or acoustical tiles. Other architects, emphasizing the aesthetic of the exposed structural system, delight in revealing the mechanical and electrical equipment. In response to this desire, many structural systems have been developed that have an expressive power in themselves and make admirable ceilings—*e.g.,* Frank Lloyd Wright's Johnson Wax offices in Racine, Wis., and Pier Luigi Nervi's Exposition Hall in Turin, Italy.

ceilometer, device for measuring the height of cloud bases. One important use of the ceilometer is to determine cloud ceilings at airports. The device works day or night by shining an intense beam of light (often ultraviolet), modulated at an audio frequency, at overhead clouds. Reflections of this light from the base of the clouds are detected by a photocell in the receiver of the ceilometer.

There are two basic types of ceilometers: the scanning receiver and the rotating transmitter. The scanning-receiver ceilometer has its separate light transmitter fixed to direct its beam vertically. The receiver is stationed a known distance away. The parabolic collector of the receiver continuously scans up and down the vertical beam, searching for the point where the light intersects a cloud base. When a reflection is detected, the ceilometer measures the vertical angle to the spot; a simple trigonometric calculation then yields the height of the cloud ceiling.

The rotating-transmitter ceilometer has its separate receiver fixed to direct reflections only from directly overhead while the transmitter sweeps the sky. When the modulated beam intersects a cloud base directly over the receiver, light is reflected downward and detected.

Ceiriog (Welsh lyricist): *see* Hughes, John Ceiriog.

Ceiriog, Eos (Welsh poet): *see* Morus, Huw.

Cela, Camilo José, in full CAMILO JOSÉ CELA TRULOCK (b. May 11, 1916, Iria Flavia, Spain), Spanish writer who won the Nobel Prize for Literature in 1989. He is perhaps best known for his novel *La familia de Pascual Duarte* (1942; *The Family of Pascual Duarte*) and is considered to have given new life to Spanish literature. His literary production—primarily novels, short narratives, and travel diaries—is characterized by experimentation and innovation in form and content. Cela is also credited by some critics with having established the narrative style known as *tremendismo,* a tendency to emphasize violence and grotesque imagery.

Cela attended the University of Madrid before and after the Spanish Civil War (1936–39), during which he served with Franco's army. His first novel, *Pascual Duarte,* established his European reputation. Traditional in form, it was a both a popular and critical success. His second novel, *La colmena* (1951; *The Hive*), with its fragmented chronology and large cast of characters, is an innovative and perceptive story of postwar Madrid. It solidified Cela's critical and popular reputa-

tion. Another of his better-known avant-garde novels, *San Camilo, 1936* (1969), is one continuous stream of consciousness.

Cela's acute powers of observation and skill in colourful description also are apparent in his travel books, based on his trips through rural Spain and his visits to Latin-American countries. The most noted of these are *Viaje a la Alcarria* (1948; *Journey to the Alcarria*), *Del Miño al Bidasoa* (1952; "From the Miño to the Bidasoa"), and *Judíos, moros y cristianos* (1956; "Jews, Moors, and Christians"). Among his numerous short narratives are *Esas nubes que pasan* (1945; "The Passing Clouds") and the four works included in the collection *El molino de viento, y otras novelas cortas* (1956; "The Windmill and Other Short Fiction"). Cela also wrote essays, poetry, and memoirs and in his later years made frequent television appearances.

In 1955 he settled in Majorca, where he founded a well-respected literary review, *Papeles de Son Armadans* (1956–79), and published books in fine editions. He began in 1968 to publish his multivolume *Diccionario secreto* (vol. 11 was published in 1972), a compilation of "unprintable" but well-known words and phrases. He became a member of the Spanish Academy in 1957.

BIBLIOGRAPHY. Robert Kirsner, *The Novels and Travels of Camilo José Cela* (1963); and D.W. McPheeters, *Camilo José Cela* (1969), discuss both the life and the literary output of the writer.

Čel'abinsk (Russia): *see* Chelyabinsk.

celadon, Chinese, Korean, Siamese, and Japanese stoneware decorated with glazes the colour range of which includes greens of various shades, olive, blue, and gray. The colours are the result of a wash of slip (liquefied clay) containing a high proportion of iron that is applied to the body before glazing. The iron interacts with the glaze during the firing and colours it. Celadons were prized in the Eastern world long before their comparatively late introduction to the West. A wide demand led to their export to India, Persia, and Egypt in the T'ang dynasty (618–907) and to most of Asia in the Sung (960–1279) and Ming (1368–1644) dynasties. The ware was popular because of its beauty, because of a superstition that a celadon dish would break or change colour if poisoned food were put into it, and because, to the Chinese, it resembled jade.

Yüeh ware, first made in the Han dynasty (206 BC–AD 220), is the earliest celadon; the glaze is olive or brownish green. The celadons of the Sung dynasty, which came from the kilns of Lung-ch'üan, were the first to reach Europe in the 14th century. Surviving wares include large dishes, bowls, and large vases. The glaze, superb in quality, is a transparent green colour. It is thick and viscous, usually with a well-marked crackle. Decoration is usually incised, but molded ornament is also found. On some pots the molding was left unglazed, so that it burned to a dark reddish brown—an effective contrast to the colour of the glaze. Most celadons attributable to the Ming dynasty have incised, under-the-glaze floral and foliate decoration.



Korean celadon vase with inlaid decoration (*mishima*), 13th century, Koryŏ dynasty; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, Hoyt Collection

Korean celadons of the Koryŏ period (918–1392) have a glaze that varies from bluish green to a putty colour. Many of the forms are lobed, based on the melon or the gourd. Perhaps the major divergence from the typical Chinese celadon is the inlaid decoration beneath the glaze of many specimens. In later examples, often referred to as *mishima,* the designs are first incised into the clay; the incisions are then filled with black-and-white slip. The inlaid patterns are diverse; but most of the subjects are floral, with an occasional bird. Isolated flowers with symmetrically radiating petals are also found, principally on boxes. During the early part of the Yi dynasty (1392–1910), the pattern was often impressed by stamps rather than incised freehand. Sgraffito decoration, in which patterns were incised through a grayish white slip, is also found.

Siamese celadons, influenced by Chinese wares, had a translucent glaze, usually grayish green and often crackled, over a grayish white body. A common decoration consists of roughly scored vertical flutes, with incised circles at the shoulder to accentuate the form. Decoration of a more definite kind is always incised under the glaze and is usually floral. Covered bowls, dishes, ewers, and bottles with two small loop handles at the neck are common forms.

In Japan the importation of Yüeh ware and the respect for Korean celadon led during the Kamakura period (1192–1333) to imitative production near Seto (Aichi prefecture). The most important ware is known as Old Seto, a true celadon but often oxidized to what the Japanese call a "dead leaf" colour. Ritual vases, loop-handled jars, rice-wine vessels, ewers, and incense burners are among the Old Seto ware; glazes include black and olive green. During the 17th century (Edo period), fine examples of celadon were made at the famous Nabeshima kilns at Arita, Japan.

In modern times, large-scale production of traditional celadon domestic wares has been undertaken at Bangkok; and ingenious copies of early ware have been made in the 20th century in China and Japan and at Seoul.

Celaenae, ancient fortress city of Phrygia (in present Turkey), the starting point of the march of the "Ten Thousand" under Cyrus (401 BC) against Artaxerxes (recounted in Xenophon's *Anabasis*). In 333 Celaenae was conquered by Alexander the Great. The city was later renamed Apamea Cibotus (*q.v.*) by Antiochus I Soter, who refounded it on a more open site in order to benefit from the growing commerce on the great eastern trade route. The site is occupied by the modern town of Dinar, Tur.

Celâli Revolts: *see* Jelâlî Revolts.

Celan, Paul, pseudonym of PAUL ANTSCHEL (b. Nov. 23, 1920, Cernăuţi, Rom. [now Chernovtsy, Ukraine]—d. May 1, 1970, Paris, Fr.), poet who, though he never lived in Germany, gave its post-World War II literature one of its most powerful and regenerative voices. His poetry was influenced stylistically by French Surrealism, and its subject matter by his grief as a Jew.

When Romania came under virtual Nazi control in World War II, Celan was sent to a forced-labour camp, and his parents were murdered. After working from 1945 to 1947 as a translator and publisher's reader in Bucharest, Celan moved to Vienna, where he published his first collection of poems, *Der Sand aus den Urnen* (1948; "The Sand from the Urns"). From the outset his poetry was marked by a phantasmagoric perception of the terrors and injuries of reality and by a sureness of imagery and prosody.

Settling in Paris in 1948, where he had studied medicine briefly before the war, he lectured on language at the École Normale and translated French, Italian, and Russian poetry, as well as Shakespeare, into German. His second volume of poems, *Mohn und Gedächtnis* (1952; "Poppy and Memory"), established his reputation in West Germany. Seven volumes of poetry followed, including *Lichtzwang* (1970; "Lightforce"). The fullest English translation of his work is *Speech-Grille and Selected Poems* (1971). He died by his own hand.

celandine, any of several distinct flowering plants of similar appearance. The celandine proper, or greater celandine (*Chelidonium majus*), once a valued plant of the Old World herbalist, is now grown somewhat in wild gardens. A member of the poppy family (Papaveraceae), it has poisonous orange sap, coarsely toothed, divided leaves, and four-petaled yellow blooms about 2.5 cm (1 inch) across. Celandine produces narrow, thin seed pods. It was formerly known as wartweed for its reputed power to remove warts.



Celandine (*Chelidonium majus*)

G.E. Hyde

The celandine poppy (*Stylophorum diphyllum*), a North American plant of the poppy family, resembles *Chelidonium* but has flowers twice the size and two-paired, much-divided leaves on the stem below the flower cluster and basal leaves. Its sap is orange yellow. *Stylophorum diphyllum* is the sole species of the genus in the Western Hemisphere; several other species are Asian. It is grown as a garden flower in both the Old World and the New World, thriving in rich, moist soil and partial shade.

The lesser celandine, or pilewort (*Ranunculus ficaria*), is a member of the buttercup family (Ranunculaceae). It has heart-shaped leaves and typical buttercup flowers. Native to Europe, it has become naturalized in North America.

Celano, Lago di (Italy): *see* Fucino Basin.

Celastraceae, the staff-tree family, in the order Celastrales, comprising about 55 genera

of woody vines, shrubs, and trees, native in tropical and temperate zones but best known for ornamental forms of the genera *Euonymus* and *Celastrus* (bittersweet). Fruit of the family is often colourful. Leaves are frequently leathery and flowers are small, with four to five sepals and petals; alternating between the petals, stamens rise from a usually conspicuous nectar disk.

Khat (*Catha edulis*) is a slender, straight, East African tree reaching a height of 25 m (80 feet), with large oval, usually opposite, finely toothed leaves. The slightly bitter leaves are chewed for a stimulant they contain.

Paxistima (or *Pachystima*), five species of low, often creeping, North American shrubs, includes *P. canbyi,* with evergreen leaves and small, greenish flowers.

Celastrales, order of flowering plants, belonging to the class Magnoliopsida, or the dicotyledons (*q.v.;* characterized by two seed leaves). Its members are chiefly trees belonging to 12 families, 147 genera, and about 2,000 species. Four of the families—the Aquifoliaceae (holly), Celastraceae (staff-tree), Icacinaceae (icacina), and Hippocrateaceae (hippocratea)—are broadly distributed in the world and contain about 90 percent of the species. They are components of forests, requiring moderately rich soil.

Many of the 300 species of the holly family (Aquifoliaceae) are native in the tropics of Central and South America and the warmer regions of Asia. Several well-known hollies, however, range northward into southern Europe and the eastern United States. *Ilex aquifolium,* the European holly, grows 50 feet (16 m) tall and furnishes valuable wood for veneers. It is used for decoration, and hundreds of horticultural varieties are available for ornamental plantings.

The American holly (*I. opaca*) is widely distributed in the warmer areas of the eastern United States and is grown in commercial orchards for its red, yellow, or black berry-like fruits. Wood of this species is valuable in cabinetmaking and interior finishing. *I. opaca,* with more than 1,000 horticultural varieties, is also used as an accent tree, for street plantings, wind barriers, and even bonsai. The dried leaves of *I. paraguariensis* are used in South America to prepare a caffeine-rich beverage, yerba maté.

Of the 55 genera in the staff-tree family (Celastraceae), *Celastrus* and *Euonymus* are best known in the Northern Hemisphere. *Celastrus scandens,* the American bittersweet, is a shrub that can twine on a trellis or overrun a wooded area by climbing into tall trees. In autumn its dry capsules open to reveal bright orange clumps of berrylike arils that are often used for their colour in dry bouquets.

Many of the Asiatic species and cultivars of *Euonymus* are evergreen. *E. fortunei,* native to central and western China, has yielded many types of ground covers, hardy as far north as New England. Cultivars of the European spindle tree (*E. europaea*) attain heights of 20 feet (6 m) and display arils ranging in colour from orange to lavender-pink.

The Icacinaceae family is composed of tropical trees and vines with its major centre of distribution in the Southern Hemisphere. A few species of its 58 genera (and 400 species), such as *Pennantia* and *Villarsia,* are cultivated locally as ornamentals.

Members of the Hippocrateaceae, a family of woody vines and slender trees, are native chiefly to South America but are also found in Africa. Latex ducts, producing a milky sap, occur in many members.

In *Celastrus* and *Euonymus* a unique, asexual method of reproduction has evolved. In addition to the embryo that is formed by fertilization of the egg within the ovule, another embryo may arise from the inner seed-coat area. Thus the two embryos are derived by different processes; the first is sexual and the other asexual (apomictic). The second embryo is, in reality, an internal bud that carries only the attributes of the plant that produced it. Both embryos may establish themselves as seedlings when the seed germinates.

Many genera in this order produce flowers singly in the axil of a leaf (angle between stem and petiole). Others, as in the hollies, produce flower clusters (inflorescences), usually consisting of relatively few flowers. A model flower of this group possesses from four to six sepals, petals, and stamens (male) in each whorl. Sepals and petals may be partially united basally. The pistil (female) is composed of three to six carpels, differentiated into a basal, swollen ovary and a lobed, pollen-receptive stigma. Each chamber of the ovary, which is superior in position, produces two ovules.

Following pollination and fertilization, the ovule becomes the seed and the ovary the fruit. In the hollies the fruit, though fleshy, is not a true berry; it is a drupe, or drupaceous berry. Among other families of the Celastrales, fruit types range from dry fruits that split in half to samaras (winged fruits).

Several kinds of flowers may be produced in hollies and other members of the Celastrales. Male flowers, containing only functional stamens, and female flowers, in which only the pistil is fully developed, can occur on a plant that also produces perfect (bisexual) flowers. This diversity increases the chances of pollination.

Seven families of this order develop a unique nectar-secreting disk placed below, between, or above the stamens. Disk position aids in distinguishing families from each other; hollies lack the disk.

It is generally agreed that the four major families of this order form a coherent group. Many structural aspects of the minor families have not been studied in detail. Features unifying the families of the Celastrales include simple leaves, one or two ovules in each ovary chamber, and the presence of nectar disks near stamens. Families are separated on the basis of the following attributes: presence or absence of stipules; vine habit; type of inflorescence; distribution of staminate, pistillate, or perfect, flowers; structure of pistil; curvature of ovule; and the characteristics of the seed.

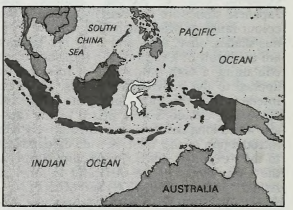
Celaya, city, south-central Guanajuato *estado* ("state"), north-central Mexico. It is in the fertile Bajío region on the Mexican Plateau, 2.5 miles (4 km) north of the Laja River and 5,774 feet (1,760 m) above sea level. Founded as Purísima Concepción de Celaya in 1571, the city played an important role in 19th-century Mexican history when it changed hands several times during Mexico's struggle for independence from Spain. General Álvaro Obregón defeated Pancho Villa at Celaya in 1915. With irrigation waters now available from the upper Lerma River, Celaya has become an important agricultural and livestock-raising centre. Corn (maize), beans, wheat, and chick-peas (garbanzos) are the principal crops, and cattle, pigs, and goats are raised. Dairying and the manufacture of candy (it is noted for its *cajetas de Celaya,* made of burnt sugar and milk) and textiles provide additional income. Lying approximately 30 miles (48 km) west of Querétaro and about 50 miles (80 km) southeast of Guanajuato city, the state capital, Celaya is a major railroad and highway junction.

Francisco Eduardo Tresguerras (1765–1833), architect, sculptor, painter, and poet, was born and did much of his work there. The Church of Nuestra Señora del Carmen (1807), considered his best work, is outstanding for the beauty of its dome. His other works include the Independence Monument in the main plaza, a bridge over the Laja, and altars in the colonial Church of San Francisco (1715), where he is buried. Pop. (1980) 141,675.

Celaya, Battle of (April 1915), decisive military engagement in the wars between revolutionary factions following the Mexican Revolution of 1911. One of the bloodiest battles in Mexican history, it was fought at Celaya, Guanajuato state, between the forces of Álvaro Obregón and Pancho Villa. In the course of the civil wars, Venustiano Carranza and Villa had eclipsed the other revolutionary leaders, and Obregón supported Carranza. After two deadly assaults, Villa's cavalry, the most formidable contingent among the revolutionary armies, failed to capture Obregón's positions, which were protected by trenches, barbed wire, and machine guns. His forces decimated, Villa retreated northward, leaving Carranza in virtual control of Mexico, though he continued his bandit rebel activities in the north until Carranza was overthrown in 1920.

Celebes, Indonesian SULAWESI, one of the four Greater Sunda Islands, Indonesia. A curiously shaped island with four distinct peninsulas that form three major gulfs—Tomini (the largest) on the northeast, Tolo on the east, and Bone on the south—Celebes has a coastline of 3,404 miles (5,478 km) and an area, including adjacent islands, of 87,897 square miles (227,654 square km).

The island is very mountainous, with some active volcanoes, but there are large plains



Celebes, Indon.

on the southern peninsula and in the south-central part of the island on which rice is grown. The highest peak is Mount Rantekombola, or Mario, at 11,335 feet (3,455 m). Major deep lakes (*danau*) are Towuti, Poso, and Matana, the latter having been sounded to 1,936 feet (590 m). The rivers are short and unimportant.

Celebes lies between the two shelves of the Australian and Asian continents. The broad central block is a complex of igneous rocks, in the southeastern corner of which is a broad band of volcanic detritus, known as tuff, more than 65 million years old; it is fringed occasionally by coral limestone. The southern ridge of Celebes has an axis of schist and quartzite, while the volcanic Minahasa area differs structurally from any other part of the island. The climate is hot but tempered by sea winds; annual rainfall varies from 160 inches (4,060 mm) in Rantepao (southwest-central section) to 21 inches (530 mm) in Palu (a rift valley near the western coast).

Generally, fauna is more Asian than Australian. Species unique to Celebes include the babirusa, or pig deer; the black-crested baboon; and the anoa, or dwarf buffalo. A distinct difference exists between the freshwater fish of Borneo and Celebes. Much of Celebes is still heavily forested, showing many floral resemblances to the Philippines but more Asian in the west and more Australian in the east.

Seven major ethnic groups inhabit Celebes: the Toala, Toradja, Buginese, Makasarese, Minahasan, Mori, and Gorontalese. The Toala,

who live throughout the island, are nomadic, shy jungle dwellers with their own language. The Toradja, inhabiting central, southeastern, and eastern Celebes, are of Austronesian (Malayo-Polynesian) stock; they have their own language and are primarily agriculturists. Most of them are Christians, although they still retain many animist practices. The Buginese and Makasarese are Muslims, well-built, energetic, fairly light-skinned, and devoted to gambling, feasting, and cockfighting; they live in southern Celebes and are extremely industrious, especially in the manufacture of plaited goods and in weaving, gold and silver work, and shipbuilding. The Minahasan, distinct from the rest, have light skin, high noses, prominent lips, widely separated eyes, and stiff, short black hair; they are tall and strong. Inhabiting the area around Manado, they are the most westernized of the island peoples and live in European style, each village having its Christian church and school. The Mori are a highland people inhabiting much of the eastern part of the island. The Gorontalese, in the west and south-central part of the northeastern peninsula, are short, smooth-haired, rather light-skinned, and of the Muslim faith.

Celebes and neighbouring islands are divided into four *provinsi* ("provinces"). The most economically advanced regions are the southern peninsula and the tip of the northeastern peninsula. In the south, wet rice is cultivated, and corn (maize), cassava, yams, and beans are raised. Some tobacco is cultivated, and salt is produced on the coast. Grain is raised on the alluvial plain around Tempe and Sidenreng lakes. There is a hydroelectric-power station located on the Sawito River east of Parepare. In the northeast, copra, forest products, and some sulfur are produced; there is also much fishing.

The eastern peninsula is largely undeveloped, with sparse population and predominantly subsistence agriculture. The southwestern peninsula and the central part of the island are centres for settlement programs, by means of which the national government is trying to resettle large numbers of people from Bali and Java to reduce population pressure on those islands. These areas of Celebes are thus becoming both more diverse and more highly developed. Roads link the principal towns of the southwestern peninsula, but elsewhere—with the exception of the Manado-Kema, the Kendari-Kolaka, and the Toraja highlands roads—they are limited to the coast. The major airports are at Makasar, Manado, Gorontalo, Kendari, Poso, and Palu.

The earliest traces of human habitation on Celebes are stone implements of the Toalian culture. Muslim sultanates of coastal Malay were established in the southern Celebes in the century before the arrival of the Europeans. The Portuguese arrived about 1512 in pursuit of a spice-trade monopoly, and the Dutch built a settlement at Macassar (Makasar) in 1607. Dutch control gradually spread until the states of Bone and Gowa lost their independence in 1905 and 1911, respectively. Occupied by Japan during World War II, the island joined the Republic of Indonesia in 1950. Political disturbances and rebellions have continued, but central government control has not been threatened. Pop. (1985 est.) 11,552,917.

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Celebes black ape, also called CELEBES CRESTED MACAQUE (species *Cynopithecus niger*), arboreal monkey of the family Cercopithecidae, found on Celebes, Bacan, and nearby islands. The Celebes black ape is a stump-tailed monkey with overhanging brows, a hairless black face, and a long, flat muzzle. It is about the size of a baboon (55–65 cm [22–26 inches] long without the tail [1 to 2 cm]) and is covered with dark brown or black fur. The male, especially, bears a longitudinal crest of crown hair. Little is known of the habits of this monkey. It is diurnal, feeds on fruit, and lives in rain forests. The people of certain tribes look on it as their ancestor.

Celebes Sea, Indonesian LAUT SULAWESI, sea of the western Pacific Ocean, bordered on the north by the Sulu Archipelago and Sea and Mindanao Island, on the east by the Sangi Islands chain, on the south by Celebes (Sulawesi), and on the west by Borneo. It extends 420 miles (675 km) north-south by 520 miles (837 km) east-west and occupies a total surface area of 110,000 square miles (280,000 square km). The sea, opening southwest through the Makassar Strait to the Java Sea, fills a steep-sided, generally flat-bottomed basin formed by downfaulting of a tectonic block. Over half of its area is more than 13,000 feet (4,000 m) deep, the greatest recorded depth being 20,406 feet (6,220 m). The edges of this enclosed basin are visible in the line of volcanic cones in northern Celebes and the Sang Islands and the mountains of the Sulu Archipelago and Mindanao. Deep water enters the sea from the Pacific south of Mindanao, flowing southwest to leave by the Makassar Strait. This pattern also holds true for surface currents.

Although the Dutch seized parts of Celebes and the Sang group early in the 17th century, the sea itself was long dominated by traders and pirates from Borneo and the surrounding islands. It did not come under colonial control until late in the 19th century. Fishing is important, and there is much coastal and interisland trade.

Celer, Quintus Caecilius Metellus: *see* Metellus Celer, Quintus Caecilius.

celery (species *Apium graveolens*), herb of the family Apiaceae (Umbelliferae). Native to the Mediterranean areas and the Middle East, celery was used as a flavouring by the ancient Greeks and Romans and as a medicine by the ancient Chinese. The ancient forms resembled smallage, or wild celery. Celery with large, fleshy, succulent, upright leafstalks, or petioles, was developed in the late 18th century. The stringiness that characterizes most celery has been eliminated from some varieties, notably the Pascal.



Celery (*Apium graveolens*)
Ingmar Holmasen

In Europe celery is usually eaten cooked as a vegetable or as a delicate flavouring in a variety of stocks, casseroles, and soups. In the United States raw celery is served with spreads or dips as an appetizer and in salads.

The tiny fruit, or seed, of the celery resembles the plant itself in taste and aroma and is used as a seasoning, particularly in soups and pickles. Celery seed contains about 2 to 3 percent essential oil, the principal components of which are *d*-limonene and selinene.

Celeriac (*Apium graveolens* variety *rapaceum*), also called celery root, or turnip-rooted celery, has a large edible root used as a raw or cooked vegetable.

celery cabbage (*Brassica pekinensis*), species of mustard cultivated for its edible leaves. *See* Chinese cabbage.

celery-top pine, also called ADVENTURE BAY PINE (species *Phyllocladus asplenifolius*), slow-growing ornamental and timber conifer of the family Podocarpaceae, native to temperate rain forests of Tasmania at elevations from sea level to 750 m (2,500 feet). The tree is shrubby at high elevations but may grow to 18 m (60 feet) and occasionally 30 m (100 feet) in lower areas. The irregularly arranged branches bear inconspicuous, scalelike leaves; leaf functions are performed mainly by deciduous, green branchlets that are flattened into leathery, leaflike phylloclades resembling celery leaflets.



Celery-top pine (*Phyllocladus asplenifolius*)
G.R. Roberts

celesta, also spelled CELESTE, orchestral percussion instrument resembling a small upright piano, patented by a Parisian, Auguste Mustel, in 1886. It consists of a series of small metal bars (and hence is a metallophone) with a keyboard and a simplified piano action in which small felt hammers strike the bars. Each bar is resonated by a wooden box or similar chamber tuned to reinforce the fundamental harmonic (component tone) of the bar. A pedal lifts a felt-pad damper from the bars, permitting use of either sustained or short notes. The normal range is four octaves upward from middle C.

The typophone, a similar, softer-toned instrument with graduated steel tuning forks instead of bars, is sometimes mistakenly called a celesta. It was invented by Mustel's father, Victor, in 1865 and patented, with improvements, in 1868.



Celesta
By courtesy of Mustel, Paris

celestial globe, representation of stars and constellations as they are located on the apparent sphere of the sky. Celestial globes are used for some astronomical or astrological calculations or as ornaments.

Some globes were made in ancient Greece; Thales of Miletus (fl. 6th century BC) is generally credited with having constructed the first. Probably the oldest in existence is the Farnese Globe, estimated as from the 3rd century BC, now in the Museo Archeologico Nazionale at Naples. It shows constellation figures but not individual stars and would have been of little practical astronomical use; it is thought to be a Roman copy of a Greek globe. Some Arabic globes made as early as the 11th century are extant. Among the seafaring peoples of the Pacific islands, globes were used to teach celestial navigation.

celestial mechanics, branch of astronomy that deals with the mathematical theory of the motions of celestial bodies. The foundation was laid by Sir Isaac Newton with the publication in 1687 of his *Philosophiae Naturalis Principia Mathematica,* usually referred to as the *Principia.* Here he published the three laws of motion that express the principles of mechanics, consolidating progress begun with the pioneer work of Galileo earlier in the 17th century. Newton also formulated the universal law of gravitation, which states that any two particles of mass in the universe attract each other with a force that varies directly as the product of the masses and inversely as the square of the distance between them.

A brief treatment of celestial mechanics follows. For full treatment, *see* MACROPAEDIA: Mechanics.

Newton's fundamental principles permit the statement of a problem in celestial mechanics in the form of a set of equations of motion, ordinary differential equations of the second order. An important triumph of Newton's was that Johannes Kepler's three laws of planetary motion were obtained as a consequence of the law of gravitation in conjunction with the laws of motion, applied to the problem of two bodies.

The next in order of difficulty is the case in which three bodies are considered. The solar system, consisting of the Sun and nine known principal planets, all but three surrounded by one or more satellites, constitutes a problem of many bodies. The significant circumstance that the mass of the Sun is about 1,000 times that of the most massive planet, Jupiter, makes the Sun's gravitational attraction far outweigh the mutual attractions of the planets. This suggests a process of successive approximations that has become the standard procedure in the mathematical theory of planetary motion, the deviations from elliptic motion being called the perturbations. In the case of the Moon's motion, the Earth produces the principal attraction. Notwithstanding the very great mass of the Sun, the effect of the Sun's attraction is a small fraction of that of the Earth owing to the close proximity of the latter. In the case of some satellites, however, the perturbations produced by the Sun's attraction may become very sizable.

During the 18th century, powerful analytical methods, made possible by the development of differential and integral calculus, were applied to the problems of celestial mechanics. These methods were generally successful in accounting for the observed motions of bodies in the solar system.

The Moon's motion was an apparent exception until this problem was finally solved during the second quarter of the 20th century. The observed deviations between observations and theory were shown to be caused not by defects in the theory but by lack of uniformity of the Earth's rotation. This led, in 1950, to the introduction of "ephemeris time," which is independent of the Earth's rotation but based on the observed motions of the Moon and the Sun. Ephemeris time may thus be regarded as the independent variable of Newtonian mechanics.

It is now recognized that the Newtonian laws of motion and law of gravitation are approximations to the true laws governing the motions of celestial bodies. In the motion of the perihelion of the innermost planet, Mercury, and in a very few other cases, relativity effects are large enough to be revealed by the most precise observations. A comparison between observations and theory, in which the perturbations are properly taken into account, confirms the excess of the motion of the perihelion in the amount of 43 seconds of arc per century, as required by the theory of relativity. This is one of the most convincing observational proofs of that theory.

A branch of celestial mechanics deals with the gravitational theory of rotating liquid or gaseous masses, with applications to the Earth and the other large planets. Newton explained the ocean tides as caused by the gravitational attraction of the Moon and the Sun. Sir George Howard Darwin, in addition to developing modern methods of tidal analysis and tidal prediction, also treated the cosmogonic aspect of tidal theory in his work on the development of the Earth–Moon system.

An important method for the treatment of planetary perturbations was introduced during the 1770s by Joseph-Louis Lagrange. In an elliptic orbit the six orbital elements have constant values, completely determined by the three coordinates and the three components of the velocity at any time. Since the attractions by other planets cause a planet to follow a path differing from a fixed ellipse, the elements of its orbit so determined will necessarily vary with the time. Hence one may describe the "perturbed" orbit of a planet by giving the elements as functions of the time. Lagrange's method provides a process for deriving analytical expressions for the derivatives of the varying elements.

An accomplishment that demonstrated strikingly the power of the theory of planetary motions was the discovery of the planet Neptune in 1846. Its presence and location in the sky had been predicted with astonishing accuracy by J.C. Adams and by U.J.J. Leverrier from deviations in the motion of the planet Uranus. Attempts were made to discover planets beyond Neptune by a similar procedure, but the discovery of Pluto at the Lowell Observatory in 1930 must be ascribed to perseverance in systematic search rather than accuracy of prediction by mathematical theory.

celestial navigation, use of the observed positions of celestial bodies to determine a navigator's position. At any moment some celestial body is at the zenith of any particular location on the Earth's surface. This location is called the ground position (GP). GP can thus be stated in terms of celestial coordinates, with the declination of the celestial object equal to latitude and the Greenwich hour angle equal to longitude. Almanacs such as those published by the Nautical Almanac Office of the U.S. Naval Observatory provide these coordinates for the Sun, Moon, and planets (or navigator's stars); the tabulations are given in terms of Greenwich Civil Time. From this information a line of position can be plotted. In principle, the line could be drawn on a very large sphere, but, in practice, a Mercator chart, or plotting sheet, is used. The navigator then uses a sextant or bubble octant to measure the altitude of the celestial object and records this altitude using Greenwich Civil Time. The navigator estimates his position, this being the dead-reckoning position. The altitude and the bearing that the celestial object would have at this position are calculated or taken from tables. The dead-reckoning position is marked on the plotting sheet and a line drawn in the direction of the celestial object's calculated bearing. From this information and from the difference between the observed and computed altitudes of the celestial object, known as the intercept, the position of the navigator can be calculated.

celestial sphere, the apparent surface of the heavens, on which the stars seem to be fixed. For the purpose of establishing coordinate systems to mark the positions of heavenly bodies, it can be considered a real sphere at an infinite distance from the Earth. The Earth's axis, extended to infinity, touches this sphere at the north and south celestial poles, around which the heavens seem to turn. The plane of the Earth's Equator, extended to infinity, marks the celestial equator. *See also* hour circle; ecliptic; zenith.

Celestina, La, Spanish dialogue novel, generally considered the first masterpiece of Spanish prose and the greatest and most influential work of the early Renaissance in Spain.

Originally published in 16 acts as the *Comedia de Calixto y Melibea* (1499; "Comedy of Calisto and Melibea") and shortly thereafter in an expanded version with 21 acts as the *Tragicomedia de Calixto y Melibea* (1502), the work has been popularly known since its publication as *La Celestina* after its chief character, the bawd who serves as the go-between for the young lovers Calisto and Melibea. Celestina's deeply explored personality dominates the plot, ostensibly tragic, of the uncontrolled passion of the lovers, which ends in disaster after its consummation. Calisto is killed in a fall from the ladder to Melibea's window; Melibea commits suicide. Celestina's coarse humour and ironic commentary, however, undercut the tragic potential of the situation; the vivid depiction of her character overshadows the philosophical significance of the work in its theme of the vanity of the human struggle against the forces of fate.

Authorship of the work, which was published anonymously, is generally attributed to Fernando de Rojas (*c.* 1465–1541), a converted Jewish lawyer about whom little else is known. *La Celestina* was widely imitated and reprinted in Spanish more than 100 times by the mid-17th century. It was translated into many languages, including English (*The Spanish Bawd,* 1631), French, Italian, German, Hebrew, and Latin. Often considered the first European novel, *La Celestina* was profoundly influential in the development of European prose fiction and is valued by critics today as much for its greatness as literature as for its historical significance.

Celestine, Latin CELESTINUS, or COELESTINUS, name of Roman Catholic popes and an antipope, grouped below chronologically and indicated by the symbol •.

• **Celestine I,** SAINT (b. Roman Campania—d. July 27, 432, Rome; feast day July 27, Irish feast day April 6), pope from 422 to 432.

He was a Roman deacon when elected on Sept. 10, 422, to succeed Boniface I. His pontificate is noted for its vigorous attack on Nestorianism, the unorthodox teaching of Patriarch Nestorius of Constantinople, which stressed that Christ's human and divine natures were independent and which denounced the Virgin's title Theotokos (God-bearer). Celestine also refuted the doctrine of Pelagius (fl. 405–418), which minimized the role of divine grace in man's salvation. In 429 Celestine dispatched the French bishops SS. Germanus of Auxerre and Lupus of Troyes to combat Pelagianism in England.

After consecrating St. Palladius at Rome in 431, Celestine sent him as the first bishop to Ireland. Archbishop St. Cyril of Alexandria

was entrusted with Nestorius' recantation at the Council of Ephesus in 431. Celestine approved the council's decision to anathematize, depose, and banish Nestorius, which caused a schism that remained unresolved for more than a century.

• **Celestine (II),** original name TEOBALDO BUCCAPECO, English-Latin THEOBALD BUCCAPECUS (fl. early 12th century), pope who was elected in December 1124 but resigned a few days later and is not counted in the official list of popes.

After the death of Calixtus II, the rival houses of Frangipani and Pierleoni struggled for the papal throne. The Pierleonis' candidate, Theobald (who would have been Celestine II), was simultaneously elected pope with the Frangipanis' candidate, Honorius II. After Theobald's attempt to prevent the establishment of a Norman kingdom in southern Italy failed, he resigned in favour of Honorius.

• **Celestine II,** original name GUIDO DI CITTÀ DI CASTELLO, or GUIDO DE CASTELLIS (b. Città di Castello, Umbria, or Macerata, Ancona [Italy]—d. March 8, 1144), pope from 1143 to 1144.

A scholar of noble birth, he studied under Peter Abélard, with whom he remained on friendly terms even after Abélard's condemnation at the Council of Sens (1140). He was made cardinal deacon in 1127 by Pope Honorius II and cardinal priest (*c.* 1134) by Pope Innocent II, whom he was elected to succeed on Sept. 26, 1143. As pope (consecrated October 3), Celestine immediately removed Innocent's interdict against King Louis VII of France. He died on the verge of a controversy with King Roger II of Sicily regarding Roger's prerogatives as apostolic legate.

• **Celestine III,** original name GIACINTO BOBONE, or BOBO-ORSINI (b. *c.* 1106, Rome, Papal States [Italy]—d. Jan. 8, 1198, Rome), pope from 1191 to 1198.

He was Peter Abélard's student and friend, and he carried out many important legations in Germany, Spain, and Portugal; St. Thomas Becket considered him his most reliable friend at the Roman Curia. He had been cardinal deacon of Santa Maria in Cosmedin, Italy, for 47 years when, on March 30, 1191, at the age of 85, he was elected as the first member of the Roman Orsini family to become pope. On the eve of his consecration he was ordained priest (April 13), and the day after his consecration he crowned King Henry VI of Germany as Holy Roman emperor.

Celestine's pontificate was overshadowed by the spectacular successes of Henry, who not only ignored the fact that Sicily had been a vassal of the Holy See but, contrary to a treaty between the Holy Roman emperor Frederick I Barbarossa and Pope Clement III, also failed to restore the full extent of the Papal States to Celestine. Despite the anxiety that the emperor's ambitious projects caused the pope, he never excommunicated him, not even when Henry imprisoned the returning crusader-king of England, Richard I the Lion-Heart. Celestine weakly supported Henry's crusade, which would probably have led to a Latin conquest of the Byzantine Empire earlier than it occurred. The pope and Henry died within a few months of each other. Celestine's conciliatory and temporizing policy toward Henry was probably caused not by senile weakness, as has been asserted, but rather by moderation and patience.

• **Celestine IV,** original name GOFFREDO CASTIGLIONI (b. Milan [Italy]—d. Nov. 10, 1241), pope from Oct. 25 to Nov. 10, 1241.

The nephew of Pope Urban III, Celestine had been made cardinal priest of St. Mark's in 1227 and cardinal bishop of Sabina in 1239 by his predecessor, Gregory IX, whom he was elected to succeed on Oct. 25, 1241. He was the first pope to be elected in a conclave, which had been set up by the senator of Rome, Matthew Rosso Orsini, who hoped to break a deadlock in the College of Cardinals. Celestine, an old and sick man, was consecrated on October 28 and died two weeks later during a controversy between the papacy and the Holy Roman emperor Frederick II.

• **Celestine V,** SAINT, original name PIETRO DA MORRONE, or PIETRO DEL MURRONE (b. 1215, Isernia?, Kingdom of the Two Sicilies—d. May 19, 1296, near Ferentino, Papal States; canonized May 5, 1313; feast day May 19), pope from July 5 to Dec. 13, 1294, the first pontiff to abdicate. He founded the Celestine order.

Pietro was a Benedictine in his youth but soon became a hermit and lived in the Abruzzi Mountains, near Sulmona. His rigorous asceticism attracted followers, and he became the head of a group of hermits (*c.* 1260) that were later called Celestines and incorporated into the Benedictine order.

Celestine was in his eighties when he was elected pope on July 5, 1294. He accepted only because of the perilous situation of the church: the papacy had been vacant for two years. Though a holy man, he lacked administrative ability and considered the papacy a distraction from his ascetic struggle for salvation. He distrusted the cardinals and became dependent on King Charles II of Naples, with whose supporters he filled the Curia. Further, he favoured his own hermits and the Franciscan Spirituals, whom he permitted to secede from the main part of their order, a solution that was much later made permanent after long struggle.

After encountering great difficulty, Celestine realized it would be dangerous for the church and for his soul as well if he continued as pope. Hence he consulted the cardinals and resigned, on December 13.

After Cardinal Benedict Caetani became his successor as Boniface VIII, some claimed the resignation unlawful. Thus the majority of the cardinals found it advisable to keep Celestine under supervision, and he was not allowed to return to his hermitage. On the verge of escaping via the Adriatic Sea, he was captured and sent back to Boniface, who kept him interned in Fumone Castle, where he died. Although Celestine had the courage to terminate an impossible situation, Dante places him at the entrance of Hell for his abdication and alludes to the pope (*Inferno,* iii, 59ff.) as ". . . him who made, through cowardice, the great refusal."

celestite, mineral that is a naturally occurring form of strontium sulfate ($SrSO_4$). It resembles barite, barium sulfate, but is much less common. Barium is interchangeable with strontium in the crystal structure; there is a gradation between celestite and barite. Celestite occurs in sedimentary rocks, particularly dolomites and dolomitic limestones, throughout the world and also is present in hydrothermal veins and in cavities in basic eruptive rocks. Celestite is mined as a source of strontium for use in sugar-beet refining and in the manufacture of pyrotechnics. It is abundant in Sicily; Bristol, Eng.; on South Bass Island, Lake Erie, Ohio; and in San Bernardino county, Calif. For detailed physical properties, *see* sulfate mineral (table).

Celestius (fl. 5th century, England), one of the first and probably the most outstanding of the disciples of the British theologian Pelagius (*q.v.*).

Like Pelagius, Celestius was practicing law in Rome when they met. In reaction to contemporary immorality, they turned from temporal to religious pursuits, and their reforming views found much support at Rome.

When the Goths menaced Rome about 409, the two men went first to Sicily and then, about 410, to North Africa, where Celestius remained after Pelagius left for Palestine in 411. During a visit to Carthage, Paulinus, a deacon of Milan, accused Celestius of denying the existence of original sin and the remission of sins by baptism. Celestius was condemned at the Council of Carthage (412), presided over by Bishop St. Aurelius, who excommunicated him. He left for Ephesus (near modern Selçuk, Turkey).

Celestius' propaganda and Pelagius' writings succeeded in making many converts, and a reaction against them grew with a powerful opposition that included St. Jerome, the great Latin biblical scholar, and Bishop St. Augustine of Hippo. The condemnation of Celestius and Pelagius was repeated at the Council of Diospolis (modern Lod, Israel) in 415 and at two African councils in 416. Although they were excommunicated in 417 by Pope St. Innocent I, the succeeding pope, St. Zosimus, was to prove sympathetic.

Celestius visited Zosimus, whom he impressed and who, after receiving a profession of faith from Pelagius, accused the African bishops in 417 of having acted precipitately. Violent outbreaks by the Pelagians in Rome caused the Western Roman emperor Flavius Honorius to condemn Pelagianism and exile Celestius from Italy. Meanwhile, Celestius, who had been commanded to appear before the pope, ignored the summons and fled from Rome. Thereupon, Zosimus excommunicated him and condemned Pelagianism. The Council of Ephesus (431) also condemned him.

celiac disease, also called NONTROPICAL SPRUE, relatively rare malabsorption syndrome of children and adults, characterized by the passage of foul, bulky, fatty stools (steatorrhea), progressive malnutrition, often with multiple vitamin deficiencies, stunting of growth, and, late in the disease, a blood picture of microcytic anemia (more often in children) or macrocytic anemia (usually in adults) similar to that of pernicious anemia. In children, celiac disease usually begins between the ages of 6 and 21 months, frequently following an infection; the course is chronic, with periods of intestinal upset, diarrhea, and wasting, interspersed with periods of apparent normality. Adult celiac disease commonly begins past the age of 30; 25 percent of cases report having had repeated attacks of diarrhea, or clinically evident celiac disease, in childhood. Symptoms of mild celiac disease include loss of appetite and weight, mental depression and irritability, and constipation alternating with diarrhea. Advanced cases may display bone pain, deformation, and osteoporosis (increased bone porosity) from calcium and vitamin D deficiency, disturbances of vision from lack of vitamin A, bleeding tendencies from lack of vitamin K, or scurvy from deficiency of vitamin C (ascorbic acid). The cause of celiac disease is not known: many cases show a familial tendency; the symptoms of most patients are relieved by a diet free of glutens (protein constituent of wheat, barley, malt, and rye flours), and it is believed that a deficiency of certain enzymes (peptidases) necessary for the digestion of glutens may underlie the disease. Successful treatment consists of the use of diets high in proteins but low in glutens and saturated fats; other supportive measures may be necessary in advanced cases.

celibacy, the state of being unmarried, usually in association with the role of a religious official or devotee. In its narrow sense, the term is applied only to those for whom the unmarried state is the result of a sacred vow, act of renunciation, or religious conviction. Celibacy has existed in some form or another throughout religious history and in virtually all the major religions of the world.

Wherever celibacy has appeared, it has generally accompanied the view that the religious

life is essentially different or even alienated from the normal structures of society and the normal drives of human nature. On the other hand, the religious style that disparages celibacy gives priority to the role of religion as employing and sanctifying the "natural" states of life: sexuality, family, and work.

Types of celibacy. Celibacy may be examined in terms of its various contexts. One type is sacerdotal celibacy, the celibacy of priests and priestesses. A priest may be defined as one who, as a mediator, performs the sacred function of communicating through rites the needs of the people to heaven and the sacred power and presence from heaven to the congregation. His function is objective. Its efficacy is assured if the priest conducts the proper rite and has the proper qualifications of ordination and, perhaps, of ritual purity, regardless of whether he is particularly moral or fervent. Celibacy would be such an objective mark of special state and ritual purity. Celibacy probably is derived from taboos that regarded sexual power as a rival to religious power, and the sexuality of the opposite sex as a polluting factor, especially in sacred or crisis situations.

Another type of celibacy is the monastic. The monk's main motive will be moral and spiritual advancement, not the ritual purity required for sacerdotal rites. To this end the interior freedom, the opportunity for asceticism and meditation, and perhaps the "new family" of the religious community, all contribute to a sense of separation from the ordinary that releases the monk for religious growth. Types of monasticism range from the solitary—the hermit in the woods or desert, the anchorite living in isolation in a church or monastery—through the cenobite living a stabilized monastic life in community, to the mendicant ascetic who wanders from place to place gathering alms. In any case, the celibate state is viewed as an inseparable part of his way of life.

Institutional celibacy for women frequently has no connection with sacerdotalism and is rather designed to aid spiritual advancement. Virginity and celibacy are considered to be assets in the attainment of spiritual goals. Generally, institutional female celibates are nuns in residential cloisters, although occasional solitaries, like the anchoress (female hermit) Dame Julian of Norwich (14th–15th century) may be noted.

Individual noninstitutional and nonsacerdotal religious celibacy is normally the state of the lay celibate or the occasional clergyman in a faith not requiring celibacy, who makes a vow to remain unmarried out of devotion or to allow the performance of some special religious service.

Celibacy in primitive religions. Among primitive peoples, the celibate state is chiefly connected with shamans and ritual purity. Not all shamans are unmarried, but because the shaman has undergone a profound initiatory experience and has had a quite extraordinary calling, the prototype of the celibate may be found among his ranks.

Celibacy in the ancient civilizations. In the great civilizations of antiquity, celibacy emerged in various contexts. The requirements for the Vestal Virgins of Rome, celibate for at least the thirty years of their service, indicate that celibacy had some place in a very ancient stratum of Roman religion. As classical civilization developed, two types of religious styles involving masculine celibacy appeared, that of the ascetic philosopher and that of the priest of the mystery religions. The Pythagoreans are an excellent example of the former. Pythagoras himself established a small community that set a premium on study, vegetarianism, and sexual restraint or abstinence. Later philosophers believed that celibacy would be conducive to the detachment and equilibrium required by the philosopher's calling. The Stoic philosopher Epictetus (born *c.* AD 50) taught that the ideal teacher would be unmarried and that his task required a calm freedom from family care.

A different mood was set by the celibate priests of the mysteries. Celibacy was especially characteristic of priest-devotees of the Great Mother cults. The well-organized priesthood of the religion of Isis, for example, represented serene sacerdotalism. Sexual abstinence was an absolute requirement of those who celebrated her holy mysteries.

Similarly, the increasing number of cults—*e.g.,* Manichaeans, Gnostics, and Hermeticists—typically had an inner circle requiring strict continence. Thus, many important religious movements in the classical world envisioned continence as an ideal and set the stage for Christian celibacy and monasticism.

Celibacy in the religions of the East. In Hinduism, celibacy is divorced from the priesthood, which is hereditary. Prominent, however, among the religious personages of India are the *sādhus,* "holy men," who live a life free of possessions and family obligation. The *sādhus* have no organization or corporate discipline. Many *sādhus,* male and female, become celibates after marriage or widowhood; others early in life. The *sādhu* is one who has left the type of life ruled by the order of *dharma* (cosmic and societal law; *i.e.,* of caste, family, money, state, and all their responsibilities and privileges) in order to seek *mokṣa* (final liberation). Worldly involvements are believed to increase one's activities and distractions and hence militate against attainment of a life of controlled equilibrium or devotional ecstasy that is the goal of the spiritual techniques.

Buddhism began as a celibate order in India dedicated to the attainment of enlightenment through the control of the passions and the withdrawal of the senses from attachment to external objects. As Buddhism became a world religion, certain variations arose: in Southeast Asia, most young men spent only a year in the order; in Tibet, Tantric monks were married; in Japan, the large Jōdo Shinshū denomination dispensed with the celibacy ideal altogether.

Chinese Taoism has monastics and independent celibate adepts. Originally the tradition was probably derived from shamanism, but now the Taoist monasticism and priesthood is modelled on the Buddhist. Shintō in Japan has no monks or celibate priesthood; it has embraced shamanesses "married" to the shrine god and celibate priestesses in major shrines, especially in premodern times.

Celibacy in the religions of the West. Celibacy was not part of the original practices of Islām. Islāmic celibacy was a matter of personal spiritual advancement or enthusiasm rather than of sacerdotal purity or institutional control, and most of the famous saints were married. In various places, bands of Ṣūfī mystics, such as the dervishes, developed out of a need for rigorous training or practice. Celibacy was exceptional even among members of these mystical orders, however.

Celibacy has had little part in normative Judaism. There were, however, prescribed periods of sexual abstinence in connection with rituals and sacrifices, and while engaging in holy wars. In post-Old Testament times, some members of the Essene sect rejected marriage.

Celibacy first appears in Christianity out of apocalyptic expectations. It was believed among the original Christians that the present age was ending and that the Kingdom of God was at hand, and that in the new age there would be no marriage, since all would be like angels. Some of the followers of Jesus gave up family life in order to devote themselves to proclaiming the Kingdom. St. Paul commended celibacy but insisted that he, like the other Apostles, had the right to be married if he so desired.

In the subapostolic period (late 1st and early 2nd centuries) some took the extreme view that all Christians should renounce marriage. Middle positions were developed to defend marriage in opposition to views that the flesh and all matter were evil and to defend celibacy in opposition to the widespread sexual license and chaos of the times. Many writers held that marriage was good, but that celibacy was better.

The pre-Christian idea that sexual activity was particularly wrong for those who officiated at the altar was assimilated by Christians, and it became common for ordained men to give up sexual relations with their wives. The regional Council of Elvira in Spain (*c.* AD 306) decreed that all priests and bishops, married or not, should abstain from sexual relations. On the other hand, the ecumenical Council of Nicaea (AD 325) declined to make such a prohibition.

The position of the Eastern churches was made clear by the decrees of the Quinisext Council in 692: bishops must be celibate, but ordained priests, deacons, and subdeacons could continue already-established marriages.

The social chaos caused by the breakup of the Roman Empire had the effect of extending the practice of celibacy among the laity. Lay persons fleeing the cities to live as hermits or to form monastic communities sought safety as well as purity.

In the 10th and 11th centuries a crisis in the practice of clerical celibacy resulted from the decline of the Carolingian Empire and the Norse (Viking) invasions. Churches were destroyed, church lands secularized, and many priests married or lived in concubinage. Not only the practice but also the principles of clerical celibacy were challenged.

The first and second Lateran Councils (1123 and 1139) put an end to the legality of theoretically continent clerical marriages. They declared priestly orders an impediment to valid marriage and vice versa. This is still the official position of the Roman Catholic Church, although occasionally exceptions are made.

The churches of the Reformation (Lutheran, Anglican, Reformed, and others) discontinued the requirement of clerical celibacy. Lay celibacy was also discontinued, but about 1845 monastic orders began to reappear in the Church of England. About the time of World War II, small Protestant monastic groups were founded on the continent of Europe.

In connection with the second Vatican Council (1962–65) clerical celibacy once again became a cause of ferment in the Roman Church. The council permitted a married diaconate. After the council, the number of priests seeking to leave the priesthood and marry vastly increased. A substantial number of European and American Catholics began to urge that celibacy be made optional for priests.

Pope Paul VI, however, issued an encyclical, *Sacerdotalis Caelibatus* (June 23, 1967), reaffirming the traditional law on celibacy. The pope returns to the New Testament texts: for the sake of Christ and the coming Kingdom of Heaven, the priest must be totally available and free of domestic responsibilities; he must witness by his way of life to the transcendent reality that fills and grips him.

Céline, Louis-Ferdinand, pseudonym of LOUIS-FERDINAND DESTOUCHES (b. May 27, 1894, Courbevoie, near Paris—d. July 1, 1961, Meudon, Fr.), French writer and physician. Céline received his medical degree in 1924 and travelled extensively on medical missions for the League of Nations. In 1928 he opened a practice in a suburb of Paris, writing in his spare time. He became famous with his first novel, *Voyage au bout de la nuit* (1932; *Journey to the End of Night,* 1934), the story of a man's tortured and hopeless search for mean-

ing, written in a vehement and disjointed style that marked its author as a major innovator of 20th-century French literature. There followed *Mort à crédit* (1936; *Death on the Installment Plan*), a similarly bleak portrayal of a world bereft of value, beauty, and decency.

Though a favourite of the left wing, Céline was disenchanted by a visit to the Soviet Union and said so in *Mea Culpa* (1937). He later developed fanatically anti-Semitic sentiments, expressed in three notorious pamphlets: *Bagatelles pour un massacre* (1937; "Trifles for a Massacre"), *L'École des cadavres* (1938; "School for Corpses"), and *Les Beaux Draps* (1941; "The Fine Mess"). These works also excoriated the French.

At the outbreak of World War II, Céline enlisted in the ambulance service, but after the fall of France in 1940 he rejected both collaboration and resistance and returned instead to work at a dispensary at Bezons. Fearing that he would be charged with collaboration, he fled during the Allied liberation of France to Denmark via Germany, which was then undergoing the height of the Allied bombing campaigns. In Denmark he was imprisoned for more than a year after French officials charged him with collaboration and demanded his extradition. He returned to France in 1951 after a military tribunal in Paris granted him amnesty. On his return, he resumed the practice of medicine and continued to write. His last works, a trilogy composed of *D'un Château l'autre* (1957; *Castle to Castle*), *Nord* (1960; *North*), and *Rigodon* (1969; *Rigadoon*), depict World War II as seen from within Germany; they are viewed by some critics as equal in power and style to his two celebrated early novels. Other works include *Guignol's Band* (1944), *Casse Pipe* (1949; "Shooting Gallery"), and *Entretiens avec le Professeur Y* (1955; "Conversations with Professor Y").

During the 1930s Céline enjoyed a high reputation, but it diminished during and after the war years because of his increasingly vicious and hysterical misanthropy. The relentless despair, amorality, rage, and pornography of his works continue to disturb some contemporary critics, who object to his underlying viewpoint even when they praise his apocalyptic lyricism. Other contemporary critics find a paradoxical humanism in Céline's agonized rhetoric and interpret his ravings as a revolt against the world's intolerable evil.

cell, in biology, the basic unit of which all living things are composed. The cell is the smallest structural unit of living matter that is capable of functioning independently. All cells are similar in composition, form, and function. A single cell can be a complete organism in itself, as in bacteria and protozoans. Groups of specialized cells are organized into tissues and organs in multicellular organisms such as the higher plants and animals.

A brief treatment of the cell follows. For full treatment, *see* MACROPAEDIA: Cells: Their Structures and Functions.

Cells were first observed in the 17th century, shortly after the discovery of the microscope. Their significance, however, was not understood until the early 19th century, when improvements in microscopy permitted closer observation.

Cells are made up of macromolecules (giant molecules) and various smaller molecules. The chief macromolecules are nucleic acids (DNA [deoxyribonucleic acid] and RNA [ribonucleic acid]), proteins, and polysaccharides. DNA comprises the genetic code that carries the essential character of the organism from generation to generation. RNA translates the genetic information into proteins, which carry out vital cell functions. Proteins, for example, recognize and transport specific molecules into and out of the cell and catalyze all chemical reactions within the cell. Polysaccharides function as structural molecules in the rigid cell walls of bacterial and plant cells and as storage molecules in the glycogen granules of vertebrate muscle cells.

Important among the smaller molecular components of cells are lipids, ATP (adenosine triphosphate), cyclic AMP (adenosine monophosphate), porphyrins, and water. Lipids are fatty substances that are a major component of cell membranes. ATP is the energy currency of the cell; this energy-rich molecule is formed when the cell needs to store energy and is broken down when the cell requires energy. Cyclic AMP functions as a regulator of cell activities; porphyrins are pigments essential for oxidation and photosynthesis. About 70 to 80 percent of a cell is water, which is vital to the chemistry of life.

There are two distinct types of cells: procaryotic cells, found only in blue-green algae and in bacteria, and eucaryotic cells, composing all other life forms. A eucaryotic cell consists of an outer membrane, cytoplasm that contains various membrane-bound structures (organelles), and a membrane-bound nucleus that encloses the gene-bearing chromosomes. Procaryotic cells have a cell membrane and cytoplasm, but they have no nucleus (their genetic material is organized into a single chromosome) and they lack membrane-bound cytoplasmic organelles. The molecular composition and activities of the two types of cells, however, are very similar.

A cell is bound by a semipermeable membrane (called the plasma membrane) that enables it to exchange certain materials with its surroundings. The plasma membrane is made up of a double layer of lipids studded with proteins. Some of the proteins extend completely through the lipid layer, others only partially penetrate it, and still others are thought to be completely embedded within the lipid layer. In plants the membrane is enclosed in a rigid cellulose cell wall.

The space between cells is filled with the extracellular matrix, a gel of polysaccharides swollen with water molecules in which are suspended protein fibres that hold cells together to form tissues.

Within the cytoplasm of both procaryotic and eucaryotic cells are ribosomes, small bodies that are the sites of protein synthesis. In addition, eucaryotic cells have a variety of separate membrane-bound cytoplasmic organelles with special functions. These organelles include the endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria, and plastids. The endoplasmic reticulum is a network of channels that functions in the movement of materials within the cell. Associated with these channels is the Golgi apparatus, which is composed of sacs that bud off from the endoplasmic reticulum. These sacs transport cell products from the endoplasmic reticulum to their appropriate locations either inside or outside the cell. Lysosomes are sacs filled with digestive enzymes; they are capable of digesting worn-out cell parts or extracellular debris, such as dead cells or foreign microorganisms that have been engulfed by the cell. Mitochondria serve as the power plants of the cell; it is within these organelles that ATP is synthesized. Plastids are found in the cells of most plants but are absent from animal cells. Of immense importance are the plastids known as chloroplasts; they contain the machinery for photosynthesis, the process by which the energy of sunlight is captured to produce carbohydrates.

The nucleus is the control centre of eucaryotic cells. Within this membrane-bound structure lie the chromosomes, which carry the hereditary material. The DNA of the chromosomes directs protein synthesis in the cell; the DNA instructions are carried from the nucleus to the cytoplasm by messenger RNA (mRNA). Procaryotic cells have no membrane-enclosed nucleus. They do, however, have nuclear matter consisting of a single chromosome.

A eucaryotic cell divides, or reproduces, to form two genetically identical daughter cells in a process called mitosis (*q.v.*). Prior to mitosis, the chromosomes replicate, so that there will be a complete set of hereditary instructions for each daughter cell. During mitosis, the doubled chromosomes are separated, with one copy of each going to each daughter cell. Among sexually reproducing eucaryotes, another type of cell division occurs in the formation of sex cells called gametes (*i.e.,* eggs and sperm). This process is known as meiosis (*q.v.*). It produces four gametes, each of which contains half the number of chromosomes of the parent cell. When a male gamete and a female gamete unite, they form a new individual in which the full number of chromosomes is restored.

Procaryotic cells reproduce in various ways, the most common being binary fission. This process involves replication of the cell's lone chromosome and the subsequent splitting of the parent cell into two daughters. It thus resembles mitosis in eucaryotes, but it lacks the special apparatus involved in true mitotic division.

cell, in electricity, unit structure used to generate an electrical current by some means other than the motion of a conductor in a magnetic field. A solar cell, for example, consists of a semiconductor junction that converts sunlight directly into electricity. A dry cell is a chemical battery in which no free liquid is present, the electrolyte being soaked up by some absorbent material such as cardboard. A primary, or voltaic, cell produces electricity by means of a chemical reaction but is not rechargeable to any great extent. The conventional dry cell (*e.g.,* flashlight or transistor-radio battery) is a primary cell. A secondary cell, such as a lead-acid storage battery, is rechargeable, as are some primary cells, such as the nickel–cadmium cell. A fuel cell produces an electrical current by constantly changing the chemical energy of a fuel and an oxidizing agent, separately stored and supplied to a chamber containing electrodes, to electrical energy. Two or more cells connected together are a battery, although in common usage "battery" is also used to designate a single cell.

cell, electrolytic: *see* electrolytic cell.

cell culture, the maintenance and growth of the cells of multicellular organisms outside the body in specially designed containers and under precise conditions of temperature, humidity, nutrition, and freedom from contamination. In a broad sense, cells, tissues, and organs that are isolated and maintained in the laboratory are considered the objects of tissue culture. The techniques of cell culture have allowed scientists to use cultures of cells for experimental studies and for biological assays of many types. *See* tissue culture.

cell division, the process by which cells reproduce. *See* meiosis; mitosis.

cella, Greek NAOS, in Classical architecture, the body of a temple (as distinct from the portico) in which the image of the deity is housed. In early Greek and Roman architecture it was a simple room, usually rectangular, with the entrance at one end and with the side walls often being extended to form a porch. In larger temples, where the cella is open to the sky, a small temple was sometimes placed within. In the Byzantine architectural tradition the naos was preserved as the area of a centrally planned church, including the core and the sanctuary, where the liturgy is performed.

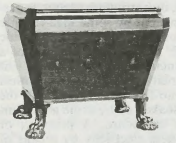
cellar, room beneath ground level, especially one for storing fruits and vegetables, both raw and canned, on a farm. A typical cellar may be beneath the house or located outdoors, partly underground, with the upper part mounded

over with earth to protect from freezing and to maintain fairly constant temperature and humidity. Such a structure is sometimes called a root cellar. The entire enclosure may be concrete, or the floor may be of dirt and the ceiling of logs or timbers treated with preservative. Equipped with a tile drain and air vent, such cellars often double as storm shelters.

Unheated basements of heated and insulated ground-level buildings are sometimes used to store fruits and vegetables for short periods. Outdoor pits or mounds covered with straw, stalks, building paper, and earth are also used, with storage time of several weeks or a few months feasible.

In northern climates cellars have been prevalent in single-family houses and were necessary when gravity heating was used. With forced air heat there is decreasing reason for building such basements, and the storage space can often be better placed above ground.

cellarette, small, movable wine cooler and, later, also a deep, metal-lined tray with compartments for holding bottles in a sideboard.



Mahogany cellarette, New York, early 19th century; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, bequest of Maria P. James, 1911

The term was first used by 18th-century cabinetmakers. Most movable cellarettes were made of mahogany, and designs were varied, the shape governed to some degree by the shapes of wine bottles. Early wine bottles were short and squat, but in the late 18th century they became progressively taller, a trend that was reflected in the depth of cellarettes.

Common varieties were circular or oval, hooped with brass bands, and provided with tapered, fluted legs with castors. Usually kept under the centre of a sideboard or side table, they were rolled out for use. Under the influence of the classical revival in the late 18th and early 19th centuries, sarcophagus shapes were popular. The movable cellarette continued in use after sideboards with built-in wine coolers were introduced in the 18th century and until the introduction of the refrigerator in the 20th century.

Celle, city, Lower Saxony *Land* (state), north-central Germany, on the Aller River, at the southern edge of the Lüneburger Heide (Heath), northeast of Hannover. The old town, Altencelle, was founded about 1248, and Celle (founded 1292) was the residence (1371–1705) of the dukes of Brunswick-Lüneburg. The old town has many fine examples of 16th- to 19th-century half-timbered buildings, including the Hoppener Haus (1532) and the grammar school (1603). The parish church (1308–1675) has the ducal burial vaults, and in the ducal palace (dating from 1292 and modified to baroque in the 17th century) is the oldest theatre in Germany still in use (since 1674–75).

Celle has several technical colleges and forestry, agriculture, bee, and virus research institutes. It has a museum specializing in Lower Saxon exhibits. Wax processing has been carried on since 1698, and one of the oldest dye works on the Continent (1817) is in the city. Other products include biscuits, electronics components, insulators, textiles, mining equipment, petroleum products, potash, and gravel. Horse breeding is important locally, and there are extensive tree nurseries. Pop. (1989 est.) 71,050.

Cellini, Benvenuto (b. Nov. 1, 1500, Florence—d. Feb. 13, 1571, Florence), Florentine sculptor, goldsmith, and writer, one of the most important Mannerist artists and, because of the lively account of himself and his period in his autobiography, one of the most picturesque figures of the Renaissance.

Early career. Cellini, resisting the efforts of his father to train him as a musician, was apprenticed as a metalworker in the studio of the Florentine goldsmith Andrea di Sandro Marcone. Banished to Siena as a result of a brawl in 1516, he returned to Florence during 1517–19 and then moved to Rome. Prosecuted for fighting in Florence in 1523 and condemned to death, he fled again to Rome, where he worked for the bishop of Salamanca, Sigismondo Chigi, and Pope Clement VII. Cellini participated in the defense of Rome in 1527, during which, by his own account, he shot the constable of Bourbon as well as the Prince of Orange.

After the sack of Rome he returned to Florence and in 1528 worked in Mantua, making a seal for Cardinal Gonzaga (Episcopal Archives of the City of Mantua). Moving back to Rome in 1529, he was appointed *maestro delle stampe* ("stamp master") at the papal mint and in 1530–31 executed a celebrated morse (clasp) for Clement VII. Like so many of Cellini's works in precious metals, this was melted down, but its design is recorded in three 18th-century drawings in the British Museum, London. The only survivors of the many works he prepared for the Pope are two medals made in 1534 (Uffizi, Florence).

Guilty of killing a rival goldsmith, Cellini was absolved by Pope Paul III; but in the following year, having wounded a notary, he fled from Rome and settled in Florence, where he executed a number of coins for Alessandro de' Medici (now in the Cabinet des Médailles in the Bibliothèque Nationale in Paris). After a further year in Rome, he paid a brief visit to France, where he was received by Francis I, a portrait medal of whom (1538; Bargello, Florence) is the sole relic of the journey. On his return to Rome in 1537, he was accused of embezzlement and imprisoned. He escaped, was once more imprisoned, and was finally released in 1539 at the insistence of Cardinal d'Este of Ferrara, for whom he executed a seal (*c.* 1540; original lost; lead impression in Lyon). Again invited to France by Francis I, he arrived at Fontainebleau in 1540, carrying with him an unfinished saltcellar, which he completed in gold for the King in 1540. This, Cellini's only fully authenticated work in precious metal (Kunsthistorisches Museum, Vienna), is the supreme example of the Renaissance goldsmith's work. In 1542 Cellini was granted letters of naturalization by the King and in 1544 received a royal commission for 12 silver candlesticks decorated with figures from mythology. The design of one of these, representing Juno, is recorded in a drawing in the Louvre, Paris. Also in 1543–44 he modelled and cast a large bronze lunette of the Nymph of Fontainebleau for the entrance to the palace (Louvre). For a projected fountain at Fontainebleau he prepared a model in 1543 for a colossal figure of Mars (lost).



Saltcellar of Francis I, encrusted enamel and gold by Benvenuto Cellini, 1540; in the Kunsthistorisches Museum, Vienna

By courtesy of the Kunsthistorisches Museum, Vienna

Later years. In 1545 Cellini left Paris precipitately and returned to Florence, where he was welcomed by Cosimo de' Medici and entrusted with the commissions for his best known sculpture, the bronze "Perseus" in Florence's Loggia dei Lanzi, where it still stands, and for a colossal bust of the Grand Duke of Tuscany (Bargello, Florence). Fleeing to Venice in 1546 to escape charges of immorality, Cellini completed the bust by 1548. In the same period he restored an antique torso from Palestrina as "Ganymede" (1546–47; Uffizi, Florence) and carved his marble figures of "Apollo" and "Hyacinth" (1546) and of "Narcissus" (1546–47); all three works are now in the Bargello in Florence, as is a small relief of a greyhound made as a trial cast for the "Perseus" (1545). A bronze bust of a banker and patron of the arts, Bindo Altoviti (*c.* 1550; Isabella Stewart Gardner Museum, Boston), was executed by Cellini in Florence. After the unveiling of the "Perseus" (1554), he began work on a marble crucifix originally destined for his own tomb in the Florentine church of SS. Annunziata; this is now in the church of the royal monastery of the Escorial (Spain). The "Escorial Crucifix" (1556) exemplifies the superiority of Cellini's art to the works of his rivals Bartolommeo Ammannati and Baccio Bandinelli. Two designs for the seal of the Academy of Florence (British Museum and Graphische Sammlung, Munich) date from 1563. His autobiography was begun in 1558 and completed in 1562; and in 1565 he began work on his important treatises dealing with goldsmiths' work and sculpture, the *Trattato dell'oreficeria* and the *Trattato della scultura.*

Cellini's lasting fame is due more to his record of his own life than it is to his work as an artist. First printed in Italy in 1728, Cellini's autobiography was translated into English (1771), German (1796), and French (1822) and, launched on the tide of the Romantic movement, gained immediate popularity. Dictated to a secretary, it is composed in colloquial language with no literary artifice and gives a firsthand account of the writer's experience in the Rome of Clement VII, the France of Francis I, and the Florence of Cosimo de' Medici. Despite its manifest exaggerations and its often boastful tone, it is a human document of surprising frankness and incomparable authenticity, and thanks to it Cellini's character is more intimately known than that of any other figure of his time.

(J.P.-H.)

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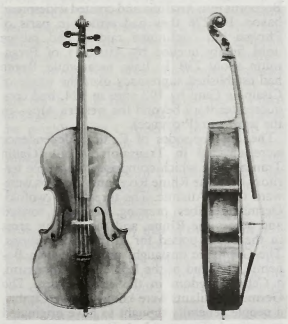
Cellini's halo, also called HEILIGENSCHEIN, bright white ring surrounding the shadow of the observer's head on a dew-covered lawn with a low solar elevation angle. The low solar angle causes an elongated shadow, so that the shadow of the head is far from the observer, a condition that is apparently required for Cellini's halo to be observed.

This phenomenon is generally attributed to reflection of incident sunlight by the dewdrops. Light reflected from the surface of such a drop will be most intense in the backward direction and falls off in intensity as the reflection angle deviates from 180°. The shadow of the observer's head encompasses the precise 180° line, and therefore no light can be reflected from this direction. If this shadow is far enough away, however, light reflected from drops immediately surrounding the observer's head-shadow back to the observer's eye will be reflected through nearly 180°; the farther away the shadow, the more nearly does the angle approach 180°. Hence, the reflected light surrounding the observer's head-shadow under these conditions will be relatively bright, giving rise to Cellini's halo.

cello, also called VIOLONCELLO, French VIOLONCELLE, German CELLO, or VIOLONCELLO, bass musical instrument of the violin group, with four strings, pitched C–G–D–A upward from two octaves below middle C. The cello, about 27½ inches (70 centimetres) long (47 inches [119 centimetres] with the neck), has proportionally deeper ribs and a shorter neck than the violin.



Cello, front and side views
EB Inc

The earliest cellos were developed during the 16th century and frequently were made with five strings. They served mainly to reinforce the bass line in ensembles. Only during the 17th and 18th centuries did the cello replace the bass viola da gamba as a solo instrument. During the 17th century the combination of cello and harpsichord for basso continuo parts became standard. Haydn, Mozart, and later composers gave increased prominence to the cello in instrumental ensembles. Notable works for the instrument include J.S. Bach's six suites for unaccompanied cello, Beethoven's five sonatas for cello and piano, the concertos of Dvořák and Kodály, and the *Bachianas brasileiras* of Heitor Villa-Lobos, for eight cellos and soprano. Outstanding cellists of the 20th century include Emanuel Feuermann and Pablo Casals.

cellophane, regenerated cellulose extruded into thin, flat, transparent sheets. Extrusion through a small hole or spinneret produces a fibre, rayon. Highly impermeable to dry gases, grease, and bacteria, cellophane is used chiefly to package food and other perishables. It is frequently given a moisture-proof coating and is sometimes dyed.

In the manufacturing process, an alkaline solution of cellulose fibres (usually wood or cotton) known as viscose is extruded through a narrow slit into an acid bath. The acid regenerates the cellulose, forming a film. Further treatment, such as washing and bleaching, yields cellophane. The name is trademarked in some countries.

cellular framing (architecture): *see* box frame construction.

cellular respiration, the process by which organisms combine oxygen with foodstuff molecules, diverting the chemical energy in these substances into life-sustaining processes and discarding, as waste products, carbon dioxide and water. Organisms that do not depend on oxygen degrade foodstuffs in a process called fermentation.

One objective of the degradation of foodstuffs is to conserve the energy in them as the energy-rich compound adenosine triphosphate (ATP). In animal cells the enzymes that catalyze the individual steps involved in respiration and energy conservation are located in highly organized rod-shaped compartments of the cell called mitochondria. In microorganisms the enzymes occur as components of the cell membrane. A liver cell has about 1,000 mitochondria; large egg cells of some vertebrates have up to 200,000.

For the most part, the major foodstuffs (carbohydrates, fats, and proteins) are made available for the energy-yielding process by degradation to a two-carbon fragment (acetyl group) that, when combined as acetyl coenzyme A, provides the fuel for an important sequence of metabolic reactions called the tricarboxylic acid cycle (TCA cycle).

Each pair of hydrogen atoms removed from a participant in the TCA cycle provides a pair of electrons that—through the action of a series of iron-containing hemoproteins, the cytochromes—eventually reduces one atom of oxygen to form water. In 1951 it was discovered that the transfer of one pair of electrons to oxygen results in the formation of three molecules of ATP. This process, called oxidative phosphorylation, or respiratory-chain phosphorylation, is the major mechanism by which the large amounts of energy in foodstuffs are conserved and made available to the cell. The series of steps by which electrons flow to oxygen permits a gradual lowering of the energy of the electrons.

cellular slime mold: *see* Acrasieae.

celluloid, the first synthetic plastic material, developed by the U.S. inventor John Wesley Hyatt in 1869 from a homogeneous colloidal dispersion of cellulose nitrate and camphor. A tough material, with great tensile strength, resistance to water, oils, and dilute acids, capable of low-cost production in a variety of colours, it found a great variety of applications in combs, collars, films, toys, and many other mass-produced consumer goods. Although its flammability led to its replacement in many of these uses by newer synthetic polymers, celluloid has continued to be manufactured and widely used in Europe, the United States, Japan, and elsewhere. *See also* Bakelite.

cellulose, a complex carbohydrate, or polysaccharide, consisting of 3,000 or more glucose units. The basic structural component of plant cell walls, cellulose comprises about 33 percent of all vegetable matter (90 percent of cotton and 50 percent of wood are cellulose) and is the most abundant of all naturally occurring organic compounds. Nondigestible by man, cellulose is a food for herbivorous animals (*e.g.*, cows, horses) because they retain it long enough for digestion by microorganisms present in the alimentary tract; protozoans in the gut of insects such as termites also digest cellulose. Of great economic importance, cellulose is processed to produce papers and fibres and is chemically modified to yield substances used in the manufacture of such items as plastics, photographic films, and rayon. Other cellulose derivatives are used as adhesives, explosives, thickening agents for foods, and in moisture-proof coatings.

cellulose acetate, original name ACETATE RAYON, also called ACETATE, man-made textile fibre produced from the plant substance cellulose, which is obtained from soft woods or the short fibres adhering to cotton seeds (linters) and treated with acetic acid and acetic anhydride, and then partially hydrolyzed so that the product, secondary acetate, is soluble in acetone. It forms a cellulose acetate solution that is extruded through fine holes in a nozzle called a spinneret, forming a fibre. Unlike rayon (*q.v.*) it is not converted back to pure cellulose but remains as cellulose acetate. During the manufacturing process, the fibre is slightly stretched, increasing its strength.

Cellulose acetate does not have the same affinity for dyestuffs as rayon and was not generally accepted until suitable dyes were developed. It is sometimes coloured by incorporating pigment in the spinning solution. Acetate is produced in the form of a long filament but is frequently cut into short lengths, or staple fibres, sometimes with crimp (waviness) imparted, to be spun into yarn. Acetate, normally glossy, can be dulled by the addition of appropriate pigments. The fibre is much weaker than nylon or even nylon staple and is also low in elasticity. The fibre can absorb about 6.5 percent of its weight in moisture. Heating produces softening, and melting occurs at about 232° C (450° F). Acetate will burn but is not easily ignited. Aging and exposure to sunlight slightly decrease strength but do not affect colour. Acetate achieved importance as a textile fibre in the 1920s and is valued for its attractive hand (properties perceived by handling) and good draping properties. It does not wrinkle easily when worn and, because of its low moisture absorption, does not easily retain certain types of stains. Acetate garments launder well, retaining their original size and shape and drying in a short time but have a tendency to retain creases imparted when wet. The fibre is used, alone or in blends, in such apparel as dresses, sportswear,

underwear, shirts, and ties and also in carpets and other home furnishings. Because of its good insulation properties, acetate is used as a covering for wire in the electrical industry.

Cellulose triacetate, generally known in the United States by the trade name Arnel, is chemically different from, but related to, secondary acetate, being fully acetylated cellulose. It has greater heat resistance than normal acetate, is faster-drying, and can be permanently pleated by heat setting. It is used, alone or in blends, for knitted and woven fabrics that are especially popular for women's apparel.

cellulose nitrate: *see* nitrocellulose.

Celosia, genus of about 60 species of herbaceous plants, of the amaranth family (Amaranthaceae), native to tropical America and Africa and characterized by alternate leaves and showy flowers in spikes, which in cultivated forms are often fasciated and form compact or feathery clusters. Some species are called woolflower for their dense chaffy flower spikes that somewhat glisten.



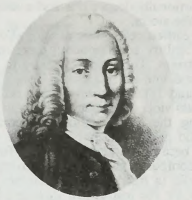
Cockscomb (*Celosia argentea*)
Grant Heilman—EB Inc.

Only a few species are popularly grown for their ornamental effect in gardens. The cockscomb (*C. cristata*) has many varieties, most of which fall into one of three groups. The plumosa group are called feathered amaranths for their plumed spikes; the nana group are dwarf varieties; and the Childsii group have ball-like knobs at the ends of flowering stalks. The range of colours is wide, from white and yellow to shades of orange, red, and purple.

celsian, an uncommon feldspar mineral, barium aluminosilicate ($BaAl_2Si_2O_8$), that occurs as hard, light-coloured, glassy masses and crystals in association with manganese deposits in contact zones, as at Jakobsberg, Swed.; Tochigi prefecture, Japan; Rhiw, Wales; near the Omuramba Otjosondjou (dry riverbed), Namibia; and near Incline, Calif., U.S. It may be regarded as the barium equivalent of another feldspar, anorthite, or calcium aluminosilicate ($CaAl_2Si_2O_8$). Hyalophane is a potassium feldspar containing 5 to 30 percent celsian; it occurs with celsian in contact zones. For detailed physical properties of celsian and hyalophane, *see* feldspar (table).

Celsius, Anders (b. Nov. 27, 1701, Uppsala, Swed.—d. April 25, 1744, Uppsala), astronomer who invented the Celsius thermometer scale (often called centigrade scale).

Celsius was professor of astronomy at the University of Uppsala from 1730 to 1744, and in 1740 he built the Uppsala Observatory. Celsius published in 1733 a collection of 316 observations of the aurora borealis, or northern lights, made by himself and others from 1716 to 1732. He advocated the measurement of an arc of a meridian in Lapland and in



Celsius, detail from a drawing by an unknown artist, 18th century
Archiv fur Kunst und Geschichte, Berlin

1736 took part in the expedition organized for that purpose, which verified Newton's theory that the Earth is somewhat flattened at the poles. In 1742 he described his thermometer in a paper read before the Swedish Academy of Sciences. His other works include *Dissertatio de Nova Methodo Distantiam Solis a Terra Determinandi* (1730; "A Dissertation on a New Method of Determining the Distance of the Sun from the Earth") and *De Observationibus pro Figura Telluris Determinanda in Gallia Habitis, Disquisitio* (1738; "Disquisition on Observations Made in France for Determining the Shape of the Earth").

Celsius temperature scale, also called CENTIGRADE TEMPERATURE SCALE, scale based on 0° for the freezing point of water and 100° for the boiling point of water. Invented in 1742 by the Swedish astronomer Anders Celsius, it is sometimes called the centigrade scale because of the 100-degree interval between the defined points. The following formula can be used to convert a temperature from its representation on the Fahrenheit (°F) scale to the Celsius (°C) value: $°C = \frac{5}{9}(°F - 32)$. The Celsius scale is in general use wherever metric units have become accepted, and it is used in scientific work everywhere.

Celsus, Aulus Cornelius (fl. 1st century AD, Rome), one of the greatest Roman medical writers, author of an encyclopaedia dealing with agriculture, military art, rhetoric, philosophy, law, and medicine, of which only the medical portion has survived. *De medicina,* now considered one of the finest medical classics, was largely ignored by contemporaries. It was discovered by Pope Nicholas V (1397–1455) and was among the first medical works to be published (1478) after the introduction of the printing press.

Most remarkable in Celsus' work is the apparently advanced state of medical practice at the time. He recommended cleanliness and urged that wounds be washed and treated with substances now considered to be somewhat antiseptic, such as vinegar and thyme oil. He described plastic surgery of the face, using skin from other parts of the body. He established the four cardinal signs of inflammation: heat, pain, redness, and swelling.

Divided into three parts, according to the type of treatment demanded by various diseases—dietetic, pharmaceutical, and surgical—the treatise contains the first accounts of heart disease, insanity, and the use of ligatures to stop arterial bleeding. Celsus also offered excellent descriptions of hydrotherapy and lateral lithotomy (for the removal of bladder stones). The historical portion of the work is of great importance; much of what is now known about Hellenistic medicine and Alexandrian anatomy and surgery comes primarily or exclusively from *De medicina.*

Celt, also spelled KELT, Latin CELTA, plural CELTAE, a member of an early Indo-European people who from the 2nd millennium BC to the 1st century BC spread over much of Europe. Their tribes and groups eventually ranged from the British Isles and northern Spain to as far east as Transylvania, the Black Sea coasts, and Galatia in Anatolia and were in part absorbed into the Roman Empire as Britons, Gauls, Boii, Galatians, and Celtiberians. Linguistically they survive in the modern Celtic speakers of Ireland, Highland Scotland, the Isle of Man, Wales, and Brittany.

The oldest archaeological evidence of the Celts comes from Hallstatt, Austria, near Salzburg. Excavated graves of chieftains there, dating from about 700 BC, exhibit an Iron Age culture (one of the first in Europe) which received in Greek trade such luxury items as bronze and pottery vessels. It would appear that these wealthy Celts, based from Bavaria to Bohemia, controlled trade routes along the river systems of the Rhône, Seine, Rhine, and Danube and were the predominant and unifying element among the Celts. In their westward movement the Hallstatt warriors overran Celtic peoples of their own kind, incidentally introducing the use of iron, one of the reasons for their own overlordship.

For the centuries after the establishment of trade with the Greeks, the archaeology of the Celts can be followed with greater precision. By the mid-5th century BC the La Tène culture, with its distinctive art style of abstract geometric designs and stylized bird and animal forms, had begun to emerge among the Celts centred on the middle Rhine, where trade with the Etruscans of central Italy, rather than with the Greeks, was now becoming predominant. Between the 5th and 1st centuries BC the La Tène culture accompanied the migrations of Celtic tribes into eastern Europe and westward into the British Isles.

Although Celtic bands probably had penetrated into northern Italy from earlier times, the year 400 BC is generally accepted as the approximate date for the beginning of the great invasion of migrating Celtic tribes whose names Insubres, Boii, Senones, and Lingones were recorded by later Latin historians. Rome was sacked by Celts about 390, and raiding bands wandered about the whole peninsula and reached Sicily. The Celtic territory south of the Alps where they settled came to be known as Cisalpine Gaul (Gallia Cisalpina), and its warlike inhabitants remained an ever-constant menace to Rome until their defeat at Telamon in 225.

Dates associated with the Celts in their movement into the Balkans are 335 BC, when Alexander the Great received delegations of Celts living near the Adriatic, and 279, when Celts sacked Delphi in Greece but suffered defeat at the hands of the Aetolians. In the following year, three Celtic tribes crossed the Bosporus into Anatolia and created widespread havoc. By 276 they had settled in parts of Phrygia but continued raiding and pillage until finally quelled by Attalus I of Pergamum about 230. In Italy, meanwhile, Rome had established supremacy over the whole of Cisalpine Gaul by 192 and, in 124, had conquered territory beyond the western Alps—in the *provincia* (Provence).

The final episodes of Celtic independence were enacted in Transalpine Gaul (Gallia Transalpina), which comprised the whole territory from the Rhine River and the Alps westward to the Atlantic. The threat was twofold: Germanic tribes pressing westward toward and across the Rhine, and the Roman arms in the south poised for further annexations. The Germanic onslaught was first felt in Bohemia, the land of the Boii, and in Noricum, a Celtic kingdom in the eastern Alps. The German assailants were known as the Cimbri, a people generally thought to have originated in Jutland (Denmark). A Roman army sent to the relief of Noricum in 113 BC was defeated, and thereafter the Cimbri, now joined

by the Teutoni, ravaged widely in Transalpine Gaul, overcoming all Gaulish and Roman resistance. On attempting to enter Italy, these German marauders were finally routed by Roman armies in 102 and 101. There is no doubt that, during this period, many Celtic tribes, formerly living east of the Rhine, were forced to seek refuge west of the Rhine; and these migrations, as well as further German threats, gave Julius Caesar the opportunity (58 BC) to begin the campaigns that led to the Roman annexation of the whole of Gaul.

The Celtic settlement of Britain and Ireland is deduced mainly from archaeological and linguistic considerations. The only direct historical source for the identification of an insular people with the Celts is Caesar's report of the migration of Belgic tribes to Britain, but the inhabitants of both islands were regarded by the Romans as closely related to the Gauls.

Information on Celtic institutions is available from various classical authors and from the body of ancient Irish literature. The social system of the tribe, or "people," was threefold: king, warrior aristocracy, and freemen farmers. The druids, who were occupied with magico-religious duties, were recruited from families of the warrior class but ranked higher. Thus Caesar's distinction between *druides* (man of religion and learning), *eques* (warrior), and *plebs* (commoner) is fairly apt. As in other Indo-European systems, the family was patriarchal. The basic economy of the Celts was mixed farming, and, except in times of unrest, single farmsteads were usual. Owing to the wide variations in terrain and climate, cattle raising was more important than cereal cultivation in some regions. Hill forts provided places of refuge, but warfare was generally open and consisted of single challenges and combat as much as of general fighting. La Tène art gives witness to the aesthetic qualities of the Celts, and they greatly prized music and many forms of oral literary composition.

celt, characteristic New Stone Age tool, a polished stone ax or adz head designed for attachment to a wooden shaft and probably mainly used for felling trees or shaping wood. Great numbers of celts have been discovered in sites in the British Isles and Denmark; they were obviously traded widely. Bronze Age tools of similar general design are also called celts.

Celtes, Conradus (German scholar): *see* Celtis, Conradus.

Celtiberia, an area in present northeastern central Spain occupied from the 3rd century BC onward by tribes of mixed Iberian and Celtic stock. These Celtiberians inhabited the hill country between the sources of the Tagus (Tajo) and Iberus (Ebro) rivers, including most of the modern province of Soria and much of the neighbouring provinces of Guadalajara and Teruel. In historic times the Celtiberians were composed of the Arevaci, Belli, Titti, and Lusones. The earliest population of Celtiberia was that of the southeastern Almería culture of the Bronze Age, after which came Hallstatt invaders, who occupied the area shortly before 600 BC. The Hallstatt people were in turn subjugated by the Arevaci, who dominated the neighbouring Celtiberian tribes from the powerful strongholds at Okilis (modern Medinaceli) and Numantia (*q.v.*). The Belli and the Titti were settled in the Jalón valley, the Sierra del Solorio separating them from the Lusones to the northeast.

The material culture of Celtiberia was strongly influenced by that of the Iberian people of the Ebro valley. Horse bits, daggers, and shield fittings attest the warlike nature of the Celtiberians, and one of their inventions, the two-edged Spanish sword, was later adopted by the Romans.

The Celtiberians first submitted to the Romans in 195 BC, but they were not completely under Roman domination until 133 BC, when Publius Cornelius Scipio Aemilianus destroyed Numantia. The Roman city of Clunia (Peñalba de Castro) later became the administrative centre.

Celtiberian language: *see* Celto-Iberian language.

Celtic Church, the early Christian church in the British Isles, founded in the 2nd or 3rd century. Highly ascetic in character, it contributed to the conversion of the Anglo-Saxons in the 7th century, but its organization soon gave way to that of Rome. It survived in Wales until the 11th century and in Scotland and Ireland until the 12th.

Celtic languages, also spelled KELTIC, a branch of the Indo-European language family, spoken over much of western Europe in Roman and pre-Roman times and currently known chiefly in the British Isles and Brittany.

A brief treatment of the Celtic languages follows. For full treatment, *see* MACROPAEDIA: Languages of the World.

The Celtic languages can be divided geographically and chronologically into the Continental Celtic language (or languages), generally called Gaulish and only slightly known from inscriptions and classical references, and Insular Celtic, which consists of the modern Celtic languages, divided into Goidelic (Irish, Manx, Scottish Gaelic) and Brythonic (Welsh, Cornish, Breton) groups.

These Celtic languages may be tentatively traced back to Common Celtic, which was the parent language of both the Continental and Insular Celtic languages. Old Irish, the most archaic Celtic language of which substantial records exist and thus the closest in structure to Common Celtic, suggests that Common Celtic retained features of its ancestral language, Indo-European, both in its consonantal and vowel systems and in grammar, or structure. The speakers of Common Celtic probably lived in the eastern part of central Europe, some of them close to the Germanic peoples.

The modern Celtic languages, all of which are descended from Insular Celtic, are the only Celtic languages known thoroughly, and in them are found many linguistic features that seldom occur in other Indo-European languages, features which might possibly be explained by the influence of a non-Celtic people who continued to live in Britain after the Celtic invasion of about 500 BC.

Of the three Modern Irish languages—Irish, Scottish Gaelic, and Manx—Irish has the longest written history. Following the period of the ogham inscriptions (AD 300–500), the Latin alphabet was introduced into Ireland, and soon the oral tradition was being committed to literary form. This period, from 600 to 900, is known as the Old Irish period. The Viking raids of the 8th century disrupted the monastic order, which had guarded the purity of the language, and about 900, with the beginning of the Middle Irish period, popular forms began to enter the language. The Anglo-Norman invasion may have inspired the Irish literati to standardize the language once again, and about 1200 this restandardization opened the Modern Irish period. As English power was consolidated in Ireland in the 17th century, the English language became more widely spoken and Irish less so, so that today fewer than 50,000 speak Irish as their native language, although about 300,000 can read it.

Modern Irish was also the literary standard in Scotland until the 17th century, when the Scottish poets began composing in their native dialects. Scottish Gaelic, too, has been threatened by English, but the number of native speakers is perhaps over 80,000. In the Isle of Man, Manx was first written down in 1610, and in the 18th century few inhabitants understood English. In the 19th century, however, speaking of Manx rapidly declined until, in the early decades of this century, it ceased to be spoken.

Though there is a fragmentary literary record for Welsh from the 8th to the 12th century, a continuous record begins only in the 12th century in the form of poetry. Though English began to flourish in Wales, the decline of Welsh was stopped by the Methodist revival of the 18th century, which put Welsh Bibles and other religious books in every home. As the Industrial Revolution brought English-speaking workers to the mines and factories of Wales, Welsh again suffered. By 1901 less than half the population spoke Welsh and, by the late 20th century, less than a quarter, though much of rural Wales is Welsh-speaking, and recent efforts have been made to increase its use in the schools.

No literary texts are available for Breton until the 15th century, and from that time the dialects became more and more divergent. In the early decades of this century, efforts have been made to standardize four dialects of Breton, but, because of French official policy excluding Breton from the schools, few children are brought up learning Breton.

Like those in Breton, Cornish literary texts began to appear only in the 15th century. At the beginning of the 18th century, Cornish was still spoken sporadically, but it ceased to be spoken by the end of the century.

Celtic literature, the body of writings composed in Gaelic and the languages derived from it, Scottish Gaelic and Manx, and in Welsh and its sister languages, Breton and Cornish.

A brief account of Celtic literature follows. For full treatment, *see* MACROPAEDIA: Celtic Literature.

Ireland never became part of the Roman Empire, preserving its Celtic culture far better than did those regions of Britain (Scotland, Wales, and Cornwall) that were least Romanized, and it did not succumb to the Anglo-Saxon invasion. It did, however, embrace Christianity, and the Druids, as priests of pagan gods, disappeared. Their successors, who fostered the native culture, were called *filid,* a word that originally meant "seers" and came to signify poets, suggesting that they were thought to retain some of the prophetic powers of their predecessors. They were primarily an order of learned men, however, responsible for keeping and transmitting the nation's oral traditions. They left fragments of genealogies and laws, in verse, no doubt for easy memorizing. Christianity had its own culture and its own learned men, who in Ireland tolerated the native culture more than in other countries. They also brought the art of writing, which, left to themselves, the Irish could not have developed for many generations, so that a great flowering of culture occurred, both secular and ecclesiastical. Irishmen soon became known to Europe as Christian missionaries, but in the 9th century they were better known as scholars, for, under the impact of the Viking invasions, the old monastic system crumbled and many learned Irishmen fled their country, taking valuable manuscripts with them. After the Vikings were repulsed, there was a cultural revival, although the emphasis was on Gaelic, rather than on Latin, learning. Ireland was therefore well placed to take advantage of the 12th-century Renaissance, although the Anglo-Norman invasion of the time brought social disruption. Even so, there were some beneficial effects, such as further Romanization of the church and greater contacts with the European continent.

Ecclesiastical scholars renewed their efforts to write down traditions that were still basically oral. The *Book of the Dun Cow* and, later, the *Book of Leinster,* both of the 12th century,

testify to their success. These manuscripts and those of a later period, such as the 16th-century *Book of the Dean of Lismore,* which includes the work of Scottish Gaelic poets and shows that Irish culture was shared by the Gaelic Scots throughout the European Middle Ages, have preserved a body of literature remarkable in extent, variety, and archaic features. Its tales form different cycles: the Ulster, Mythological, Historical, and Fenian. The most famous tale in the most important cycle, that of Ulster, is *The Cattle Raid of Cooley.* It describes the epic struggle of the men of Connaught under Queen Medb against the men of Ulster under King Conchobar supported by Cú Chulainn, the greatest of all Irish heroes, although he was subsequently superseded in popular favour by Fionn, the hero of the Fenian cycle (one of many changes in popular taste that affected Irish literature in the 12th century).

Although they contain archaic features, the Welsh tales, 11 in number and collectively called the *Mabinogion,* are of a later age than are the Irish ones and are preserved in later manuscripts, notably the *White Book of Rhyderch* and the *Red Book of Hergest,* both of about the 14th century. The most famous of them, "The Four Branches of the Mabinogi," of the second half of the 11th century or later, has a much more sophisticated narrative style than has "Culhwch and Olwen" (*c.* 1100), which retains pronounced folk-tale characteristics. King Arthur is featured in the latter and in the three romances, "Owain and Luned," "Geraint and Enid," and "Peredur the Son of Efrawg," which correspond to the "Yvain," "Erec," and "Perceval" of the 12th-century French poet Chrétien de Troyes, although the precise relationship between the two canons is still disputed. The chronicler Geoffrey of Monmouth's *Historia regum Britanniae* (*c.* 1136) launched the Arthurian legend and Celtic motifs into the mainstream of European literature. Geoffrey was descended from a Breton family that had entered Britain with the Normans, and the Bretons were renowned at the time as storytellers, so that Brittany may well have been another source of Celtic legend. Unfortunately, neither Breton nor Cornish has preserved any distinctively Celtic medieval prose or poetry other than the Breton political prophesy, *The Dialogue between Arthur and Guenglaff,* found in a manuscript from about 1450.

Apart from a few fragments of poems, no early Breton literature has survived. The Middle Breton texts extant are mostly of the 16th century or later and are largely derivative. They may be divided into religious poems, the longest of which is *The Mirror of Death* (1519), and religious plays in verse form, three of which present the lives of St. Nonn, St. Gwenole, and St. Barbara. *The Life of St. Catherine* (published 1576), although only a translation, is the first substantial prose work extant. The first literary text in Middle Cornish to survive is a dramatic composition (*c.* 1400) in which a girl is praised for her virtues and offered as a wife. From the 15th century there is a long poem, *The Passion of Our Lord;* a dramatic trilogy, the *Ordinalia;* and from 1504 *The Life of Meriasek.* The first and only Modern Cornish composition *Gwreans an Bys* (1611; *The Creation of the World*), appeared as the language began to decline. It seems clear that the bardic order so typical of the Celts in Ireland, Scotland, and Wales failed either to establish itself or to survive in Cornwall and Brittany.

The Gaelic, Scottish Gaelic, and Welsh bards in the later Middle Ages continued the tradition of laudatory poetry that they had inherited from their predecessors; indeed, it became their main genre. They continued to be trained in schools of different kinds. This training was reflected in the highly traditional content of their poems, in the extremely intricate nature of their well-named "strict" metres—the Irish *dán direach* and the Welsh *canu caeth*—and their consistently fine craftmanship. In Ireland the poets were increasingly members of bardic families, such as the O'Dalys. They restricted the scope of their compositions almost exclusively to praise of the lords on whom they depended for patronage; they insisted on greater strictness in rhyme and lavishness of poetic ornament; and they specialized in two related fields of traditional lore, the historical and the genealogical. When patronage ceased with the disappearance of the native nobility, the bardic schools were disbanded and the *dán direach* metres gave way to the simpler, although still well-embellished, *amhrán,* or song metres. Welsh poetry had begun with the early 6th-century bards, Taliesin and Aneirin in particular; it underwent a revival in the 12th and 13th centuries in the poems, mainly *awdlau,* or odes, of the poets of the princes and continued in the poems, mainly *cywyddau,* of the poets of the nobility and landed aristocracy. With the gradual Anglicization of the latter from Tudor times onward, the poets lost their patrons and were unable to maintain their professional status and standards. The *cywydd* had replaced the *awdl* partly because one of its first practitioners was a poet of outstanding genius, Dafydd ap Gwilym (fl. 1340–70), but its golden age was the century from 1435 to 1535. The *canu caeth* metres, including the *cywydd,* lost popularity to the "free metres" but continued to be used.

The invention of printing, the Renaissance, and the Reformation (the latter particularly strongly resisted in Ireland) made little immediate impact on Celtic culture other than in Wales, where humanism made itself felt and the influence of the Bible translated into Welsh was profound. In the 18th century the Methodist revival brought Protestantism home to Welshmen now literate for the first time, producing their greatest hymn writer, William Williams (1717–91). The medieval attitude lingered on in parts of Ireland, Scotland, and Brittany long after it had disappeared elsewhere; consequently, those parts remained exceptionally rich in folklore up to the 20th century.

The long absence of any native self-government, together with nonvernacular educational policies, delayed the development of Celtic-language prose to meet the needs of modern life, as well as the adoption of new literary forms such as the novel. The decline of Celtic languages forced users to become bilingual, while writers tended to adopt the second or foreign tongue as a means of literary expression: hence the existence of Anglo-Irish, Anglo-Scottish, Anglo-Welsh, and Franco-Breton schools of writing. Nevertheless, the various language-revival movements have produced writers who use Irish, Scottish Gaelic, Welsh, and Breton with great vitality to compose remarkably successful novels, short stories, and plays, as well as some strikingly modern poetry.

Celtic religion, the religious beliefs and practices of the ancient Celts.

A brief treatment of Celtic religion follows. For full treatment, *see* MACROPAEDIA: European Religions, Ancient.

Because of their great reverence for the art of memory, the pre-Christian Celts themselves left no writings. Other than a few inscriptions, the principal sources of modern information about them are contemporary Greek and Latin writers, notably Poseidonius, Lucan, and Julius Caesar. Insight can also be gleaned from the sagas and myths, particularly of Ireland and Wales, that were recorded by native Christian monks centuries later.

Celtic myth is for the most part a disorganized collection of remnants, difficult to sort out. Roman writers such as Caesar made a great effort to syncretize the Gallic gods with their own. While a common Indo-European heritage did manifest itself in certain parallels between the two cultures, their contrasts were far more striking. Celtic "theology" and "eschatology" were pervaded by a spirit of animism and a dreamlike consciousness that bore little resemblance to the rather impersonal Roman state religion.

Among the male Celtic deities, the god Lugus (or Lug) was prominent. Greek writers identified him with the sun god Apollo, with whom he shared also the mastery of crafts and the patronship of music. Caesar appears to have associated him with Mercury because of his ubiquitousness. Another important god is Cernunnos, the stag-horned, shamanistic Lord of the Animals. Stags play an integral part in the Celtic literature recorded in the early Christian period, apparently embodying the attributes of the shaman. Many other animals, including the raven, the crane, the bull, and the boar, are also accorded divine significance.

Among the female deities, the mare goddess, variously called Epona (Gaul), Macha (Ireland), and Rhiannon (Britain), is a very powerful force, as is the crow-goddess Morrígan. These two figures seem to have ruled most closely the fortunes of king and tribe, the former personifying fertility, the latter, death and rebirth.

Goddesses frequently manifested themselves in triple aspects or in groups of three. Examples include the Gallic Matronae, or three mothers; the Irish Brigits, who rule over poetry, healing, and metalcraft; and the "great queen" Morrígan, whose three aspects represent death-prophecy, battle-panic, and death-in-battle. According to Lucan, the Gauls also had a triple god in whose honour they practiced human sacrifice. His aspects comprise thunder, war, and a mysterious bull, which may represent fertility.

Celtic worship centred upon the interplay of the "otherworld" or divine element with the land and the waters. Wells, springs, rivers, and hills were believed to be inhabited by guardian spirits, usually female, the names of which survive in many place-names. The land itself was regarded anthropomorphically as feminine. The ocean, ruled by the god Manannán, was also, particularly in British and Irish cosmology, a force of great magic and mystery.

The Celtic otherworld was conceived of as a group of islands far across, or sometimes under, the Western ocean. Its eternally young inhabitants were believed to celebrate continuously with feasts, music, and warrior-contests. Many heroes in the Irish sagas are lured away by women from these islands, and later Christian saints were said to have sailed off in search of them.

Based upon a fluid cosmology in which shape-shifting and magic bonds between humans and other creatures are commonplace, Celtic myths point to a strong belief in the transmigration of souls. Such artifacts as the Gundestrup Caldron (found in Denmark) and the so-called Paris relief depict scenes of shamanistic woodland ritual, and much of Celtic poetry well into the Christian period reflects a preoccupation with transformations and animal consciousness. Trees were a central element in ritual, several types of wood being regarded as oracular. The letters of the alphabet and the names of the months were based on tree-symbols. The Druids took their name from an ancient Indo-European word meaning "Knowing the Oak Tree."

Irish cult life revolved around seasonal observances. One of the two greatest yearly festivals was Samain (November 1), Summer's-End, or the Feast of the Dead. The other was Beltine (May 1), Bel's-Fire, which honoured the god Belenus and his province of war as well as other "goings forth" to pasture, to the hunt,

to wooing, etc. These periods were in turn divided by the lesser feasts of Imbolc (February 1), the beginning of the spring season sacred to the goddess Brigid, and Lugnasad (August 1), the feast of the marriage of Lugus and the day of the harvest fair. Christianity absorbed and incorporated these great festivals, some of the original spirit of which can be seen in the corresponding modern observances.

Celtis, Conradus (Latin), Celtis also spelled CELTES, German CONRAD PICKEL (b. Feb. 1, 1459, Wipfeld, near Würzburg [Germany]—d. Feb. 4, 1508, Vienna, Austria), German scholar known as *Der Erzhumanist* ("The Archhumanist"). He was also a Latin lyrical poet who stimulated interest in Germany in both classical learning and German antiquities.

Celtis studied at Cologne and Heidelberg, was crowned poet laureate by the Holy Roman emperor Frederick III at Nürnberg in 1487 (the first German to receive this honour), spent two years in Italian humanist circles, studied mathematics and astronomy at Kraków, and became professor of poetry and rhetoric in Ingolstadt in 1491. In 1497 Maximilian I appointed him professor in Vienna, where Celtis founded, on Italian models, a centre for humanistic studies, the Sodalitas Danubiana.

Celtis rediscovered the manuscripts of Germany's first woman poet, the 10th-century nun Hrosvitha, and also the so-called Peutinger Table, a map of the Roman Empire. Among his scholarly works were editions of Tacitus' *Germania* (1500), Hrosvitha's plays (1501), and the 12th-century poem on Barbarossa, *Ligurinus* (1507).

The dominant theme of patriotism that partly inspired these editions is an important element in Celtis' works. German greatness past and present is a recurrent theme, as in his inaugural lecture at Ingolstadt (*Oratio,* 1492); in it, in a nationalistic, anti-Italian tone, he commends the study of poetry, eloquence, and philosophy as a foundation for personal and political virtue. Celtis' masques with music, *Ludus Dianae* (1501) and *Rhapsodia* (1505), were early forerunners of Baroque opera. His greatest work, however, is his lyric poetry—*Odes* (published posthumously, 1513), *Epigrams* (in manuscript until 1881), and especially *Amores* (1502), love poems of forthright sensuality and true lyrical intensity.

Celto-Iberian language, also spelled CELT-IBERIAN, extinct Indo-European language of the western part of the Iberian Peninsula. Celto-Iberian was written in the Iberic script (borrowed from speakers of the non-Indo-European Iberian language in eastern and southern Spain) and is known primarily from a small number of coin inscriptions and an even smaller number of inscriptions on stone. Leading scholars believe Celto-Iberian to be an archaic Celtic dialect.

Cemal Paşa, in full AHMED CEMAL PAŞA (b. May 6, 1872, Constantinople, Ottoman Empire [now Istanbul, Tur.]—d. July 21, 1922, Tiflis, Georgia, Transcaucasian S.F.S.R. [now Tbilisi, Georgia]), Turkish army officer and a leading member of the Ottoman government during World War I.

Cemal joined the secret Committee of Union and Progress while a staff officer, becoming a member of the military administration after the Revolution of 1908. A forceful provincial governor, he was made head of security forces in Constantinople and then minister of public works. When World War I broke out, Cemal was, with Talat Paşa and Enver Paşa, one of the government's most influential men. After attempting unsuccessfully to invade Egypt, he was made governor of Syria, and he persecuted the Armenian minority there. After the war he served the new Turkish republic until his assassination by an Armenian nationalist.

cement, in building and engineering construction, finely ground powder that when mixed with water, sets and hardens into a solid mass. Other types of cements are used as binding materials generally classed as adhesives.

A brief treatment of cement follows. For full treatment, *see* MACROPAEDIA: Industrial Glass and Ceramics.

The ancient Romans made cement from lime and volcanic ash and used it extensively in building throughout their empire. In 1824 the British engineer Joseph Aspdin patented portland cement, naming it portland because, in colour, it resembled the limestone quarried on the Isle of Portland. This type proved stronger and more water-resistant for longer periods of time than previous forms and soon became the most widely used cement.

Limestone and clay are the two most common raw materials from which portland cement is made. These contain the four basic ingredients of cement: calcium carbonates (found in limestone), silica, alumina, and iron oxide (found in clay). In the manufacture of cement, the ingredients are crushed and ground to a fine powder, blended to the desired proportions, and heated in a kiln at high temperatures. This last process forms lumps, called clinkers, which are then mixed with gypsum to retard the setting of the cement. Special ingredients may be added to produce cement with special properties—for example, oil-well cement (designed to resist the high temperatures and pressures found in deep wells) and waterproof cements. The mixture is then pulverized into a fine, even powder. The hardening of portland cement when it is mixed with water largely results from the hydration of the calcium silicates in it to form a colloidal gel. This in turn forms a hard, solid mass when the remaining water content evaporates.

Other types of cement include slag cement, made with slag by-products of blast furnaces producing pig iron, and high aluminum cement, made with a high concentration of aluminates. These are often used for their ability to resist attack by chemicals such as the sulfates present in air pollution. Cements made from gypsum are used in plaster and plasterboard. Other types of cements have been made from plastics, resins, and other natural and synthetic materials.

Cement is used by itself for only a small number of purposes, such as for grout. It generally is mixed with a filler material, called an aggregate. Mixed with sand, cement forms mortar, used in masonry construction, and, with gravel or crushed stone, it forms concrete. Concrete, which is sturdy, flexible, and inexpensive, is the world's most widely used building material.

cementation, in geology, hardening and welding of clastic sediments (those formed from preexisting rock fragments) by the precipitation of mineral matter in the pore spaces. It is the last stage in the formation of a sedimentary rock. The cement forms an integral and important part of the rock, and its precipitation affects the porosity and permeability of the rock. Many minerals may become cements; the most common is silica (generally quartz), but calcite and other carbonates also undergo the process, as well as iron oxides, barite, anhydrite, zeolites, and clay minerals.

It is unclear just how and when the cement is deposited. Part seems to originate within the formation, and part seems to be brought in from outside by circulating waters.

The reverse process, called decementation, also is thought to occur. There is evidence that decementation has occurred in calcareous sandstones, in which case the calcareous cement or grains are dissolved in the same manner as the solution of limestones. The frosted and etched surfaces of quartz grains in some friable and loosely cemented sandstones seem to indicate the former presence of a carbonate cement that has been leached.

cementum, also called CEMENT, in anatomy, thin layer of bonelike material covering the roots and sometimes other parts of the teeth of mammals. Cementum is yellowish and softer than either dentine or enamel. It is made by a layer of cementum-producing cells (cementoblasts) adjacent to the dentine. The fibres of the periodontal membrane, which holds the tooth in its socket, are embedded in the cementum. Deposition of cementum continues throughout the life of the animal, especially in response to stresses. In humans, for example, as the tooth crown wears down, new cementum is deposited on the roots so that the tooth gradually rises higher in the socket and good occlusion (bite) is maintained.

cemetery, place set apart for burial or entombment of the dead. Reflecting geography, religious beliefs, social attitudes, and aesthetic and sanitary considerations, cemeteries may be simple or elaborate—built with a grandeur that overshines the community of the living. Also, the places may be regarded as "holy fields" or taboo areas. In countries such as Japan and Mexico, cemeteries are festival places on certain occasions set aside to honour the dead. In other countries and among other religious groups, they are simple and stark and generally shunned.

In most cultures, providing a place for the dead was originally a family obligation because of the widespread belief that ties of kinship last beyond death. The land bought by the biblical Abraham from the sons of Heth had as a principal feature a cave in which his dead could be buried. Having a family mausoleum or graveyard is a custom that has endured in many parts of the world. Their locations have often been selected with great care: in China *fêng shui* ("augury") experts picked sites calculated to provide "good wind and water"; Koreans traditionally hired geomancers to divine auspicious locations, out of the range of vision of "baleful spirits." The desire to be united with ancestors has been very strong. Dutiful Asian sons return the bodies of their parents to Japan and China at sometimes enormous cost; in the Western world, bodies are frequently shipped by air, rail, and boat "back home." Even when the tribe or the community took over the obligation, burial in the communal graveyard was a jealously guarded privilege. Strangers could dwell in towns and cities but could not be buried in their cemeteries. Special cemeteries for criminals, foreigners, and the poor were set up by the ancient Jews, the Romans, and other peoples. In Europe from the medieval period until well into the 19th century, convicted witches and murderers, along with suicides, were excluded from cemeteries.

Sanitary precautions have influenced the nature and location of cemeteries. Romans and Jews, for example, regarded cemeteries as hazardous and established their graveyards outside the walls of Rome and Jerusalem. The ancient Egyptians and the Chinese also shared this concern for sanitation. Christians, on the other hand, had no such concern: they used catacombs as combined mass graves and places of worship, and, when they were allowed to practice their religion freely, they buried the dead in churches and churchyards. Overcrowding became very common after the 6th century, when many secular authorities decided to revert to the Roman custom of permitting burial only outside the walls of the city. Church land was not subject to secular sanitary laws, however, and during the European Middle Ages and Renaissance the problem intensified.

By the middle of the 18th century the con-

sequences of overcrowded churchyard burial and the lack of adequate space for further burial within city limits had become a matter of public apprehension. The vaults under the pavements of the churches and the small spaces of open ground surrounding them were crammed with coffins. Many such buildings became direct sources of disease to those who frequented them. In the churchyards, coffins were placed tier above tier in the graves until they were within a few feet (or sometimes even a few inches) of the surface, and the level of the ground was often raised to that of the lower windows of the church. To make room for fresh interments, the sextons had recourse to the surreptitious removal of bones and partially decayed remains, and in some cases the contents of the graves were systematically transferred to pits adjacent to the site, the gravediggers appropriating the coffin plates, handles, and nails to be sold as waste metal. As a result of these practices, the neighbourhoods of the churchyards were usually unhealthy and their sight intolerable.

In all the large towns these practices prevailed to a greater or lesser degree. In London, however, because of the immense population and the consequent mortality, they more readily attracted public attention; and, after more than one partial measure of relief had been passed, the churchyards were, with a few exceptions, finally closed by law in 1855. Several London cemeteries had been established by private enterprise earlier, but the Burial Acts of 1855 marks the start of general development of cemeteries in Great Britain and Ireland. Burial within the limits of cities and towns was almost everywhere abolished, and where it was still allowed it was surrounded by safeguards that made it practically innocuous.

From 1860 churchyard burials have gradually been discontinued in many countries and have gone through a transition from single burial plots on private property, to church graveyards, to cemeteries and now to memorial parks where the graves are marked with flat metal markers instead of the customary gravestones. One of the largest 19th-century projects was England's Brookwood, organized by the London Necropolis Company. It had a private railway station in London and two in the cemetery, its own telegraphic address, and special areas for different religions, nationalities, social organizations, and professions. Perhaps the most famous of the type is California's Forest Lawn. In the United States there continue to be public cemeteries, cooperative cemeteries, church cemeteries, and large, mutually owned cemeteries. In addition to state, county, and municipal cemeteries, the federal government operates a complex of national cemeteries in the United States and abroad for military servicemen and members of their families. In the modern cemetery, lots are sold by the government, religious, commercial, or other organization that has charge. A definite fee is charged for perpetual care, and a charge is made for opening the grave and other duties performed by the sexton or superintendent.

cénacle, a literary coterie formed around various of the early leaders of the Romantic movement in France, replacing the salon as a place for writers to read and discuss their works. An early *cénacle* formed around the brothers Deschamps, literary editors of the short-lived but influential *Muse Française.* When the review ceased publication in 1824, the young contributors shifted to the salon of Charles Nodier, who was then librarian of the Bibliothèque de l'Arsenal, second of the great French libraries. The activities of this group, which included Alphonse de Lamartine, Alfred de Vigny, Alfred de Musset, and Victor Hugo, are described in the *Mémoires* of Alexandre Dumas *père.* Three years later, Hugo and the critic Sainte-Beuve formed a *cénacle* at Hugo's house in the rue Notre-Dame-des-Champs, where other young writers, including Prosper Mérimée, Théophile Gautier, and Gérard de Nerval, joined the group. The entourage of Gautier, Nerval, and Petrus Borel, the more turbulent, bohemian Romantics, became known as the Petit Cénacle. When Hugo's poetic drama *Hernani* was performed in 1830, their clamour and applause supporting the play overwhelmed the scorn of the traditionalists who had come to disparage it, thus ending the battle of the Romantics—the so-called battle of *Hernani*—for the demise of the outmoded dramatic conventions of Classicism.

Cenci, Beatrice (b. Feb. 6, 1577, Rome [Italy]—d. Sept. 11, 1599, Rome), young Roman noblewoman whose condemnation to death by Pope Clement VIII aroused public sympathy and became the subject of poems, dramas, and novels, including *The Cenci* (1819) by Percy Bysshe Shelley and *Beatrice Cenci* (1958) by Alberto Moravia.

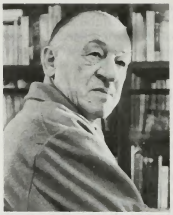


Beatrice Cenci, oil painting by Guido Reni; in the Galleria Nazionale, Rome
Alinari—Art Resource/EB Inc.

Beatrice was the daughter (by his first wife) of Francesco Cenci, a vicious and violent Roman nobleman of great wealth and influence. In 1595 he took his second wife, Lucrezia, with Beatrice, to the lonely castle of La Petrella, in the province of Aquila, imprisoning them there and treating them with great brutality. After various attempts to gain her freedom, Beatrice found refuge in a liaison with the castellan, Olimpio Calvetti.

With Calvetti, her brother Giacomo, and others, she finally planned the murder of her father. He was assassinated on Sept. 9, 1598, and his body thrown from a balcony to create the appearance of an accident. The facts, however, soon came out, and the whole Cenci family was arrested. Lucrezia, Giacomo, and Bernardo, another brother, confessed the crime, and Beatrice, who at first denied everything, even under torture, also ended by confessing. Great efforts were made to obtain mercy for the accused, but Clement refused to grant pardon and Beatrice, Lucrezia, and Giacomo were executed, Bernardo escaping death because of his youth. The Cenci property was confiscated, and this, it was rumoured, was the pope's object in destroying them.

Cendrars, Blaise, pseudonym of FRÉDÉRIC SAUSER (b. Sept. 1, 1887, La Chaux-de-Fonds, Switz.—d. Jan. 21, 1961, Paris, Fr.), French-speaking poet and essayist who created a powerful new poetic style to express a life of action and danger. His poems *Pâques à New York* (1912; "Easter in New York") and *La Prose du Transsibérien et de la petite Jehanne de France* (1913; "The Prose of the Trans-Siberian and of Little Jehanne of France") are combination travelogues and laments.



Cendrars, 1953
Lipnitzki—H. Roger-Viollet

Poetry, to Cendrars, was action sealed into words by bold new devices: simultaneous impressions in a jumble of images, feelings, associations, surprise effects, conveyed in a halting, syncopated rhythm. His novel *Bourlinguer* (1948; "Knocking About") glorifies the dangerous life. His abundant, mainly autobiographical writings were a strong influence on his contemporaries.

The critics long ignored Cendrars, but the American avant-garde writer Henry Miller saw in him a "continent of modern letters." Cendrars received his recognition in 1961 (Grand Prix Littéraire de la Ville de Paris), the year of his death.

Cenis, Mount, French MONT CENIS, Italian MONTE CENSIO, or MONCENSIO, massif and pass over the French Alps to Italy, Savoie *département,* southeastern France, northeast of Briançon and west of the Italian city of Turin. The pass, an invasion route from earliest times, is traversed by a road 24 miles (38 km) long, built by Napoleon I in 1803–10, linking Lanslebourg in the Arc Valley, Savoie, in France, with the Susa Valley, Piedmont, in Italy. The road climbs southeastward from Lanslebourg to Mount Cenis Pass (elevation 6,834 feet [2,083 m]) and passes between two mountain peaks more than 8,200 feet (2,500 m) high. It continues along the Mount Cenis Plateau, past a great reservoir with an area of 2.6 square miles (6.7 square km), contained by a dam 0.9 mile (1.4 km) long.

The Mount Cenis Tunnel (Fréjus Tunnel) below the Fréjus Pass aids travel between Modane, Fr., and Bardonècchia, Italy. It is an engineering landmark in the building of which several techniques were pioneered.

Cennai (city, India): *see* Madras.

Cennini, Cennino (di Drea) (b. *c.* 1370, near Florence [Italy]—d. *c.* 1440, Florence), late Gothic Florentine painter who perpetuated the traditions of Giotto, which he received from his teacher Agnolo Gaddi. He is best known for writing *Il libro dell'arte* (1437; *The Craftsman's Handbook*), the most informative source on the methods, techniques, and attitudes of medieval artists. Painting, according to Cennini, holds a high place among human occupations because it combines theory or imagination with the skill of the hand. In *Il libro dell'arte,* Cennini gave the first known explanation of the technique of painting with egg tempera.

cenobitic monasticism, form of monasticism based on "life in common" (Greek *koinobion*), characterized by strict discipline, regular worship, and manual work. St. Pachomius was the author of the first cenobitic rule, which was later developed by St. Basil the Great (*c.* 329–379). Cenobitic monasticism was introduced in the West by St. Benedict of Nursia and became the norm of the Benedictine order. In the East its major centres were the monastery of Stoudios in Constantinople (now Istanbul, Tur.) and several monastic communities on Mount Athos, in Greece. *Compare* idiorrhythmic monasticism.

Cenomani, a Celtic people of Cisalpine Gaul (northern Italy) who, during the 3rd and 2nd centuries BC, allied with the Romans against other Gallic tribes. After first joining the uprising led by the Carthaginian Hamilcar, an agent of Hannibal in Gaul, in 200 BC, they deserted the Insubres (*q.v.*) during the battle at Larius Lacus (Lake Como) in 196 BC and made their own treaty with the Romans. Their territory was probably bounded by the Ollius (Oglio), Padus (Po), and Athesis (Adige) rivers.

cenotaph (from Greek *kenotaphion,* "empty tomb"), monument, sometimes in the form of a tomb, to a person who is buried elsewhere. Greek writings indicate that the ancients erected many cenotaphs, including one raised by the Athenians to the poet Euripides, though none of these survive. Such existing memorials are distributed mainly in major churches—*e.g.,* in Santa Croce, Florence, where there are memorials to Dante, Niccolò Machiavelli, and Galileo, and in Westminster Abbey and St. Paul's Cathedral, London. The term is now almost wholly applied, however, to national war memorials, notably the London Cenotaph, designed by Sir Edwin Lutyens and completed in 1920.

cenote (from Maya *dz'onot*), natural well or reservoir, common in the Yucatán Peninsula, formed when a limestone surface collapses, exposing water underneath. The major source of water in modern and ancient Yucatán, cenotes are also associated with the cult of the rain gods, or Chacs. In ancient times, notably at Chichén Itzá, precious objects, such as jade, gold, copper, and incense and also human beings, usually children, were thrown into the cenotes as offerings. A survivor was believed to bring a message from the gods about the year's crops.

Cenozoic Era, the third of the major eras of Earth history and the interval of time during which the continents assumed their modern configuration and geographic positions. It was also the time when the Earth's flora and fauna evolved toward those of the present.

A brief treatment of the Cenozoic Era follows. For full treatment, see MACROPAEDIA: Geochronology.

The Cenozoic, from the Greek for "recent life," began about 66.4 million years ago and is divided by international agreement into two periods, the Tertiary (66.4 to 1.6 million years ago) and the Quaternary (1.6 million years ago to the present). The designations Tertiary and Quaternary have been carried over from earlier geologic nomenclature when they were used to distinguish more recent rocks from older ones, which were classified as Primary and Secondary. Some authorities prefer to subdivide the time interval encompassed by the Tertiary into the Paleogene and Neogene periods and dispense with the term Tertiary altogether.

The Tertiary and Quaternary are subdivided into epochs, the Tertiary into the Paleocene (66.4 to 57.8 million years ago), Eocene (57.8 to 36.6 million years ago), Oligocene (36.6 to 23.7 million years ago), Miocene (23.7 to 5.3 million years ago), and Pliocene (5.3 to 1.6 million years ago); the Quaternary into the Pleistocene (1,600,000 to 10,000 years ago) and the Holocene (the last 10,000 years).

The Tertiary Period was a time of mountain building. Major tectonic movements in the Earth's crust resulted in the great mountain ranges of today: the Andes, the Alps, the Himalayas, and the Cascade chain of volcanoes in western North America. The final phase of the Laramide orogeny in the Rocky Mountains also occurred during the Tertiary.

The evolution of plant life in the Tertiary changed the face of the Earth. The angiosperms, flowering plants whose seeds are enclosed for protection and carry their own food supply in their fruit, overtook the gymnosperms, or "naked seed" plants, that were dominant during the Mesozoic Era (245 to 66.4 million years ago). The angiosperms apparently originated in what is now Southeast Asia. They spread rapidly throughout the world, reaching the Arctic and Antarctic regions, which were not ice-capped at the time. The distribution of angiosperms was affected to a degree by the orientation of major mountain ranges. In most of Eurasia the mountains run east-west; in the Americas and Southeast Asia they run north-south. After the great ice ages of the Pleistocene, many of the plants in Eurasia remained in the southern regions when the ice subsided because the mountains blocked their way. In America and Southeast Asia, however, they found their way back to the northern regions.

The most important biological development of the Tertiary was the evolution of the mammals. Two major groups of mammals, the placentals and the marsupials, appeared during the Cretaceous Period (144 to 66.4 million years ago) and radiated rapidly during the early Tertiary. Continental drift was influential in mammalian evolution. Australia was isolated throughout much of the Tertiary and its marsupial population evolved without competition, diversifying into many forms and exploiting various ecological niches. South America had been reached by some specialized placental mammals as well as marsupials. The placentals evolved more successfully, though some marsupials also thrived.

During the Paleocene Epoch mammalian evolution in both the Old and New World accelerated, and many increasingly differentiated forms developed. Among these were the rodents, carnivores, hoofed animals, and primates. During the Pliocene, the first hominoids, with upright posture and modern limb proportions, appeared. From the fossil record it appears that the earliest forms of the genus *Homo* evolved in East Africa, South Africa, and Indonesia. Early modern humans finally emerged during the Pleistocene.

Throughout the Quaternary there occurred successive periods of glacial advance and retreat that considerably affected floral and faunal development in the Northern Hemisphere. Like many other species, the early humans were displaced by the glaciations, but unlike some other animals they adapted to the changing conditions and survived what has been called the Great Ice Age.

censer (incense burner): *see* thurible.

censor, plural CENSORS, or CENSORES, in ancient Rome, a magistrate whose original functions of registering citizens and their property were greatly expanded to include supervision of senatorial rolls and moral conduct. Censors also assessed property for taxation and contracts, penalized moral offenders by removing their public rights, such as voting and tribe membership, and presided at the lustrum ceremonies of purification at the close of each census. The censorship was instituted in 443 BC and discontinued in 22 BC, when the emperors assumed censorial powers.

The censors, who always numbered two, were elected normally at five-year intervals in the Comitia Centuriata (one of the assemblies in which the Roman people voted). Plebeians became eligible in 351 BC for the originally patrician office. Judgments were passed only with the agreement of both incumbents, and the death or abdication of one resulted in the retirement of the other.

censor, in traditional East Asia, governmental official charged primarily with the responsibility for scrutinizing and criticizing the conduct of officials and rulers.

The office originated in China, where, under the Ch'in (221–206 BC) and Han (206 BC–AD 220) dynasties, the censor's function was to criticize the emperor's acts; but, as the imperial office gained prestige, the censorate became mainly an instrument for imperial control of the bureaucracy, investigating acts of official corruption and misgovernment for the emperor. By the T'ang dynasty (618–907), the censorate, or Yü-shih-t'ai, as it was then known, had thus become a major organ of the government. It expanded even further during the Sung dynasty (960–1279) and reached the apogee of its power during the Ming (1368–1644) and Ch'ing (1644–1911) dynasties, when the imperial institution became extremely autocratic. Retitled the Tu-ch'a-yüan in 1380, it was then a huge governmental bureau controlled by two chief censors and composed of four subdivisions.

The censors checked important documents, supervised construction projects, reviewed judicial proceedings, kept watch over state property, and maintained a general lookout for cases of subversion and corruption. Usually recruited from the civil bureaucracy, the censors were generally younger men of relatively low rank who were tenured for a maximum of nine years, after which they resumed their former posts. Their chief power derived from their direct access to the emperor. Some censors, however, were punished for their overzealous criticisms of favoured imperial policies, and this induced others to mute their criticisms and ignore many cases of misgovernment. The major effect of the office was to spread fear throughout the bureaucracy, preventing officials from instituting any kind of radically new or innovative policies.

Although the functions of the censorate were maintained in the Chinese Nationalist and, to a lesser extent, the Chinese Communist governments, the institution effectively ended in China with the overthrow of the Ch'ing dynasty in 1911.

A censorate apparatus was adopted by all the East and Central Asian states that copied the Chinese bureaucratic system. In Korea, because of the relatively weak position of the Korean king and the strength of the aristocracy, the censorate became a highly important organ that not only scrutinized corruption but directly criticized the policies of the monarch. In Korea the original boards of censors (Sahŏnbu and Saganwŏn) were supplemented by the Hongmun'gwan (Office of Special Counselors) and Kyŏngyŏn (Office of Royal Lectures), which eventually became a forum for evaluating state policy and the conduct of the king and officials.

The Tokugawa government (1603–1867) of Japan instituted a censorial system (*metsuke*) in the 17th century for the surveillance of affairs in every one of the feudal fiefs (*han*) into which the country was divided. Many daimyos (lords of fiefs) were transferred to smaller *han* or lost their domains altogether as a result of the unfavourable judgments of the censorate.

censorship, the suppression or prohibition of speech or writing that is condemned as subversive of the common good. It occurs in all manifestations of authority to some degree, but in modern times it has been of special importance in its relation to government and the rule of law.

A brief treatment of censorship follows. For full treatment, *see* MACROPAEDIA: Censorship.

In the ancient world the regulation of the moral, as well as the political, life of a people was considered a proper, if not necessary, role of government. In modern Western society, however, censorship often is considered a relic of an unenlightened and repressive age. A major reason for this difference of opinion is the change in the concept of the individual and his relation to society. Grounded in Christian doctrine and state-of-nature theories about so-

cial organization, the modern belief in the dignity of the individual has severely limited the scope of legitimate power to censor.

In the ancient Greek communities, as in Rome, it was assumed that the character of a people would and should be shaped by that of the government. Even the quite open society of Athens had limits, as indicated by the trial and conviction of Socrates in 399 BC for his corruption of youth and acknowledgment of unorthodox divinities. In the *Republic,* Plato outlines a comprehensive system of censorship, particularly of the arts, as part of the development of the best possible regime.

Such censorship was an integral part of life in ancient Israel, where opinions and actions were routinely governed by the community. But those in a position to know—the prophet Nathan, for example—were expected to speak out against abuses by those in power. This was possible because the community had been trained to share and respect a group of moral principles grounded in thoughtfulness. It led to the encouragement in early Christianity of private, individual testimonies of faith bearing upon the eternal welfare of the soul.

Ancient China was perhaps the largest polity to be thoroughly trained on a vast scale. Of great importance were the systems of education and examination that determined one's place in a social structure that made much of the Confucian insistence upon deference to authority and respect for ritual. Under the Chinese system, control of information was retained by the authorities, who also determined the contents of the authoritative texts.

In Christendom, perhaps the most dramatic form of censorship was the *Index Librorum Prohibitorum,* by which the Roman Catholic church for centuries policed the literature available to its followers. Other methods used by authorities (Catholic and non-Catholic alike) to control what people believed or thought were the development of creeds, such as the Nicene Creed, and the conduct of trials, such as those of Joan of Arc (1431) and Thomas More (1535).

The struggle against censorship in the Anglo-American world began to take its modern form in the 17th and 18th centuries. Of special importance was John Milton's "Areopagitica" (1644), in which he argued against a government's right to license (or previously restrain) publication. Milton's definition of freedom of the press, however, did not preclude the condemnation of material after publication, a matter taken up by the First Amendment of the Constitution of the United States (1787) in its guarantee of freedom of speech as well as of the press. Since then, the history of censorship in the United States has been that of the application of those freedoms in a variety of circumstances for the good both of the human being and of the community.

Such restrictions upon the scope of censorship as may be seen in the United States and Great Britain have not been instituted throughout the modern world. In totalitarian countries, tight control of the press before publication is maintained, and there are severe sanctions against those who circumvent the system. Such a system of censorship tends to grow out of a polity's principles and experience, including the manner in which it regards considerations of liberty, the common good, and the rights, virtues, and duties of its citizens.

census, an enumeration of people, houses, firms, or other important items in a country or region at a particular time. Used alone, the term usually refers to a population census—the type to be described in this article. However, many countries take censuses of housing, manufacturing, and agriculture.

Censuses, being expensive, are taken only at infrequent intervals: every 10 years in many countries, every 5 years or at irregular intervals in other countries. In noncensus years the population is estimated with the aid of vital statistics if these are sufficiently reliable. For instance, the population in postcensal year X equals the population at the last census plus the births, minus the deaths, plus or minus the net migration during the intervening years.

History. Strictly speaking, the modern population census began to evolve only in the 17th century. Before that time, inventories of people, taxpayers, or valuables were certainly made, but the methods and purposes of such inventories were different from modern ones. The most important difference was that early inventories were made to control particular individuals—*e.g.,* to identify who should be taxed, inducted into military service, or forced to work. Because it was usually not to an individual's interest to be counted or to give correct information for these purposes, the premodern enumerations tended to be inaccurate. A second difference was that early inventories did not seek to count all the people or even a representative sample of them but only those in particular categories, such as family heads or males of military age. Such surveys are known to have been made in ancient Babylonia, Palestine, Persia, China, and Egypt. Every five years, the Romans enumerated citizens and their property to determine their liabilities. This practice was extended to include the entire Roman Empire in 5 BC. After the collapse of Rome the practice was discontinued in the West until the modern period. The main exception was Domesday Book (*q.v.*), the inquest of England in 1086 that was made to acquaint William the Conqueror with the landholders and holdings of his new domain. Under the threat of siege, the German city of Nürnberg made an almost complete count of its people in 1449.

The modern idea of a population census as a complete enumeration of all the people and their important characteristics for purposes of understanding the basic structure and trends of the society rather than for identifying and controlling particular individuals slowly arose in the 17th and 18th centuries. There is no such thing as "the first census" because, although early efforts embodied one or another modern feature, none of them embodied all modern features. Perhaps the first effort in an area larger than a city to count everyone at successive intervals was made in New France (Quebec) and Acadia (Nova Scotia), where 16 enumerations were made between 1665 and 1754. In 1749 the Swedish clergy, who had long kept lists of parishioners, was required to render returns from which the total population of Sweden (including Finland) was obtained, and a similar development began in Denmark in 1787. Certain Italian states conducted approximately accurate enumerations: Sardinia in 1773 and 1795, Parma in 1770, and Tuscany in 1766. Enumerations occurred in several German states from 1742 onward. Although several British North American colonies—such as Virginia in 1624–25 and subsequently—had made full enumerations, the United States made history when it took its first census in 1790, not only because of the size of the area enumerated and the effort to obtain data on characteristics of the population but also because of the political purpose for which it was undertaken—namely, representation in Congress on the basis of population. England took its first census in 1801, and, although France tried to do so in 1800 and 1806, the administrative machinery was poor and the results untrustworthy until 30 years later.

Only gradually did the early census takers learn what was basic information and how to obtain it. The first United States census did not, for example, secure data on occupation, birthplace, marital status, or exact age. A five-year age classification of whites was provided by the 1800 census, but other items had to wait until later, and until 1850 the unit used was the family rather than the individual. In England no satisfactory attempt was made to secure age data until 1841, and no effort to secure marital status until 1851.

The history of modern census taking thus involves three parallel developments: (1) the invention and gradual spread of the idea of countrywide enumerations for general scientific and governmental purposes, (2) the improvement of administrative machinery, techniques, and accuracy of enumeration, including legal safeguards assuring that individual answers would be kept in confidence, and (3) the deepening and systematization of the types of information obtained. All three developments tended to increase the effectiveness of censuses as sources of essential information.

It is a mistake to think that in the history of each country there is a date, marked by the first census, before which the size and characteristics of the population were totally obscure and after which they are totally clear. Usually some fragmentary information was available even before the first census, and afterward some time was required before the census record became reasonably full and accurate. As the countries pioneering in census taking gradually worked out better systems of enumeration, however, these could be transferred to new countries without repeating all the trials and errors. Canada's first dominion-wide census was taken in 1871, India's in 1871–72, and Egypt's in 1897.

In addition to the national censuses, others were taken in colonial territories, parts of countries, cities, and so on. It is estimated that in the decade after World War II at least 150 countries or areas took censuses collecting individual data on more than two billion persons. The large number of countries having censuses in the second half of the 20th century was partly due to efforts of the United Nations. Not only does the United Nations encourage countries to take censuses, but it sponsors regional statistical committees that suggest minimum standards and offer technical assistance in the planning and conduct of enumerations. When China reported a census in 1953, the last large part of the world was removed from demographic darkness. The population of the entire world is now known with a degree of accuracy never before approximated, and the structure of populations (including their socioeconomic characteristics) and their patterns of change are understood as never before.

Modern census procedure. Modern censuses refer to a precisely delimited territory and subareas and, for this reason, are normally planned and conducted with the aid of detailed maps. They aim to enumerate every person within the designated territory. A "de jure" census tallies people according to their regular or legal residence, whereas a "de facto" census allocates them to the place where enumerated—normally where they spend the night of the day enumerated. By either method, the reported territorial distribution is according to where people sleep (nighttime population) rather than where they work (daytime population). For this reason the population of central cities is usually far less than the number employed there and that of suburbs far more than those employed in suburbs.

In addition to being precise as to territory, the census must be precise as to time; accordingly, a specific moment is almost always selected. This "census moment," often fixed at midnight, becomes the chronological line separating the included from the excluded. All persons born after the census moment or dying before it are excluded; all others are included. The census moment is also the ref-

erence point for certain kinds of questions, such as age, marital status, and citizenship. Although some questions, such as occupation or labour-force participation, refer to a period of time rather than an infinitesimal moment, clarity requires that the exact limits of the period be specified. The need for time precision is necessary because the actual enumeration may take days or weeks. Because during this period many people will have moved about, died, or been born, the census is taken as of a certain day, hour, and moment.

The requirement that all individuals be enumerated does not mean that all individuals must actually be interviewed. A wife may supply information about her husband; a parent may supply information about his or her children. Nor does it mean that every question must be answered about every individual. If all individuals are enumerated—that is, counted and categorized on a few basic questions—there then exists a basis for sampling with respect to other questions.

Because census information is obtained by using a fixed questionnaire for interviewing, there are two broad types of resulting data: direct data, the answers to specific questions on the schedule; and derived data, the facts discovered by classifying and interrelating the answers to various questions. Direct information, in turn, is of two sorts: items such as name, address, and the like, used primarily to guide the enumeration process itself; and items such as birthplace, marital status, and occupation, used directly for the compilation of census tables. From the second class of direct data, derived information is obtained, such as total population, rural-urban distribution, and family composition. The following is one list of desirable topics suggested by the United Nations.

DIRECT TOPICS: *Geographic* (1) place enumerated and/or place of usual residence; *Familial* (2) relation to head of household or family; *Demographic* (3) sex, (4) age, (5) marital status, (6) children ever born, (7) birthplace; *Economic* (8) type of activity, (9) occupation, (10) industry, (11) employer-employee status; *Social and political* (12) citizenship, (13) language, (14) ethnic or religious affiliation; *Educational* (15) literacy or level of education, (16) school attendance.
DERIVED TOPICS: (17) total population; (18) population of towns and local areas; (19) urban-rural distribution; (20) household or family composition. Possible additional topics include prior place of residence (for understanding internal migration), farm-tenure status, income, labour-force participation, duration of marriage, and number of prior marriages.

The machinery used to analyze the results has a profound influence on the whole census. In the 19th century, when tabulations were made manually, no complex questions were asked because of the impossibility of analyzing them. This situation was entirely changed with the introduction of computerized tabulations and analyses. Modern computers have led to a second revolution that by permitting complex tabulations to be made quickly, has moved the bottlenecks to the data-transfer stages, when the written records are converted for computer use and when the tabulated results are to be turned into printed books.

centaur, Greek KENTAUROS, in Greek mythology, a race of creatures, part horse and part man, dwelling in the mountains of Thessaly and Arcadia. Traditionally they were the offspring of Ixion, king of the neighbouring Lapiths, and were best known for their fight (centauromachy) with the Lapiths, which resulted from their attempt to carry off the bride of Pirithous, son and successor of Ixion. They lost the battle and were driven from Mount Pelion. In later Greek times they were often represented drawing the chariot of the wine god Dionysus or bound and ridden by Eros, the god of love, in allusion to their drunken and amorous habits. Their general character



Centaur fighting a Lapith, detail from a metope of the Parthenon of Athens; in the British Museum
Hirmer Fotoarchiv, Munchen

was that of wild, lawless, and inhospitable beings, the slaves of their animal passions.

Centaurs may best be explained as the creation of a folktale in which wild inhabitants of the mountains and savage spirits of the forests were combined in half-human, half-animal form. In early art they were portrayed as human beings in front, with the body and hindlegs of a horse attached to the back; later, they were men only as far as the waist. They fought using rough branches of trees as weapons.

Centaurea, genus of about 500 species of herbaceous plants of the composite family (Asteraceae). Most are native to the Old World and chiefly centred in the Mediterranean region.

The genus includes a wide variety of annual and perennial garden plants such as the cornflower, or bachelor's button (*C. cyanus*), and the basket-flower (*C. americana*). Others are variously known as knapweed, thornless thistle, cardo-del-valle, dusty miller, blue bottle, mountain bluet, sweet-sultan, hard heads, and Spanish buttons.

center: *see under* centre, except as below.

Center for ———: *see under* substantive word or words (*e.g.*, Study of Democratic Institutions, Center for the).

centigrade temperature scale (physical science): *see* Celsius temperature scale.

centimetre, also spelled CENTIMETER, metric unit of length equal to 0.01 metre (*q.v.*).

centipede (class Chilopoda), any of about 2,800 species of long, flattened, many-segmented predaceous anthropods with each segment bearing one pair of legs, except the



Centipede (*Scolopendra*)
E.S. Ross

hindmost. They are any member of the arthropod class commonly grouped with several other classes as myriapods.

Centipedes remain under stones, bark, and ground litter by day; at night they capture other small invertebrates. They move rapidly on from 14 to 177 pairs of legs and have one pair of long, many-jointed antennae and a pair of jawlike, venomous claws just behind the head.

The 25-millimetre (1-inch) house centipede (order Scutigerida, or Scutigeromorpha) of Europe and North America is the only one common in dwellings. It has a short, striped body and 15 pairs of very long legs. Other centipedes have shorter, hooklike legs; in some the last pair is pincerlike.

Soil centipedes (order Geophilida, or Geophilomorpha) are burrowers; they alternately expand and contract the body, in the manner of earthworms. The order Scolopendrida, or Scolopendromorpha, of the tropics contains the largest centipedes; *Scolopendra gigantea* of the East Indies may reach a length of 280 mm (11 inches). These forms are capable of inflicting severe bites. Scolopendrids, as well as the geophilids, have relatively slow and sinuous movements.

The little stone centipedes (order Lithobiida, or Lithobiomorpha) are short-bodied; they and the house centipedes are the fastest moving centipedes, running with the body held straight.

Cento, town, Ferrara *provincia,* Emilia-Romagna *regione,* north-central Italy, on the Reno River, 15 miles (24 km) northwest of Bologna. A chapel was built in the church of Santa Maria del Rosario for the 17th-century Baroque painter Guercino (G.F. Barbieri), who is represented in the local art gallery and was born in Cento. Several churches, notably the Santa Maria del Rosario, also contain the painter's works. The town, which is overlooked by the Rocca (a 14th-century castle), was founded on an island formed by the Reno and Po rivers. A little more than a mile beyond the Reno is Pieve di Cento, to which Cento was formerly joined. The town has hemp and metal industries. Pop. (1989 est.) mun., 29,055.

Cento: *see* Central Treaty Organization.

Central, region of Scotland, created by the administrative reorganization of 1975, with an area of 1,042 square miles (2,700 square km). Of the former counties, it includes all of Clackmannan, most of Stirling, part of Perth, and a small part of West Lothian and is divided into the districts of Clackmannan, Stirling, and Falkirk. The region has a wide variety of industry including petrochemicals, brewing, engineering, electronics, and paper manufacturing, as well as an extensive and prosperous agricultural area. Pop. (1989 est.) 271,400.

Central, Cordillera, mountain range in western Dominican Republic. The core of its highlands rises just west of Santo Domingo, the national capital, and extends northwestward to the Haitian border; from it flow the headstreams of the nation's three chief river systems—the Yuna, the Yaque del Norte, and the Yaque del Sur. The structurally complex range has a crestline of between 5,000 and 8,000 feet (1,500 and 2,400 m), with several isolated higher peaks. Duarte Peak, originally known as Mount Loma Tina and then as Trujillo Peak, rises to 10,417 feet (3,175 m); it is thus the highest peak in the West Indies. The rugged, heavily forested slopes of the cordillera have defied all but a few attempts to build through highways. Settlement is sparse.

Central, Cordillera, limestone mountain range that forms the interior of Puerto Rico island. It consists of three parts. The Cordillera Central proper occupies the west-central part of the island, extending about 50 miles (80 km) from San Germán in the west to the watershed between the Manatí and La Plata rivers in the east-central part of the island. In the cordillera, 11 miles (18 km) north of Ponce, is the island's highest peak, Cerro de Punta (4,390 feet [1,338 m]). Limonite (iron-

ore) deposits are found in the Las Mesas hills in the west.

There is a gradual transition between the Cordillera Central and the lower Sierra de Cayey farther east, the peaks of which rise to 3,000 feet (900 m). The central mountains have more granitic outcrops than do the western mountains. The rivers of both the Cordillera Central and the Sierra de Cayey, notably the Arecibo, La Plata, and Loíza, are used extensively for hydroelectric power and water supply. The third section, another subsidiary branch, is the Sierra de Luquillo, which constitutes the northeastern part of the island; it is separated from the Sierra de Cayey by the Caguas, Gurabo, and Blanco valleys. Almost two-thirds of this humid tropical region is occupied by the Caribbean National Forest.

central Africa, region of Africa that straddles the Equator and is drained largely by the Congo River system. It includes, according to common definitions, the countries of the Congo, the Central African Republic, and Zaire; Gabon is usually included along with the Central African Republic because of their common historical ties, both of these countries having once been part of French Equatorial Africa. Rwanda and Burundi, although they are located east of the East African Rift System that forms the eastern divide of the Congo Basin, are also often included in discussions of the region because of their long administrative connections with the former Belgian Congo (now Zaire). The island republic of São Tomé and Principe, off the Atlantic coast of Gabon, is also included in the region. Area 1,402,000 square miles (3,632,000 square km). Pop. (1993 est.) 62,900,000.

A brief treatment of central Africa follows. For full treatment, *see* MACROPAEDIA: Central Africa.

Physical and human geography. Central Africa may be divided into several broad geographic regions. In the west, the Atlantic Ocean littoral of Gabon and the Congo includes the mouth of the Congo River in southwestern Zaire. The east, centre, and south are occupied by the vast, low-lying Congo River basin, which consists of dense tropical rain forest, mostly in Zaire. Bordering the Congo River system on the north lies the wooded savanna region of the Ubangi Plateau in the Central African Republic. On the extreme east, the Mitumba Mountains in eastern Zaire border the East African Rift System, which is the site of (south to north) Lakes Tanganyika, Kivu, Edward, George, and Albert. Relatively small highlands lie east of the Rift System in Rwanda and Burundi. The interior bowl of the Congo River basin dominates most of central Africa.

Central Africa has a hot and wet climate with temperatures averaging about 80° F (27° C) and with heavy rainfall throughout the year. Those parts nearest the Equator are covered by a tropical rain forest that totals almost 400,000 square miles (1,000,000 square km) in area. The rain forest is surrounded on its margins by drier, less dense forests and wooded savannas.

Central Africa is the most uniformly rainy part of tropical Africa and is also the least densely populated. The population is unevenly distributed, and immense areas of the equatorial forest are nearly uninhabited. The most densely populated regions are the Burundi and Rwanda highlands, in the extreme east, and sites along the lower course of the Congo River, in particular that of the city of Kinshasa in Zaire. The population of central Africa consists of many different ethnic groups speaking languages belonging to the Benue-Congo, or Bantu, subgroup of the Niger-Congo family of languages. The peoples of the northernmost regions speak languages belonging to the Adamawa-Eastern subgroup of the Niger-Congo family. Hundreds of languages are spoken in all. Pygmies, considered to be the earliest inhabitants of the Congo River basin, are scattered throughout the central part of the region.

The economies of the central African nations are primarily agricultural and depend on subsistence farming techniques to grow staple crops of plantains, cassava, corn (maize), and taro in the forest and savanna. Cash crops include cotton, tobacco, peanuts (groundnuts), coffee, and cacao. There is little cattle raising owing to the presence of the tsetse fly in many areas. Minerals extracted include copper, cobalt, manganese, zinc, and tin (in Zaire), petroleum, manganese, and uranium (in Gabon), and diamonds (in Zaire and the Central African Republic). Industrial activity remains on a small scale and consists mainly of the processing of minerals and of locally produced agricultural goods.

History. The ancestors of the modern-day population of central Africa were Bantu-speaking peoples who had migrated to the region by about 800 AD and displaced its original Pygmy inhabitants. The Kongo and Luba kingdoms emerged in the 15th century, followed by the Lunda kingdom in the 16th century. European penetration of the region began in the late 15th century, and slave trading was undertaken by the Portuguese, Dutch, and French on an increasingly large scale in the 16th and following centuries. The great Atlantic slave trade, which reached its peak in the 18th and early 19th century, virtually depopulated some regions, forced the inhabitants of others to flee into the interior, and generally had a deep and scarring influence on central Africa.

The central African interior was first thoroughly explored by the British in the second half of the 19th century. In the 1880s the Belgian king Leopold II organized the Congo Free State in what is now Zaire, while in that same decade France created the colony of French Congo out of what are now Congo, Gabon, and the Central African Republic. Belgium took over Leopold's Congo Free State in 1908 as a colony and renamed it the Belgian Congo. The colonial period came to an abrupt end in most of central Africa in 1960, when Belgium granted independence to Rwanda and the Belgian Congo (renamed Zaire in 1971) and France granted independence to the new nations of Gabon, Congo, and the Central African Republic. Belgium granted Burundi independence in 1962.

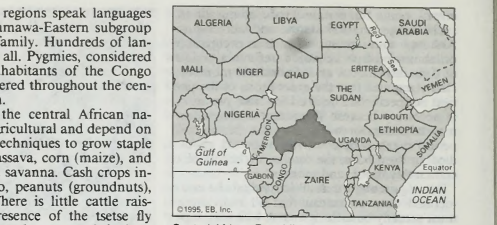
Central African Federation: *see* Rhodesia and Nyasaland, Federation of.

Central African Republic, French RÉPUBLIQUE CENTRAFRICAINE, landlocked country lying at the centre of the African continent. It is bordered by Chad to the north, The Sudan to the east, Zaire and Congo to the south, and Cameroon to the west. It extends about 840 miles (1,350 km) from east to west and about 470 miles from north to south. The capital is Bangui. Area 240,324 square miles (622,436 square km). Pop. (1993 est.) 2,998,000.

A brief treatment of the Central African Republic follows. For full treatment, *see* MACROPAEDIA: Central Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The Central African Republic comprises a low plateau with an elevation of 2,000 to 2,500 feet (610 to 760 m) that separates three of Africa's major hydrologic basins: those of the Congo River to the south, the Chari River to the north, and the Nile River far off to the northeast. Tributaries of the Chari River occupy the northern third of the country's territory. The remaining two-thirds of the terrain drain southward into the Ubangi



Central African Republic

River, which forms the country's southern border with Zaire. The Central African Republic lies largely in the savanna grassland zone, though tropical rain forests mantle the southern regions and stretch along rivers far into savanna country. More than one-half of the country's total area is forested, providing substantial wealth in tropical hardwoods.

The climate of the Central African Republic is transitional between the sub-Saharan climate to the north and the equatorial climate to the south. Rainfall, outside the regions of dense rain forest in the south along the Ubangi River, is seasonal, falling mostly from March to October. Precipitation increases to the south and southwest and also becomes more evenly distributed throughout the year. Temperatures are relatively uniform, averaging for the most part between 75° and 80° F (24° and 27° C) throughout the year.

The people. Almost all of the Central African Republic's inhabitants trace their origin to communities that were founded in the 18th and 19th centuries when various African peoples fled into the interior to escape slave traders operating in areas to the north and east. They now form a mosaic of heterogeneous ethnic groups speaking languages belonging to the Adamawa-Eastern subgroup of the Niger-Congo language family. The Banda, Baya (Gbaya), Ngbandi, and Azande constitute the largest ethnic groups and account for almost three-quarters of the country's inhabitants. The nation is sparsely inhabited as a whole, and the population is densest along the Ubangi River, which gave its name to the various peoples who live along its banks. The national language is Sango, a lingua franca. The official written language is French, which is taught in the schools. Other ethnic languages, such as Zande, are spoken as well. Animist religious forms are still practiced by a large portion of the population, although most people profess Christianity, the majority of them Protestant.

The population is growing rapidly, though at a relatively low rate for sub-Saharan Africa. The birth rate is about average for the subcontinent, but the death rate is significantly above average—owing largely to high levels of infant mortality. Almost half the population is urban and the proportion is growing.

The economy. The Central African Republic has a developing free-enterprise economy of mixed state and private structure. It lacks infrastructural facilities and is one of the poorest of the less-developed countries. The gross national product (GNP) is not growing as rapidly as the population, and the GNP per capita is among the lowest in the world. Agriculture, including forestry, and trade are the main components of the GNP.

Agriculture produces about two-fifths of the gross domestic product (GDP), although only about 3 percent of the land is cultivated, much of it under subsistence agriculture. The most important domestic crops are cassava, yams, and millet. Cash crops include peanuts (groundnuts), cotton, coffee, and tobacco. Palm cultivation for kernels and oil was placed on a commercial basis in the 1980s.

Forestry accounts for a significant part of the agricultural share of the GDP, and timber is a major export. Yet lumber industries remain undeveloped because of the country's inadequate transportation network. Most of the timber harvest is used for fuel.

Although mining produces less than 3 percent of the GDP, diamonds generate more than 50 percent of the value of exports, even though much of the production is smuggled out of the country. Manufacturing is largely confined to traditional handicrafts and to light processing industries. The most important products include cotton textiles and clothing, leatherwork, plywood and furniture, processed vegetable oils, foods, cigarettes, and beer.

The Central African Republic's chief exports are diamonds, cotton, lumber, coffee, tobacco, and gold, imported mainly by Belgium, France, and Switzerland. Few of the country's roads are paved, and poor transportation has hampered economic development. Extensive inland waterways totaling some 4,400 miles (7,100 km) have been the traditional transport arteries, using shallow-draft vessels. The Ubangi River is navigable for seagoing vessels below Bangui, which is the country's chief port and the site of its only international airport.

Government and social conditions. The Central African Republic is governed under a 1986 constitution that effectively vests all executive and most legislative power in the presidency. The Congress consists of the Economic and Regional Council and the National Assembly. Half the members of the Economic and Regional Council are appointed by the president, and the National Assembly elects the other half. The National Assembly, whose members are elected by universal adult suffrage to five-year terms, submits laws to the president for approval and promulgation. The Central African Democratic Assembly (Rassemblement Démocratique Centrafricaine; RDC) was the sole legal political party until a multiparty political system was established in 1991.

Health conditions are extremely poor; serious diseases such as malaria, sleeping sickness, and leprosy are common. Medical care is inadequate because of the country's severe shortage of medical personnel and hospital facilities. The infant mortality rate is one of the highest in central Africa. Average life expectancy at birth is only about 48 years for men and 53 years for women, one of the lowest averages in the world.

Education is free, but it is estimated that only about one-half of all children receive primary education. Secondary education is available to even fewer. The major institution of higher education is the University of Bangui (founded 1969). The press is firmly controlled by the government, which owns and operates the broadcast media.

History. Archaeological findings in the Central African Republic suggest human habitation in late Paleolithic times. Documentary records, however, are practically nonexistent before the 19th century, and scanty thereafter. There is some evidence that part of what is now the Central African Republic was part of a 16th-century empire known as Gaoga. Slave raiding was carried on throughout the 16th, 17th, and 18th centuries and decimated the original population, which was replaced by migrants from areas farther north and east.

The French explored and claimed central Africa and in 1889 established a post at Bangui. They secured total control by 1911, but insurrections continued. In 1898 the French partitioned the colony among great commercial concessionaires. Their conscription of labour, facilitated by the poverty of the whole area and the absence of adequate communication apart from the rivers, led to great outcries, but the abuses continued into the late 1920s.

In 1946 the colony, then called Ubangi-Shari (Oubangui-Chari), became an overseas territory of France and elected Barthélémy Boganda to the French parliament. He led the movement for independence that resulted in the creation, in 1958, of the Central African Republic, an autonomous republic within the French Community. Boganda died in 1959, and under his successor, David Dacko, the country was granted independence a year later. Jean-Bédel Bokassa led a successful military coup in 1965, and he became one of Africa's most notorious and profligate tyrants. He declared himself emperor in 1976 and renamed the country the Central African Empire. His participation in a massacre of some 100 children in 1979 brought about his deposition through French intervention, and Dacko resumed the presidency until a bloodless coup in 1981 installed General André Kolingba and his Military Committee of National Recovery. In 1985 Kolingba introduced a series of measures to increase civilian participation in the government. The ruling party, the RDC, was formed in 1986.

Central America, southernmost region of North America, lying between Mexico and South America and comprising Panama, Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala, and Belize. Area 202,000 square miles (523,000 square km). Pop. (1993 est.) 30,610,000.

A brief treatment of Central America follows. For full treatment, *see* MACROPAEDIA: Central America.

Physical and human geography. Flanked by the Caribbean Sea on the east and the Pacific Ocean on the west, the region extends in an arc roughly 1,140 miles (1,835 km) long from the northwest to the southeast. Humid swamps and lowlands extend along both the west and east coasts, but four-fifths of Central America is either hilly or mountainous. The western band of Pacific coastal lowland is narrow and overshadowed by mountain ranges, and, except in Nicaragua and Honduras, the eastern plains along the Caribbean are also narrow. Elevation steadily increases west of the Caribbean lowlands, until, toward the Pacific Coast, plateau highlands culminate in mountain ridges and some 40 volcanic cones, some of which attain heights of more than 12,000 feet (3,700 m).

Some of Central America's volcanoes erupt violently from time to time, and earthquakes frequently occur in the region. Severe quakes in 1931 and 1972 caused heavy damage to Managua, the capital of Nicaragua. The region's weathered volcanic lavas produce a fertile soil, however, and the highlands of the volcanic zones have consequently become highly productive agricultural zones and areas of dense population.

Altitude mitigates the climatic effects of Central America's tropical latitude so that average temperatures in the highlands are much lower than those in the coastal lowlands. Rainfall occurs primarily during the summer and is heaviest between May and November. January through March are the driest months. In general the Caribbean side receives twice as much rain as the Pacific region.

Central America's natural vegetation is varied. Tropical rain forests occupy the eastern lowlands, while evergreen forests clothe the lower slopes along the Pacific coast and pine and oak forests grow at somewhat higher elevations. Much of Central America's timberland, however, has been cleared by slash-and-burn cultivators, who move on when the soil is exhausted.

The original American Indians remain the basis of the population of the region and constitute a majority in Guatemala. Until the beginning of the 19th century, immigration was officially limited to citizens of Spain, and the Spanish were thus the only significant European contributors to the racial mixture of the area. Two-thirds of the entire population of Central America are mestizos, *i.e.,* of mixed Indian and Spanish ancestry. Mestizos constitute majorities in Honduras, Nicaragua, El Salvador, and Panama. Costa Rica, however, has a majority of Spanish descent. Blacks, brought to the region in very small numbers, are a significant element in the populations of Panama and Belize.

The region's rate of population increase is one of the highest in the world, though infant mortality is high and life expectancy is generally low. Central America is predominantly Roman Catholic, though in the more remote areas (principally inhabited by Indians) traditional religious practices and Roman Catholicism coexist. Spanish is the official language in all of Central America except in Belize, where English is official; American Indian languages are also spoken.

The economy. From the mid-19th century Central America's economy was based on the production of coffee and bananas for export. Cotton, sugar, and beef were exported in increasing amounts after World War II. Corn (maize), beans, and squash are grown as staple foods. There is now growing diversification in the economies of the region, though this has not provided a more equitable distribution of wealth. Manufacturing is sharply hampered by Central America's limited mineral and energy resources and by the restricted size of its market. Much industrial employment is in the form of cottage industries, and artisans outnumber factory workers. The processing of food, beverages, and tobacco and the making of textiles, clothing, shoes, furniture, and leather are the main industries. Agriculture still employs a larger proportion of workers than any other sector, except in Panama, where services, largely related to the Panama Canal, are of major economic importance.

History. By 11,000 BC, hunting peoples had occupied most of Central America. By 500 BC, in what is now Belize as well as in the mountainous plateaus of Guatemala and in El Salvador and Honduras, the people who have come to be known as the Maya were developing a civilization that reached its zenith during the Classic period, from about AD 250 to 900. Spaniards arrived and conquered the region in the early 16th century, and Spain ruled Central America for about 300 years. After various administrative changes, Spain organized most of the region into the captaincy general of Guatemala about 1560. Independence from Spanish rule came in 1821, and in 1823 the United Provinces of Central America—comprising the states of Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica—was formed. British Honduras, which was still a colony, did not join the federation, and Panama remained part of Colombia.

In 1824 the federation adopted a constitution, but in 1838 Costa Rica, Honduras, and Nicaragua seceded from the federation, thus effectively terminating it. The history of the individual countries of Central America throughout the rest of the 19th century consists largely of struggles between conservative parties, which supported the Roman Catholic church and the traditions of royal Spain, and liberal parties, which favoured sweeping social and economic reforms and the political reunification of the Central American states. Central American politics were dominated by the conservative Guatemalan dictator Rafael Carrera from 1840 to 1865, after which the liberals returned to power in all the states except Nicaragua by 1872. Central America's politics were further complicated by a strong U.S.-British rivalry for commercial rights and the control of transportation routes across the Isthmus of Panama. Britain's early 19th-

century commercial dominance gave way to the United States' economic, diplomatic, and cultural dominance in the 20th century, however. In 1903 Panama declared its independence from Colombia and granted the United States the right to build an interocean canal through its territory; the Panama Canal opened in 1914.

The liberals' political dominance from the 1870s resulted in a strong emphasis on agricultural exports as the key to national modernization. Coffee became the most important commodity promoted by the liberals, and its profits supported the rise of planter elites in most of the states. Banana exports were then developed in the coastal regions by American fruit companies in collaboration with the liberals. But despite liberal political rhetoric, military dictatorships were the characteristic political institution of this period, as the planter elites came to depend on greater military strength to defend their interests against landless or impoverished mestizos and Indians.

By the mid-20th century these landowning elites faced strong challenges from middle- and working-class political parties and labour unions who objected to the inequitable ownership of the land. Conservative governments were overthrown in Guatemala, El Salvador, and Costa Rica in the 1940s, but the United States' covert overthrow of Guatemala's reformist government in 1954 proved a crucial influence, and right-wing military regimes regained their ascendancy throughout the region in the following years. At the end of the 20th century, rapid population growth, inequalities of wealth, and political instability remained the chief obstacles to Central America's economic and social development.

Central America, United Provinces of (1823–40): *see* United Provinces of Central America.

Central American Common Market (CACM), Spanish MERCADO COMÚN CENTROAMERICANO (MCCA), association of five Central American nations that was formed to facilitate regional economic development through free trade and economic integration. It came into existence through the General Treaty on Central American Economic Integration signed by Guatemala, Honduras, El Salvador, and Nicaragua in December 1960; Costa Rica joined in July 1962.

The Central American Common Market was formed in response to the necessity of cooperation among these smaller nations in order to attract industrial capital and diversify their economies. By the late 1960s the CACM had made considerable progress in stimulating the expansion of the region's commerce and manufacturing. Many trade barriers between its member states were eliminated or reduced, and between 1961 and 1968 trade among them increased to a figure seven times its previous level. But in 1969 Honduras and El Salvador engaged in a war that resulted in a break in their commercial and diplomatic relations. After cutting off El Salvador's access to the Pan-American Highway, Honduras virtually withdrew from the CACM in early 1971 and imposed tariffs on imports from the other common-market countries. The other members agreed to continue the CACM in spite of growing discontent within the group, but in 1983 Guatemala as well imposed many restrictions on trade within the region. The CACM entered a state of suspension in the mid-1980s owing to internal political instability and violence in some member countries and mounting debt and protectionist pressures.

In 1993 all of the CACM's members except Costa Rica signed agreements creating a new Central American Free Trade Zone, which was basically an agreement to gradually reduce their tariffs on intraregional trade over a period of several years.

Central American Indian local race, any of a group of local races of the American Indian geographic race, populating Central America from the southwestern United States to northwestern South America. The Central American Indians are short, stocky or slender people with brown to dark brown skin, moderately flat to aquiline features, and black, coarse hair. They lack blood types B and A_2 in the ABO system and nearly lack type A_1, the majority of the populations being almost exclusively of blood type O. They suffer from nutritional deficiencies and show some genetic adaptation to these dietary lacks. *See also* American Indian geographic race.

Central Asia, central region of Asia, extending from the Caspian Sea in the west to the border of western China in the east. It is bounded on the north by Russia and on the south by Iran, Afghanistan, and China. The region consists of the former Soviet republics of Kazakhstan, Uzbekistan, Tajikistan, Kyrgyzstan, and Turkmenistan. Area 1,542,000 square miles (3,994,000 square km). Pop. (1993 est.) 53,612,000.

A brief treatment of Central Asia follows. For full treatment, *see* MACROPAEDIA: Central Asia.

Physical and human geography. Central Asia's landscape can be divided into the vast grassy steppes of Kazakhstan in the north and the Aral Sea drainage basin in the south. About 60 percent of the region consists of desert land, the principal deserts being the Karakum, occupying most of Turkmenistan, and the Kyzylkum, covering much of western Uzbekistan. Most of the desert areas are unsuitable for agricultural use except along the margins of the Amu Darya and Syr Darya river systems, which wind their way northwestward through Kyrgyzstan, Tajikistan, and eastern Uzbekistan and Turkmenistan after rising in mountain ranges to the south and east. These two major rivers drain into the Aral Sea and provide most of the region's water resources, though northern Kazakhstan is drained by rivers flowing north into Russia. On the east and south Central Asia is bounded by the western Altai and other high mountain ranges extending into Iran, Afghanistan, and western China.

Central Asia experiences very dry climatic conditions, and inadequate precipitation has led to heavy dependence on the Syr Darya and Amu Darya for irrigation. The region as a whole experiences hot summers and cool winters, with much sunshine and very little precipitation. The scarcity of water has led to a very uneven population distribution, with most people living along the fertile banks of the rivers or in fertile mountain foothills in the southeast; comparatively few live in the vast arid expanses of central and western Kazakhstan and western Uzbekistan and Turkmenistan.

The five largest ethnic groups in Central Asia are, in descending order of size, the Uzbek, Kazakh, Tajik, Turkmen, and Kyrgyz. All these groups speak languages related to Turkish except for the Tajik, who speak a language related to Persian. Islām is the dominant religion, with most adherents belonging to the Sunnite branch. As a result of the region's historical incorporation into Russia and then the Soviet Union, large numbers of Russians and Ukrainians give it a distinctive multiethnic character. Population growth in Central Asia has been quite rapid in the 20th century owing to high birth rates and Soviet health measures that brought down mortality rates. The region experienced environmental problems in the late 20th century owing to the effects of rapid agricultural development, overdependence on irrigation, and the effects of Soviet nuclear-weapons testing in some areas.

Central Asia's economic activity is centred on irrigated agriculture in the south and on heavy and light industry and mining in Kazakhstan. Under Soviet rule the area supplied most of the U.S.S.R.'s cotton and was a major supplier of coal and other minerals for industrial use. Irrigated cotton-growing is dominant in the east and southeast, while there is some dry farming of wheat in the far northern provinces of Kazakhstan, where the Soviets' Virgin and Idle Lands program of the 1950s brought much steppe under the plow for the first time.

History. The human occupation of Central Asia dates back to the late Pleistocene Epoch, approximately 25,000 to 35,000 years ago, but the first identifiable human groups to live there were the Cimmerians and Scythians (1st millennium BC) in the west and the Hsiungnu people (from 200 BC) in the east. In the 6th century BC the first Turkic peoples established an empire that lasted for two centuries and greatly influenced the region's subsequent ethnic character. Another Turkic people, the Uighurs, rose to dominance in the 8th century, and their rule in turn gave way to that of the Khitans and then to the Karakhanids, a Turkic people closely related to the Uighurs. The region was gradually Islāmized beginning in the 11th–12th century, a process that was virtually complete by the 15th century. The Mongols took over almost all of Central Asia in the 13th century, and their rule in the form of various independent khanates lasted until Timur's conquests about 1400. Following the breakup of his dynasty, southern Central Asia became divided into several rival khanates that were ruled by his descendants. By the end of the 15th century all of these Timurid possessions had fallen into the hands of the Uzbek people.

Russia's conquest of the region began in the 17th century and continued until the last independent Uzbek khanates were annexed or made into protectorates in the 1870s. Soviet rule replaced that of the Russian tsars after the Russian Revolution of 1917, and thereafter the region was increasingly integrated into the Soviet system through a planned economy and improved communications. In the 1920s and '30s the Soviet government created five Soviet socialist republics out of the region: the Kazakh S.S.R., the Uzbek S.S.R., the Kirgiz S.S.R., the Tajik S.S.R., and the Turkmen S.S.R. Under Soviet rule, southern Central Asia undertook the large-scale cultivation of cotton to supply the U.S.S.R.'s textile industry with raw material. When the Soviet Union collapsed, all five Central Asian Soviet socialist republics obtained their independence in 1991, becoming the sovereign and independent nations of Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, and Turkmenistan.

Central Asian arts, the literary, performing, and visual arts of a large portion of Asia embracing the Turkic republics (Uzbekistan, Kazakhstan, Kyrgyzstan, Turkmenistan), Azerbaijan, Afghanistan, Mongolia, Tibet, Nepal, and parts of Russia and China. As used here, the term "Central Asian arts" denotes only those traditions that were not influenced by the religion of Islām. (*See* Islāmic arts.)

A brief treatment of Central Asian arts follows. For full treatment, *see* MACROPAEDIA: Central Asian Arts.

The most important written literatures among the Central Asian peoples are those of the Tibetans and Mongolians. Tibetan developed as a literary language from the 7th century as a result of cultural contacts with neighbouring Buddhist countries to the south, on the Indian subcontinent. Most works produced between the 7th and 13th centuries are skillful translations of Buddhist works from

Sanskrit, after which a vast body of orthodox Buddhist works of purely Tibetan origin was built up. Mongolian literature began in the 13th century with chronicles of Genghis Khan and his successors, but from the late 16th century Mongolian literature was profoundly influenced by Buddhism.

The variety of musical styles in Central Asia ranges from the systematically organized classical music of the Turkic peoples, to the notated religious chants of Buddhists in Tibet, to the highly varied folk music styles of the Mongols, Siberians, and numerous other ethnic groups.

The performing arts have played an especially important role in Central Asian societies, where they evolved as didactic art forms within a religious context. Two main types of performance predominate throughout Tibet, Nepal, Sikkim, Bhutan, and Mongolia: those related to shamanism and those derived from Buddhism. Music performed on drums and stringed instruments accompanied shamanistic trances, during which a person symbolically journeyed to the heavens or to the netherworld. The performance of Buddhist monastic dances and morality plays is also accompanied by various drums and horn instruments. In monastic dance, which is used to teach Buddhist dogma, elaborate costumes and masks signify grotesque devils, skeletons, Indian spiritual teachers, and the tutelary deities of the Buddhist pantheon. The morality play illustrates Buddhist history and folktales; complex scenarios, costumes and mask, and set dialogue are typical, and the mythological themes follow Indian theatre closely. The performing arts of the Turkic peoples are very different from these other traditions because of the influence of Islām.

It is possible to distinguish three broad categories of style and influence in the visual arts. The tribes of Central Asia shared, for the most part, a "nomadic" Scytho-Altaic art favouring animal and hunting motifs. The widespread Scythian culture is seen best in the 6th-century BC Śaka gold hoards—belts, harnesses, and jewelry—of the Pamirs. Contacts with the Greco-Roman world and with India, Iran, and China also left their mark; Hellenistic influence was most pronounced in Bactria and culminated in the Kushan style of Gandhāra. The most important pre-Islāmic influence on Central Asia's visual arts, however, was Buddhism—both Hīnayāna and Mahāyāna. Buddhist texts provided the subject matter for the ivory statuary of Begram; the two massive Buddhas cut into a cliff face at Bamian, Afg.; and the bas-reliefs of the Gandhāra artists. Mahāyāna Buddhism, introduced from India in the 8th century, also stimulated the arts of Tibet and Nepal. Nepal's traditions in architecture and painting were adaptations of those of India, whether the themes were Hindu or Buddhist. But Nepalese forms in both architecture and painting tend to be smoother and more flowing and graceful than their Indian prototypes, if also less dynamic. Buddhist religious art was gradually introduced into Tibet from the 8th century, and a distinctive Tibetan imagery was subsequently developed. Tibet's religious art is primarily didactic and symbolic, and an understanding of its significance requires a knowledge of Tibet's idiosyncratic form of Buddhism.

central bank, institution, such as the Bank of England, the U.S. Federal Reserve System, the Bank of France, or the Bank of Japan, that is charged with regulating the size of a nation's money supply, the availability and cost of credit, and the foreign-exchange value of its currency. Regulation of the availability and cost of credit may be nonselective or may be designed to influence the distribution of credit among competing uses. The principal objectives of a modern central bank in carrying out these functions are to maintain monetary and credit conditions conducive to a high level of employment and production, a reasonably stable level of domestic prices, and an adequate level of international reserves.

Central banks also have other important functions, of a less general nature. These typically include acting as fiscal agent of the government, supervising the operations of the commercial banking system, clearing checks, administering exchange-control systems, serving as correspondents for foreign central banks and official international financial institutions, and, in the case of central banks of the major industrial nations, participating in cooperative international currency arrangements designed to help stabilize or regulate the foreign-exchange rates of the participating countries.

Central banks are operated for the public welfare and not for maximum profit. The modern central bank has had a long evolution, dating back to the establishment of the Bank of England in 1694. In the process, central banks have become varied in authority, autonomy, functions, and instruments of action. Virtually everywhere, however, there has been a vast and explicit broadening of central-bank responsibility for promoting domestic economic stability and growth and for defending the international value of the currency. There also has been increased emphasis on the interdependence of monetary and other national economic policies, especially fiscal and debt-management policies. Equally, there has evolved a widespread recognition of the need for international monetary cooperation, and central banks have played a major role in developing the institutional arrangements that have given form to such cooperation.

The broadened responsibilities of central banks in the second half of the 20th century were accompanied by greater government interest in their policies; and, in a number of countries, there occurred institutional changes, in a variety of forms, designed to limit the traditional independence of the central bank from the government. Central-bank independence, however, really rests much more on the degree of public confidence in the wisdom of the central bank's actions and the objectivity of the bank's leadership than on any legal provisions purporting to give it autonomy or to limit its freedom of action.

Central banks traditionally regulate the money supply primarily by expanding and contracting their assets. An increase in a central bank's assets causes a corresponding increase in its deposit liabilities (or note issue), and these, in turn, provide the funds that serve as the cash reserves of the commercial banking system—reserves that commercial banks, by law or custom, must maintain, generally in a prescribed proportion of their own deposit liabilities. As banks acquire larger cash balances with the central bank, they are in a position to expand their own credit operations and deposit liabilities to a point where the new, larger cash reserves no longer produce a reserve ratio greater than the minimum set by law or custom. A reverse process occurs when the central bank contracts the volume of its assets and liabilities.

The typical operations by which central banks alter the volume of their assets may be summarized as follows:

1. "Open-market operations" consist mainly of purchases and sales of government securities, but operations in bankers' acceptances and in certain other types of paper often are permissible. Open-market operations are an effective instrument of monetary regulation only in countries with well-developed securities markets. Open-market sales of securities by the central bank drain cash reserves from the commercial banks. This loss of reserves tends to force some banks to borrow from the central bank, at least temporarily. Banks faced with the cost of such borrowing, at what may well be a high discount rate, and also faced with the possibility of being admonished by the central bank about their lending policies react ordinarily by becoming more restrictive and selective in extending credit. Open-market sales, by reducing the capacity of the banking system to extend credit and by tending to drive down the prices of the securities sold, also tend to raise the interest rates charged and paid by banks. The rise in government security yields and in the interest rates charged and paid by banks forces other financial institutions to offer a higher rate of return on their obligations, in order to be competitive, and, given the reduced availability of bank credit, enables them, like banks, to command a higher rate of return on their loans. Thus, the impact of open-market sales is not limited to the banking system. It is diffused throughout the economy. Conversely, purchases of securities by the central bank tend to lead to credit expansion by the financial system and to lower interest rates, unless the demand for credit is rising at a faster rate than the supply, which normally is the case once an inflationary process gets under way; then, interest rates will rise rather than fall.

Changes in domestic money-market rates resulting from central-bank actions also tend to change the prevailing relations between domestic and foreign money-market rates, and this, in turn, may set in motion short-term capital flows into or out of the country.

2. Loans to banks, generally called "discounts," or "rediscounts," are short-term advances against commercial paper or government securities to enable banks to meet seasonal or other special temporary needs either for loanable funds or for cash reserves to replace reserves lost as a result of a shrinkage in deposits. The Bank of England ordinarily deals with discount houses rather than directly with banks, but the effect on bank reserves is similar. The provision of such advances is one of the oldest and most traditional functions of central banks. The rate of interest charged is known as the "discount rate," or "rediscount rate." By raising or lowering the rate, the central bank can regulate the cost of such borrowing. The level of and changes in the rate also indicate the view of the central bank on the desirability of greater tightness or ease in credit conditions.

Some central banks, especially in countries that lack a broad capital market, extend medium- and long-term credit to banks and to government development corporations in order to facilitate the financing of domestic economic-development expenditures and to alleviate the deficiency of financial savings. Such longer-term lending is not regarded as an appropriate central-bank activity by many authorities, however, and is considered a dangerous source of inflationary pressures.

3. Direct government borrowing from central banks generally is frowned upon as encouraging fiscal irresponsibility and commonly is subject to statutory limitation; nevertheless, in many countries the central bank is the only large source of credit for the government and is used extensively. In other countries, indirect support of government financing operations has monetary effects that differ little from those that would have followed from an equal amount of direct financing by the central bank.

4. Central banks buy and sell foreign exchange to stabilize the international value of their own currency. The central banks of major industrial nations engage in so-called "currency swaps," in which they lend one another their own currencies in order to facilitate their activities in stabilizing their exchange rates. Prior to the 1930s, the authority of most central banks to expand the money supply was limited by statutory requirements that re-

stricted the capacity of the central bank to issue currency and (less commonly) to incur deposit liabilities to the volume of the central bank's international reserves. Such requirements have been lowered or eliminated by most countries, however, either because they blocked expansions of the money supply at times when expansion was considered essential to domestic economic-policy objectives or because they "locked up" gold or foreign exchange needed for payments abroad.

5. Many central banks have authority to fix and to vary, within limits, the minimum cash reserves that banks must hold against their deposit liabilities. In some countries, the reserve requirements against deposits provide for the inclusion of certain assets in addition to cash. Generally, the purpose of such inclusion is to encourage or require banks to invest in those assets to a greater extent than they otherwise would be inclined to do and thus to limit the extension of credit for other purposes. Similarly, especially lower discount rates sometimes are used to encourage specific types of credit, such as to agriculture, housing, and small businesses.

6. In periods of intense inflationary pressure and shortage of supplies, especially during wartime and immediately thereafter, many governments have felt a need to impose direct measures to curb the availability of credit for particular purposes—such as the purchase of consumer durables, houses, and nonessential imported goods—and often have had these controls administered by their central banks. Such controls typically establish maximum loan-value to purchase-price ratios and maximum maturities that must be prescribed by lenders. These controls often apply to nonbank as well as to bank lenders, and this is necessary for effectiveness in countries in which nonbank lenders are important sources of the types of credit being curbed. The general experience of central banks with direct credit controls has not been favourable: opportunities for evasion are too easy, especially if overall credit conditions are not extremely tight; and inequities in the impact of the controls become socially and politically troublesome. An early example of selective credit-control authority vested in a central bank and one that, on balance, has worked tolerably well is the authority conferred on the U.S. Federal Reserve Board in 1934 to establish margin requirements on stock-market credit.

Central Bohemia: *see* Středočeský.

Central Brāhui Range, southern offshoot of the Himalayas, lying in the centre of the Balochistān plateau, Pakistan. It extends southward for about 225 miles (360 km) from the Pishīn Lora and Zhob rivers to the Mūla River. The range is a series of parallel limestone ridges covered with juniper forests and hemming in narrow valleys, and its trend is north-south between Mūla and Quetta but turns sharply east-southeast just north of Quetta to meet the Sulaimān Range. Summits generally exceed 6,000 feet (1,800 m) and gradually decline toward the south; the highest peaks are Khalifat (11,440 feet [3,487 m]) and Zarghūn (11,738 feet [3,578 m]) north of Quetta. The Bolān, Harnai, and Mūla are the principal passes. Brahui tribes are predominant in the south, as are Pashtuns, with chiefly Kākaṛs in the north.

Central Celebes (Indonesia): *see* Sulawesi Tengah.

Central City, city, seat (1861) of Gilpin county, north-central Colorado, U.S. It lies along North Fork of Clear Creek in the Front Range of the Rockies, 26 miles (42 km) west of Denver. A historic mining town on a rocky hillside along Gregory Gulch (elevation 8,560 feet [2,609 m]), it originated soon after the first important lode gold discovery was made there in 1858 by John H. Gregory and was named for its locus as the centre of supplies and mail for other mining camps. During its boom days in the 1860s it was known as the "richest square mile on earth"; its population reached 15,000, and it rivaled Denver as Colorado's leading city. After its ramshackle playhouses were destroyed by fire in 1874, a fine opera house was built (1878) of mountain stone. Central City languished with the drop in gold production, and by the 1930s it was almost a ghost town.

Mementos of Central City's past are preserved in a reconstructed narrow-gauge railway (1867), Teller House (1872), and in the Central Gold Mine and Museum. Central City became perhaps the best known of all Colorado mining towns because of its annual summer opera and drama festival held in the Opera House. After limited-stakes gambling was legalized in Central City in 1991, many casinos were built that changed the town's character and attractions dramatically. Glory Hole, a huge mining pit (900 feet long and 300 feet deep), is in nearby Quartz Hill. Inc. town, 1886. Pop. (1990) 335.

Central Committee, in the history of the Soviet Union, the highest organ of the Communist Party between party congresses, though in practice this status was held by the Politburo from the 1920s on. The Communist parties of other countries were also governed by central committees.

The first Central Committee was founded by Vladimir Lenin's Bolshevik faction in 1912 when it broke off from the Russian Social-Democratic Workers' Party. The committee determined broad policy objectives for the Bolsheviks, and in October 1917 it established a Politburo of five of its members to lead the Russian Revolution. The size of the Central Committee made it an unwieldy body for quick decision-making, however, and it almost immediately began to lose power to the Politburo, the newly created Secretariat, and other party organs. Party secretary Joseph Stalin expanded the committee's membership in the 1920s with his own supporters, but the Central Committee continued to function as a quasi-parliamentary body, with free debate and factions, until the mid-1930s, when Stalin had most of its membership executed in order to establish his complete personal control over the party. Thereafter the Central Committee's role was greatly diminished, though in the period of collective leadership following Stalin's death (1953), rival party leaders again had to win control of factions among its membership, which proved decisive in the leadership crises of 1957 and 1964.

The Central Committee's membership was elected by the party congress, but this merely involved assenting to a slate of candidates presented by the Politburo. The committee grew over the years from 25 members in 1921 to 307 in 1986, and it convened twice a year for a day or two. Central Committee membership ordinarily went to the holders of the most important positions in the Soviet government and economy, thereby enabling the committee to serve as the party's chief tool within the government. The Politburo, Secretariat, and other party organs issued their official decrees in the Central Committee's name until the Soviet Union's demise in 1991. The central committees of eastern European countries were similar in form and function to the Soviet model, as is that of China.

Central Intelligence Agency (CIA), principal intelligence and counterintelligence agency of the U.S. government. Formally created in 1947, the agency grew out of the World War II Office of Strategic Services (OSS). Previous U.S. intelligence and counterintelligence efforts had been conducted by the army and navy and by the Federal Bureau of Investigation (FBI) and suffered from duplication, competition, and lack of coordination. U.S. allies had criticized the lack of any central intelligence function.

In June 1942 President Franklin D. Roosevelt created the OSS so that the fragmented and uncoordinated strands of U.S. intelligence-gathering would be brought together under a single organization. A similar office set up for this purpose in July 1941, the Office of the Coordinator of Information, had basically foundered, but its head, Coordinator of Information William J. ("Wild Bill") Donovan, became head of the OSS upon its founding and was largely responsible for building that organization. During World War II the OSS was responsible for collecting and analyzing foreign intelligence concerning areas where U.S. military forces operated. The OSS obtained intelligence through secret agents in enemy territory, it carried out counterpropaganda and disinformation activities, and it staged special operations behind enemy lines involving sabotage, demolition, and the supplying and direction of resistance fighters. Under Donovan's capable if unorthodox direction, the OSS was remarkably effective despite the initial inexperience of most of its personnel. At its height it amounted to about 12,000 members.

The OSS was dismantled in October 1945, but the administration of President Harry S. Truman recognized the need for a coordinated postwar intelligence establishment. In 1946 the president established by executive order a Central Intelligence Group and a National Intelligence Authority. These bodies selected key personnel from the motley group assembled under wartime pressures by the OSS and tried to impose some central direction on postwar intelligence operations, although the armed forces maintained their own independent intelligence services.

In 1947 Congress created the National Security Council (NSC) and, under its direction, the Central Intelligence Agency, which was to advise the NSC on intelligence matters bearing on national security, make recommendations on coordinating intelligence activities of government agencies generally, correlate and evaluate intelligence and see to its proper communication within government, and carry out such other national-security intelligence functions as the NSC might direct. CIA directors have been a varied lot, including military men (such as Admiral Roscoe Hillenkoetter, the first, and Eisenhower's wartime staff head, General Walter B. Smith), a diplomat and intelligence expert (Allen W. Dulles), a business executive (John A. McCone), a veteran of the CIA itself (William E. Colby), and a political-party leader (George Bush), among others.

The CIA is organized into four major directorates. The Intelligence Directorate analyzes intelligence that is gathered overtly from available sources and that which is obtained covertly through espionage, aerial and satellite photography, and interception of radio, telephone, and other forms of communication. Its analyses are distributed variously as bulletins, reports, and exhaustive surveys. It also monitors foreign radio broadcasts. The Directorate of Operations is responsible for covert operations, including clandestine collection of intelligence (*i.e.*, espionage) and special covert activities. The Directorate of Science and Technology is charged with keeping the agency abreast of scientific and technological advances, and it develops technical devices useful to the agency and supplies technical and scientific support to agency operations. The Directorate of Administration not only administers but also contains the Office of Security, which is responsible for the security of personnel, facilities, information, and such information sources as defectors from other governments.

Clandestine activities are carried on under

various guises—including the diplomatic cloak used by virtually every intelligence service, as well as such fronts as corporations that the CIA creates or acquires. The agency also "debriefs" business travelers, journalists willing to be so interviewed, and others returning to the United States from a sensitive or professionally interesting place.

Among the CIA's major covert operations were the expulsion of Mohammad Mosaddeq as premier and the restoration of the shah of Iran in 1953, and the following year the toppling of an unfriendly leftist government in Guatemala. The attempted Bay of Pigs invasion of Cuba (1961) by CIA-supported Cuban dissidents was a fiasco. In 1973 and 1974 the agency was damaged by the revelation that former CIA operatives had repeatedly played illegal roles in the Watergate affair.

Although it was popularly thought to have been a U.S. counterpart of the former Soviet agency known as the KGB (*q.v.*), the CIA is limited by the legislation that created it to intelligence and counterintelligence activities on foreign soil, whereas the KGB had numerous and major domestic intelligence-gathering and police functions. Nevertheless, the cloak of secrecy necessary to any espionage and counterespionage operation has permitted the CIA occasional excursions beyond its legal mandate. Such lapses do not long escape public notice in the United States, where the constitutional guarantee of freedom of the press may collide with the effect of the CIA's secrecy and the silence required of former operatives. Moreover, in the United States the press can have an adversarial relationship with government—unlike, for example, the United Kingdom and certain other representative democracies, where official-secrets acts inhibit press freedom. Moreover, the two-party system and three-branch form of the U.S. government frequently give rise to antagonism between the legislative and executive arms. As a consequence, public debate over certain CIA activities or over its role in general is not rare.

Central Java (Indonesia): *see* Jawa Tengah.

Central Karoo (South Africa): *see* Great Karroo.

Central League, Japanese SENTORARU RIGU, one of the two associations of professional baseball teams in Japan. Both the Central League and the Pacific League were founded in 1950. The Central League comprises six teams, each of which is owned and sponsored by a major corporation. In the 1980s the league consisted of the Chūnichi Dragons, Hanshin Tigers, Hiroshima Tōyō Carp, Taiyō Whales, Yakult Swallows, and Yomiuri Giants.

Central Massif (France): *see* Massif Central.

Central Pacific Basin, major submarine basin of the central part of the north Pacific Ocean, between the Line Islands to the east and the Marshall Islands to the west. It occupies a large area of the north Pacific and extends westward to a zone of trenches, the Andesite Line (a region of intense volcanic and seismic activity), which includes the Aleutian Trench, the Kuril Trench, the Japan Trench, and the Yap Trench. The deepest section of the Central Pacific Basin lies more than 21,300 feet (6,500 m) below sea level. The basin is bordered by the submarine Mid-Pacific Mountains on the north, and the Phoenix Islands and the Tokelau Islands mark its southern reaches south of the Equator. Its floor is covered with the remains of oceanic organisms that once inhabited its waters. The comparatively warm Pacific North Equatorial Current and the Pacific Equatorial Current flow westward and eastward, respectively, in the basin.

Central Pacific Railroad, American railroad company founded in 1861 by a group of California merchants known later as the "Big Four" (Collis P. Huntington, Leland Stanford, Mark Hopkins, and Charles Crocker); they are best remembered for having built part of the first American transcontinental rail line. The line was first conceived and surveyed by an engineer, Theodore Dehone Judah, who obtained the financial backing of the California group and won federal support in the form of the Pacific Railway Act (1862), which provided land grants and subsidies to the Central Pacific and Union Pacific. Each company was granted financial support from government bonds and awarded sizable parcels of land along the entire length of the track as an added incentive.

Huntington represented the company in the east, handling the financing and purchasing and acting as political lobbyist. Crocker was in charge of construction. Stanford, who was governor of California in 1861–63, saw to the company's financial and political interests in the West. The associates subscribed some of their own funds initially, but most of the capital for the actual construction came from public funds and grants. All four men became enormously wealthy.

The Central Pacific began laying track eastward from Sacramento in 1863, and the Union Pacific started westward from Omaha, Neb., two years later. To meet its manpower needs, the Central Pacific hired thousands of Chinese labourers, including many recruited from farms in Canton. The crew had the formidable task of laying the track crossing the rugged Sierra Nevada mountain range and had to blast nine tunnels to accomplish this. The crew of the Union Pacific, which was composed largely of Irish immigrants and Civil War veterans, had to contend with Indian attacks and the Rocky Mountains. On May 10, 1869, after completing 1,800 miles (2,900 km) of new track, the two rail lines met at Promontory, Utah.

In subsequent years feeder lines of the Central Pacific were established throughout California (some of them under the umbrella of a company called the Southern Pacific Company of California), and already existing trackage along southern routes to Texas and New Orleans was acquired. On March 17, 1884, a new Southern Pacific Company was incorporated (under a special Kentucky charter) to act as a holding company for the several operating railroads; the Central Pacific was leased to it until 1959, then merged with it.

Central Park, largest and most important public park in Manhattan, New York City. It occupies an area of 840 acres (340 hectares) and extends between 59th and 110th streets (about 2.5 miles [4 km]) and between Fifth and Eighth avenues (about 0.5 miles [0.8 km]). It was one of the first American parks to be developed using landscape architecture techniques.

In the 1840s the increasing urbanization of Manhattan prompted the poet-editor William Cullen Bryant and the landscape architect Andrew Jackson Downing to call for a new, large park to be built on the island. Their views gained widespread support, and in 1856 most of the park's present land was bought with about $5,000,000 that had been appropriated by the state legislature. The clearing of the site, which was begun in 1857, entailed the removal of a bone-boiling works, many scattered hovels and squalid farms, free-roaming livestock, and several open drains and sewers. A plan was devised by the architects Frederick Law Olmsted and Calvert Vaux that would preserve and enhance the natural features of the terrain to provide a pastoral park for city dwellers; the plan was chosen from 33 submitted in competition for a $2,000 prize. During the park's ensuing construction millions of cartloads of dirt and topsoil were shifted to build the terrain, about 5,000,000 trees and shrubs were planted, a water-supply system was laid, and many bridges, arches, and roads were constructed.

The completed Central Park officially opened in 1876, and it is still one of the greatest achievements in artificial landscaping. The park's terrain and vegetation are highly varied and range from flat grassy swards, gentle slopes, and shady glens to steep, rocky ravines. The park affords interesting vistas and walks at nearly every point. The Metropolitan Museum of Art is in the park, facing Fifth Avenue. There are also a zoo, an ice-skating



Horse-drawn carriage in Central Park, New York City
K. Gunnar—Bruce Coleman Inc

rink, three small lakes, an open-air theatre, a band shell, many athletic playing fields and children's playgrounds, several fountains, and hundreds of small monuments and plaques scattered through the area. There are also a police station, several blockhouses dating from the early 19th century, and "Cleopatra's Needle" (an ancient Egyptian obelisk). The park has numerous footpaths and bicycle paths, and several roadways traverse it.

central-place theory, in geography, an element of location theory (*q.v.*) concerning the size and distribution of central places (settlements) within a system. Central-place theory attempts to illustrate how settlements locate in relation to one another, the amount of market area a central place can control, and why some central places function as hamlets, villages, towns, or cities.

The German geographer Walter Christaller introduced central-place theory in his book entitled *Central Places in Southern Germany* (1933). The primary purpose of a settlement or market town, according to central-place theory, is the provision of goods and services for the surrounding market area. Such towns are centrally located and may be called central places. Settlements that provide more goods and services than do other places are called higher-order central places. Lower-order central places have small market areas and provide goods and services that are purchased more frequently than higher-order goods and services. Higher-order places are more widely distributed and fewer in number than lower-order places.

Christaller's theory assumes that central places are distributed over a uniform plane of

constant population density and purchasing power. Movement across the plane is uniformly easy in any direction, transportation costs vary linearly, and consumers act rationally to minimize transportation costs by visiting the nearest location offering the desired good or service.

The determining factor in the location of any central place is the threshold, which comprises the smallest market area necessary for the goods and services to be economically viable. Once a threshold has been established, the central place will seek to expand its market area until the range—*i.e.*, the maximum distance consumers will travel to purchase goods and services—is reached.

Since the threshold and range define the market area of a central place, market areas for a group of central places offering the same order of goods and services will each extend an equal distance in all directions in circular fashion.

The German economist August Lösch expanded on Christaller's work in his book *The Spatial Organization of the Economy* (1940). Unlike Christaller, whose system of central places began with the highest-order, Lösch began with a system of lowest-order (self-sufficient) farms, which were regularly distributed in a triangular-hexagonal pattern. From this smallest scale of economic activity, Lösch mathematically derived several central-place systems, including the three systems of Christaller. Lösch's systems of central places allowed for specialized places. He also illustrated how some central places develop into richer areas than others.

Edward Ullman introduced central-place theory to American scholars in 1941. Since then geographers have sought to test its validity. Iowa and Wisconsin have been two areas of empirical research that have come closest to meeting Christaller's theoretical assumptions.

Central Powers, World War I coalition that consisted primarily of the German Empire and Austria-Hungary, the "central" European states that were at war from August 1914 against France and Britain on the Western Front and against Russia on the Eastern Front. The Ottoman Empire entered the war on the side of the Central Powers on Oct. 29, 1914. Bulgaria came in on Oct. 14, 1915.

central processing unit (CPU), principal part of any digital computer system, generally composed of the main memory, control unit, and arithmetic-logic unit. It constitutes the physical heart of the entire computer system; to it is linked various peripheral equipment, including input/output devices and auxiliary storage units (*see* input/output device; computer memory).

The control unit of the central processing unit regulates and integrates the operations of the computer. It selects and retrieves instructions from the main memory in proper sequence and interprets them so as to activate the other functional elements of the system at the appropriate moment to perform their respective operations. All input data are transferred via the main memory to the arithmetic-logic unit for processing, which involves the four basic arithmetic functions (*i.e.*, addition, subtraction, multiplication, and division) and certain logic operations such as the comparing of data and the selection of the desired problem-solving procedure or a viable alternative based on predetermined decision criteria.

Central Range (Malaysia): *see* Main Range.

Central Range (Taiwan): *see* Chung-yang Range.

Central Region Plateau, also called LILONGWE PLAIN, largest continuous tableland in Malawi. Its area of 9,000 square miles (23,310 square km) is bordered by the Chimaliro Hills and Viphya Mountains on the north, the Great Rift Valley on the east, the Dwangwa River on the west, and the Kirk and Dzalanyama ranges on the south. The highlands, rising out of the east-central area, have a gently undulating surface with heights varying from 2,500 feet (760 m) to 4,500 feet (1,400 m). The highlands' west-central area is dotted with hills of remarkably uniform elevations of 4,700 (1,430 m) to 5,000 feet (1,500 m). The broad valleys of the Lilongwe, Bua, and Dwangwa rivers traverse the region in an east-northeast direction. Their tributaries spread out in *nadambo* (bogs), offering little free-flowing water. The greater part of the Central Region Plateau has poor, sandy soils supporting grasslands and a sparse agricultural population. The fertile clays of the Lilongwe area, however, produce Malawi's major tobacco crop.

Central Russian Upland, Russian SREDNERUSSKAYA VOZVYSHENNOST, large upland area of the Russian Plain, in the central part of European Russia. It stretches in a north–south direction from the Oka River to the Donets River and the Donets Ridge. The upland has a total north–south length of 600 miles (1,000 km) and a width of 300 miles (480 km), with a maximum height of 950 feet (290 m). In the central part of the upland, near the cities of Voronezh, Oryol, and Kursk, is the Voronezh Anticline; this is a massive upwarping of the underlying Russian Platform and is a geologic base of great antiquity and stability. Elsewhere the Central Russian Upland is overlain by deep deposits of clays, limestones, and sands. The upland forms part of the watershed between rivers flowing to the Black and Caspian seas.

Central Siberian Plateau, Russian SREDNESIBIRSKOYE PLOSKOGORYE, vast upland area, north-central Siberia, Russia. The plateau occupies an area of 600,000 square miles (1,500,000 square km). It is situated in Krasnoyarsk *kray* (region), Yakutiya (Yakut-Sakha), and in Irkutsk *oblast* (province). It is bounded by the Yenisey River on the west, the North Siberian Lowland on the north, the Lena River (according to some authorities, by the Verkhoyansk Mountains) on the east, and the Vostochny Sayan (Eastern Sayan) Mountains and the Baikal region on the south. The plateau is underlain by crystalline rocks of the stable Siberian Platform, but these are overlain by marine deposits as well as newer rock series. The average elevation is 1,650–2,300 feet (500–700 m), but occasional tablelands occur: the Putoran Mountains, the Yenisey Ridge, and others. Vegetation in the plateau varies from tundra in the north to steppe-grasslands in the south.

Central Slovakia Region: *see* Stredoslovenský.

central stage: *see* theatre-in-the-round.

Central Sudanic languages, group of languages spoken by various peoples in the southern Sudan, northeastern Zaire, northwestern Uganda, Chad, and the Central African Republic, in north-central Africa. These languages form one of the subbranches of the Chari-Nile branch of the Nilo-Saharan language family. There are two main subgroups of Central Sudanic languages: Bongo-Bagirmi—including Bongo, Beli, Baka, Morokodo, Bagirmi, and Sara—and Moru-Madi—including Moru, Avukaya, Logo, Lendu, Lugbara, and Madi. Some scholars have applied the name Eastern Sudanic to this group of languages, but most specialists now use that term to refer to a related group of Chari-Nile languages spoken farther to the east. *See also* Chari-Nile languages.

Central Treaty Organization (CENTO), formerly MIDDLE EAST TREATY ORGANIZATION, or BAGHDAD PACT ORGANIZATION, mutual security organization dating from 1955 to 1979 and composed of Turkey, Iran, Pakistan, and the United Kingdom. Until March 1959 the organization was known as the Middle East Treaty Organization, included Iraq, and had its headquarters in Baghdad.

Formed at the urging of Britain and the United States, the Central Treaty Organization was intended to counter the threat of Soviet expansion into vital Middle East oil-producing regions. It was never very effective. Iraq withdrew from the alliance in 1959 after its anti-Soviet monarchy was overthrown. That same year the United States became an associate member, the name of the organization was changed to CENTO, and its headquarters was moved to Ankara. Following the fall of the shah in 1979, Iran withdrew, and CENTO was dissolved.

Central Valley, Spanish VALLE CENTRAL, structural depression in central Chile between the Western Cordillera of the Andes and the coastal range, extending for about 400 miles (650 km) from the Chacabuco Range in the north to the river Bío-Bío in the south. The valley is the agricultural heartland of Chile and consists of a 40- to 45-mile- (64- to 72-kilometre-) wide plain made up of a vast thickness of heavily mineralized alluvial soils deposited by the region's principal rivers, the Mapocho, Maule, and Maipo. This central section of Chile enjoys a Mediterranean climate, with the cool, dry summers and mild, rainy winters characteristic of the western coasts of all the continents between 30 and 40 degrees latitude. Vegetation varies with the altitude: near sea level *Solanum maritimum*, a relative of the potato, is common; up to 2,500 feet (760 m) characteristic plants include a treelike lily (*Crinodendron patagua*), *Bellota miersii*, and low trees such as *Acacia*. The original dry forest, however, has been gradually eliminated by urban and agricultural encroachment.

The valley was the original centre of European colonization beginning in the mid-1500s. It continues to be the home of the majority of Chileans and is the predominant agricultural region of the country, containing 40 percent of all its cultivated land. Santiago, the capital and cultural centre of the nation, with a metropolitan-area population of more than 4,200,000, is situated at the northern end of the valley. Three other urban centres of more than 130,000 people, Talcahuano, Chillan, and Temuco, are located to Santiago's south along a longitudinal railroad constructed midway between the Andes and the coastal range; each city was a centre of settlement of Chile's rich agricultural hinterlands outside Santiago. A section of the Chilean portion of the Pan-American Highway runs southward through the valley from San Felipe, and air service connects all major centres.

Central Valley, also called the GREAT VALLEY, valley, in California, U.S., covering about 18,000 square miles (47,000 square km) and paralleling the Pacific coast for about 450 miles (725 km). Only 40 miles (64 km) in width, it is almost totally enclosed by mountain walls, which include the Klamath Mountains (north), Sierra Nevada (east), Tehachapi Mountains (south), and Pacific Coast Ranges (west). The Sacramento and San Joaquin rivers, which run through the Central Valley, are fed mainly by the abundant rains and melting snows of the Sierra's western flank. The San Joaquin valley in the south embraces more than three-fifths of the entire basin, and the Sacramento valley in the north constitutes the remainder. The most northerly part of the Sacramento valley, extending about 30 miles (48 km) north of the city of Red Bluff, is known as Anderson Valley. The Sacramento and San Joaquin rivers combine southwest of

the city of Sacramento in an area known as the Delta Lands to enter San Francisco Bay, the Central Valley's only outlet.

The development of ranching and agriculture in the valley progressed rapidly after the California Gold Rush in 1849. Because of the irrigation made possible by numerous dams and canals, the area now contains some of the richest farmland in the United States and produces a wide variety of crops, including cotton, fruits (wine grapes, peaches, apricots), grains (wheat, rice), nuts, sugar beets, and vegetables. The valley is also rich in petroleum and natural gas.



Irrigated farmland in Central Valley, California
Ray Atkeson

Centralia, city, in Marion and Clinton counties, southern Illinois, U.S. It was founded in 1853 by the Illinois Central Railroad (whence its name), and railroad shops formed the basis of its economy. Other activities now include agriculture (fruit growing and dairying), coal mining, oil production, and light manufacturing (auto parts, fuses, and plastics). Centralia is the site of the Warren G. Murray Developmental Center for exceptional children. Kaskaskia College, a junior college, was established there in 1965. Inc. 1859. Pop. (1990) 14,274.

Centralia, original name CENTERVILLE, city, Lewis county, southwest Washington, U.S. The city is situated near the confluence of the Chehalis and Skookumchuck rivers and lies midway between Portland, Ore., and Seattle, Wash. In the mid-19th century the site was a stopover point for stagecoaches. The townsite was founded in 1850 by J.G. Cochran, and the city was laid out as Centerville in 1875 by George Washington, a freedman who had been Cochran's slave. The city was renamed Centralia in 1891. Lumbering is Centralia's chief industry; the economy depends also on dairying, poultry raising, and fruit farming in the area. Centralia Junior College was established in 1925. Nearby Fort Borst Park contains Borst Blockhouse (1852) and Borst Farmstead (1860). Inc. 1886. Pop. (1990) 12,101.

Centre, industrial district in Hainaut province, southwestern Belgium. It lies in the upper valley of the Haine River and is centred on the town of La Louvière between Mons and Charleroi. The coal mines that gave rise to the district are now closed, but heavy industry continues in the form of blast furnaces and steelworks at La Louvière, a petroleum refinery at Felay, and an automobile assembly plant at Seneffe-Manage. The Centre Canal serves the district and has antique canal lifts of archaeological interest. At Mariemont, north of Morlanwelz, the 16th-century castle built by Mary of Hungary, Charles V's sister, is open to the public.

Centre, *région,* encompassing the central French *départements* of Cher, Indre, Indre-et-Loire, Loir-et-Cher, Loiret, and Eure-et-Loir and coextensive with the former provinces of Berry, Touraine, and Orléanais. The capital of the *région* is located at Orléans. The *région* has an area of 15,116 square miles (39,151 square km) and is bounded by the *départements* of Eure to the northwest, Yvelines and Essonne to the northeast, Seine-et-Marne to the north, Yonne, Nièvre, and Allier to the east, Creuse and Haute-Vienne to the south, Vienne to the southwest, and Maine-et-Loire, Mayenne, and Orne to the west. Centre lies in the Paris Basin and is bisected by the Loire River, which flows east to west. Mount Saint-Marien in Cher reaches an elevation of 1,653 feet (504 m) and is the highest point in the *région.*

Centre *région* is sparsely populated. As in most rural areas of France, the population declined by more than 11 percent between 1891 and 1946. Because of its proximity to Paris, a magnet for job seekers, its growth has subsequently remained at a level below the national average. Demographic recovery has favoured the northern *départements* neighbouring Paris, such as Loiret, Eure-et-Loir, and Loir-et-Cher.

Centre is a leading producer of wheat, barley, and corn (maize), and it also produces Sauvignon, Pinot, and Cabernet grapes. Industrial crops are widely cultivated and include sugar beets, rapeseed (colza), and sunflowers. The *région* has benefited from the decentralization of Parisian industries since 1945. It has factories manufacturing such products as ball bearings, automotive parts, tires, and plastics. The nuclear reactors generating power at Dampierre-en-Burly (Loiret), Saint-Laurent-des-Eaux (Loir-et-Cher), and Avoine-Chinon (Indre-et-Loire) have reduced the region's imports of energy. The service sector is highly developed and employs approximately one-half of the work force. Tourism is centred on the chateaus of the Loire valley. Pop. (1990) 2,371,036.

Centre National d'Art et de Culture Georges Pompidou (Paris): *see* Pompidou Centre.

Centre National des Indépendants et Paysans (French political party): *see* National Centre of Independents and Peasants.

centre of ——— : *see under* substantive word (*e.g.,* gravity, centre of).

Centre Party, German ZENTRUMSPARTEI, in Germany, political party active in the Second Reich from the time of Otto von Bismarck in the 1870s to 1933. It was the first party of imperial Germany to cut across class and state lines, but because it represented the Roman Catholics, who were concentrated in southern Germany, it could never win a parliamentary majority.

Throughout the 1870s the Centre Party was estranged from Bismarck in the *Kulturkampf,* which was a struggle between the chancellor and the Roman Catholic church. From 1877, however, the Centre Party began supporting Bismarck in return for peace with the church and protective tariffs that benefited the individual states. By 1887 the two factions were reconciled. The Centre returned to opposition against Leo, Graf von Caprivi, Bismarck's successor, when it was denied control of religious education.

By 1900, however, the party had been mollified in this respect and voted for establishing a powerful German navy, though its support came from peasants unconnected with the sea. Other periods in which the party supported the government in exchange for concessions to confessional interests followed until World War I. In 1916 the Centre Party was instrumental in underscoring the German chancellor's subservience to the military, but in 1917 the party urged peace negotiations with the Allies. The Centre joined the Weimar coalition, which framed a constitution after the Second Reich's collapse, and until 1928 the party frequently participated in coalition governments. During the years of the Weimar Republic, five Centre Party politicians—Konstantin Fehrenbach, Joseph Wirth, Wilhelm Marx, Heinrich Brüning, and Franz von Papen—served as chancellors. Although the Centre Party remained relatively moderate in its stance during the polarization of German politics in the early 1930s, the party's deputies voted for the Enabling Act of March 1933, which allowed Chancellor Adolf Hitler to assume dictatorial powers in Germany. The Centre Party was dissolved by the Nazi-dominated government in July 1933.

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centrifugal force, quantity, peculiar to a particle moving on a circular path, that has the same magnitude and dimensions as the force that keeps the particle on its circular path (the centripetal force) but points in the opposite direction.

A stone whirling in a horizontal plane on the end of a string tied to a post on the ground is continuously changing the direction of its velocity and, therefore, has an acceleration toward the post. This force is equal to the square of its velocity divided by the length of the string. According to Newton's second law, an acceleration is caused by a force, which in this case is the tension in the string. If the stone is moving at a constant speed and gravity is neglected, the inward-pointing string tension is the only force acting on the stone. If the string breaks, the stone, because of inertia, will keep on going in a straight line tangent to its previous circular path; it is not the influence of a centrifugal "force" that will make the stone fly off in a radially outward direction.

Although it is not a real force according to Newton's laws, the centrifugal-force concept is a useful one. For example, when analyzing the behaviour of the fluid in a cream separator or a centrifuge, it is convenient to study the fluid's behaviour relative to the rotating container rather than relative to the Earth; and, in order that Newton's laws be applicable in such a rotating frame of reference, an inertial force, or a fictitious force (the centrifugal force), equal and opposite to the centripetal force, must be included in the equations of

motion. In a frame of reference attached to the whirling stone, the stone is at rest; to obtain a balanced force system, the outward-acting centrifugal force must be included.

Centrifugal force can be increased by increasing either (1) the speed of rotation, (2) the mass of the body, or (3) the radius, which is the distance of the body from the centre of the curve. Increasing either the mass or the radius increases the centrifugal force proportionally, but increasing the speed of rotation increases it in proportion to the square of the speed; that is, an increase in speed of 10 times, say from 10 to 100 revolutions per minute, increases the centrifugal force by a factor of 100. Centrifugal force is expressed as a multiple of G, the symbol for normal gravitational force (strictly speaking, the acceleration due to gravity). Centrifugal fields of more than 1,000,000,000 G have been produced in the laboratory by devices called centrifuges.

centrifugal pump, device for moving liquids and gases. The two major parts of the device are the impeller (a wheel with vanes) and the circular pump casing around it. In the most common type, called the volute centrifugal pump, fluid enters the pump at high speed near the centre of the rotating impeller and is thrown against the casing by the vanes. The centrifugal pressure forces the fluid through an opening in the casing. This outlet widens progressively in a spiral fashion, which reduces the speed of the fluid and thereby increases pressure. Centrifugal pumps produce a continuous flow of fluid at high pressure; the pressure can be increased by linking several impellers together in one system. In such a multistage pump the outlet for each impeller casing serves as the inlet to the next impeller. Centrifugal pumps are used for a wide variety of purposes, such as pumping liquids for water supply, irrigation, and sewage disposal systems. Such devices are also utilized as gas compressors.

centrifuge, any device that applies a sustained centrifugal force; that is, a force due to rotation. Effectively, the centrifuge substitutes a similar, stronger, force for that of gravity. Every centrifuge contains a spinning vessel; there are many configurations, depending on use. A perforated rotating drum in a laundry that throws off excess water from clothes, for example, is a type of centrifuge. A similar type is used in industry to separate fluids from solid matter after crushing.

As enunciated by Sir Isaac Newton in his first law of motion, a freely moving body (such as a ball) tends to travel in a straight line, and if directed along a curved path by some restraining force (such as would result were a hand-held string tied to it) it will exert a force against the directing or restraining force in its continual effort to fly off onto a straight tangential course. It is a familiar observation that an object revolving in a circle exerts a force away from the centre of rotation. This force, which is the outward pull of the ball on its string, is the centrifugal force. Also, there is general appreciation of the fact that the amount of this force can be increased by increasing either the angular velocity of rotation, the mass of the object, or the radius of the circle through which the object moves. Perhaps not so generally appreciated is the fact that whereas the centrifugal force is directly proportional to the radius and to the mass, it is proportional to the *square* of the angular velocity. For example, doubling the mass of the rotating object will increase the centrifugal force by a factor of 2, but doubling the number of revolutions per minute (rpm) will increase the centrifugal force by a factor of 4 (equals 2 times 2); similarly, increasing the speed by a factor of 10 will increase the force by a factor of 100 (equals 10 times 10). Centrifugal force is expressed by the basic relation $F = mv^2 / R = 4\pi^2 mn^2 R$; F is the centrifugal force, m the mass, R the radius, v the speed, and n the number of revolutions per second.

The centrifugal force is often compared directly with the weight (pull of gravity) of the object, and the amount of force is stated as so many "times gravity" or so many "G." Through the use of special research apparatus, forces greater than 5,000,000 times gravity have been produced by spinning small metal rotors of about pea size at speeds exceeding 1,000,000 revolutions per minute.

The rotating element of a centrifuge is usually driven about a fixed axis by an electric motor, or by an air turbine in some high-speed machines, and is known as a rotor, bowl, or drum. For the minimizing of vibration and strain on the shaft and bearings, it is essential that a loaded rotor be well balanced; *i.e.,* that its total mass be so distributed about the axis of rotation that the resultant of all the elemental forces is zero. If the bearings are suited to high speeds and if ample power is available to overcome the frictional resistance of the bearings, the only limitation to the speed of a well-balanced rotor is the strength against rupture of the material from which it is made.

For example, a rotor with a 15-centimetre (6-inch) diameter used in certain biological studies and designed especially for high speeds has a limiting speed for routine operation of about 60,000 revolutions per minute. In a rotor of given design, the maximum angular velocity obtainable before rupture is to a close approximation inversely proportional to the rotor's diameter. Thus, a small rotor having only one-half the diameter of a larger one can be as safely rotated at twice the angular velocity and with the production at the periphery of twice the centrifugal force.

The widest use of centrifuges is for the concentration and purification of materials in suspension or dissolved in fluids. Suspended particles denser than the suspending liquid tend to migrate toward the periphery, while those less dense move toward the centre. The rapidity with which the migration proceeds is dependent on the intensity of the centrifugal field, the difference between the density of the particle and that of the suspending liquid, the viscosity of the liquid, the size and shape of the particle, and to some extent the concentration of the particles and the degree to which they are electrically charged. The net motivating force exerted on the particle is the difference between the centrifugal field acting on it and the opposing buoyancy of the liquid. All other things being equal for two particles, one with a diameter 10 times that of the other will require only $^1/_{100}$ as much average centrifugal field to move a given distance in a given time as the smaller.

From the foregoing discussion, it is clear that a practically complete separation of the suspending medium and the suspended particles can be produced if the centrifugation is allowed to continue until all particles have collected against the outer wall of the spinning vessel or centrifuge. It should also be noted that a partial separation of two groups of suspended particles of different size can be effected by allowing centrifugation to continue only long enough for all of the larger particles to be completely packed into the sediment, since then many of the small particles will still be suspended in the fluid. If separation of the larger as well as the smaller particles is desired, the surface fluid can be drawn off and the sediment resuspended in some suitable liquid and subsequently centrifuged again to effect further separation.

Centrifuges may be classified in three general categories depending on whether the spinning centrifuge bowl that contains the material to be separated has a solid wall, a perforated wall, or some combination of the two. Also, they may be characterized according to whether the material is treated in a continuous flow process, a batch process, or a combination of the above processes.

Bottle centrifuges. A bottle centrifuge is a batch-type separator that is primarily used for research, testing, or control. The separation takes place in test tube or "bottle-type" containers, which are symmetrically mounted on a vertical shaft. The shaft of a bottle centrifuge is usually driven by an electric motor, gas turbine, or a hand-driven gear train located above or below the rotor. In most cases, the bottles are supported by high-strength metal containers so that their axis is perpendicular to the axis of rotation. The sedimentation occurs in a radial direction, and in some bottle centrifuges the test tubes or bottles are inclined at an angle of about 37° to the axis of rotation in order to reduce the distance that the material must settle.

Bottle centrifuges are standard equipment for most biological, chemical, or medical laboratories. They are used to separate solid materials in suspension or to clarify liquids when precipitation will not take place in a reasonable time in the gravitational field G. In most commercial bottle centrifuges the centrifugal field may be varied from a few G up to tens of thousands. Commercial uses of the bottle centrifuge include tests for the butterfat content of milk, determination of the sediment in crude mineral and vegetable oils, and clinical tests of various kinds.

Tubular centrifuges. The tubular centrifuge is used primarily for the continuous separation of liquids from liquids or of very fine particles from liquids, although in some cases it is employed as a batch-type centrifuge. In general, it is used when higher centrifugal fields are required for separation. The rotating bowl of a tubular centrifuge consists of a long hollow tube (length many times its diameter) as shown schematically in Figure 1. For continuous separation the feed or material to be centrifuged enters at one end near the axis and is removed in two streams containing the separated material. In many cases the separation is not complete and the separated fractions must be passed through the machine several times. Many different designs for the internal structure of the tube are employed, but in general radial vanes are used to bring the feed material up to speed and to slow down the separated streams before they are discharged. The centrifuge is driven by a high-speed motor or an air or steam turbine. The sedimentation

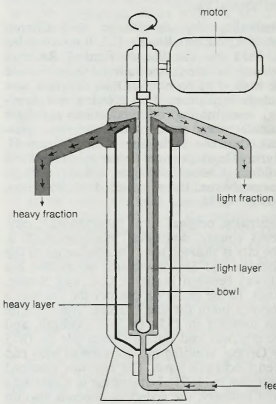


Figure 1: Tubular centrifuge

takes place as the fluid flows from one end of the tube to the other. When the heavy material consists of very fine particles or molecules and the concentration is very low, the solid material is usually allowed to deposit on the wall. In this case the machine is operated as a batch centrifuge.

The tubular centrifuge is finding an increasing number of applications because of the high centrifugal fields that may be used (10^5 G near the periphery in some cases). A few typical uses are as follows: (1) the purification of vaccines (uncentrifuged vaccines contain a large amount of nonessential and harmful material); (2) purification of lubricating and industrial oils; (3) clarification and purification of food products such as essential oils, extracts, and fruit juices; (4) separation of immiscible liquids that cannot be separated by gravity.

Disk-type centrifuges. The disk-type centrifuge consists of a vertical stack of thin disks in the shape of cones. The sedimentation takes place in the radial direction in the space between adjacent cones. This greatly reduces the settling distance and hence increases the rate at which the material is separated. The angle of the cones is designed so that upon reaching the inside surface of the cone the heavier material slides down along its surface in a manner that is similar to that of the 37° fixed-angle bottle centrifuge.

The disk-type centrifuge usually operates continuously. The material to be processed enters in one stream and is separated into two purified streams. These centrifuges are used primarily for the separation of liquids in which the solid or immiscible components occur in relatively low concentrations. The familiar cream separator, widely used in the dairy industry and on farms for separating cream from milk, is a typical example of this type of centrifuge. They also are used for the purification of fuel oil, the reclamation of used motor oil, and the removal of soap stock in the refining of vegetable oils.

Basket centrifuges. Basket centrifuges are often called centrifugal filters or clarifiers. They have a perforated wall and cylindrical tubular rotor. In many cases the outer wall of a basket centrifuge consists of a fine mesh screen or a series of screens with the finer mesh screens supported by the heavier coarse screen, which in turn is supported by the bowl. The liquid passes through the screen, and the particles too large to pass through the screen are deposited. The basket centrifuge is employed in the manufacture of cane sugar, in the home and in laundries for the rapid drying of clothes, and in the washing and drying of many kinds of crystals and fibrous materials, etc.

Vacuum-type centrifuges. In the centrifuges described above, the rotor spins in air or some other gas at atmospheric pressure. The gaseous friction on a spinning rotor increases at a relatively high rate so that the power required to drive the rotor also increases rapidly. As a result, the temperature of the rotor rises drastically, sometimes exceeding the boiling point of water. As the rotor surface near the periphery moves faster than near the axis, a thermal gradient or variation in temperature through the rotor wall is established along the radius with the periphery at a higher temperature than the axis. These small radial temperature gradients produce convection within the centrifuge, and these convection currents can cause remixing and disturb sedimentation.

The heat buildup and convection problems caused within a centrifuge by air resistance can be avoided by spinning the rotor within an evacuated chamber. The elimination of air resistance also makes possible the attainment of high rotational speeds with relatively little expenditure of energy. Many vacuum-type centrifuges are ultracentrifuges; *i.e.*, they operate at speeds of more than about 20,000 revolutions per minute. Figure 2 shows a schematic diagram of an early vacuum-type ultracentrifuge. The centrifuge rotor located inside the vacuum chamber is connected to the air-supported, air-driven turbine by a vertical, small-diameter, flexible steel shaft.

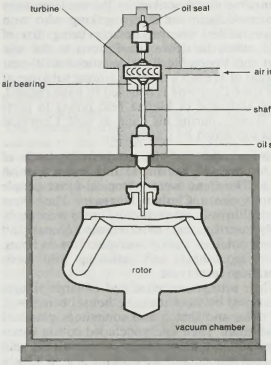


Figure 2: Air-driven, vacuum-type ultracentrifuge

The rotor of a typical vacuum-type ultracentrifuge is 18 cm (7 inches) in diameter and carries 300 millilitres (10 ounces) of liquid in a centrifugal field of more than 300,000 G. Practically all substances of importance in medicine and biology and all other substances with molecular weights of 50 daltons (one dalton is 1.66×10^{-24} grams) or more are easily purified in this type of bottle centrifuge. The rotor of a vacuum-type ultracentrifuge can be replaced by one with sector-shaped cells and transparent windows so that the progress of the sedimentation can be optically measured and photographed. This method was first used by T. Svedberg and J.B. Nichols in 1923 and was widely applied thereafter to determine the sedimentation rates and sizes of many submicroscopic particles, particularly protein molecules and viruses.

The vacuum-type centrifuge may be used for the determination of the molecular weights of practically all substances in solution. In modern commercial vacuum-type centrifuges the air drive and support have been replaced by the more efficient and convenient electric motor drive, and the entire machine has been redesigned and made almost automatic in its operation. The present commercial vacuum-type ultracentrifuge has become an indispensable tool in laboratories where it is necessary to purify substances of importance in biochemistry, biophysics, biology, medicine, and the pharmaceutical industry.

The ultracentrifuge can be used in two principal ways for determining the molecular weights of various proteins. The first consists in carrying out the sedimentation in a centrifugal field high enough to produce a relatively sharp sedimentation boundary, *i.e.*, the boundary between the sedimenting molecules and the pure solvent. The rate at which this boundary moves out along the radius toward the periphery is then measured and the value of the molecular weight is calculated. This is called the rate of sedimentation method. The second method consists in centrifuging the material until equilibrium is established in the centrifuge cell, *i.e.*, until the rate at which the material settles out is balanced by back diffusion. If the concentration in the cell is then determined at various radial distances, the value of the molecular weight can be calculated.

Vacuum-type tubular centrifuges are used to purify many biological materials that cannot easily be separated in other ways. They have been employed both as continuous-flow and as density-gradient centrifuges. The density-gradient centrifuge consists in setting up a radial density variation or gradient in the tubular centrifuge with slowly sedimenting nonreactive smaller molecules such as sucrose or calcium chloride. If, then, the density of the substance to be purified falls within the range of the artificial density gradient, it will collect in a thin cylindrical surface at a definite radius. If more than one substance is in the solution, each of the substances will collect at a radius determined by its particle density.

Another important use of the vacuum-type centrifuge is gas separation. When a gas is subjected to a centrifugal field, a radial pressure gradient is immediately established. Consequently, a mixture of any two gases with different molecular weights may be separated in a centrifuge with the lighter gas being concentrated on the axis. In 1919, after it was pointed out that it should be possible to separate the isotopes of an element by centrifuging, a number of attempts were made to obtain separation but were all unsuccessful, probably due to convection and remixing in the centrifuge. In 1937 the isotopes of chlorine were separated with a vacuum-type ultracentrifuge. An evaporative centrifuge method was used in which the material to be separated is admitted to the rotor and condensed on the periphery with the rotor stationary. The rotor is then driven to operating speed and the lighter material pumped out through the hollow shaft while the heavier material remains in the centrifuge to be collected later. The centrifuge used in gas separation should be spun as rapidly as possible and should be as long as possible. The centrifuge method is suited to the separation of the heavier isotopes as well as the lighter ones, because it depends on the differences in the masses rather than on their absolute values.

Since the mid-1940s the technique of gaseous centrifuging has been further developed and extended. Workers in Germany and in The Netherlands have had considerable success with the method. A remarkably simple vacuum-type gas centrifuge that is especially adapted to uranium isotope separation has been devised. During the 1970s a centrifuge plant was constructed in Europe for the purpose of commercially producing reactor-grade uranium-235 for use in nuclear power plants.

centring (construction): *see* falsework.

centripetal acceleration, property of the motion of a body traversing a circular path. The acceleration is directed radially toward the centre of the circle and has a magnitude equal to the square of the body's speed along the curve divided by the distance from the centre of the circle to the moving body. The force causing this acceleration is directed also toward the centre of the circle and is named centripetal force.

centromere (biology): *see* chromosome.

centumviri, in ancient Rome, court of civil jurisdiction that gained distinction for its hearing of inheritance claims, through which it influenced succession. The court, instituted in *c.* 150 BC, was composed of three men from each tribe, a total of 105 judges; hence, the name *centumviri* ("100 men"), which remained unaltered even when the number increased to 180 by the time of Trajan. It disappeared in the 3rd century AD.

centurion, the principal professional officer in the armies of ancient Rome and its empire. The centurion was the commander of a *centuria,* which was the smallest unit of a Roman

legion. A legion was nominally composed of 6,000 soldiers, and each legion was divided up into 10 cohorts, with each cohort containing 6 *centuria.* The centurion thus nominally commanded about 100 men, and there were 60 centurions in a legion. The centurions in a legion were arranged in a complicated order of rank, with variations in authority and responsibility from top to bottom. There was little actual difference in status between most of these centurion ranks, however, with the exception of the first-ranking centurion of the first-ranking cohort; this officer, the *primus pilus,* participated in councils of war with the military tribunes and the legion commander. Most centurions were of plebeian origin and were promoted from the ranks of the common soldiers. They formed the backbone of the legion and were responsible for enforcing discipline. They received much higher pay and a greater share of the spoils than did common soldiers.

Centuripe, town, Enna *provincia,* east-central Sicily, Italy. The town lies at an elevation of 2,402 feet (732 m) on a ridge between the Simeto and Dittaino rivers, northwest of Catania. The ancient Centuripae, which the Greek historian Thucydides called a city of the Siculi (an ancient Sicilian tribe), allied itself with Athens against Syracuse. Centuripae remained independent of Syracuse, except for a period of domination under the Syracusan tyrant Agathocles, until it was taken by Rome in the First Punic War. The city apparently suffered in the Roman war against Sextus Pompeius, son of Pompey the Great, and did not regain its prosperity. Partly destroyed by Frederick II in 1233 (after which most of the inhabitants moved to Augusta), the city's ruin was completed by Charles of Anjou. It was later rebuilt by Francesco Moncada, count of Adernò (now Adrano), and was ruled by his descendants as a county until 1813. Known as Centorbi until 1863, it passed to the Kingdom of Italy in 1860 and was the scene of heavy fighting in World War II.

Remains of the classical city include Hellenistic houses with wall paintings, baths, and cisterns, and several substruction walls, mostly of the Roman period, on the steep slopes. Centuripe's civic museum and the Palazzo Comunale exhibit Hellenistic terra-cottas, finely painted vases of local manufacture, and relics from a large number of excavated tombs in the area. Agriculture (cereals) and the quarrying of chalk and marble are the main economic activities. There are local mineral springs. Pop. (1987 est.) mun., 6,631.

Century Dictionary and Cyclopedia, dictionary of American English that is generally regarded as one of the greatest ever produced. The first edition (1889–91) contained six volumes; a supplementary *Cyclopedia of Names,* including personal and geographic names, famous works of art and literature, and the like, was published in 1894. The entire work was under the superintendence of William Dwight Whitney (1827–94), professor of philology at Yale University. An atlas was added in 1897, and partial revisions of the set were made from time to time thereafter; a 12-volume edition was produced in 1911. Long after it went out of print, the *Century Dictionary and Cyclopedia* remained one of the most valuable references for etymologists, lexicographers, and historians. It contained more than 200,000 main entries and 500,000 definitions. In addition to thorough coverage of American English and complete etymology, the set strongly emphasized scientific and technical terms. A two-volume *New Century Dictionary of the English Language* (1952) and a three-volume *New Century Cyclopedia of Names* (1954) are modernizations of the 1911 edition.

century plant, member of the agave family of flowering plants. *See* Agavaceae.

Centwine (d. 685), king of the West Saxons, or Wessex (from 676), son of King Cynegils and brother of King Cenwalh. His reign was marked by renewed victories over the Welsh. Centwine was described by the contemporary writer Aldhelm as a strong king who won three battles, one presumably being that of 682, when he drove the Britons to the sea. Yet the Venerable Bede mentions a 10-year period of Wessex's division among subkings at the time Centwine is believed to have reigned, and Aethelred of Mercia held power in parts of Wessex during his reign as well. Centwine was succeeded by Caedwalla.

Cenú, Indians of the northern lowlands of Colombia who became extinct under Spanish rule. The Cenú were a tropical-forest people who spoke a Cariban language. They were agriculturists, and their chief crops were probably corn (maize), sweet manioc (yuca), and sweet potatoes; cotton was raised for its fibres. Hunting, fishing, and gathering wild foods were also important.

Their settlements consisted of large villages protected by stockades, the houses being built of poles and thatch and sometimes plastered with mud. Their crafts included cotton weaving, pottery, the making of hammocks and dugout canoes, and the working of gold. Clothing, because of the hot climate, was minimal; men probably wore only genital coverings or ornaments, while women wore wraparound skirts of cotton cloth. Gold ornaments of all types were common.

The Cenú were ruled by chiefs, including a woman chief. Polygamy was common, and cannibalism was practiced. Their religion centred on idols housed in large temples.

Cenwalh (d. 674), king of the West Saxons, or Wessex (from 643), son of Cynegils. Though his father became a Christian, Cenwalh himself long remained a pagan. Soon after his succession he discarded his wife, sister of King Penda of Mercia, who retaliated by making war and driving Cenwalh into exile (645–648). While in exile in East Anglia he was baptized and, on his return to the throne in Wessex (648), built St. Peter's in Winchester. Throughout much of his reign, he fended off his enemies, the Welsh and the Mercians. The Mercians seized the Isle of Wight, southern Hampshire, and all the West Saxon lands north of the Thames from Cenwalh. In the west Cenwalh did have military successes, however, notably when he drove the Britons to the River Parret in 658. His wife Seaxburg (or Seaxburh) apparently reigned for about one year after his death.

Cenwulf, also spelled COENWULF (d. 821, Basingwerk, Wales), Anglo-Saxon king of the Mercians from 796 who preserved the Mercian supremacy established by King Offa (reigned 757–796). During a Kentish rebellion against Mercian suzerainty, he tried to move the chief English see from Canterbury to London. He abandoned this plan after quelling the revolt (*c.* 798) and installing his brother as client king of Kent. Cenwulf fought an indecisive war with Eardwulf of Northumbria in 801–802 and died (probably of natural causes) during an invasion of Wales.

Ceol (d. 597), king of the West Saxons, or Wessex. Ceol was the son of Cutha, who was brother of King Ceawlin. After his victory over his uncle Ceawlin at Wodnesbeorg (Wiltshire) in 592, he reigned for five years. He was succeeded by his brother Ceolwulf (reigned 597–611) and then by his son Cynegils.

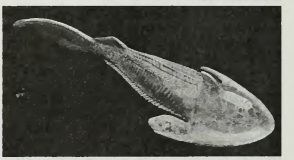
ceorl, also spelled CHURL, the free peasant who formed the basis of society in Anglo-Saxon England. His free status was marked by his right to bear arms, his attendance at local courts, and his payment of dues directly to the king. His wergild, the sum that his family could accept in place of vengeance if he were killed, was valued at 200 shillings. Nineteenth-century scholars often represented the ceorl as the typical peasant labourer in a kind of Anglo-Saxon democracy. Actually, he was a member of a peasant elite that was gradually extinguished between the 7th and 12th centuries. A few ceorls prospered and attained the rank of thegn (a free retainer, or lord, corresponding, after the Norman Conquest, to the position of baron or knight), but most were driven, first by economic pressure and later by the Norman Conquest, into the class of unfree villeins. The word ceorl came to denote a depressed and subject peasant and, by the 14th century, was used as a pejorative.

Cepeda, battles of (1820, 1859), two engagements fought at Cepeda, in the Buenos Aires province of Argentina, during the decades of disunity following the declaration in 1816 of Argentine independence.

On Feb. 1, 1820, at Cepeda, federalist forces, made up of gauchos from Santa Fe and Entre Ríos provinces, defeated the *unitarios* (advocates of strong central government), who were led by General José Rondeau, supreme director of the United Provinces of the Río de la Plata. Most of the *unitarios* were upper-class *porteños* (inhabitants of the port city of Buenos Aires). Several months of anarchy followed, known in Argentine history as the "terrible year of 1820." The Buenos Aires Congress and the directory were terminated, and the *unitarios* were forced to agree to a treaty between their own and the other provinces, by which the autonomy of each was upheld. The treaty failed to solve the conflict between Buenos Aires and the hinterland, which continued intermittently for 40 more years.

On Oct. 23, 1859, Bartolomé Mitre, in command of a Buenos Aires army, was defeated at Cepeda by forces of the Argentine Confederation, led by Justo José de Urquiza. This defeat ended a six-year secession of Buenos Aires and forced that province to accept a federal constitution in 1853, which was, however, amended to allow Buenos Aires greater influence. The period of armed strife, however, was not closed until after the Battle of Pavón (1861).

Cephalaspis, extinct genus of very primitive jawless, fishlike vertebrates found in Devonian rocks (between 345,000,000 and 395,000,000 years old) in Europe and North America and less commonly in rocks of the preceding Silurian Period. *Cephalaspis,* one of an early group of vertebrates called ostracoderms, possessed an external bony head shield, but probably its internal skeleton was not ossified to any great extent. Its eyes were situated on the dorsal side of the flat head; the ventral placement of its mouth indicates that *Cephalaspis* was a bottom-feeding animal. It is probable that *Cephalaspis* lived by straining organic matter from the bottom sediments of the freshwater streams it inhabited, a feeding method that persisted from its ancestors. *Cephalaspis* differed from its predecessors in that the head shield was freed from the rest of the body, allowing for greater mobility, and it also possessed paired pectoral fins. Sensory structures, perhaps electric organs of a sort, were present



Cephalaspis

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

along the margins of the head shield. *See also* ostracoderm.

Cephallenia, also called CEPHALONIA, Modern Greek KEFALLINÍA, island, largest of the Ionian Islands, west of the Gulf of Patraïkós. With the island of Ithaca (Itháki) and smaller nearby islands, it forms the *nomós* (department) of Kefallinía in modern Greece. The island, 302 square miles (781 square km) in area, is mountainous, with Mount Aínos (ancient Mount Aenos; 5,341 feet [1,628 m]) often snowcapped for months. Except for the Raki, there are few permanent streams, and springs can fail in the summer. In the west a gulf penetrates the island from the south; on its east side is the capital and port of Argostólion (*q.v.*), on its west side is the town of Lixoúrion. Agriculture is limited; currants are the chief export, but olives, grapes, grain, and cotton are also grown. Cephallenia's manufactures include lace, carpets, wine, and boats.

The island was an important Mycenaean centre and was probably the island known to Homer as Same. In the Peloponnesian War it sided with Athens and later was a member of the Aetolian League. It surrendered to Rome in 189 BC but later revolted and was subdued. During the Middle Ages it was captured by the Norman adventurer Robert Guiscard, who died there during a revolt in 1085. It then was ruled by various Neapolitan and Venetian families until it fell to the Turks (1479–99), only to revert again to Venetian rule. In 1797 France briefly possessed it, and in 1809 it was taken by the British, who established a protectorate over the Ionian Islands by the terms of the Treaty of Paris (1815). The islands were ceded to Greece in 1864. In 1953 an earthquake devastated the island, destroying Argostólion and other villages. Close to Argostólion are the ruins of Cranii and the Venetian castle of St. George (Hagios Georgios). Several Mycenaean tombs exist at Mazakarata and Diakata. Pop. (1981) island, 27,649; (1991 prelim.) *nomós,* 32,314.

cephalopod, any marine mollusk of the class Cephalopoda (phylum Mollusca), including the cuttlefish, nautilus, octopus, and squid.

A brief treatment of cephalopods follows. For full treatment, *see* MACROPAEDIA: Mollusks.

Some representatives of the group rank as the most active and largest invertebrate animals in existence, as, for example, the giant squid *Architeuthis,* which reaches nearly 18 m (59 feet), including its tentacles. Cephalopods are exclusively marine forms. Cuttlefish are primarily found along the continental shelf; nautilus and squid inhabit the open seas, often at considerable depths; and most octopods live near shore in rocky and coralline habitats, though some occur in deep-sea environments.

Cephalopods are bilaterally symmetrical and characteristically have a highly developed centralized nervous system embedded in cartilage. Their eyes are generally image-forming organs similar in structure (though not in derivation) to the eyes of vertebrates. The head is armed with prehensile tentacles that have rows of round suction disks. The number and structure of the tentacular arms vary from group to group. The octopus, for example, has eight equisized arms, whereas squid and cuttlefish have eight such arms plus two longer, slender tentacles with expanded ends. All cephalopods are able to swim by means of a jet propulsion—*i.e.,* they fill the folds in the body walls with water and then squeeze it through a flexible, muscular funnel, or siphon, on the ventral side. The force of the expelled water propels the animals backward.

Most cephalopods can readily change skin colour to blend in with their surroundings for protection against predators. Many species also squirt clouds of dark inklike fluid at potential attackers. The genus *Nautilus* has a large, chambered external shell, but other cephalopods have only reduced internal shells (*e.g.,* the flat, chalky shell of the cuttlefish and the thin, elongated shell of the squid) or none at all, as in the case of the octopus. Most cephalopods are predaceous carnivores that feed on fish, crustaceans, and other mollusks. They use a radula, a tonguelike structure covered with rows of numerous small teeth, and horny jaws to tear apart their prey. Sexes are separate, and eggs are generally laid in grapelike festoons attached to a hard surface. *See also* cuttlefish; nautilus; octopus; squid.

cephalosporin, any of a group of β-lactam antibiotics that inhibit the synthesis of a structural component of the bacterial cell wall. The cephalosporins were first isolated from cultures of the fungus *Cephalosporium acremonium.* Modifications of the β-lactam ring have resulted in more than 20 derivatives with a range of antibacterial properties. The cephalosporins are often used as an alternative in patients who are sensitive to penicillin.

The cephalosporins have been organized into groups based roughly on their activity. First-generation cephalosporins (*e.g.,* cephalothin and cefalozin) tend to be broad-spectrum antibiotics that are effective against gram-positive and many gram-negative bacteria, including *Staphylococcus, Streptococcus,* and many strains of *Escherichia coli.* They have also been used to fight pulmonary infections caused by *Klebsiella pneumoniae.*

Second-generation cephalosporins (*e.g.,* cefuroxime and cefamandole) and third-generation ones (such as ceftazidime) tend to be more effective against gram-negative bacterial species that are resistant to the first-generation cephalosporins. Second-generation cephalosporins have proven effective against gonorrhea, *Haemophilus influenzae,* and the abscesses caused by *Bacteroides fragilis.* The ability of many cephalosporin derivatives to penetrate the cerebral spinal fluid makes them effective in treating meningitis.

Cephalus, legendary ancestor of an Attic family, traditionally a great hunter. He was beloved by the goddess Dawn (Eos, or Aurora). With his hound, Laelaps (Hurricane), he overcame the vixen of Teumessus that had ravaged Boeotia. The most popular tale about Cephalus in later Greek and Roman literature concerned his wife Procris. Cephalus' devotion to hunting aroused in her suspicions that she had a rival, and so she followed him. Emerging suddenly from a thicket, she was fatally struck by her husband, who mistook her for his prey. Later legends by false etymology made Cephalus the founder of the Ionian island community of Cephallenia and linked him with the ancestry of Odysseus.

Cepheid variable, one of a class of variable stars whose periods (*i.e.,* the time for one cycle) of variation tend to be proportional to their luminosity and that are therefore useful in measuring interstellar and intergalactic distances. Most are spectral type F (moderately hot) at maximum luminosity and type G (cooler, Sun-like) at minimum. The prototype star is Delta Cephei, the variability of which was discovered by John Goodricke in 1784. In 1912 Henrietta Leavitt of Harvard Observatory discovered the aforementioned period-luminosity relationship of the Cepheids.

Cepheids are now considered to fall into two distinct classes. The classical Cepheids, which are dependable in their period-luminosity relationship, all have periods from about 1.5 days to more than 50 days and belong to the class of relatively young stars found largely in the spiral arms of galaxies and called Population I. Short-period Cepheids, also called cluster-type variables, or RR Lyrae variables, all have periods of less than one day and show no dependable relationship between period and luminosity; this last fact caused considerable confusion among astronomers before it was recognized. RR Lyrae variables can still be employed as distance indicators because their absolute magnitudes tend to be alike. Short-period Cepheids belong to Population II, a class of older stars found in the core and in the halo of the Milky Way Galaxy.

Classical Cepheids exhibit a relation between period and luminosity in the sense that the longer the period of the star, the greater its intrinsic brightness; this period-luminosity relationship has been used to establish the distance of remote stellar systems. The absolute magnitude of a classical Cepheid can be estimated from its period. Once this is known, the distance of the star can be deduced from a comparison of absolute and apparent (measured) magnitudes.

Cephisodotus THE ELDER (fl. *c.* 400 BC), Greek sculptor, assumed to be the father of Praxiteles. He made certain statues for the city of Megalopolis, founded in 370 BC.

A noted work of his was "Eirene" ("Peace"), a somewhat Madonna-like figure bearing the infant Plutus (Wealth), a grouping recalled in Praxiteles' more famous "Hermes Carrying the Infant Dionysus." Cephisodotus should not be confused with Cephisodotus the Younger, a son of Praxiteles, noted for portrait sculptures, none of which have survived.

Ceram, also spelled SERAN, or SERANG, Indonesian SERAM, Indonesian island located between the Ceram Sea on the north and the Banda Sea on the south; it is west of New Guinea and east of Buru Island, across the Manipa Strait. It forms part of Maluku Tengah *kabupaten* (regency), Maluku *provinsi* ("province"), and is administered from Ambon. Ceram has an area of 6,621 square miles (17,148 square km).

Ceram is mountainous, the highest point being Mount Binaiyi (9,905 feet [3,019 m]) in the central part, and seismic activity is common. Its many rivers are partly navigable by small craft only during the rainy season. Within the Ceram group are included Ceram Laut, the Gorong (or Goram) Islands, and the Watubela group, all southeast of Ceram. None has hills of more than 1,300 feet (400 m), and most are thickly wooded. Ceram is covered with tropical forests, the result of a hot climate and heavy rainfall, and excellent timber is produced. The sago palm thrives, and forest products are exported. The flightless cassowary is noteworthy among the fauna.

The Ceramese people of the interior are of mixed Malay-Papuan stock; they live in pile-supported houses and for weapons traditionally use bow and arrow, the short swordlike *parang,* and the lance. They survive by fishing, hunting, and making sago flour. The Ceramese language has no written script and is closely related to the indigenous language of Ambon; Malay is commonly used on the coasts, along which are Muslim and Christian settlements. The coastal inhabitants grow some rice and corn (maize), and there are a few coffee and tobacco plantations. There are airfields at Bula and Amahai.

Dutch influence over the island began in the mid-17th century; it was completed with help from Ternate and Ambon. In 1950 the Christians joined in an abortive secession attempt of the South Moluccan Republic. Pop. (1971) 92,187.

ceramics, the art or process of making useful and ornamental articles from clay by shaping and then hardening them by firing at high temperatures. Ceramics under this definition are generally known as pottery (*q.v.*). More broadly, ceramics denotes the manufacture of any product that is made from a nonmetallic mineral by firing at high temperatures. Industrial ceramics can thus be said to comprise all industrially used solid materials that are nei-

ther metallic nor organic. Chief among these are glass; earthenware, porcelain, and whiteware; porcelain enamels; brick, tile, and terracotta; refractories; cement, lime, and gypsum; and certain abrasives.

A brief treatment of industrial ceramics follows. For full treatment, *see* MACROPAEDIA: Industrial Glass and Ceramics.

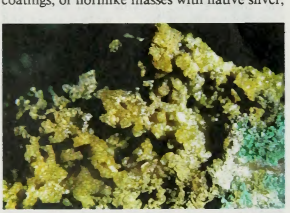
The properties that make ceramics so useful are their mechanical strength in spite of brittleness; their chemical durability (at both normal and high temperatures) against the effects of oxygen, water, and various chemicals; their hardness; and their ability to be decorated.

Among the many structural products made from naturally occurring clay materials are common and face bricks, terra-cotta, sewer pipe, drain and hollow tile, glazed architectural tile, and roofing tile. The general term whitewares includes a wide range of products, such as art pottery and stoneware; dinnerware, including fine china and earthenware; and such industrially useful substances as sanitary china plumbing ware; wall and floor tile; chemical porcelain; and electrical porcelain, which has dielectric and electronic applications.

Ceramics are highly useful as refractories, *i.e.*, materials that can retain their chemical and physical identity and mechanical functions even at extremely high temperatures. Refractory ceramics, most of which are made from either clays, silica, chromite, or magnesite, are widely used in metallurgy to line blast furnaces, converters, smelters, and ore roasters, as well as in boilers and in kilns that are used to make ceramics.

A porcelain enamel consists of a thin layer of special glass that is fused to a metal surface in order to protect the metal from oxidation or corrosion, to improve the object's hardness or abrasive strength, or to make possible products with a wide range of colours. Such abrasives as fused alumina, silicon carbide, and boron carbide are also classified as industrial ceramics. Among the cements, portland cement is by far the most important, because it is the basic ingredient of concrete.

cerargyrite, also called HORN SILVER, gray, very heavy halide mineral composed of silver chloride (AgCl); it is an ore of silver. It forms a complete solid-solution series with bromyrite, silver bromide (AgBr), in which bromine completely replaces chlorine in the crystal structure. These are secondary minerals that commonly occur as alteration products of native silver, silver sulfides, and sulfosalts in silver deposits that have been oxidized by weathering. They are often found as crusts, coatings, or hornlike masses with native silver,



Cerargyrite from New South Wales
Joseph and Helen Guetterman collection. photograph, John H. Gerard

wad, and limonite and are common in Germany, Chile, and the western United States. For detailed physical properties, *see* halide mineral (table).

Cerastes, genus of venomous, desert-dwelling snakes of the viper family, Viperidae. There are two species, the horned viper (*C. cerastes*), which usually has a spinelike scale above each eye, and the common, or Sahara, sand viper (*C. vipera*), which lacks these scales. Both species are small (seldom more than 60 cm [about 2 feet] long), stocky, and broad-headed and are found in northern Africa and the Middle East.

These vipers are pale, sand-coloured snakes marked with dark spots or crosswise bars. They habitually bury themselves in the sand. Like certain other desert snakes, they travel by sidewinding—*i.e.*, by moving obliquely across the sand. Their venom is relatively weak and is seldom fatal to humans.

Ceratium, genus of single-celled aquatic organisms common in freshwater and saltwater from the Arctic to the tropics. Its members are armoured dinoflagellates. (A dinoflagellate has two unlike flagella and has both plant and animal characteristics.) The genus is a member



Ceratium tripos (magnified)
Eric V. Grave

of the kingdom Protista, which incorporates microorganisms known as algae and protozoans. The cell is flattened horizontally and contains chromatophores with yellow, brown, or green pigments. The theca, or armour, is composed of many textured plates that form one anterior horn and usually two posterior horns; these horns slow the sinking of the organism. Genus members' body form varies according to salinity and temperature indicators, the spines tending to be short and thick in cold, salty water and long and thin in less salty, warmer water. Members of the genus form an important part of the plankton found in northern seas.

ceratopsian, also called CERATOPIAN, any of a group of plant-eating dinosaurs of the Cretaceous Period (144 to 66.4 million years ago), characterized by cranial horns and a beaklike mouth. The suborder Ceratopsia comprises three families: Psittacosauridae, the most primitive and often hornless; Protoceratopsidae, including *Protoceratops* and *Leptoceratops;* and Ceratopsidae, including *Triceratops* and *Torosaurus.* The term ceratopsian literally means "horn face," referring to the fact that most of these dinosaurs had large horns on the snout or brow; some, especially the ceratopsids, also had horns arrayed along the rear margin of the skull frill, a pronounced bony expansion over the neck region.

Ceratosaurus, genus of large carnivorous dinosaurs found as fossils in Late Jurassic rocks (144 to 163 million years old) of North America. *Ceratosaurus* was similar to, and perhaps closely related to, the allosaur (*q.v.*). *Ceratosaurus,* however, although weighing up to 2 tons, was slightly smaller than *Allosaurus,* bore a distinctive horn on its snout and a row of bony plates down the middle of its back, and had four clawed fingers rather than three.

Cerceau, du, FAMILY, also called ANDROUET DU CERCEAU, a renowned French family of architects and decorators who virtually constituted a dynasty in architecture and decoration from the 16th century until the end of the 17th century.

Jacques Androuet du Cerceau (b. *c.* 1520, Paris, France—d. *c.* 1585, Annecy), the first member of the dynasty, was trained as an architect, decorator, and engraver. His major achievements were his published collections of engravings, furniture designs, and architectural details.

At some early point in his career, du Cerceau traveled to Italy under the auspices of the future cardinal Georges d'Armanac. The influence of du Cerceau's exposure to ancient Roman architecture permeates his later work. His first volume of engravings appeared in 1549, and he subsequently moved to Paris, where his first book on architecture appeared in 1559. For several years after 1560 he worked for Renée de France, Duchess of Ferrara, on her castle at Montargis, and it was the duchess who saved him from religious persecution because of his adherence to Protestant beliefs. In the 1570s du Cerceau worked for the French king Charles IX and for Catherine de Médicis.

Du Cerceau's best and most noted publication, *Les plus excellents bastiments de France,* 2 vol. (1576 and 1579; "The Finest Buildings of France"), is an outstanding resource for many 16th-century houses that since have been altered or destroyed. Among his other published works are *Arcs* (1549; "Arches"), *Temples* (1550), *Vues d 'Optique* (1551), and *Livre d'Architecture* (1559; "Book of Architecture"). He did actually build several structures, but nothing remains of his work.

Baptiste Androuet du Cerceau (1545–90) succeeded his father, Jacques Androuet, in 1572–77 as the major architect of Charles IX's Château Charleval. Later, in 1578, he worked on the Pont Neuf, which is his only surviving work. In 1584 Henry III named Baptiste supervisor of France's royal office of works; it is believed that Baptiste was responsible for the Hôtel d'Angoulême and the Hôtel de Lamoignon (1584).

Jean I Androuet du Cerceau (1585–1649), grandson of Jacques Androuet, was the most important designer of private houses during the early 17th century. He was responsible for the two most typical private homes of Louis XIII's reign: the Hôtel de Sully (1624–29) and the Hôtel de Bretonvillieurs (1637–43). He also held the title of honorary architect of all the works and buildings of the king and was responsible for the horseshoe stairs at Fontainebleau.

Cercopithecidae, family of catarrhine, or Old World, monkeys that includes the individuals and groups known as baboon; Barbary ape; bonnet monkey; Celebes black ape; colobus; DeBrazza's monkey; diana monkey; drill; gelada; guenon; hamadryas; langur; macaque; mandrill; mangabey; mona monkey; owl-faced monkey; patas monkey; proboscis monkey; rhesus monkey (*qq.v.*).

Cerdaña, French CERDAGNE, high valley in the Pyrenees east of Andorra, partly in Spain (Gerona *provincia*) and partly in France (Pyrénées-Orientales and Ariège *départements*). It is drained by the upper Sègre River. Within the French portion is the Spanish enclave of Llivia (*q.v.*). The town of Llivia, the Julia Livia, or Libica, of the Romans, was the capital of the Cerdaña until the 12th century; the subsequent seat of the counts of Cerdaña was Hix near Puigcerdá. In 1276 the area became subject to the counts of Rosellón (Roussillon). In 1659 Spain ceded 33 Cerdaña communities to France, retaining Llivia. Because of its high elevation, the region is cool most of the year and quite cold in winter. Zinc mining dates from ancient times. The area also has petroleum deposits.

Cerdic (d. 534), founder of the West Saxon kingdom, or Wessex. All the sovereigns of England except Canute, Hardecanute, the two Harolds, and William the Conqueror are said to be descended from him. A Continental ealdorman who in 495 landed in Hampshire, Cerdic was attacked at once by the Britons.

Nothing more is heard of him until 508, when he defeated the Britons with great slaughter. Strengthened by fresh arrivals of Saxons, he gained another victory in 519 at Certicesford, a spot which has been identified with the modern Charford, and in this year took the title of king. Turning westward, Cerdic appears to have been defeated by the Britons in 520 at Badbury or Mount Badon, in Dorset, and in 527 yet another fight with the Britons is recorded. His last work was the conquest of the Isle of Wight, probably in the interest of some Jutish allies.

cereal, also called GRAIN, any grass yielding starchy seeds suitable for food. The cereals most commonly cultivated are wheat, rice, rye, oats, barley, corn (maize), and sorghum.

A brief treatment of cereals follows. Full treatment is provided in the following MACROPAEDIA articles. For cereal cultivation, *see* Farming and Agricultural Technology. For cereal processing, *see* Food Processing.

As human food, cereals are usually marketed in their raw grain form (some are frozen or canned) or as ingredients of various food products; as animal feed, they are consumed mainly by livestock and poultry, which are eventually rendered as meat, dairy, and poultry products for human consumption; and they are used industrially in the production of a wide range of substances, such as glucose, adhesives, oils, and alcohols.

Wheat is the world's most widely grown cereal, in addition to being one of the oldest grains grown. It is believed to have been milled 75,000 years ago. In modern times, wheat is used to produce meal, breakfast cereals, and flour for bakery products. It can be cultivated in a wide range of soils but thrives in temperate climates.

Rice is the second largest cereal crop and is a staple food in all areas of Asia, which yields about nine-tenths of the world's total rice production. Unlike wheat, which is generally raised on large farms and harvested mechanically, rice is usually grown on small paddies and harvested by hand. Cultivation methods have changed little over the centuries; the paddies are inundated with water, usually up to about 6 inches (15 cm), then drained and dried just before harvest. Most rice is milled for direct, local consumption. Other products in which rice is used are breakfast cereals and such alcoholic beverages as Japanese sake.

Rye is the second most widely used cereal (after wheat) for bread making, although its gross production is less than one-fifteenth that of wheat. It is also used in other bakery products and in distilled liquors. Rye can be grown on relatively poor soils and is able to survive more severe winters than most grains. Poland is one of the world's largest rye producers.

Oats are grown in most of the temperate regions of the world, especially in the United States, Canada, and northern Europe. Most of the oats produced are used in animal feed, although they may also be processed for human consumption.

Barley is also grown in temperate climates; it does not need especially rich soils. Most barley is used for animal feed. It is also the source of the malt used in both the brewing of beer and the distillation of alcoholic beverages. Barley malt is also a constituent of vinegar and breakfast foods.

Corn, or maize, was originally produced in the Western Hemisphere by Indians and was then carried to Europe by the early explorers. Today it is a major crop cultivated in most temperate climates, although the United States is by far the single largest producer. For human consumption, corn is consumed as a fresh food, is canned or frozen, or is processed into corn flour, corn oil, and other by-products. It is a very important animal feed as well.

Sorghum, also called milo, is principally grown for use as animal feed.

Most grains have similar dietary properties; they are rich in carbohydrates and energy value but comparatively low in protein and naturally deficient in calcium and vitamin A. Breads are usually enriched in order to compensate for any nutritional deficiencies in the cereal used.

Cereal and cereal by-products are often consumed in the areas in which they are grown, but they are also major commodities in international trade.

cerebellum, in human anatomy, section of the brain that coordinates sensory input with muscular responses, located just below and behind the cerebral hemispheres and above the medulla oblongata.

For a depiction of the cerebellum in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

The cerebellum integrates nerve impulses from the labyrinths of the ear and from positional sensors in the muscles; cerebellar signals then determine the extent and timing of contraction of individual muscle fibres to make fine adjustments in maintaining balance and posture and to produce smooth, coordinated movements of large muscle masses in voluntary motions.

Like the larger cerebrum, the cerebellum is divided into two lateral hemispheres, which are connected by a medial part called the vermis. Each of the hemispheres consists of a central core of white matter and a surface cortex of gray matter and is divided into three lobes. The flocculonodular lobe, the first section of cerebellum to evolve, receives sensory input from the vestibules of the ear, determining balance; the anterior lobe receives sensory input from the spinal cord; and the posterior lobe, the last to evolve, receives nerve impulses from the cerebrum. All of these nerve impulses are integrated within the cerebellar cortex.

Injuries or disease affecting the cerebellum usually produce neuromuscular disturbances, in particular ataxia, or disruptions of coordinated limb movements. The loss of integrated muscular control may cause muscular tremors and difficulty in standing without support.

cerebral cortex, in human anatomy, layer of gray matter that constitutes the outer layer of the cerebrum and is responsible for integrating sensory impulses and for higher intellectual functions. The human cortex is several centimetres thick and has a surface area of about 2,000 square cm (310 square inches), owing largely to an elaborate series of convolutions in the brain surface; it is the extensive development of this cortex in human beings that is believed to distinguish the human brain from those of other animals.

The cerebral cortex contains six layers, which are distinguished from one another by the relative proportions of different kinds of nerve cells.

The gray matter of the cerebral cortex usually is divided into four lobes, roughly defined by major surface folds; sometimes the limbic system, or limbic lobe, is considered to be a fifth lobe. (These subdivisions are arbitrary and largely a matter of convenience.) The frontal lobe contains control centres for motor activity and speech, the parietal for somatic senses (touch and position), and the temporal for auditory reception and memory. The occipital lobe at the back of the brain holds the brain's major visual-reception area. The limbic lobe is concerned with smell, taste, and emotional responses.

cerebral fissure, also called CEREBRAL SULCUS, any of numerous deep grooves in the surface of the cerebrum that delineate its various anatomic divisions, or lobes. The fissures originate in the extensive folding of the brain's surface, which greatly increases the area of the cerebral cortex, the major functional section of the human brain. The main fissures are the lateral fissure, or fissure of Sylvius, between the frontal and temporal lobes; the central fissure, or fissure of Rolando, between the frontal and parietal lobes, which separates the chief motor and sensory regions of the brain; the calcarine fissure on the occipital lobe, which contains the visual cortex; the parietooccipital fissure, which separates the parietal and occipital lobes; the longitudinal fissure, which separates the cerebral hemispheres almost completely, leaving only the corpus callosum at the bottom of the fissure to connect them; and the transverse fissure, dividing the cerebrum from the cerebellum.

cerebral palsy, paralysis (loss of volitional control over a motor function) resulting from a brain disorder suffered either before or at birth or during infancy. The meaning of the term cerebral palsy is broad, usually including all motor disturbances attributable to a cerebral disorder of early life. Specifically, however, two types of infantile cerebral palsy are meant: spastic and athetosic. In the spastic type, there is a severe paralysis of the voluntary movements, with spastic contracture of the extremities either on one side of the body (hemiplegia) or on both sides (diplegia). In the latter, spastic contracture and paralysis are usually more prominent in the lower extremities than in the arms and hand (Little's diplegia), or only the legs may be affected (paraplegia). In the athetosic type, the voluntary movements may not be paralyzed, and spastic contractures may be slight or absent. Instead, there are slow, changing, mobile spasms in the face, neck, and extremities, either on one side (hemiathetosis) or, more frequently, on both sides (double athetosis), with resulting involuntary movements in the whole body or its parts, facial grimacing, and inarticulate speech (dysarthria), all of which increase under stress or excitement. In the spastic type, the cerebral damage affects especially the nerve cells and connections of the cerebral cortex (outer gray matter), either of one cerebral hemisphere (contralateral to paralysis), as in infantile hemiplegia, or of both hemispheres, as in diplegia. In the athetosic type, damage to the brain particularly affects the basal ganglia underlying the cerebral cortex.

Cerebral palsy does not necessarily imply mental retardation; many children affected with cerebral palsy grow to be mentally competent adults. Any cerebral disorder in early life may, however, result in impairment, sometimes severe, of the subsequent intellectual and emotional development. Epileptic attacks in the form of convulsive seizures, especially in the parts affected by the paralysis, occur in many children with cerebral palsy. In the spastic type of cerebral palsy, mental retardation and epileptic attacks are particularly frequent. In the athetosic type, the incidence of severe mental retardation is much lower, and occurrence of convulsive seizures is exceptional. Children affected with athetosis may be perceptive and intelligent; because of the involuntary movements and dysarthria, however, they are often unable to communicate by intelligible words or signs and, thus, may appear mentally retarded.

The causes of cerebral palsy are multiple and variable but basically involve a malfunctioning of the complex neuronal circuits of the basal ganglia and the cerebral cortex. Heredity plays only a small role. It may manifest itself in neoplastic malformations of nerve cells, interstitial tissues, and blood vessels of the brain with tendency to produce tumours, or it may express itself in an abnormal chemistry of

the brain. Fetal diseases and embryonic malformations of the brain are more common causes of cerebral palsy than is heredity. Incompatibility of parental blood types, leading to severe jaundice of the newborn, may cause brain damage and cerebral palsy. Asphyxia at birth was once thought to be the most common immediate cause of a great majority of cerebral palsies; research conducted in the 1980s indicated that abnormalities of delivery often are markers of earlier brain damage and that the causes of cerebral palsy are much less certain than was previously believed. Postnatal diseases—particularly infections of infancy and childhood, severe head injuries, and poisoning—are other, less common, causes of cerebral palsy.

Treatment with the so-called muscle-relaxant drugs is, at best, palliative, temporary in effect and limited in value. The basic program of treatment aims at the psychological management, education, and training of the child to develop whatever sensory, motor, and intellectual assets are still available to him, in order to compensate for the physical liabilities.

cerebrospinal fluid (CSF), clear, colourless liquid that fills the ventricles (cavities) of the brain and the spinal cord, surrounds them as well, and acts as a lubricant and a mechanical barrier against shock.

The nervous system of the vertebrate embryo consists of a hollow tube with a canal running through its whole length. As the organism develops, the canal becomes narrow in the spinal cord, while widening in the brain and creating the ventricles. CSF is formed primarily in the ventricles, which serve as a network of interconnected holds. The fluid flows down through the brain-stem canal, and leaves the central nervous system by being absorbed into surrounding tissue spaces.

CSF has a slightly alkaline chemical composition, similar to blood. It contains no red blood cells, though, and low amounts of protein and lipids in comparison to blood. It is about 99 percent water and freezes at 0.57° C (33° F). There are about 100 to 150 millilitres of cerebrospinal fluid in the normal adult body.

The cerebrospinal fluid serves a mostly mechanical function. It bathes the brain and the spinal cord and helps support the brain's weight. It also provides lubrication for the surfaces created between surrounding bones and the brain and spinal cord. When an individual is hit on the head, the fluid acts as a buffer, dulling the blow by distributing its impact. The fluid helps keep pressure within the cranium at a constant level. An increase in the volume of blood or brain tissue results in a corresponding decrease in the fluid. Conversely, if there is a decrease in the volume of matter within the cranium, as occurs in atrophy of the brain, the cerebrospinal fluid compensates with an increase in volume. The fluid also transmits metabolic waste products, antibodies, abnormal chemical substances, and pathological products of disease away from the brain and spinal-cord tissue into the bloodstream. It also carries certain drugs to nervous-system tissue.

The exact method of the formation of the cerebrospinal fluid is uncertain. It is believed that, after originating in the ventricles, it is filtered through the nervous-system membranes (ependyma). The formation of the fluid is a continual process, and all of it is replaced every six to eight hours, or three or four times a day. The fluid is eventually absorbed into the veins. It leaves the cerebrospinal spaces in a variety of locations, including spaces around the spinal roots and the cranial nerves. Some of it may be directly absorbed by veins on the brain surface. No specific organ propels the circulation of the fluid. Movement of the fluid is affected by the downward pull of gravity, the continual process of secretion and absorption, blood pulsations in contingent tissue, respiration, pressure from the veins, and head and body movements.

Doctors use the cerebrospinal fluid to diagnose a number of body malfunctions and diseases. They gather the fluid by inserting a needle in the lumbar region of the lower back. Various diseases are indicated by a chemical analysis of the fluid, as well as by its appearance. If the fluid, which is clear and colourless in its normal state, is cloudy or opalescent, some form of meningitis (inflammation of the central nervous system lining) is indicated. Blood in the fluid indicates a hemorrhage in the ventricles or the brain.

cerebrovascular accident (medicine): *see* stroke.

cerebrum, in human anatomy, the largest and uppermost portion of the brain. The cerebrum is one of the three main divisions of the brain (the others being the cerebellum and the brain stem). It consists of the cerebral hemispheres and accounts for two-thirds of the brain's total weight. The cerebrum is considered to be the seat of conscious mental processes; it contains centres for sensory integration and the controls of voluntary movement and higher intellectual functions, including speech and abstract thought.

For a depiction of the cerebrum in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

The cerebral hemispheres consist of an inner core of myelinated nerve fibres, the white matter, and a heavily convoluted outer cortex of gray matter; the extensive development of the outer cortex differentiates the brain of humans from those of other mammals. Nerve fibres in the white matter serve chiefly to connect functional areas of the cerebral cortex, although some core structures also have important independent functions. A deep fissure running from front to back divides the cerebrum into two hemispheres, each controlling the activities of the opposite side of the body. One of these hemispheres is functionally dominant, concentrating the specialized nervous apparatus for speech and thought and determining spatial preferences such as right- or left-handedness. The other controls more subtle, complex perceptions, such as the recognition of faces.

A connection between the two hemispheres is effected by the corpus callosum, a thick band of white matter that allows the integration of sensory data and functional responses from both sides of the body. Other important cerebral structures include the hypothalamus, which controls metabolism and maintains homeostasis, and the thalamus, a principal sensory relay centre that is involved with the emotions and instincts. These structures surround spaces (ventricles) filled with cerebrospinal fluid, which helps to supply the brain cells with nutrients and provides the brain with shock-absorbing mechanical support.

Ceredigion, district, northern Dyfed county, western Wales. It was created in 1974 and covers an area of 693 square miles (1,794 square km) on the western coast of Wales, rising eastward to hills and valleys and the upland of Plynlimon. It borders the districts of Meirionnydd and Montgomery to the north; Radnor and Brecknock to the east; and Dinefwr, Carmarthen, and Preseli to the south. Evidence of prehistoric settlement has been discovered at Pendinas, near the port of Aberystwyth in northern Ceredigion. Aberystwyth dates back to 1277, when Edmund Crouchback, brother of Edward I of England, built a castle that the Welsh destroyed five years later. The king rebuilt it two years after that, and Owen Glendower, a Welsh warrior, held it from 1404 to 1408. The town of Cardigan, in southern Ceredigion, has a bridge of Norman origin (rebuilt in 1640) and castles dating to 1093 and 1160.

Benefiting from efforts of the Development Board for Rural Wales, Ceredigion has become one of the fastest-growing districts in Wales. The educational and administrative centre of Aberystwyth, however, has absorbed more of the growth than have the rural areas. Agriculture remains the principal means of livelihood in the district; the Milk Marketing Board's factory in Felinfach serves an extensive dairying region. Sheep are also raised in the area. Educational institutions in Aberystwyth include the first college of the University of Wales (1872); the Welsh Agricultural College; the College of Librarianship, Wales; and the National Library of Wales. Pop. (1991 prelim.) 63,600.

Čeremchovo (Russia): *see* Cheremkhovo.

ceremonial exchange: *see* gift exchange.

Ceres, in Roman religion, goddess of the growth of food plants, worshiped either alone or in association with the earth goddess Tellus. At an early date her cult was overlaid by that



Ceres, classical sculpture; in the Vatican Museum
Alinari—Art Resource

of Demeter (*q.v.*), who was widely worshiped in Sicily and Magna Graecia. On the advice of the Sibylline Books, a cult of Ceres, Liber, and Libera was introduced into Rome (according to tradition, in 496 BC) to check a famine. The temple, built on the Aventine Hill in 493 BC, became a centre of plebeian religious and political activities and also became known for the splendour of its works of art. Destroyed by fire in 31 BC, it was restored by Augustus. The three chief festivals of Ceres' cult all followed Greek lines.

Ceres, largest known asteroid in the solar system and the first to be discovered, by Giuseppe Piazzi of the Palermo Observatory on Jan. 1, 1801. Additional observations by Piazzi were cut short, and Ceres was rediscovered on Jan. 1, 1802, by Franz von Zach, who used orbit calculations by Carl Friedrich Gauss. Ceres was named after the Roman goddess of agriculture. It revolves around the Sun in 4.6 terrestrial years and has a diameter estimated at about 700 km (440 miles).

Ceresio, Lago (Switzerland–Italy): *see* Lugano, Lake.

Cerignola, town, Foggia *provincia,* Puglia (Apulia) *regione,* southeastern Italy. It lies on high ground marking the southern limit of the Puglia Tableland, southeast of Foggia.

On April 28, 1503, the Spaniards defeated the

French below Cerignola and made the Kingdom of Naples a Spanish province. The town later passed to the princely families of Caracciolo and Pignatelli. The philologist Nicola Zingarelli was born at Cerignola (1860), and Pietro Mascagni composed the opera *Cavalleria rusticana* there in 1890. An important communications and market centre, Cerignola produces wine, olive oil, almonds, wheat, oats, and linen and conducts a trade in wool as well. Pop. (1991 prelim.) mun., 54,971.

cerium (Ce), chemical element, most abundant of the rare-earth metals of transition Group IIIb of the periodic table. Cerium is iron gray in colour and about as soft and ductile as tin. It oxidizes slowly in air, rapidly reacts with water to yield hydrogen, and burns brilliantly when heated. Cerium as the oxide (ceria) was discovered (1803) by Jöns Jacob Berzelius and Wilhelm Hisinger working together, and independently by Martin Klaproth. It was named after the asteroid Ceres, which was discovered in 1801. Ceria, the second rare earth to be discovered (yttria was first), turned out to be a mixture of oxides from which seven elements were separated during the course of the next century. These other elements were the lighter rare-earth metals, from lanthanum (atomic number 57) to gadolinium (atomic number 64), with the exception of promethium. Cerium occurs in monazite, bastnaesite, and many other minerals. It also is found among the fission products of uranium, plutonium, and thorium. Cerium is about as abundant as copper and nearly three times as abundant as lead in the igneous rocks of Earth's crust. Four stable isotopes occur in nature: cerium-140 (88.48 percent), cerium-142 (11.07 percent), cerium-138 (0.250 percent), and cerium-136 (0.193 percent). The metal itself is prepared by electrolysis of the anhydrous fused halides or by thermoreduction of the halides with alkali or alkaline-earth metals. It exists in four allotropic (structural) forms.

Cerium and its compounds have a number of practical applications. The dioxide is employed in the optics industry for fine polishing of glass (replacing rouge); it is also used as an opacifier in porcelain coatings and as a decolorizer in glass manufacturing. Cerium nitrate has been used in the manufacture of incandescent-gas mantles; other salts are employed in the ceramic, photographic, and textile industries. The metal serves as an ingredient in the carbon-impregnated arc lamps that have been used for illumination in the motion-picture, television, and related industries. Together with the other rare-earth metals, cerium is a constituent of numerous ferrous and nonferrous alloys; a superior high-temperature alloy for jet engines contains about 3 percent cerium with magnesium. Misch metal (50 percent cerium) is used for cigarette-lighter flints, in tracer bullets, and in electron-tube manufacture as a getter, which removes traces of oxygen.

Along with praseodymium and terbium, cerium is different from the other trivalent rare earths in that it forms compounds in which it is tetravalent; it is the only rare earth that exhibits a +4 oxidation state in solution. Tetravalent (ceric) salts, which are powerful but stable oxidizing agents, are used in analytical chemistry to determine oxidizable substances such as iron(II). Most cerium(IV) salts are orange to yellow in colour, as are solutions containing the Ce^{4+} ion. Cerium(III) behaves as a typical rare earth; its compounds are usually white.

atomic number	58
atomic weight	140.120
melting point	798° C
boiling point	3,257° C
specific gravity	6.771 (25° C)
valence	3, 4
electronic config.	2-8-18-20-8-2 or $(Xe)4f^{2}5d^{0}6s^{2}$

Čerkassy (Ukraine): *see* Cherkassy.

Cermak, Anton J., in full ANTON JOSEPH CERMAK (b. May 9, 1873, Kladno, Bohemia, Austria-Hungary [now in Czech Republic]—d. March 6, 1933, Miami, Fla., U.S.), American politician, mayor of Chicago, who was killed by an assassin's bullet intended for U.S. President-elect Franklin D. Roosevelt.

Cermak was born about 50 miles (80 km) from Prague but celebrated his first birthday on Ellis Island in New York harbour. His parents settled in Braidwood, Ill., where, as an adolescent, Anton followed his father into the coal mines.

In 1890 Cermak moved to Chicago and—after holding a number of minor jobs—established himself successfully in business. Meanwhile, he was also making his mark in the city's Democratic Party organization. Starting out as a clerk, he advanced to precinct captain and in 1902 won a seat in the state legislature. He stayed there until 1909, when he became an alderman in the Chicago city council. After a tenure as bailiff of the municipal court, he returned to the city council in 1919.

In 1922 Cermak's political career took a major step forward when he was elected chairman of the Cook County Board of Commissioners. By 1928 he was undisputed leader of the local Democratic Party, and his adroit use of patronage and other aspects of the emerging Democratic machine in Chicago brought him the mayoralty in 1931. On the national front, Cermak's influence was decisive in bringing Illinois into the Roosevelt camp at the 1932 Democratic national convention.

On Feb. 15, 1933, while riding in Roosevelt's open touring car, Cermak was wounded by a gunshot intended for the president-elect; he died three weeks later.

CERN, byname of ORGANISATION EUROPÉENE POUR LA RECHERCHE NUCLÉAIRE, formerly (1952–54) CONSEIL EUROPÉEN POUR LA RECHERCHE NUCLÉAIRE, English EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, international scientific organization established for the purpose of collaborative research into subnuclear physics (also called high-energy, or particle, physics). The organization operates expressly for research of a "pure scientific and fundamental character," and the results of its experimental and theoretical work are made generally available. Headquarters are in Geneva, Switz.

The establishment of CERN was at least in part an effort to reclaim the European physicists who had emigrated for various reasons to the United States as a result of World War II. The provisional organization, which was known as the Conseil Européen pour la Recherche Nucléaire (CERN), was proposed by Nobel Prizewinner Isidor Isaac Rabi at the fifth General Conference of UNESCO. Upon its actual establishment, the word *Organisation* replaced *Conseil,* although the organization continued to be known by the acronym of the earlier name. In the late 20th century it had a membership of 14 European nations, in addition to several nations that maintained "observer" status.

CERN has the most powerful and versatile facilities of its kind in the world. The site covers more than 100 hectares (250 acres) in Switzerland and, since 1965, more than 450 hectares (1,125 acres) in France. The activation of a 600-megavolt synchrocyclotron in 1957 enabled CERN physicists to observe (some 22 years after the prediction of this activity) the decay of a pi-meson, or pion, into an electron and a neutrino. The event was instrumental in the development of the theory of weak interaction. The laboratory grew steadily, activating the particle accelerator known as the Proton Synchrotron (1959), which used "strong focusing" of particle beams; the Intersecting Storage Rings (ISR; 1971), enabling head-on collisions between protons; and the Super Proton Synchrotron (SPS; 1976), with a 7-kilometre (4.35-mile) circumference. With the addition of an Antiproton Accumulator Ring, the SPS was converted into a proton-antiproton collider in 1981 and provided experimenters with the discovery of the W and Z particles (carriers of the weak nuclear force) in 1983. The Large Electron-Positron Collider (LEP; 1989), which has a circumference of almost 27 km (17 miles), has facilitated detailed studies of the Z particle and the standard model of particle physics.

Cernan, Eugene Andrew (b. March 14, 1934, Chicago, Ill., U.S.), American astronaut who left his spacecraft for more than two hours of extravehicular activity during the Gemini 9 mission (1966).

Cernan was commissioned in the U.S. Navy in 1956, became a test pilot, and earned his master's degree in aeronautical engineering at the U.S. Naval Postgraduate School, Monterey, Calif. In 1963 he was named in the second group of astronauts.

Cernan and Thomas P. Stafford were launched into space on June 3, 1966, in Gemini 9. In addition to the activity outside the craft, they rendezvoused three times with a target vehicle during the three-day mission.

On May 18, 1969, Cernan, Stafford, and John W. Young began the eight-day mission of Apollo 10. As Lunar Module pilot, Cernan brought the landing craft into a close lunar orbit, approaching the surface to within 16 km (10 miles). Stafford and Cernan completed a complex series of orbital maneuvers before rejoining the Command Module. The mission performed every function necessary for a lunar landing but the landing itself and was the final test of Apollo systems.

Cernan commanded the Apollo 17 Moon flight (with Ronald Evans and Harrison Schmitt, Dec. 7–19, 1972). He and Schmitt, a geologist, explored the Taurus-Littrow region of the Moon's surface (Dec. 11–14) and concluded the Apollo Moon program. After serving as deputy director of the Apollo-Soyuz Test Project (completed in July 1975), Cernan resigned from the navy and the space program in 1976 to enter private business.

Cernăuţi (Ukraine): *see* Chernovtsy.

Černigov (Ukraine): *see* Chernigov.

Černogorsk (Russia): *see* Chernogorsk.

Černovcy (Ukraine): *see* Chernovtsy.

Cernuda, Luis, in full LUIS CERNUDA Y BIDÓN (b. Sept. 21, 1902, Seville, Spain—d. Nov. 5, 1963, Mexico City, Mex.), Spanish poet and critic, a member of the Generation of 1927, whose work expresses the gulf between what is wished and what can be attained.

In 1925 Cernuda received a law degree from the University of Seville and published several poems. In 1927 some of his poems were read at the tercentenary of Luis de Góngora, and his collection *Perfil del aire* ("Profile of the Wind") was published. Later collections of poems, notably *Los placeres prohibidos* (1931; "Forbidden Pleasures"), were influenced by Surrealism and indicate an increasing bitterness toward life—influenced by facing his homosexual orientation. All of his poems were collected in *La realidad y el deseo* ("Reality and Desire"), which was frequently expanded and reissued.

A supporter of the Spanish Republic, Cernuda toured Britain for it in 1938 and, after the republic's fall, became a professor in Britain. From 1947 to 1952 he taught at Mount Holyoke College in the United States. He visited Mexico in 1951 and settled there in 1952. He published criticism of earlier poets and collections of poems using classical and Mexican myths for reference. All of his poems

appeared in the final edition of *Realidad y deseo,* published posthumously in 1964. An English-language anthology of his work, *The Poetry of Luis Cernuda,* was published in 1971.

Cernunnos (Celtic: "Horned One"), in Celtic religion, an archaic and powerful deity, widely worshipped as the "lord of wild things." Cernunnos may have had a variety of names in different parts of the Celtic world, but his attributes were generally consistent. He wore stag antlers and was sometimes accompanied by a stag and by a sacred ram-horned serpent that was also a deity in its own right. He wore and sometimes also held a torque, the sacred neck ornament of Celtic gods and heroes. The



Cernunnos flanked by the Celtic equivalents of the Greek and Roman gods Apollo and Mercury, carved relief; in the Musée-Abbaye Saint-Remy, Reims, Fr.
Jean Roubier

earliest known depictions of Cernunnos were found at Val Camonica, in northern Italy, which was under Celtic occupation from about 400 BC. He was also portrayed on the Gundestrup Caldron, a silver ritual vessel found at Gundestrup in Jutland, Den., and dating to about the 1st century BC.

Cernunnos was worshipped primarily in Britain, although there are also traces of his cult in Ireland. The Christian Church strongly opposed him because of his powerful pagan influence. He was used as a symbol of the Antichrist and as such figured in Christian iconography and medieval manuscripts.

Cerrito, Fanny, original name FRANCESCA CERRITO (b. May 11, 1817, Naples—d. May 6, 1909, Paris), ballerina noted for the brilliance, strength, and vivacity of her dancing, and one of the few women in the 19th century to achieve distinction as a choreographer.

Cerrito made her debut in Naples in 1832 and gained international fame in London in 1840. There, in 1842, she choreographed her first piece, a pas de trois for *Alma.* Her greatest role was in *Ondine,* created for her by Jules Perrot in London in 1843. Two years later she appeared with Marie Taglioni, Carlotta Grisi, and Lucile Grahn in Perrot's *Pas de quatre.*

Fanny Cerrito's favourite partner was Arthur Saint-Léon, a noted choreographer who arranged *La Fille de marbre* for her Paris Opéra debut in 1847. They married in 1845 but separated in 1851. She staged *Gemma* in Paris in 1854 and then went to Russia. While there, she narrowly missed being hit by a falling piece of burning scenery; the resulting shock so affected her heart that she was forced to retire in 1857.

Cerro de Pasco, mining city and capital of Pasco department, located in the highlands of central Peru, northeast of Lima, to which it is connected by rail and highway. One of the world's highest cities, it lies at an elevation of 14,232 feet (4,338 m). Rich silver ores were discovered nearby in 1630, and for about two centuries it was one of the world's chief sources of silver. The city is known for its copper, gold, lead, zinc, and bismuth mines. During the 1970s the new town of San Juan de Pampa was built nearby. Pop. (1987 est.) 70,000.

Cerro Gordo, Battle of (April 1847), confrontation at a mountain pass about 60 miles (97 km) northwest of Veracruz, Mex., where the U.S. Army under General Winfield Scott first met serious resistance in the Mexican War. Advancing to the interior, Scott's 8,500 men reached Plan del Río, a few miles from Cerro Gordo, where they met a Mexican force of 12,000 men under General Antonio López de Santa Anna entrenched in the pass. A flanking maneuver to gain the enemy rear, suggested and guided by Captain Robert E. Lee (later commanding general of the Confederate Army), was in progress when fighting began on the front, and the Mexicans broke. Santa Anna escaped, leaving about 1,130 casualties and about 3,000 prisoners. The American loss was 431, including 63 dead. Scott moved on to Puebla, the second largest city of Mexico, and later to Mexico City.

Cerro Sechín, pre-Columbian temple site in the present-day Casma Valley, of the north central coast of Peru, known for its unusual large stone sculptures. These carvings are in a style unlike anything else reported in Peru. The Cerro Sechín temple and sculptures presumably are quite early, although whether they are pre-Chavín (before *c.* 900 BC) is uncertain. The Cerro Sechín carvings have been executed by deep-line incisions on relatively unfinished stone slabs. Most of the figures represent humans, perhaps dead or sacrificed persons.

Cerro Tololo Inter-American Observatory (CTIO), astronomical observatory founded in 1965 in Chile as the southern branch of the Kitt Peak National Observatory. It is located on top of a 7,200-foot- (2,200-metre-) high mountain, about 285 miles (460 km) north of Santiago and 50 miles (80 km) inland from the coastal city of La Serena. It is operated by the Association of Universities for Research in Astronomy and funded by the U.S. National Science Foundation.

The CTIO houses several telescopes and auxiliary instruments, the most significant of which is a reflecting telescope with a 4-metre (157-inch) mirror. The observatory is best noted for its research on the central region of the Milky Way Galaxy, the Magellanic Clouds, and high-energy cosmic radio and X-ray sources.

Certhiidae, songbird family, order Passeriformes, consisting of most of the tree creepers, small climbing birds found throughout woodlands of the Northern Hemisphere.

Members range in size from 9.5 to 19 cm (3½ to 7½ inches) long. They have downcurved bills as long as, or longer than, the rest of the head; short, strong legs; and long, stiff tail feathers. These solitary, brownish birds climb tree trunks and large limbs, probing bark in search of insects. The common tree creeper (*Certhia familiaris*), of cool woodlands, ascends trees in a spiral manner as it feeds; it is called brown creeper in North America. *Salpornis spilonata,* the spotted creeper of Africa, is tentatively included in the family. The Australian tree creepers are classified in a separate family, Climacteridae.

The Certhiidae belongs to the songbird suborder (Passeres).

certificate of deposit *see* deposit, certificate of.

certiorari, in common-law jurisdictions, a writ issued by a superior court for the reexamination of an action of a lower court. It is also issued by an appellate court to obtain information on a case pending before it. The writ of certiorari was at first an original writ from England's Court of Queen's (King's) Bench to the judges of inferior courts ordering them to present certain records. Certiorari was later expanded to include the chancery (equity) courts. The writ was abolished in 1938, but the High Court of Justice retained the right to make an order of certiorari. Such orders have been useful in the review of decisions of administrative courts from which there is no regular means of appeal, particularly in reviewing questions of error in the admission and exclusion of evidence.

In the United States, certiorari is used to review questions of law or to correct errors and to insure against excesses by the lower courts. Such writs are also issued in exceptional cases when an immediate review is required.

Cerularius, Michael (patriarch of Constantinople): *see* Michael Cerularius.

cerussite, lead carbonate ($PbCO_3$), an important ore and common secondary mineral of lead. It is formed by the chemical action of carbonated water on the mineral



Cerussite from New South Wales
By courtesy of the Illinois State Museum; photograph, John H. Gerard—EB Inc.

galena. Notable localities are Murcia, Spain; Tsumeb, South West Africa/Namibia; Broken Hill, New South Wales; and Leadville, Colo. For detailed physical properties, *see* carbonate mineral (table).

Cervantes Saavedra, Miguel de (b. Sept. 29?, 1547, Alcalá de Henares, Spain—d. April 23, 1616, Madrid), Spanish novelist, playwright, and poet, the creator of *Don Quixote* (1605) and the most important figure in Spanish literature.

A brief account of the life and works of Miguel de Cervantes Saavedra follows. For full treatment, *see* MACROPAEDIA: Cervantes.

After studying in Madrid, Cervantes went to Italy and became a soldier, taking part in the sea battle of Lepanto (1571), during which he was wounded and lost the use of his left hand. After many adventures, including five years as a captive of the Turks, he returned to Spain in 1580. Cervantes produced his first book, a pastoral novel, *La Galatea,* in 1585. From 1582 to 1587 he also wrote some 20 or 30 plays, only two of which survive: *El Trato de Argel* ("The Traffic of Algiers") and *La Numancia* ("Numantia"). There followed from 1587, while he was in uncongenial government service and his fortunes were at their lowest, a long hiatus in his literary career. *El ingenioso hidalgo Don Quixote de la Mancha* ("The Ingenious Hidalgo Don Quixote de la Mancha") was published in 1605 and was an immediate success. Though it did not bring him riches, it put him in the front rank of men of letters. Among his subsequent works are a

collection of 12 short stories, *Novelas ejemplares* (1613; "Exemplary Tales"); a collection of comedies, *Ocho comedias y ocho entremeses nuevos* (1615; "Eight Comedies and Eight New Interludes"); and the second part of *Don Quixote* (1615).

Cervera y Topete, Pascual (b. Feb. 18, 1839, Medina Sidonia, Spain—d. April 3, 1909, Puerto Real), Spanish admiral whose fleet was destroyed in battle off Cuba in the Spanish–American War (1898).

A graduate of a naval cadet school, he engaged in operations off Morocco and in the Sulu Islands and the Philippines. Afterward he was on the West Indian station during the early part of the first Cuban War (1868–78), returning to Spain in 1873 to serve on the Basque coast against the Carlists. Over the years he rose to flag rank and in 1892 became minister of marine in the cabinet of Praxedes Mateo Sagasta; he soon resigned, however, when he was unable to receive backing for naval reforms and added funds.

In April 1898, when the Spanish-American War broke out, Cervera was chosen to command a squadron composed of four cruisers and several destroyers stationed in the Cape Verde Islands. This ill-fated squadron started upon its reckless cruise across the ocean only after its commander had repeatedly sent dispatches warning both the minister of marine and the prime minister, Sagasta, that the ships were insufficiently provided with coal and ammunition. In compliance with the instructions of the government, Admiral Cervera made for the landlocked harbour of Santiago de Cuba, where he cooperated in the defense by landing some guns and a naval brigade. In spite of his energetic representations, Cervera received an order from Madrid, dictated by political considerations, to sally forth. The squadron met forces trebly superior to it and was totally destroyed. The admiral, three of his captains, and 1,800 sailors and marines were taken by the victors to Portsmouth, N.H. After the war Cervera and his captains were tried before the supreme naval and military court of Spain, which honourably acquitted them all. In 1901 he became vice admiral, in 1902 was appointed chief of staff of the Spanish navy, and in 1903 was made life senator.

Cerveteri (Italy): *see* Caere.

Cervi, Gino (b. May 3, 1901, Bologna, Italy—d. Jan. 3, 1974, Punta Ala), Italian character actor and manager best-known outside of Italy for his film portrayal of a small-town Communist mayor in the "Don Camillo" films.

The son of a theatre critic, Cervi worked with various theatres for 15 years (1924–39) until he became the manager of Rome's Teatro Eliseo. His portrayals of Feste in *Twelfth Night* (1938) and Falstaff in *The Merry Wives of Windsor* (1939) established him as the foremost Italian comedian in classic roles.

After World War II, Cervi and the Eliseo company mounted Italian premieres of new foreign works; his George in Cocteau's *Les Parents terribles* (1945; *Intimate Relations*) and Hector in Giraudoux's *Tiger at the Gates* (1946) further enhanced his reputation. His outstanding theatrical accomplishment, however, was his portrayal of the title role in *Cyrano de Bergerac* (1953), an interpretation that was enthusiastically received, even in Paris. Cervi's film work also achieved international acclaim after the war, when director Alessandro Blasetti's *Quattro Passi fra le Nuvole* (1942; "Four Steps in the Clouds") was released outside of Italy. *The Little World of Don Camillo* (1951), a French-Italian screen venture costarring Cervi and the French comedian Fernandel, was so successful that five Don Camillo sequels were produced before the death of Fernandel in 1971. Cervi appeared in more than 110 motion pictures and played the part of police inspector Maigret in a popular Italian television series based upon the detective novels of the French writer Georges Simenon. His son, Tonino Cervi, became a film producer.

cervical erosion, ulceration of the lining of the uterine cervix made evident by bright red or pink spots around its opening. The cervix is the part of the uterus (womb) whose tip projects into the upper region of the vagina.

In the earliest stage of erosion, patches of mucous membrane are shed from the cervix. The following stages are usually associated with different degrees of healing. The primary lesion shows an ulcer; its surface lacks mucous membrane, the tissue is granular, and there may be many white blood cells and bacteria associated with it. Soon after the ulcer erupts, the body starts repairs by covering the exposed area with a new epithelial (covering) layer. An erosion may heal completely or partially or may recur. The erosion does not totally heal until the infection and discharge that caused it originally are eradicated.

Erosions are most prevalent in women during their menstrual years, in those who have had children, and during cervical or vaginal infections. They are less common in virgins and in older women who have experienced menopause. The erosion itself is relatively insignificant; occasionally, however, it may precede cervical cancer.

Extensive erosions can involve part of the surrounding vaginal wall. As the ulcer heals, it acquires patches of pinkish-tan epithelium (covering), which form small islands over the eroded area. The small islands eventually grow together, giving the lesion an uneven contour. There are mucous glands in the cervical tissue that lead to the surface of the epithelium; if these ducts are covered or blocked, the glands fill with retained fluids, causing small cysts.

Erosions that bleed on trauma or have an irregular, bumpy (papillate) surface are generally regarded as of the more hazardous variety. Most smooth, round erosions do not require treatment, for they heal by themselves when the cause is removed. Larger erosions are lightly cauterized in spots to stimulate epithelial growth. Erosions found to be cancerous are usually removed surgically. Removal of part or all of the cervix does not prevent fertilization and childbearing.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

cervical spondylosis, degenerative disease of the neck vertebrae, causing compression of the spinal cord and cervical nerves.

Prolonged degeneration of the cervical spine results in a narrowing of the spaces between vertebrae, forcing intervertebral disks out of place and thus compressing or stretching the roots of the cervical nerves. The vertebrae may themselves be squeezed out of proper alignment. Arthritis developing in reaction to the stress generates new, anomalous bone growth (the "spondylitic bar") that impinges on the spinal cord, further interfering with nervous function.

The typical symptoms of cervical spondylosis consist of a radiating pain and stiffness of the neck or arms, restricted head movement, headaches, spastic paralysis, and weakness in the arms and legs. Because of the combination of neurological symptoms and bone degeneration and the common incidence of arthritis in the elderly, cervical spondylosis may be difficult to distinguish from primary neurological disease with unrelated arthritis.

Treatment of uncomplicated cases consists of rest and traction and may include use of a cervical collar to limit movement. If these measures are not successful and neurological symptoms continue to progress, surgical decompression of the spine by removal of herniated disks or fusion of vertebrae may be necessary.

cervicitis, inflammation of the uterine cervix, the small, thick-walled tube that is the protruding extension of the uterus (womb) leading into the vagina. The narrow central canal of the cervix is lined with a moist mucous membrane, and it contains mucous glands. The cervix secretes most of the mucus and other fluids found in the reproductive tract; in normal circumstances, the secretions help to preserve and transport sperm from the male, and they keep the vagina bathed in fluids. The cervix serves as an excellent warm, secluded spot for bacterial invasion and growth. Vaginal infections can easily spread to the cervix. Poor drainage or blockage of the cervix causes a chronic infection. Irritation can be caused by trauma incurred during abortions or delivery, by medical instruments, cauterization, radiation therapy, or intrauterine contraceptive devices. Cervicitis is most common during the years of active menstruation; it seldom affects young girls and is only occasionally found in older women.

Infections can be localized in one part of the cervix, or they may affect the whole structure. When the whole cervix is involved in an acute infection, there is inflammation and swelling of the mucous membrane. The cervix is enlarged, firm, congested with blood, and filled with tissue fluids. The vagina is also reddened and glazed from irritation caused by the discharge. In the chronic condition, the discharge is thicker but not as abundant or as irritating. There is usually no pain. The chronic infection can spread to surrounding tissue. Common causes of a chronic condition are radiation therapy, surgical operations, deep lacerations, or deep cauterization. Overgrowth of the mucous membrane causes cervical polyps (projecting lumps of tissue). The major symptom of all cervicitis is a profuse creamy-yellow or grayish-green discharge that may have an unpleasant odour and may be irritating. The excessive discharge can inhibit fertilization.

Cervicitis may worsen during pregnancy. The eroded surface enlarges, polyps increase in size, and discharges are more prevalent. Infections can cause constrictions of the cervix, which may lead to difficult labour.

Treatment of cervicitis may be cauterization, prophylactic (protective) measures, or, sometimes, surgery. Surgical procedures include cervix repair or removal; removal does not prohibit further pregnancies. *See also* leukorrhea; vulvitis.

Cervin, Mont (Switzerland–Italy), Italian MONTE CERVINO: *see* Matterhorn.

Cervini, Marcello (pope): *see* Marcellus II.

cervix, uterine (anatomy): *see* uterine cervix.

Césaire, Aimé(-Fernand) (b. June 25, 1913, Basse-Pointe, Martinique), French-speaking African poet and playwright, cofounder with Léopold Sédar Senghor of Negritude, an influential movement to restore the cultural identity of black Africans.

Together with Senghor and others involved in the Negritude movement, Césaire was educated in Paris. In the early 1940s he returned to Martinique and engaged in political action supporting the decolonization of the French colonies of Africa. Viewing the plight of the blacks as only one facet of the proletarian struggle, he became a deputy to the Constituent Assembly in 1946 and joined the Communist Party (1946–56). He found that Surrealism, which freed him from the traditional forms of language, was the best expression for his convictions. He

voiced his ardent rebellion in a European language heavy with African imagery. In the fiery poems of *Cahier d'un retour au pays natal* (1939; *Return to My Native Land*) and *Soleil cou-coupé* (1948), he lashed out against the oppressors.

Césaire turned to the theatre, discarding Negritude for black militancy. His tragedies are vehemently political: *La Tragédie du Roi Christophe* (1963; *The Tragedy of King Christophe*), a drama of decolonization in 19th-century Haiti, and *Une Saison au Congo* (1966; *A Season in the Congo*), the epic of the 1960 Congo rebellion and of the assassination



Césaire
Keystone

of the Congolese political leader Patrice Lumumba. Both depict the fate of black power as forever doomed to failure.

Cesalpino, Andrea, Latin ANDREAS CAESALPINUS (b. June 6, 1519, Arezzo, Tuscany [Italy]—d. Feb. 23, 1603, Rome), Italian physician, philosopher, and botanist who sought a philosophical and theoretical approach to plant classification based on unified and coherent principles rather than on alphabetical sequence or medicinal properties. He helped establish botany as an independent science.

Cesalpino succeeded his teacher, Luca Ghini, as professor of medicine and director of the botanical gardens at the University of Pisa. From 1592 he served as physician to Pope Clement VIII and taught at Sapienza University in Rome. His work on the anatomy and physiology of the blood anticipated the work of William Harvey. His *De plantis libri XVI* (1583) is considered the first textbook of botany. The brief first book presents the principles of botany using the models of Aristotle and Theophrastus; the remaining 15 books describe and classify more than 1,500 plants. While his classification system anticipated Linnaeus' system of binomial nomenclature, Cesalpino retained the false classic divisions of woody and herbaceous plants and the belief that plants are not sexual. He profoundly influenced later botanists.

César, in full CÉSAR BALDACCINI (b. Jan. 1, 1921, Marseille), French sculptor perhaps best known for his "compression sculptures" made from compacted automobiles during the 1960s.

César studied drawing and modeling at the École des Beaux-Arts in Marseille under a teacher named Cornu, who had himself studied with Rodin; César went on to study at the École des Beaux-Arts in Paris (1943–50).

Though César's early experimentation with found materials (objets trouvés) may have expressed more an economic than an aesthetic impulse, he soon began to exploit street salvage to eerie and compelling effect. During the 1950s he used rusted bolts, cans, metal stripping, and the like to construct stylized insects, animals, and fish. César also produced prototypes of human forms, frequently with distorted or missing body parts, as in "Torso" (1954). In addition to the compressions, his later work included "expansions," for which he employed polyurethane, a substance that sets rapidly, to create dramatic gestural sculptures.

César, *departamento,* northern Colombia, bounded on the northeast by Venezuela and on the southwest by the Magdalena River. Created in 1967, the *departamento,* with an area of 8,844 square miles (22,905 square km), descends from the Sierra Nevada de Santa Marta in the north and the Serranía (mountains) de Perijá in the northeast to the lowlands of the Magdalena River valley. It is traversed by the César River, a tributary of the Magdalena. Cotton, rice, and corn (maize) are the principal crops, and cattle raising is widespread. Industry centres on Valledupar (*q.v.*), the departmental capital, but is of less importance than agriculture. César is traversed north to south by the Santa Marta–Bogotá railroad (the Atlantic Railway), and highways from Santa Marta, Cúcuta, and Ríohacha lead through César to Valledupar. Pop. (1985) 584,631.

cesarean section, cesarean also spelled CAESARIAN, surgical removal of a fetus, at or before full term, from the uterus through an abdominal incision. Little is known of either the origin of the term or the history of the procedure. According to ancient sources, the procedure takes its name from a branch of the ancient Roman family of the Julii, whose cognomen Caesar (Latin *caedere,* "to cut") originated from a birth by this means; some modern historians doubt that this is true.

The first documented cesarean section on a living woman was performed in 1610; she died 25 days after the surgery. Abdominal delivery was subsequently tried in many ways and under many conditions, but it almost invariably resulted in the death of the mother from sepsis or hemorrhage. Even in the first half of the 19th century, the recorded mortality was about 75 percent, and fetal craniotomy—in which the life of the child is sacrificed to save that of the mother—was usually preferred. Eventually, however, improvements in surgical techniques, antibiotics, and blood transfusion and antiseptic procedures so reduced the mortality that cesarean section came to be frequently performed as an alternative to normal childbirth.

In modern obstetrical care, cesarean section usually is performed when the life of either the mother or the child would be endangered by attempting normal delivery. The medical decision is based on physical examination, special tests, and patient history. The examination includes consideration of any diseases the mother may have had in the past and disorders that may have arisen because of pregnancy. Special tests that might be performed include fetal scalp blood analysis and fetal heart-rate monitoring. Common indications for cesarean section include obstructed labour, failure of labour to progress, placenta praevia (development of the placenta in an abnormally low position near the cervix), fetal distress, diabetes, and improper positioning of the fetus for delivery. In addition, cesarean section is often used if the birth canal is too small for normal delivery. Sometimes when a woman has had a child by cesarean section, any children born after the first cesarean section are also delivered by that method; but vaginal delivery is often possible.

The risks of cesarean section are low but real. The operation constitutes major surgery, and, compared to the risks of normal vaginal delivery, it is more dangerous for the mother. The risk of other complications—such as infection, hemorrhage, blood clots, and injury to the bladder or intestines—is also greater. If the baby is delivered by cesarean section planned in advance of labour, the infant can be premature. It has also been suggested that elective cesarean section may rob the infant of hormones and other substances released by the mother during labour.

By the late 20th century, the incidence of cesarean sections in the United States had risen dramatically, largely as a result of an increase in the number of malpractice suits brought against obstetricians for failing to operate if there was the slightest indication of trouble in delivery.

Cesari, Giuseppe (Italian painter): *see* Cavaliere d'Arpino.

Cesarotti, Melchiorre (b. May 15, 1730, Padua, Republic of Venice [Italy]—d. Nov. 4, 1808, Selvazzano, near Padua), Italian poet, essayist, translator, and literary critic who, by his essays and his translation of the purported poems of the legendary Gaelic bard Ossian, encouraged the development of Romanticism in Italy.

Educated in Padua and a teacher of rhetoric there (1751–60), Cesarotti later was a tutor in the Venetian household of the powerful Grimani family. In 1768 he became professor of Greek and Hebrew at the University of Padua. His versified translation, from the English version of James Macpherson, of the Ossian poems (*Poesie di Ossian,* 1763–72; modern ed., 1924) revived interest in nature poetry. Two important essays also encouraged would-be Romantic writers: *Saggio sulla filosofia del gusto* (1785; "Essay on the Philosophy of Taste") and *Saggio sulla filosofia delle lingue* (1785; "Essay on the Philosophy of Languages"), the latter demanding the loosening of literature from academic bonds.

Sent in 1797 as one of the Italian ambassadors who met Napoleon I at Campo Formio, Cesarotti praised him in an epic poem called *Pronea* (1807; "Providence"). He also wrote miscellaneous verse, translations of Aeschylus, Demosthenes, Voltaire, Thomas Gray's "Elegy Written in a Country Church Yard," and a prose version of the *Iliad.*

Cesenà, town, Forlì *provincia,* Emilia-Romagna *regione,* northern Italy, on the Savio River at the northern foot of the Apennines, south of Ravenna. It originated as the ancient Caesena, a station on the Via Aemilia and a fortress in the wars of the Ostrogoths and the Byzantines. An episcopal city and an independent commune in the 11th–13th century, it was heroically defended in 1357 by Cia, wife of the lord of Forlì, against papal troops under the Spanish cardinal Gil Alvarez Carrillo de Albornoz. In 1377 it was destroyed by Cardinal Robert of Geneva (later the antipope Clement VII), after which it was held by the Malatesta family of Rimini until 1465, when it passed under papal domination. Popes Pius VI and Pius VII were born at Cesenà in 1717 and 1740, respectively.

The town is dominated by the Rocca Malatestiana, a medieval fortress built in 1381–1450 and partly rebuilt in 1466–80. The rich medieval Malatestiana Library was built in 1447–52. The town is an important agricultural and commercial centre. Pop. (1988 est.) mun., 89,837.

Cēsis, German WENDEN, Russian TSESIS, city and district centre, Latvia, situated on the Gauja River at the foot of the Vidzeme (Livonia) highlands, 55 miles (90 km) northeast of the city of Riga. It is an old city, first mentioned in documents in 1206, and its castle dates from 1207. It was once a prosperous town of the Hanseatic League, as evidenced in its fine architecture, including the Church of St. John (1283). The old town is now preserved by government decree. After a long period of decline, Cēsis began to grow again in the last century after the construction of the Riga–Valka railway. An industrial suburb to the east manufactures foodstuffs and build-

ing materials and specializes in metalworking. Pop. (1991 est.) 22,100.

cesium (Cs), chemical element of Group Ia of the periodic table, the alkali metal group, first element to be discovered spectroscopically (1860), by Robert Bunsen and Gustav Kirchhoff, who named it for the unique blue lines of its spectrum. This silvery white, most reactive, and perhaps softest of all metals is liquid in a warm room. It is about half as abundant as lead and 70 times as abundant as silver. Cesium occurs in minute quantities in the Earth's crust, as in the minerals pollucite and lepidolite. Cesium can be isolated by electrolysis of a molten cesium-barium-cyanide mixture. Cesium reacts explosively with water; it readily combines with oxygen, so that it is used in electron tubes as a getter to clear out the traces of oxygen and other gases trapped in the tube when sealed. Because cesium is strongly photoelectric (easily loses electrons when struck by light), it is used extensively in photoelectric cells and in television cameras to form the electronic image, and it has been proposed for use in plasma propulsion engines for deep-space exploration. Cesium has also been used in an atomic clock.

Naturally occurring cesium is entirely the nonradioactive isotope, cesium-133; 20 radioactive isotopes from cesium-123 to cesium-144 have been artificially prepared. Cesium-137 is useful in medical and industrial radiology because of its long half-life of 30 years. Except for francium, cesium is the most electropositive and most alkaline element, and thus, more easily than all other elements, it loses its single valence electron and forms electrovalent bonds with nearly all the inorganic and organic anions. Cesium hydroxide (CsOH), containing the hydroxyl radical (OH^-), is the strongest base known, attacking even glass. Some cesium salts are used in making mineral waters.

atomic number	55
atomic weight	132.905
melting point	28.5° C
boiling point	671° C
specific gravity	1.873 (20° C)
valence	1
electronic config.	2-8-18-18-8-1 or $(Xe)6s^1$

Česká Republika: *see* Czech Republic.

České Budějovice, German BUDWEIS, city, capital of Jihočeský *kraj* (region), Czech Republic. It is a regional cultural and industrial centre lying amid lakes at the confluence of the Vltava (Moldau) and Malše rivers. Founded and fortified in 1265 by the Bohemian king Otakar II, the city is rich in medieval architecture and has one of the largest arcaded town squares in Europe, with the Baroque Samson's Fountain in the middle. The Museum of South Bohemia features natural science, archaeology, arts, and history of the region.

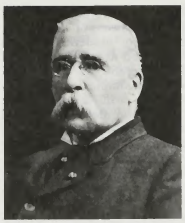
The city was a terminal for one of Europe's first horse-drawn tramways, opened in 1827 between České Budějovice and Linz, Austria. The original home of Budweiser beer, the city is still noted for the production of beer and of pencils (since 1790) and porcelain as well; other manufactures include enamelware, furniture, tobacco, and food products. Anthracite, lignite, and graphite deposits lie nearby to the west. Pop. (1991 prelim.) 97,283.

Českomoravská Vysočina (Czech Republic): *see* Bohemian-Moravian Highlands.

Československo: *see* Czechoslovakia.

Cesnola, Luigi Palma di (b. June 29, 1832, Rivarolo, Piedmont, kingdom of Sardinia [Italy]—d. Nov. 21, 1904, New York, N.Y., U.S.), U.S. Army officer, archaeologist, and museum director who amassed one of the largest collections of antiquities from Cyprus.

Educated at the Royal Military Academy, Turin (1843–48), Cesnola served at the age



Cesnola
By courtesy of the Metropolitan Museum of Art, New York

of 17 in the Sardinian Army of Revolution and in 1851 was graduated from the Royal Military Academy of Cherasco. He served in the Crimean War. Cesnola went to New York in 1860, founded an officer training school at the outbreak of the American Civil War, and, for services with the Union Army, was promoted to brigadier general. In 1865, having been naturalized, he was appointed U.S. consul to Cyprus, where he remained 11 years, gathering some 35,000 objects from nearly 70,000 tombs. The bulk of his collection was acquired by the Metropolitan Museum of Art, New York City (1872), of which he was director from 1879 to 1904. The accuracy of the records that he made of objects from his collection was repeatedly challenged, but modern research has tended to vindicate him. His published works include *Cyprus: Its Ancient Cities, Tombs, and Temples* (1877).

Céspedes, Carlos Manuel de, in full CARLOS MANUEL DE CÉSPEDES Y BORJA DEL CASTILLO (b. April 18, 1819, Bayamo, Cuba—d. March 22?, 1874, San Lorenzo), Cuban revolutionary hero. Although his revolution failed, Céspedes started the Ten Years War, which ultimately led to Cuban independence.

Céspedes was born into a prominent plantation family who had been granted their Cuban estate in 1517. After receiving his baccalaureate from Havana (1840), Céspedes completed his law studies in Spain. While in Spain he took part (1843) in the revolution led by Juan Prim, for which he was exiled to France. Upon his return to Cuba, Céspedes started a law practice, wrote poems and pamphlets, and secretly organized an independence movement.

By 1868 he was made chief of the revolutionary movement in the Oriente region, and on Oct. 10, 1868, Céspedes, at the head of only 147 poorly armed men, proclaimed independence for Cuba in the "Grito de Yara" ("Cry of Yara"). The insurrection gained momentum and, by the end of the month, had 12,000 volunteers and scored some stunning military successes. Céspedes, who favoured the gradual emancipation of the slaves, allowed them to join the rebel army only with their owners' permission. The slaves were emancipated by a new constitution adopted in April 1869, the same month that Céspedes was elected president by the revolutionary government. Spanish troops poured into Cuba, and the earlier victories were followed by defeats and retreats. Céspedes' government lost prestige, and his ambivalent stand on slavery angered both conservatives and liberals. A Cuban tribunal deposed him in absentia (1873), and Céspedes was forced into hiding; he was finally discovered and shot by Spanish soldiers.

Céspedes, Pablo de (b. 1538, Córdoba, Spain—d. 1608, Córdoba), Spanish poet, painter, sculptor, and architect.

Céspedes was educated at Alcalá de Henares, where he studied theology and Oriental languages. On leaving the university he went to Rome. In 1560, while in Rome, proceedings were taken against him by the Inquisition at Valladolid, but they were dropped. He returned to Spain a little before 1577 and received a prebend of the Cathedral at Córdoba, where he lived until his death. Cristobal de Vera, Juan de Peñalosa, and Zambrano were among his pupils. His "Last Supper" at Córdoba was much admired in his time. Céspedes was the author of several prose pieces on subjects connected with his profession. His poem "The Art of Painting," containing a glowing eulogy of Michelangelo, is considered among the best didactic verse in Spanish. The few remaining fragments were first printed by Francisco Pacheco in his treatise *Del arte de la pintura* ("The Art of Painting") in 1649.

cessio bonorum (Latin: "a cession of goods"), in Roman law, a voluntary surrender of goods by a debtor to his creditors. It did not amount to a discharge of the debt unless the property ceded was sufficient for the purpose, but it secured the debtor from personal arrest. The creditors sold the goods, applying the proceeds to their claims. Although property that the debtor might acquire later could be claimed by the creditors, he could not be deprived of the bare necessities. The main features of *cessio bonorum* were adopted into the French and other legal systems. In England it survives in the internal regulations of certain commercial bodies, such as stock exchanges.

To make the best use of the Britannica, consult the INDEX *first*

Cessna, Clyde Vernon (b. Dec. 5, 1879, Hawthorne, La., U.S.—d. Nov. 20, 1954, near Rago, Kan.), American aviator and aircraft manufacturer who invented the cantilever wing and a V-shaped tail configuration and whose dedication to a simple, flexible monoplane design made his planes, such as variations on the 180, popular as bush aircraft and as forest and rescue planes.

Cessna worked as a farmhand, prospector, threshing-machine operator, and automobile salesman until he saw a flying circus in Oklahoma and decided to be a flyer. He worked at an airplane factory in the Bronx, New York City, for two months and returned to Oklahoma, where he flew his first plane in 1911. In 1917 he produced a monoplane powered by a 6-cylinder, air-cooled engine. In the 1920s he joined forces with businessman and air enthusiast Victor Roos to produce Cessna-Roos aircraft until 1927. Then Cessna bought out the company, which was closed (1931–34) during the Depression. Cessna retired in 1934. A revived Cessna Aircraft Company later came to produce more than 8,000 planes a year.

Cesti, Pietro Antonio, byname MARC' ANTONIO (b. Aug. 5, 1623, Arezzo, Tuscany [Italy]—d. Oct. 14, 1669, Florence), composer who, with Francesco Cavalli, was one of the leading Italian composers of the 17th century.

Cesti studied in Rome and then moved to Venice, where his first known opera, *Orontea,* was produced in 1649. In 1652 he became chapelmaster to Archduke Ferdinand of Austria at Innsbruck, a post he combined for a time with membership in the papal choir. From 1666 to 1669 he was vice chapelmaster to the imperial court in Vienna.

Throughout the 17th century his operas were widely performed in Italy and elsewhere. His most sumptuous opera, *Il pomo d'oro* (1667; *The Golden Apple*), and his masterpiece, *Dori* (1661), appear in modern editions. He is said to have written about 100 operas, but only 15 are extant. Christ Church, Oxford, Eng., possesses an important manuscript collection of 18 secular and three sacred cantatas. Numerous other cantatas are preserved elsewhere. His cantatas and his religious plays show the

influence of the more conservative, contrapuntal Roman school; his operas, that of the more progressive Venetian school. But the solemn and lyrical vocal lines of his cantatas reflect the bel canto style that he helped introduce from the cantata into the opera. In this, in his harmonic language, and in his emphasis on the singer and the aria, as against text and recitative, he foreshadowed operatic developments of the 18th century.

cestode: *see* tapeworm.

cestodiasis, also called TAPEWORM INFESTATION, infestation with cestodes, a group of flattened and tapelike hermaphroditic worms that are intestinal parasites in humans and other animals, producing larvae that may invade body tissues.

For humans there are two kinds of tapeworm infestations: (1) intestinal cestodiasis, in which the mature worm lives in the lumen of the intestine, producing eggs that are evacuated in the feces and develop further in other animal hosts, and (2) visceral and somatic cestodiasis, in which the larvae form lesions in body organs. Thirty or more species of tapeworms cause intestinal cestodiasis in humans. The more common ones include the following: *Taenia saginata,* or beef tapeworm, about 4.5 to 6 m (15 to 20 feet) long; *Taenia solium,* or pork tapeworm, about 2 to 3 m long; and *Diphyllobothrium latum,* about 9 m long, acquired by the eating of undercooked beef, pork, or fish that harbour larval forms of the worms. *Hymenolepis nana,* or dwarf tapeworm, only a few centimetres long, releases eggs that require no intermediate hosts. It is possibly the most common cestode found in humans, affecting chiefly children. Symptoms of intestinal cestodiasis include abdominal pain that may be relieved by eating and that may be associated with distention, flatulence, and nausea. Often, however, there are no symptoms, and first notice of infestation may occur only when segments of the worms are passed in the stools. Treatment may involve surgery or the use of antiparasitic drugs.

Visceral and somatic cestodiasis include the following infections: (1) Echinococcosis, or hydatic disease, is caused by the larval stage of *Echinoccocus granulosus* or *E. multilocularis.* In humans the first organism produces cystic, slowly expanding lesions principally involving the liver and lungs; the second organism produces an alveolar (pitted) type of lesion that progresses rapidly, may occasionally form lesions in the brain and bones, and is invariably fatal. The symptoms of echinococcosis are generally those of a slowly growing tumour and vary depending on the body structure involved. The adult worm lives mainly in dogs, and human infestation is contracted by the ingestion of eggs present in dog excreta. Surgical removal of the lesions is the only cure. (2) Sparganosis is caused by the *Spirometra mansoni* larva, which may be acquired by drinking water that contains water fleas harbouring the first larval stage. The larvae may grow to a length of 30 cm (12 inches) in the abdominal wall or in the region of the eye socket; surgical removal of the larva is the current treatment.

cesura (prosody): *see* caesura.

cetacean, any of several species of aquatic mammals, including the whales, porpoises, and dolphins, that make up the order Cetacea. Cetaceans are found in oceans worldwide, as well as in some tropical lakes and rivers.

A brief treatment of cetaceans follows. For full treatment, *see* MACROPAEDIA: Mammals.

The order Cetacea is divided into three suborders: the Archaeoceti, a group of toothed cetaceans that are now extinct; the Odontoceti, about 70 species of modern toothed cetaceans, including sperm whales, killer whales, narwhals, beluga, dolphins, and porpoises; and the Mysticeti, 13 species of baleen, or whalebone, whales. The two types of modern cetaceans are mainly distinguished by the shapes of their heads and the nature of their teeth. Most odontocetes have simple teeth of uniform shape numbering from 2 to 300; the mysticetes have no teeth and feed instead by straining small organisms from the water through baleen plates, which are long, bristly structures of horn anchored to the upper jaw.

Cetaceans originated in the early Tertiary or Late Cretaceous (about 70 million years ago), when they diverged from a group of land-dwelling, carnivorous mammals. The specific land-dwelling ancestors of the cetaceans are uncertain, however. There is also uncertainty as to whether the modern toothed cetaceans and baleen whales evolved from the same archaeocete relative or separately from different land-dwelling mammals.

Cetaceans range in length from about 1.3 m (4.3 feet) in the smaller porpoises to about 30 m (100 feet) in the blue whale. Weights range from about 45 kg (100 pounds) to 136,000 kg (150 tons). Modern cetaceans have tapered bodies, no external hind limbs (although vestigial limb structures are found internally), and tails ending in a horizontal blade of two lobes, or flukes. Vertical tail movements produce forward propulsion, while the paddle-shaped flippers balance and steer the cetacean.

Among odontocetes the teeth are used for seizing prey (fish and squid), which is not chewed before it is swallowed. This necessitates a specialized, multichambered stomach suitable for prolonged digestion of the unchewed food. Baleen whales eat plankton and small crustaceans and fishes that they strain from the water in two ways: by swimming forward with the mouth open slightly, keeping a continuous stream of food-filled water moving through the baleen plates, or by gulping mouthfuls of water and expelling them through the baleen.

Baleen whales have a reduced sense of smell, and odontocetes have none. Hearing, on the other hand, is exceptionally well developed in all cetaceans. Porpoises, in particular, are capable of hearing sounds pitched 10 times higher than the human limit. All cetaceans use a variety of sounds to communicate socially, and odontocetes produce high-pitched clicks whose echoes allow them to discriminate objects and to navigate.

Because cetaceans are mammals, they must come to the water's surface to breathe through blowholes located on top of their heads. Odontocetes have single blowholes, while baleen whales have pairs. After inhaling, the cetacean holds its breath while it dives beneath the surface. Smaller cetaceans can hold their breath for several minutes, but the larger species may stay underwater for an hour or longer. Sperm whales are known to have dived to depths of 1,100 m (3,600 feet) or more.

Baleen whales are usually solitary except during the breeding season, but odontocetes spend most of their lives in organized schools ranging in number from a few animals to 1,000 or more. Odontocete schools can be complex in structure, with subgroups divided by family, age, and sex. These subgroups often swim, dive, and feed independently, except when the school is frightened or traveling rapidly. Play is common among odontocetes but rare in the baleen whales. Play takes various forms: sexually related prodding and rubbing of the genitals, balancing floating objects on the fins or flukes, and swimming and diving in formation or riding waves. Cetaceans frequently assist other cetaceans that are in trouble (known as epimeletic behaviour). Both baleens and odontocetes will stand by or support a wounded or sick animal. Females assist each other in giving birth, and mothers frequently shield their young.

All cetaceans are seasonal breeders, with impregnation taking place during the period from spring to fall. The gestation period is 11 to 12 months, except in the sperm whale, in whom it is 16 months. Birth takes place underwater, after which the mother pushes the calf to the surface for its first breath. Baleen whales nurse their young from 7 to 10 months, and odontocetes nurse even longer. Milk is forced into the mouth of the baby by contractions under the mother's mammary gland. In odontocetes the mother-young relationship lasts for several years, and even a fully grown cetacean may return to its mother in times of stress.

Most baleen whales migrate seasonally from feeding to calving grounds, a distance that may be as great as 5,000 km (3,000 miles). Sperm whales also migrate long distances, but other odontocetes' migrations are local in nature. Cetaceans can swim at relatively high speeds, porpoises at 38 km per hour (21 knots, or 24 miles per hour), and whales at 56 km per hour (35 miles per hour).

Cetina, Gutierre de (b. 1520?, Seville, Spain—d. 1557?), Spanish poet, author of "Ojos claros serenos" ("Clear, Serene Eyes"), one of the most frequently anthologized poems in the Spanish language.

Cetina was a soldier and spent most of his life traveling, visiting Italy, Germany, and Mexico. Influenced by the poet Garcilaso de la Vega, Cetina drew heavily upon classical and Italian poetry for his sources, and he wrote extensively in Italianate metres. A considerable portion of his verse is freely translated from Petrarch, Ausiás March, and others. His sonnets, marked by elegance and dextrous metre, are considered to be his finest work. He is thought to have died, or at least been seriously wounded, in a street brawl in Puebla de los Angeles (now Puebla de Zaragosa), Mex.

Cetinje, city, former capital and cultural centre of Montenegro (now a republic within Yugoslavia). It lies 2,198 feet (670 m) above sea level on the Cetinje plateau, surrounded by peaks and at the foot of Mount Lovćen (5,738 feet [1,749 m]). The city's name derives from the river, the Cetina (or Cetinja). The monastery at Cetinje became the seat of the prince-bishops, or *vladike,* theocratic rulers of Montenegro, from 1516 to 1851. The Montenegrins constantly battled the Turks and Albanians, and Cetinje was overrun by Turkish forces in 1692, 1714, and 1785. On the first occasion the defendants of the monastery fired the gunpowder supply, destroying the monastery, themselves, and many Turks.

The monastery, restored in 1701 and after 1785, is well preserved; it contains manuscripts, relics, and the first book printed (1493) in the South Slav countries. Vlaška Church (1450) has a railing made from captured Turkish rifles. The Biljarda Castle (1838, restored 1951) was the residence of the great poet-ruler Petar II Petrović Njegoš (*vladika* 1830–51), who is entombed atop Mount Lovćen. The Njegoš Museum contains part of his



The monastery at Cetinje, Montenegro, Yugos.
J. Allan Cash

private library and art collection. The state (formerly national) museum (founded 1896) is in a former palace built in 1867.

From 1878 to 1918 Cetinje was the capital of independent Montenegro; it passed to Yugoslavia in 1918. In 1946 Cetinje was succeeded as the capital of Montenegro by Titograd (now Podgorica). Local industries produce refrigerators, appliances, and footwear. Pop. (1991) 15,924.

Cetraria islandica (lichen): *see* Iceland moss.

Cetshwayo, also spelled CETEWAYO (b. *c.* 1826, near Eshowe, Zululand [now in Natal, S.Afr.]—d. Feb. 8, 1884, Eshowe), last great king of the Zulus (reigned 1872–79) whose strong military leadership and political acumen restored the power and prestige of the Zulu nation, which had declined during the reign of his father, Mpande (Panda). As absolute ruler of a rigidly disciplined army of 40,000 men, Cetshwayo was considered a threat to British colonial interests; the Zulu War (1879) and subsequent destruction of Zulu power removed that threat.

Inspired by the exploits of his illustrious uncle Shaka, Cetshwayo took part in fierce raids on European settlers when he was only 12. He further distinguished himself in wars against the Swazis (1853–54). Partly because the practice of polygamy produced so many heirs, his claim to his father's throne was not secure until six of his many half brothers were slain and two others forced to flee. After Mpande's death in 1872, Cetshwayo was proclaimed king according to tribal custom. A coronation ceremony performed by Sir Theophilus Shepstone, British secretary for native affairs in Natal, followed.

Until the annexation of the Transvaal by the British (1877), Shepstone remained on good terms with Cetshwayo. But as the new governor of the Transvaal, Shepstone reversed himself and supported Boer claims against the Zulus in disputed territories. As an angry Cetshwayo increased the size of his forces, Sir Bartle Frere, the British high commissioner for South Africa, decided to eliminate what he regarded as a standing menace to European settlers. On the pretext that Cetshwayo had violated earlier agreements with Shepstone, an ultimatum was sent in December 1878 demanding what amounted to the dissolution of the Zulu military system. When, as Frere expected, the demand was not met, the British invaded Zululand. Armed with little more than spears, the Zulus, in a surprise attack at Isandhlwana (Isandlana) on Jan. 22, 1879, wiped out an entire British regiment. The British recovered and decisively defeated the Zulus at Ulundi (July 4, 1879).

Cetshwayo was captured in August and confined near Cape Town, and Zululand was divided among 13 chiefs. Refusing to submit to exile, Cetshwayo beseeched the authorities, including Queen Victoria, to allow him to visit Britain and present his case. Proud and dignified, he made a great impression in London; and, because the division of Zululand proved unworkable, the British restored him as ruler of central Zululand in January 1883. Several of the new chiefs, however, refused to accept him. Beaten in battle by a rival, he became a fugitive and sought the protection of the British resident at Eshowe, where he died of a heart attack. Cetshwayo's grave, deep in the Nkandla forest, is considered sacred and is guarded by Zulus.

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Cette (France): *see* Sète.

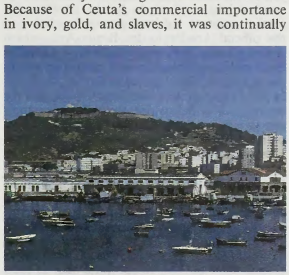
Ceṭṭi, group of castes widespread in southern India, roughly corresponding to the Banias, a similar group of merchant castes in the north. They specialize primarily in the mercantile trades, as bankers, moneylenders, pawnbrokers, shopkeepers, and merchants. They employ a special trade jargon, which contains more or less secret names for figures. Among certain Ceṭṭi castes, mass weddings were held at intervals of 10 or 15 years, apparently for reasons of economy. Such a marriage season would last for many months.

cetyl alcohol, also called 1-HEXADECANOL [$CH_3(CH_2)_{15}OH$], a solid organic compound that was one of the first alcohols to be isolated from fats. Cetyl alcohol was discovered in 1817 by the French chemist Michel Chevreul. When he heated a sample of spermaceti (a solid wax formed by the cooling of sperm whale oil) with caustic potash (potassium hydroxide), colourless crystals appeared. Although Chevreul thought that these crystals were a compound of ethylene and water, a more complete analysis by other researchers in 1836 established its composition as an alcohol.

Cetyl alcohol is now manufactured through the reduction of ethyl palmitate (the waxy ester of palmitic acid) with metallic sodium and alcohol or under acidic conditions with lithium aluminum hydride as a catalyst. Cetyl alcohol is used widely in lubricants, emulsifiers, insecticides, and detergents. Because it is not readily hydrolyzed, cetyl alcohol can be applied as a thin film over a surface (*e.g.,* on the leaves of growing plants or across a water reservoir) to reduce the rate of water loss through evaporation. Cetyl alcohol also melts at a temperature higher than that of the human body, so it is useful in preparing cosmetic creams (*e.g.,* lipsticks) that are easily molded and softened when warmed by the skin.

Ceuta, Arabic SEBTA, Spanish *plaza* (enclave), military post, and free port on the coast of Morocco, at the Mediterranean entrance to the Strait of Gibraltar. Though physically contiguous with Morocco, Ceuta is administered by Spain. The city is on a narrow isthmus that connects Mount Hacho (one of the Pillars of Hercules) to the mainland.

Successively colonized by Carthaginians, Greeks, and Romans, it became independent under the Byzantine governor Count Julian. Because of Ceuta's commercial importance in ivory, gold, and slaves, it was continually



The harbour at Ceuta, on the coast of Morocco
Christine Osborne/Middle East Pix

disputed until Portugal gained control (1415). The port passed to Spain in 1580 and was assigned to Spain in the Treaty of Lisbon (1688). At the outbreak of the Spanish Civil War (1936), General Francisco Franco dispatched an expedition to Spain from Ceuta. In 1994 the Spanish government approved statutes of autonomy for Ceuta, replacing the city council with an assembly similar to those of Spain's other autonomous communities.

Five centuries of Spanish Christian occupation have given the place a European rather than Moorish appearance. (Only about a third of the population is Muslim.) Lying south of the isthmus, the port consists of a small bay enclosed by two breakwaters. With the construction of modern port facilities, Ceuta grew as a military, transport, and commercial centre. Fishing and the drying and processing of the catch are important industries, as are brewing, metallurgy, and machine repairs. Tourism is gradually becoming significant. A teacher-training college, business school, and administrative school are affiliated with the University of Granada. Area 7 square miles (18.5 square km). Pop. (1992 est.) 70,746.

Cevdet Paşa, Ahmed (b. March 22, 1822, Lovča, Ottoman Empire [now Lovech, Bulg.]—d. May 25, 1895, Istanbul [now in Turkey]), statesman and historian who was an outstanding figure in 19th-century Turkish letters.

Cevdet went to Istanbul at the age of 17 to complete his education at a religious college. In 1844/45 he was appointed qadi (judge) and then became the juridical adviser to the grand vizier (Ottoman prime minister), Mustafa Reşid Paşa, from 1846 to 1858. Throughout his life Cevdet held a number of important positions in the Ottoman government, including the post of *vak'anüvis,* or official court chronicler; the governorships of a number of Ottoman provinces; and, finally, the post of minister of justice, in which position he supervised and was a driving force behind the official codification and consolidation of Ottoman law, known as the Mecelle. More conservative than many of his contemporaries, however, who advocated a legal code based on the French Civil Code, Cevdet favoured a system based mainly on Islāmic law.

Although he wrote poetry in his early years, Cevdet is mainly known for his historical works, among which the best known are his 12-volume *Tarih-i Cevdet* ("Cevdet's Chronicle"), covering the period 1774 to 1826; the *Tezakir-i Cevdet* ("The Memoirs of Cevdet"), a collection of observations made on the events during his service as official court chronicler; and the *Maruzat* ("Observations"), written about the events from 1839 to 1876. Cevdet also wrote a number of Turkish grammars, including the *Kavaid-i Osmaniye* ("Ottoman Fundamentals"), with an important introduction, as well as a simpler version, the *Kavaid-i Türkiye* ("Turkish Fundamentals").

Other works include his *Takvim-i Edvar* ("The Calendar of the Ages"), which deals with the reform of the calendar, and, finally, his completion of the translation of the *Muqaddimah* ("Prologomena") to the historical work of the great 14th-century Arab historian Ibn Khaldūn, a work that profoundly influenced Cevdet Paşa's writings.

Cévennes, mountain range of southern France containing peaks over 5,000 feet (1,525 m) and forming the southeastern rim of the Massif Central, overlooking the lower valley of the Rhône River and the plain of Languedoc. A part of the Atlantic-Mediterranean watershed, its Mediterranean slope is riven by valleys gashed by torrents that eventually become rivers—*e.g.,* the Tarn, Hérault, Gard, and Ardèche. In the valleys grapes, olives, and other fruits are grown. Although mulberries for the nourishment of silkworms are no longer cultivated, there are still some textile mills. Heavy industries are centred on the small Alès coalfield, although it is in decline. Although the name Cévennes signifies wooded slopes, they have been largely denuded; a state reforestation program is under way. The range is also the site of the Cévennes National Park.

Cévennes National Park, nature reserve located in the *départements* of Lozère and Gard, southern France. The park, created in 1970, occupies 353 square miles (913 square km) of the Cévennes and Causses regions southeast of the Massif Central. It is

dominated by calcareous (limestone) plateaus, the highest point being Mount Lozère (5,584 feet [1,702 m]). Forests cover more than half the park; trees include evergreen oaks, chestnuts, common and durmast oaks, beeches, Scots pines, and birches. There are about 1,700 flowering plants, the most notable being wild daffodils, martagon lilies, and lady's slipper orchids. Matgrass and hair grass abound. The local bird population, once abundant but decimated by hunting prior to the creation of the park, still includes golden eagles, peregrine falcons, hen harriers, Montague's harriers, eagle owls, stone curlews, and little bustards. Animals include otters, badgers, foxes, martens, wild boars, roe deer, and moufflons, and livestock are allowed to graze. The castle of Roquedols has been ceded to the park. More than 584,000 acres (236,300 hectares) adjoining the park have been designated as a peripheral, or buffer, zone.

Ceyhan River, Turkish CEYHAN NEHRİ, historically PYRAMUS, river, southern Turkey, rising in the Nurhak Mountains of the Eastern Taurus range, northeast of Elbistan. It flows southeast past Elbistan, where it is fed by the Harman Deresi and numerous other small streams. It then turns south, is joined by the Aksu on the outskirts of Kahramanmaraş, changes course toward the southwest, and empties into the Mediterranean Sea after a course of about 316 miles (509 km). The region through which the river flows was once part of the Byzantine Empire; its present name is the Turkish form of the Arabic Jayḥān, which was applied to both the river and the region.

Ceylon: *see* Sri Lanka.

Ceylon ironwood (species *Mesua ferrea*), tropical tree, of the garcinia family (Clusiaceae), of the tea order (Theales), cultivated in tropical climates for its form, foliage, and fragrant flowers. The slow-growing Ceylon ironwood reaches about 18 m (60 feet) and has shining green, willowy foliage that is scarlet when young. The fragrant, yellow-centred, white flowers are 7 or 8 cm (3 inches) wide and have four petals.

Cézanne, Paul (b. Jan. 19, 1839, Aix-en-Provence, Fr.—d. Oct. 22, 1906, Aix-en-Provence), French painter, one of the greatest of the Postimpressionists, whose works and ideas were influential in the aesthetic development of many 20th-century artists and art movements, especially Cubism. Cézanne's art, misunderstood and discredited by the public during most of his life, grew out of Impressionism and eventually challenged all the conventional values of painting in the 19th century through its insistence on personal expression and on the integrity of the painting itself. He has been called the father of modern painting.



"Boy in a Red Waist-Coat," oil on canvas by Paul Cézanne, 1893–95; in the collection of Mr. and Mrs. Paul Mellon

From the collection of Mr. and Mrs. Paul Mellon, Upperville, Va.

Cézanne's subjects are principally landscape and still life, with a few portraits; his colours are strong yet sober. He emphasized the underlying structure of his subjects rather than the objective vision offered by the light they reflected. His works include "Card Players" (1890–92) and numerous studies of Mont Sainte-Victoire in Provence (*e.g.*, "Mont Sainte-Victoire with Large Pine Trees," 1885–87).

Cézanne was the son of a well-to-do bourgeois family. He received an excellent classical education at the Collège Bourbon in Aix. In 1858, under the direction of his father—a successful banker determined that his son should enter the same profession—Cézanne entered the law school of the University of Aix-en-Provence. He had no taste for the law, however, having decided at an early age on some kind of artistic career, and, after two years of vacillation, he persuaded his father, with the support of his mother's entreaties, to allow him to study painting in Paris.

Early work in Paris (1861–70). Cézanne's first stay in Paris lasted only five months. The instability of his personality gave way to severe depression almost immediately when he found that he was not as proficient technically as some of the students at the Atelier Suisse, the studio where he began his instruction. He stayed as long as he did only because of the encouragement of Émile Zola, with whom he had formed a close friendship at the Collège Bourbon. Returning to Aix, Cézanne made a new attempt to content himself with working at his father's bank, but after a year he returned to Paris with strengthened resolution to stay. During his formative period, from about 1858 to 1872, Cézanne alternated between living in Paris and visiting Aix.

The early 1860s was a period of great vitality for Parisian literary and artistic activity. The conflict had reached its height between the Realist painters, led by Gustave Courbet, and the official Académie des Beaux-Arts, which rejected from its annual exhibition—and thus from public acceptance—all paintings not in the academic Neoclassical or Romantic styles. In 1863 the emperor Napoleon III decreed the opening of a Salon des Refusés, to counter the growing agitation in artistic circles over painters refused by the Salon of the Académie. The works of the Refusés were almost universally denounced by the critics—a reaction that consolidated the revolutionary spirit of these painters. Cézanne, whose tastes had soon shifted away from the academic, became associated with the most advanced of this group, including Édouard Manet, Camille Pissarro, Claude Monet, Auguste Renoir, and Edgar Degas. Most of these artists were only in their 20s (as was Cézanne) and were just forming their styles; they were to become, with the exception of Manet, the Impressionist school. Cézanne's friend Zola was passionately devoted to their cause, but Cézanne's friendship with these young men was at first inhibited by his touchiness and deliberate rudeness, born of extreme shyness and a moodiness that was offended by their convivial ways. Nevertheless, he was supported by their revolutionary inspiration as he sought to synthesize the influences of Courbet, who pioneered in the unsentimental treatment of commonplace subjects, and the Romantic painter Eugène Delacroix, whose compositions, depending on colour instead of line, greatly impressed Cézanne.

During this period Cézanne began to develop a style that was almost opposite to that of his mature works. It was violent and dark; he painted scenes with harsh extremes of light and shadow and with a looseness and vigour that are remarkable for the time but can be traced to the influence of Delacroix's swirling compositions. The sensitive dynamism of this youthful period, with the inner feverishness that it reveals, foreshadows the daring innovations of Fauvism and of modern Expressionism, particularly the works of Maurice de Vlaminck and Georges Rouault.

Impressionist years (1870–78). In July 1870, with the outbreak of the Franco-German War, Cézanne left Paris for Provence, partly to avoid being drafted. He took with him Marie-Hortense Fiquet, a young woman who had become his mistress the previous year and whom he finally married in 1886. The Cézannes settled at Estaque, a small village on the coast of southern France, not far from Marseille. There he began to paint landscapes, exploring ways to depict nature faithfully and at the same time to express the feelings it inspired in him. He began to approach his subjects the way his Impressionist friends did; in two landscapes from this time, for example, "Snow at Estaque" (1870–71) and "The Wine Market" (1872), the composition is that of his early style, but already more disciplined, more attentive to the realism of light.

In January 1872 a son, Paul, was born to Cézanne and Marie-Hortense. Soon afterward, at the invitation of Camille Pissarro, Cézanne took his family to live at Pontoise in the valley of the Oise River. There and at the nearby town of Auvers he began seriously to learn the techniques and theories of Impressionism from Pissarro, who of his painter friends was the only one patient enough with his difficult personality to teach him. The two artists painted together intermittently through 1874, taking their canvases all over the countryside and painting out-of-doors, a technique that was still considered radical. From this time on, Cézanne was to devote himself almost exclusively to landscapes, still lifes, and, later, portraits. Pissarro persuaded Cézanne to lighten his colours and showed him the advantages of using the broken bits of colour and short brush strokes that were the trademark of the Impressionists and that Cézanne came to use regularly, although with a different effect, in his later work. Even while under Pissarro's guidance, however, Cézanne painted pictures clearly indicating that his vision was unique and that his purpose was quite different from that of the Impressionists. Although he used the Impressionist techniques, he emphasized the underlying structure of the objects he painted rather than the objective vision presented by the light that emanated from them, which was the main concern of the Impressionists. Already he was composing with cubic masses and architectonic lines; his strokes, unlike those of the Impressionists, were not strewn with colour, but they complemented each other in a chromatic unity. His most famous painting of this period, "The Suicide's House" (1872–73), illustrates these forces at work.

In 1874, with the first official show of the Impressionists, Cézanne returned to Paris. Although the paintings that Cézanne exhibited at the first Impressionist show and at their third show in 1877 were the most severely criticized of any works there, he continued to work diligently, periodically going back to soak up the light of Provence. He made sojourns at Estaque in 1876, and in 1878 at Aix-en-Provence, where he had to endure the insults of his tyrannical father, whose financial help he needed to survive, since his canvases were still not finding buyers. The single exception to this lack of patronage was the connoisseur Victor Chocquet, whose portrait he painted in 1877. After the second Impressionist show Cézanne broke professionally with Impressionism, although he continued to maintain friendly relations with "the hum-

ble and colossal Pissarro," with Monet, "the mightiest of us all," and with Renoir, whom he also admired. Dismayed by the public's reaction to his works, however, he isolated himself more and more at both Paris and Aix, and he effectively ended his long friendship with Émile Zola, as much because of neurotic distrust and jealousy as from disappointment at Zola's "popular" writing, which his antisocial and single-minded genius found incomprehensible.

Development of his mature style (1878–90). During this period of isolation, from the late 1870s to the early 1890s, Cézanne developed his mature style. "L'Estaque" (*c.* 1888) is perhaps the first masterpiece of the classic Cézanne. It is a composition of grand and calm horizontals, in which the even up-and-down strokes create a clean prismatic effect and the sea spreads wide its implacable blue. Like all his mature landscapes, this painting has the exciting and radically new quality of simultaneously representing deep space and flat design. Cézanne knew well how to portray solidity and depth; his method is that used by the Impressionists to indicate form: in his



Cézanne, self-portrait, oil on canvas, *c.* 1878–80; in the Phillips Collection, Washington, D.C.

By courtesy of the Phillips Collection, Washington, D.C.

own words, "I seek to render perspective only through color." The intelligence and the eye of the painter were able to strip away that which was diffuse and superimposed in the view of a given mass, in order to analyze its constituent elements. He chose to rediscover a more substantial reality of simple forms behind the glimmering veil of appearances, an almost Platonic conception of the Mediterranean intellect. "Everything in Nature is modeled after the sphere, the cone and the cylinder. One must learn to paint from these simple figures." At the same time, his picture is a shimmering harmony of colour that can be seen as a totally flat design, without depth. Other striking landscapes from this period are the prismatic landscapes of Gardanne ("The Mills of Gardanne") and the series of monumental compositions in which Mont Sainte-Victoire near Aix becomes a mythical presence ("Mont Sainte-Victoire with Large Pine Trees," 1887).

Cézanne was to use essentially the same approach in his portraits. Some of the best known are a portrait of his son in the National Gallery of Art, Washington, D.C. (1885), "Madame Cézanne in a Yellow Armchair" (1890–94), "Woman with Coffee-Pot" (1890–94), and "The Card Players" (1890–92). This last painting portrays a theme that Cézanne treated in five different versions. Except for the card-player paintings, in which the sober dignity of the men is well expressed, there is no attempt in Cézanne's portraits to hint at the sitter's character. In most cases he treats the background with the same care as the subject and often violently distorts facial colour to bring it in harmony with the total composition. Cézanne also applied his principles of representation in his extraordinary still lifes, of which he painted more than 200. He organizes them as though they were architectural drawings, giving the most familiar objects significance and force through the intensity of the colour and the essential simplicity of the form.

Full of the intensity of feeling aroused by his surroundings, Cézanne's art was also deeply intellectual, a conscious search for solutions to problems of representation. Although he had great admiration for many other painters, he disagreed with the objectives of all but himself; painters that narrated events, as did the Romantics and the old masters, and painters that only represented nature—however perfectly, as did the Impressionists—seemed to him to lack a purity of purpose that only his own art possessed. At the same time, he was not a truly abstract painter, for the ideas of structure that he wished to express were about reality, not design. He was, however, the major source of inspiration for the Cubists Georges Braque, Pablo Picasso, and Juan Gris.

After his father's death in 1886, Cézanne was able to be independent financially. He had married Marie-Hortense six months earlier and, after a year in Paris in 1888, he installed her and their son there permanently. Cézanne himself then settled in Aix except for a few visits to the capital, to Fontainebleau, to Giverny, to Jura in Switzerland, and to the home of Claude Monet, where he met the sculptor Auguste Rodin. In 1895 the art dealer Ambroise Vollard set up the first one-man exhibition of Cézanne's work (more than 100 canvases), but, although the young artists and some art lovers were beginning to show enthusiasm for his painting, the public remained unreceptive.

Final years. Cézanne's art was increasing in depth, in concentrated richness of colour, and in skill of composition. He felt capable of creating a new vision. From 1890 to 1905 he produced masterpieces, one after another: 10 variations of the "Mont Sainte-Victoire," three of the "Boy in a Red Waist-Coat," and the "Bathers" series in which he attempted to return to the classic tradition of the nude and explore his concern for its sculptural effect in relation to the landscape. He was obsessed with his work, which was in itself time-consuming since he painted slowly.

Cézanne had always had extreme difficulty in getting along with people, and, deeply upset by the death of his mother in 1897, he withdrew gradually from his wife and from the friends of his youth. By the turn of the century his fame had begun to spread, and, since he was rarely seen by anyone, he became something of a legendary figure. He exhibited at the widely attended annual Salon des Indépendants in 1899 and at the Exposition Universelle held in Paris in 1900, and his works were finally sought after by galleries. The Caillebotte collection opened at the Luxembourg Gallery in Paris with two Cézannes. The National Gallery in Berlin purchased a landscape as early as 1900. Young artists admired him; in 1901, the young Symbolist Maurice Denis painted "Homage à Cézanne," a picture of artists admiring one of his still lifes.

Cézanne's last period, the fruit of intense meditation in solitude, reached the heights of lyricism, which only the greatest artists can attain in their lifetime, in its revelation of life in nature. "The landscape," he said, "becomes human, becomes a thinking, living being within me. I become one with my picture . . . We merge in an iridescent chaos." In the apparent immobility of the Provençal countryside, he found geologic forces trapped in the rocks, powerful saps coursing through the trees. With a few light brushstrokes, this sick and misanthropic old man, shut up in his studio, was able to breathe life into the last Mont Sainte-Victoire paintings (1898–1902) and the views of Château-Noir. The last of the great "Bathers" paintings (1900–05), in which he succeeds in integrating monumental nudes with a landscape in his structural vision of reality, was a profound inspiration to the major painters of the 20th century—particularly Picasso, who modeled his "Demoiselles d'Avignon" after it.

The diabetes from which Cézanne had been suffering for a long time became more serious, and in October 1906 he finally succumbed to a harsh chill caught while working in the fields. He died a few days later and was buried in Aix-en-Provence. The following year, a retrospective showing of his works (56 paintings) was held at the Salon d'Automne in Paris and won considerable acclaim. (R.Hu./Ed.)

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CFL: *see* Canadian Football League.

C.H., companion of honour, member of a British honorary society. *See* Companions of Honour, Order of the.

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cha-cha, also spelled CHA CHA, also called CHA-CHA-CHA, CHACHACHÁ, or CHA CHA CHA, a fast rhythmic ballroom dance derived from the Latin-American mambo and having a basic pattern of three steps and a shuffle, with a rocking of the hips. (Musically it consists of two quarter notes, three eight notes, and an eighth rest.)

The cha-cha was invented about 1948 by the Cuban violinist (later band leader) Enrique Jorrín and, after being recorded in 1953, became a craze in the Americas and Europe. Bands or orchestras specializing in the cha-cha and related music were called *charangas.* One of the most popular renditions was the Tommy Dorsey orchestra's "Tea for Two Cha-Cha" (1958).

cha-no-yu: *see* tea ceremony.

cha-shitsu, small Japanese garden pavilion or room within a house, specifically designed for the tea ceremony (*q.v.*). Ideally, the *cha-shitsu,* or tea house, is separated from the house and is approached through a small garden called a *roji* ("dewy path"), the first step in breaking

communication with the outer world. The tea house is usually a small, thatched-roof structure with plain plaster walls, whose several openings, placed at different heights and filled



Exterior of a *cha-shitsu*, showing a portion of the *roji* and the "kneeling-in" entrance
Arthur Drexler

with *shōji* (sliding panels of wooden lattice covered with translucent paper), admit a soft, diffused light. A small, "kneeling-in" entrance, about 2½ feet (75 centimetres) square, set above a stepping stone, is intended to inculcate humility in all who enter. The interior is large enough to accommodate five kneeling guests, which is the ideal number. The *cha-shitsu* is completely bare except for the *toko-no-ma*, the alcove in which paintings, pottery, flower arrangements, and other forms of art are displayed.

The most famous of all tea masters, Sen Rikyū (1522–91), was the first to build a *cha-shitsu* that was a distinct physical entity instead of a special room within the house.

Chaadayev, Pyotr Yakovlevich, Chaadayev also CHAADAEV (b. June 7 [May 27, old style], 1794, Moscow—d. April 26 [April 14, O.S.], 1856, Moscow), intellectual and writer whose ideas of Russian history precipitated the controversy between the opposing intellectual camps of Slavophiles and Westernizers.

In his early years Chaadayev was an army officer and a liberal. During the 1820s he experienced a conversion to mystical Christianity, with strong leanings toward Rome. In 1823–26 he travelled in Europe, afterward writing in French his *Lettres philosophiques* (1827–31; "Philosophical Letters"), which posed the problem of Russia's relation to the West; articulated a ruthless criticism of Russian history, culture, and the Orthodox religion; and advocated assimilation of Roman Catholicism and western European culture. The first letter of this work was published in Russian translation in the review *Teleskop* ("Telescope") in 1836. The periodical was banned, and Chaadayev was declared insane and placed under medical supervision. He continued to live in Moscow, however, where he was venerated by the young Westernizers. He had affinities with both the Slavophiles and Westernizers, but his advocacy of a Western path of development for Russia divided him from the former, and his religio-historical conception separated him from the latter.

Chab-do (China): *see* Ch'ang-tu.

Chaban-Delmas, Jacques(-Pierre-Michel), original name JACQUES-PIERRE-MICHEL DELMAS (b. March 7, 1915, Paris), French politician, president of the National Assembly, and premier.

He was educated in political science and law and worked as a journalist before joining the army in 1938. As one of the early members of the Résistance (joined December 1940), he used Chaban as his code name, which he later legally added to his own. He was extremely active in the Résistance, at the same time earning a law degree. He joined the Free French government (October 1943) and rose to become the main liaison officer between the Résistance and the Free French general staff. In that capacity he was able to persuade the Allies to enter Paris rather than bypass it and to persuade the other Résistance leaders to defer any Parisian uprising until the Allies were close enough to be of help. Owing in large part to his efforts, the city was taken with a minimum loss of life. As a reward, Gen. Charles de Gaulle promoted him to general (1944). In 1945 he was able to pass the civil-service examination to become an inspector of finance.

Chaban-Delmas ran for deputy to the National Assembly as a Radical Socialist (1946). His war record and affable personality won him easy victories in this and successive elections, and from 1947 the Gaullist party was founded, and Chaban-Delmas had to choose between the radicals and the Gaullists. He chose the Gaullists, becoming a major force in their left wing.

He held Cabinet posts in several Fourth Republic governments, serving as minister of public works (1954–55), minister of state (1956–57), and defense minister (1957–58). He served as the chairman of the (Gaullist) Social Republicans group from 1953 and became a leader of the (Gaullist) Union for the New Republic. In this capacity he was active in the return of de Gaulle to power in 1958 and the formation of the Fifth Republic.

His presidency of the National Assembly (from 1958 to 1969) was interrupted when he became premier under Pompidou (June 20, 1969–July 5, 1972). He became inspector general of finances in 1973 and served again as president of the National Assembly from 1978 to 1981. In 1974 Chaban-Delmas ran unsuccessfully for president. He wrote *L'ardeur* (1975; "Ardour"); a biography, *Charles de Gaulle* (1980); and *La Libération* (1984).

Chabarovsk (Russia): *see* Khabarovsk.

chabazite, common hydrated sodium and calcium aluminosilicate mineral, $(Ca,Na_2)Al_2Si_4O_{12} \cdot 6H_2O$, in the zeolite family. Its brittle, glassy, white or flesh-red, rhombohedral crystals often are found in cavities in basalt or andesite, as in Trentino, Italy; Northern Ireland; Melbourne, Australia; and the area near the Bay of Fundy, Nova Scotia. Within the crystals, the atoms of silicon, aluminum, and oxygen are linked in a rigid, cagelike three-dimensional network (rather than in chains or sheets) traversed by open channels occupied by the ions of sodium and calcium and the molecules of water. The presence of aluminum atoms in place of silicon atoms in this structure creates negatively charged sites in the structural framework and gives chabazite its cation-exchange properties (dissolved sodium, potassium, magnesium, and calcium readily replacing each other in the interstices), which are important in water softeners.

Chabazite, one of the dominant zeolites in altered volcanic deposits, is the principal member of a group of zeolite minerals that have very similar modes of occurrence, chemical and physical properties, and internal structures. The group includes gmelinite, erionite, and levyne (levynite). These minerals differ from chabazite and from one another in the geometrical pattern of their three-dimensional framework. For chemical formulas and detailed physical properties, *see* zeolite (table).

Chablis, classic white wine of France, made from chardonnay grapes grown in strictly delimited areas surrounding the village of Chablis and along the Serein River in the district of Yonne in northern Burgundy. Chablis is noted for its distinctively dry, full-bodied, somewhat acidic character and a rather austere aroma described in wine terminology as "flinty."

Chablis vineyards are classified according to several categories. Those producing rather undistinguished, light, quick-maturing wines are designated Petit Chablis. The best wines come from any of the seven vineyards ranked *grand cru* ("great growth"): Vaudésir, Les Clos, Grenouilles, Valmur, Blanchots, Preuses, and Bougros. In good vintages wines from the more numerous *premier cru* ("first growth") vineyards can be almost as fine.

In the 20th century the name chablis has been loosely appropriated as a generic term for numerous ordinary white wines made elsewhere (notably California). While some of these are agreeable, they typically contain no chardonnay and bear no resemblance to the character of true Chablis.

Chabot, Philippe de, SEIGNEUR (lord) DE BRION, also called ADMIRAL DE BRION, French AMIRAL DE BRION (b. *c.* 1492—d. June 1, 1543), grand admiral of France under Francis I, whose favour raised him from the petty nobility of Poitou to glory and the vicissitudes of power. As well as the seigniory of Brion, he held the titles of comte de Charny and comte de Buzançois.

A companion of Francis I in his childhood, he rose to prominence after that King's accession (1515). In the war between Francis and the Holy Roman emperor Charles V, he took part in the defense of Marseille (1524) and was captured with Francis at the Battle of Pavia (1525). He was made admiral of France and governor of Burgundy after the negotiation of the Peace of Madrid (January 1526), being thereafter known as the Admiral de Brion. In 1535 he commanded the army for the invasion of Piedmont. Both at court and in military commands, however, he had the constable Anne, duc de Montmorency, as his rival; and his enemies, particularly the chancellor Guillaume Poyet, conspired to get him accused of peculation. He was sentenced to banishment, to the confiscation of his estates, and to the payment of a large fine in February 1541; but the King's mistress, Anne de Pisseleu, duchesse d'Étampes, intervened to procure him the King's pardon in March, and he was reinstated, Montmorency and Poyet being disgraced. He died shortly before the trial of Poyet.

Though he was no seaman, Chabot took some interest in his duties as admiral of France and did much to promote Jacques Cartier's expedition to Canada.

Chabrias (d. 356 BC, Chios, Ionia), mercenary who fought with distinction for the Athenians against various enemies and for the kings of Cyprus and Egypt.

Chabrias defeated the Spartans in 388 and again in 378, when Athens joined Thebes against Sparta. On the latter occasion he invented a new defensive technique: he ordered each soldier to receive a charge kneeling on his left knee, with his shield resting on the ground and spear pointed at the enemy. In 366 he was accused of treachery but was acquitted, and in about 361 he accepted a command under King Tachos of Egypt. At the outbreak of the Social War (357–355; Athens versus its allies of the second Athenian Confederation), Chabrias served with the Athenian fleet. He lost his life in a naval battle near the island of Chios, off the coast of Ionia.

Chabrier, (Alexis-) Emmanuel (b. Jan. 18, 1841, Ambert, Puy-de-Dôme, Fr.—d. Sept. 13, 1894, Paris), French composer whose best works reflect the verve and wit of the Paris scene of the 1880s and who was a musical counterpart of the early Impressionist painters.

Chabrier was attracted in his youth to both music and painting. He studied law in Paris from 1858 to 1862. During these years he also studied the piano and harmony and counterpoint. His technical training was, however, limited, and in the art of composition he was self-taught. From 1862 to 1880 he was employed at the Ministry of the Interior, producing during this period the operas *L'Étoile* (1877; "The Star") and *Une Éducation manquée* ("A Deficient Education"), first performed with piano accompaniment in 1879 and with orchestra in 1913. Two unfinished operettas were sketched out between 1863 and 1865 in cooperation with the poet Paul Verlaine. He was closely associated with the Impressionist painters and purchased the celebrated "Bar at the Folies-Bergère" by his friend Édouard Manet.

After hearing Richard Wagner's *Tristan und Isolde* at Munich in 1879 Chabrier left the Ministry of the Interior to devote himself exclusively to music. As chorus master at the Concerts Lamoureux he helped to produce a concert performance of *Tristan* and became associated with Vincent d'Indy, Henri Duparc, and Gabriel Fauré as one of the group known as "Le Petit Bayreuth." Chabrier's best music was written between 1881 and 1891 when, after visiting Spain (where he was inspired by the folk music), he settled at La Membrolle in Touraine. His works during this period include the piano pieces *Dix Pièces pittoresques* (1880; "Ten Picturesque Pieces"), *Trois valses romantiques* (1883; "Three Romantic Waltzes") for two pianos, and *Bourrée fantasque* (1891; "Bourrée [dance] Fantastic"); the orchestral works *España* (1883; "Spain") and *Joyeuse Marche* (1888; "Joyful March"); the opera *Le Roi malgré lui* (1887; "The King in Spite of Himself"); and six songs (1890). The last three years of his life were marked by a mental and physical collapse.

Chabrier's music, frequently based on irregular rhythmic patterns or on rapidly repeated figures derived from the bourrée, a dance of his native Auvergne, was inspired by both broad humour and a sense of caricature. His melodic gifts, developed by the popular songs of the Paris cafés-concerts, were abundant though inclined to coarseness. In his piano and orchestral works he developed a sophisticated Parisian style that was a model for the 20th-century composers Francis Poulenc and Georges Auric. His orchestration was remarkable for novel instrumental combinations. In *España* his use of the brass and percussion anticipated effects in Igor Stravinsky's *Petrushka*.

Chabrier was also a notable letter writer, the collection of his published letters being valued for its literary as well as its musical interest and for its streak of spontaneous, Rabelaisian humour.

Chabrol, Claude (b. June 24, 1930, Paris, Fr.), motion-picture director, scenarist, and producer who was France's master of the mystery thriller.

After attending the School of Political Science at the University of Paris, he was a critic and public relations man for 20th Century-Fox's French office. *Le Beau Serge* (1958; "Handsome Serge," *Bitter Reunion*), written and produced by Chabrol, was an important film of the Nouvelle Vague (New Wave), a term applied in the late 1950s to a widely diversified experimental movement in French films. That same year he wrote, directed, and produced *Les Cousins* (1958; *The Cousins*) and later directed such pictures as *Les Bonnes Femmes* (1960; "The Good Women"), *Landru* (1962; *Bluebeard*), *Les Biches* (1968; *The Does*), *Le Boucher* (1969; *The Butcher*), *Violette Nozière* (1978; *Violette*), *Le Cheval d'orgueil* (1979; *The Horse of Pride*), *Blood Relatives* (1981), *Poulet au vinaigre* (1985; "Chicken in Vine-



Chabrol, 1968
Keystone

gar"), *Le Cri du hibou* (1987; "The Cry of the Owl"), *Une Affaire de femmes* (1988; *Story of Women*), and an adaptation (1991) of Gustave Flaubert's *Madame Bovary*.

Chabrol's fascination with the grotesque, his use of the irony of situation, and his commingling of tragedy and comedy reflect the strong stylistic influence of the English director Alfred Hitchcock. He was coauthor of a biography of Hitchcock in 1957.

Chac, Mayan god of rain, especially important in the Yucatán region of Mexico where he was depicted in Classic times with protruding fangs, large round eyes, and a proboscis-like nose.

Like other major Mayan gods, Chac also appeared as four gods, the Chacs. The four gods were associated with the points of the compass and their colours: white, north; red, east; black, west; and yellow, south. At Chichén Itzá, in post-Classic times, human sacrifice became associated with the rain god, and the priests who held the arms and legs of the sacrificial victims were termed *chacs*.



Chac Mool, Mayan Toltec sculpture, *c.* 1000, from Chichén Itzá, Yucatán; in the Minneapolis Institute of Arts
By courtesy of the Minneapolis Institute of Arts

In post-Classic Mayan and Toltec ruins, reclining figures known as the Chacs Mool are thought to represent the rain god. Following the Spanish conquest, the Chacs were associated with Christian saints and were often depicted on horseback.

Chacabuco, Battle of (Feb. 12, 1817), in the Latin-American wars of independence, a victory won by South American patriots over Spanish royalists near Santiago, Chile. It began the expulsion of the Spaniards from Chile, completed the next year at the Battle of Maipú. After Argentine independence from Spain had been declared in 1816, José de San Martín, leader of the independence movement in southern South America, embarked on the liberation of Chile (January 1817). Beginning in 1810, the independence movement there had been plagued by bitter rivalry between the brothers José Miguel and Juan José Carrera on the one hand and Bernardo O'Higgins on the other. Joined by O'Higgins, San Martín led about 5,000 troops on a difficult 20-day march over the high Andes; he lost about 2,000 men in the cold and high altitudes but managed to surprise the Spaniards. The Spanish general Rafael Maroto mustered only about 1,500 troops to meet the advancing enemy force at Chacabuco. Initially, the Spanish infantry drove back O'Higgins' contingent, but a successful grenadier charge led by San Martín against the Spanish cavalry gave O'Higgins' forces time to recover and attack the Spanish flank; the Spaniards were driven into rout. The people of Santiago honoured San Martín as the liberator of Chile and elected him governor, which office he refused in favour of O'Higgins. Before the final victory at Maipú, San Martín's army sustained a serious defeat at Cancha-Rayada in March 1818.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Chacao, city, northwestern Miranda state, northern Venezuela. The city, in a valley in the central highlands, was formerly a commercial centre in an agricultural area producing coffee, corn (maize), sugarcane, and fruit. With the growth of the national capital, it has become a residential and commercial part of the Caracas metropolitan area. Highways and expressways connect Chacao to downtown Caracas, approximately 5 miles (8 km) to the west. Pop. (1990 est.) 77,144.

chachalaca, any of several small birds of the curassow family. *See* curassow.

Chachapoyas, capital of Amazonas *departamento,* located in northern Peru. It lies at 7,657 feet (2,334 m) above sea level in the cool Utcubamba River valley. A site of ancient settlement, it is the oldest Spanish city east of the Andes. Founded in 1538 as San Juan de la Frontera de los Chachapoyas ("Saint John of the Frontier of the Chachapoyas") at a site slightly to the southeast, the town was later moved to its present location. It is the trade and industrial centre for the surrounding agricultural region, in which sugarcane, cacao, and coca are grown; cattle raising is also important. Principal industries include alcohol distilling and straw-hat weaving. About 80 miles (130 km) northeast of Cajamarca and 420 miles (675 km) north of Lima, to which it is connected by highway, Chachapoyas can also be reached by air. Pop. (1990 est.) 13,100.

Chachoengsao, town, south-central Thailand, about 25 miles (40 km) east of Bangkok. It is a port on the Bang Pakong River. On the railway between Bangkok and the Cambodian border, Chachoengsao is connected by a coastal road to Trat (southeast) and is a site of Buddhist pilgrimage. Rice cultivation and milling are major economic activities in the region, and there is a large government distillery. Pop. (1988 est.) 44,162.

chacma, species of baboon (*q.v.*).

Chaco (plain, South America): *see* Gran Chaco.

Chaco, *provincia,* northeastern Argentina, between the northwestern Argentine highlands and the Paraná River and bounded on part of the east by Paraguay. It has an area of 38,468 square miles (99,633 square km), most of which is low hardwood forest with patches of savanna trending to thorn scrub and savanna in the drier northwest. Heavy rainfall, in combination with the flat terrain, produces widespread flooding during the summer. The Bermejo and Guaycurú rivers cross the province but do not provide adequate drainage. The province composes part of the Gran Chaco, which includes

adjoining lands of Argentina to the north and south, the northwestern half of Paraguay, and adjoining areas of Bolivia. Chaco National Park (37,000 acres [15,000 hectares]) in northeastern Chaco province includes extensive savannas and palm forests.

The region was explored in 1528 by Sebastian Cabot and settled in the 17th century by Jesuits, who established *reducciones* (work missions) for the large Indian population. The provincial capital, Resistencia (*q.v.*), was founded in 1875. Chaco, organized as a national territory in 1884, was renamed Presidente Juan Perón in 1950; it attained provincial status in 1951 and resumed its original name following the revolution of 1955.

The economic development of Chaco province was retarded in the 19th and early 20th centuries by the region's humid, subtropical climate, the lack of markets and transportation facilities, poor drainage, severe evaporation problems, and pests, notably locusts. But the exploitation of the quebracho tree (a source of tannin) has increased, and the province provides most of Argentina's cotton; sorghum and sunflowers are also grown. Pop. (1986 est.) 791,000.

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Chaco Boreal, region of distinctive vegetation occupying about 100,000 square miles (259,000 square km) in northwestern Paraguay, southeastern Bolivia, and northern Argentina. The region is part of the vast, arid lowland known as the Gran Chaco (*q.v.*). The Chaco Boreal's land is flat and is marked by deciduous scrub woodlands to the west of the Paraguay River that include the quebracho, a tree valuable as a source of tannin. Farther west are forests of spiny, thorny, deciduous trees and brush, interrupted by patches of tall, coarse savanna grass. Paraguay acquired most of the region from Bolivia after the Chaco War (1932–35), though the southwestern and northwestern portions of the region remain in Argentina and Bolivia, respectively. Paraguay has not pursued an active colonization policy in the Chaco Boreal, though the region has extensive grasslands suitable for cattle raising. The major impediment to development is the lack of potable water. Mayor Pablo Lagerenza (formerly Fortín Ingavi) is the largest town in the Paraguayan part of the Chaco Boreal. This town was the site of the final, decisive battle of the Chaco War in 1935.

Chaco Culture National Historical Park, formerly CHACO CANYON NATIONAL MONUMENT, national historical park in northwestern New Mexico, U.S. It is situated 45 miles (72 km) south of Bloomfield. It was established in 1907 as a national monument and was redesignated and renamed in 1980. It occupies an area of 53 square miles (137 square km), which consists of a canyon dissected by the Chaco and Gallo washes. It contains 13 major pre-Columbian Indian ruins and more than 300 smaller archaeological sites representing high points in Pueblo cultures. Pueblo Bonito (built in the 10th century), the largest and most completely excavated Pueblo site, contained about 800 rooms and 32 kivas (underground ceremonial chambers). The excavations indicate that the people excelled in toolmaking, weaving, pottery, farming, and masonry. Artifacts are displayed at the visitor centre.

Chaco War (1932–35), costly conflict between Bolivia and Paraguay. Hostile incidents began as early as 1928 over the Chaco Boreal, a wilderness region of about 100,000 square miles (259,000 square km) north of the Pilcomayo River and west of the Paraguay River that forms part of the Gran Chaco. The conflict stemmed from the outcome of the War of the Pacific (1879–84), in which Chile defeated Bolivia and annexed that nation's entire coastal region. Thereafter, Bolivia attempted to break out of its landlocked situation through the Río de La Plata system to the Atlantic coast; athwart that route lay the Gran Chaco, which the Bolivians thought had large oil reserves.

Bolivia seemed to enjoy overwhelming advantages over Paraguay: it had thrice the latter's population, an army well-trained by the German general Hans von Kundt, and an ample supply of arms purchased by loans from American banks. But the morale of Bolivia's army of Indian conscripts was low, and Paraguayans were better fitted to fight in the lowland swamps and jungles, in which many Bolivians died of disease and snakebite as well as gunfire. Both countries had maintained military posts in the disputed region.

On Dec. 5, 1928, Paraguay initiated a series of clashes, which led to full-scale war in spite of inter-American arbitration efforts. Both belligerents moved more troops into the Chaco, and by 1932 war was definitely under way. In June the Bolivians seized Paraguayan positions in the northern Chaco and launched a successful attack in the central Chaco against Fortín Boquerón. In August Paraguay ordered mobilization and sent forces under General José Estigarribia in their first major offensive against Fortín Boquerón, which fell at the end of September. Kundt was recalled by Bolivia, and he concentrated his forces in the south to attack Fortín Nanawa, where there was heavy fighting for several months.

Paraguay formally declared war on May 10, 1933. Estigarribia launched a series of attacks along an extended front late in October and made such impressive gains that the Bolivian president Daniel Salamanca replaced Kundt with General Enrique Peñaranda. At the end of a three-week truce, Estigarribia renewed his drive (Jan. 9, 1934) against the Bolivian post of Ballivián, where from March to July the heaviest fighting of the war occurred. Ballivián fell on November 17, and Salamanca was forced to resign. Paraguay's advance continued into indisputably Bolivian territory in January 1935.

After Bolivian counterattacks put Paraguayan forces on the defensive, a truce was arranged on June 12, 1935. About 100,000 men lost their lives in the war. A peace treaty was arranged by the Chaco Peace Conference, which included Argentina, Brazil, Chile, Peru, Uruguay, and the United States. It was signed in Buenos Aires on July 21, 1938. Paraguay gained clear title to most of the disputed region, but Bolivia was given a corridor to the Paraguay River and a port (Puerto Casado). The war had caused disruption of the Bolivian economy, provoking demands for reform among the deprived Bolivian masses. Argentina was given the main credit for the settlement, and Argentine investors profited greatly from Paraguay's territorial gain.

chaconne, also spelled CIACONNE, fiery and suggestive dance that appeared in Spain about 1600 and eventually gave its name to a musical form. Miguel de Cervantes, Francisco Gómez de Quevedo, and other contemporary writers imply a Mexican origin but do not indicate whether it was indigenous or a Spanish dance modified there. Apparently danced with castanets by a couple or by a woman alone, it soon spread to Italy, where it was considered disreputable as it had been in Spain. During the 16th century the dance became subdued and stylized, and in the 17th century it gained favour at the French court. There it was danced by an ensemble of women or by a



Step from the chaconne, engraving by H. Fletcher, from Kellom Tomlinson's *The Art of Dancing*, 1735
By courtesy of the Victoria and Albert Museum, London

double line of couples, who as a group and as individual couples solemnly executed various figures.

The musical form of the chaconne is a continuous variation, never clearly or consistently distinguished from the passacaglia (*q.v.*) either by Baroque or by subsequent musicians. In addition, 17th-century French composers often designated as chaconne pieces in rondeau form—*i.e.,* with refrain (R) recurring before, after, and between contrasting passages or couplets (R A R B R C R, etc.). Johann Sebastian Bach's "Chaconne" from the *Partita in D Minor* for unaccompanied violin is an example of masterly use of the chaconne as a variation form. François Couperin's harpsichord music includes many chaconnes *en rondeau,* such as "La Favorite."

Chad, officially REPUBLIC OF CHAD, French RÉPUBLIQUE DU TCHAD, landlocked country in north-central Africa, covering an area of 495,755 square miles (1,284,000 square km).



Chad

The capital is N'Djamena (formerly Fort-Lamy). Lying about the Lake Chad basin to the northeast and southeast, Chad is bordered by Libya to the north, The Sudan to the east, Central African Republic and Cameroon to the south, and Nigeria and Niger to the west. The population in 1990 was estimated to be 5,668,000.

A brief treatment of Chad follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The country's terrain takes the form of a shallow basin that rises gradually from 750 feet (228 m) above sea level at Lake Chad, which is situated in the centre of the western frontier. Lake Chad covered much more of the region in earlier geologic periods and still varies considerably in surface area. The Lake Chad basin is lined with clay and sand sediments and is rimmed by mountains, including the volcanic Tibesti Massif to

the north, rising to 11,204 feet (3,415 m) at Mount Koussi; the sandstone Ennedi Plateau to the northeast; the crystalline rock mountains of Ouaddaï (Wadai) to the east; and the Oubangui Plateau to the south. The basin's lowest elevation is the Djourab Depression, at 573 feet (175 m) above sea level.

Chad's river network is virtually limited to the Chari and Logone rivers and their tributaries, which flow from the southeast into Lake Chad. The Chari is about 750 miles (1,200 km) in length, and the Logone, formed by the junction of the Pendé and Mbéré rivers, runs more than 600 miles (970 km) before it joins the Chari at N'Djamena. The level of Lake Chad fluctuates mainly according to the flow of the rivers.

Chad's wide climatic range varies from wet and dry tropical in the southern region to semiarid in the south-central region to hot arid in the central and northern regions. In the wet and dry tropical zone, between 32 and 48 inches (800 and 1,200 mm) of rainfall occur annually between May and October, while in the central semiarid zone between 12 and 32 inches (300 and 800 mm) of rain fall between June and September. Extreme annual temperatures range from 53° to 124° F (12° to 50° C).

The wet and dry tropical zone is characterized by shrubs, tall grasses, and scattered broad-leaved deciduous trees. The semiarid zone has broad savanna (grassy parkland), while the hot arid zone is composed of sand dunes and plateaus in which vegetation is scarce, though there are occasional palm oases. The wildlife in the southern and south-central regions includes elephant, hippopotamus, rhinoceros, warthog, giraffe, antelope, lion, leopard, and cheetah, which coexist with a wide assortment of birds and reptiles.

Only about 2 percent of the total land area of Chad is considered truly arable, some 10 percent is forested, and more than one-third is available as pasture.

The people. The population of Chad presents a tapestry composed of different languages, peoples, and religions that is remarkable even amid the diversity of Africa. Although French and Arabic are the official languages, more than 100 different languages and dialects are spoken in the country. The Sara are the largest ethnic group, accounting for about one-quarter of the country's total population; together with the related Bagirmi and Bongo (Chari-Nile language family), they occupy the central parts of the Chari and Logone river basins. The Laka and Mbum people (Niger-Congo language family) live to the west of the Sara groups, and the Tangale people are found along the banks of the Chari and Logone rivers. The Buduma, Kuri, and Kanemba peoples (Saharan group of languages) are engaged in agriculture and livestock raising and inhabit the Lake Chad region. Arabs, composed of a multitude of tribes, represent a single ethnic group despite their widespread distribution.

The great majority of Muslims are found in the north and east. Islām is well established in most major towns and wherever Arab populations are found. In the southern part of the country and in the mountainous regions of Guéra, most of the people are still animists. There are several Roman Catholic dioceses and some Protestant mission groups.

The average population density of Chad is low. Most of the inhabitants are concentrated in the southern part of the country. Urban population is only about one-fourth of the total, with about one-half of that number living in N'Djamena.

Chad's birth rate is high by world standards but slightly below average for sub-Saharan Africa. Its death rate, however, is high by African standards. The population is increasing at a comparatively low rate for an African country; emigration resulting from drought, conflict, and famine may help to account for this.

Economy. Chad has a developing mixed economy based largely on agriculture. Inadequate governmental structures, drought, and internal violence constitute major obstacles to economic development, and the country remains one of the poorest on the continent. The gross national product (GNP), however, is growing more rapidly than the population.

Agriculture accounts for somewhat less than half of the gross domestic product (GDP) and employs more than four-fifths of the work force. Cultivation is concentrated in the southern and south-central regions, while the raising of cattle and, to a lesser extent, camels predominates in the central and north-central regions. Subsistence farming accounts for most of the country's agricultural production. Annual yields of cotton, the most important export crop, vary greatly with rainfall, and the Ministry of Agriculture has introduced new varieties of cotton and improved planting and ginning techniques in an effort to increase production. Live cattle and frozen bovine meat comprise the second most important export. The principal food crops are sorghum, millet, and peanuts (groundnuts). Although in normal years Chad is practically self-sufficient in foodstuffs, severe drought occasionally necessitates extensive food aid to ward off starvation.

The extraction of petroleum from the Kanem region north of Lake Chad was begun in 1977, but political changes halted production in 1980. Further exploitation of the substantial reserves awaits the establishment of a stable government. Natron (native sodium carbonate) is mined on the northern edge of Lake Chad.

Chad is the least industrially developed of the countries of equatorial Africa, with manufacturing accounting for less than one-tenth of the GDP. The principal industry is cotton ginning. Sugar refineries and a textile factory account for a substantial amount of industrial output; other enterprises include slaughterhouses, refrigeration plants, rice mills, brick factories, and construction enterprises. Electricity is generated by oil-powered plants, and the scarcity of oil supplies combined with the extensive damage done to various installations by rebellions and civil war have resulted in intermittent and generally low production of electricity.

Services account for more than two-fifths of the GDP and employ about one-eighth of the work force. Transportation services are extremely limited; efforts to improve the system include a project to develop secondary roads in the Sahel zone with aid from the Food and Agriculture Organization of the United Nations.

There is a chronic balance-of-trade deficit, and the country is heavily dependent upon foreign aid, primarily French. France and Cameroon are the chief trading partners; other major partners include Germany and Italy.

Government and social conditions. Chad experienced almost constant conflict between warring internal factions, as well as frequent changes in government, from the 1970s to the 1990s. All regimes were marked by some measure of authoritarianism.

Health conditions are poor and compare unfavourably with those of most western African countries. Life expectancy is relatively low at 45 years, and infant mortality is very high. Chad's health facilities provide only a limited range of services and are concentrated in the south, with almost none in the northern provinces. There is an acute shortage of medical personnel, and sanitation is poor throughout the country. Intestinal diseases are the leading cause of death, and infectious hepatitis, malaria, tuberculosis, tetanus, leprosy, and measles are also major health problems.

Chad's literacy rate of about 18 percent is lower than that of most western African countries. Public and private schools, the latter mostly Roman Catholic and Protestant, which fewer than one-half of school-age children attend, provide primary education. Secondary and technical education are available; the University of Chad (founded in 1971) is the only institution offering higher education.

Cultural life. Chad's culture is based on traditional arts and customs. Although a written literary tradition has not developed, there is an extensive body of oral literature. In the northern areas of Chad there are outstanding prehistoric rock engravings and paintings. A diversity of traditional crafts has survived, notably the decoration of calabashes, brass metalworking, and basket weaving.

History. Neolithic sites scattered throughout the northern regions attest to early populations, who were probably Negroid cave dwellers. The southern region around Lake Chad has been under settlement since about 500 BC. In the early 8th century AD, increased desiccation of Saharan borderlands and population pressure from northern and eastern Africa stimulated Berber migrations into Chad.

About AD 800 the kingdom of Kanem was founded; it converted to Islām in 1085. By the early 1200s the borders of Kanem had been expanded to Fezzan in the north, Ouaddaï in the east, the Niger River in the west, and north of Lake Chad into the Bornu kingdom. At the same time the new kingdom of Kanem-Bornu was established through merger; its power and prosperity peaked in the 16th century because of its command of the southern terminus of the trans-Sahara trade route to Tripoli. At this time the rival kingdoms of Baguirmi and Ouaddaï evolved in the south. At the height of their power in the 17th century, the Baguirmi made an unsuccessful attempt to expand their territory into Kanem-Bornu. The Ouaddaï eventually raided Baguirmi and outer Kanem-Bornu. In the years 1883–93, all three kingdoms fell to the Sudanese adventurer Rābiḥ az-Zubayr. The territory was explored in 1891 by the French, and by 1900 Rābiḥ was overthrown. In 1910 Chad was made part of the federation of French Equatorial Africa, and it became a French overseas territory in 1946. In 1958 an autonomous republic within the French Community was proclaimed, and complete independence was attained in 1960.

Independent Chad's stability was soon endangered by tensions between the black and predominantly Christian population of the south and the nonblack, Muslim population of the north. N'Garta (François) Tombalbaye became Chad's first president, and a new constitution was adopted two years later. In the mid-1960s two guerrilla movements arose that sought to overthrow the existing government, reduce French influence in Chad, and foster closer ties with Libya and the other Arab states of North Africa. In 1975 Tombalbaye was deposed and killed in a military takeover, and Brigadier General Félix Malloum became head of state. In 1977 Libya annexed a strip of Chadian territory and two years later began an offensive into Chad but was driven back, partly with French aid.

Civil war continued through most of 1980 and intermittently thereafter, with substantial Libyan involvement. Libyan forces withdrew by the end of 1981. With the defeat of the Libyan-backed People's Armed Forces in June 1982, the government was replaced for the third time, and Hissen Habré of the faction known as the Armed Forces of the North was installed as head of state. In 1990 his regime in turn was overthrown by a rebel group known as the Patriotic Salvation Movement, headed by General Idriss Deby and backed by Libya's leader Muammar al-Qaddafi.

Chad, SAINT, also called CEADDA (d. March 2, 672, Lichfield, Mercia, Eng.; feast day, March 2), monastic founder, abbot, and first bishop of Lichfield, who is credited with the Christianization of the ancient English kingdom of Mercia.

With his brother St. Cedd, he was educated at the great abbey of Lindisfarne on Holy Island (off the coast of Northumbria) under its founder, Abbot St. Aidan, and later apparently studied with St. Egbert, a monk at the Irish monastery of Rathmelsigi. Cedd recalled Chad to England to assist in establishing the monastery of Laestingaeu (now Lastingham, North Yorkshire). Upon Cedd's death in 664, Chad succeeded him to become the second abbot of Laestingaeu, and, probably late in the same year, at the request of King Oswiu (Oswy) of Northumbria, he was consecrated bishop of the Northumbrians (with his see at York).

An ecclesiastical dispute arose because St. Wilfrid had already been chosen bishop of York and had gone to Gaul for his consecration, a mix-up recorded in Venerable Bede's *Ecclesiastical History of the English People* (considered to be the best source for Chad's life). The issue remains confusing. When in 669 the new archbishop, St. Theodore of Canterbury, arrived in England, he charged Chad with improper ordination. On Wilfrid's return in the same year, Chad resigned York and retired to Laestingaeu. Theodore, however, was so impressed with Chad's humility that when the bishop of Mercia died he asked King Oswiu to appoint Chad as the bishop's successor. The king approved, and Chad, having been reconsecrated by Theodore in 669, chose Lichfield, where he built a church and monastery, as the new seat of his diocese.

During the last three years of his life, Chad founded a monastery in Lindsey, on land given him by King Wulfhere of Mercia. In the same area Chad supposedly founded another monastery, at Barrow-upon-Humber. He is noted as having conducted his apostolate zealously, traveling much on foot. He died of plague, and numerous miracles were reported as having taken place at his tomb. His relics, originally in the Cathedral of Lichfield, were saved by Roman Catholics during the Reformation and transferred to St. Chad's Cathedral, Birmingham.

Chad, Lake, French LAC TCHAD, lake in west-central Africa at the conjunction of the countries of Chad, Cameroon, Nigeria, and Niger.

A brief treatment of Lake Chad follows. For full treatment, *see* MACROPAEDIA: Africa.

The remnant of a much larger ancient sea, Lake Chad is the largest lake in western Africa and one of the largest lakes on the continent. In the northeast it is bounded by the fossil dunes of the Kanem region. There the shores of the lake are sharp and clearly shaped into peninsulas and islands and underlain with channels that follow the lines of the dunes. The lake itself is composed of two pools (basins) separated by a ridge that impedes circulation between them. Lake Chad's surface area exhibits a seasonal fluctuation that reflects variations in local rainfall and drainage into the lake. The lake's main feeder source is the Chari-Logone river system flowing from the south. The mean area of the lake also tends to vary from year to year, and there has been a pronounced trend toward shrinkage since the mid-1960s. By the mid-1990s Lake Chad had shrunk to only some 1,000 square miles (2,600 square km). This change is apparently related to reduced local rainfall and the desertification of the surrounding Sahel region. Crocodiles and hippopotamuses still inhabit the lake. It has historically been a place of refuge against invaders, resulting in a mixed population consisting of Yedina (Buduma), Kuri, and Kanembu peoples.

Chad australopithecine, specimen of early hominid, known from the frontal bone and part of the face of a single individual, found in sandstone by Yves Coppens in 1960, at Koro Toro, southeast Chad. The remains were associated with the teeth of an extinct elephant and have been given a provisional date of late Early Pleistocene or early Middle Pleistocene Epoch (500,000 to 200,000 years ago). The frontal bone is steep and the cranial capacity large; the face is large, with big orbits and upper jawbones, broad cheekbones, protruding jaws, and a small canine. The taxonomy of the specimen is in dispute: some consider it to be an example of a female *Australopithecus robustus,* and others classify it as a northern example of *Homo habilis.* Its finder named it *Tchadanthropus uxoris* and believed it to be a form transitional between *Australopithecus* and *Homo erectus.*

Chadic languages, languages spoken in northern Nigeria, northern Ghana, Niger, and Cameroon and in parts of Togo, Benin, Chad, and the Central African Republic. The Chadic languages are generally classified by scholars as a branch of the Afro-Asiatic (formerly Hamito-Semitic) language family. The group includes many languages that are spoken by small numbers of people and that have no written form; among these are Angas, Kotoko, Sokoro, and Mubi.

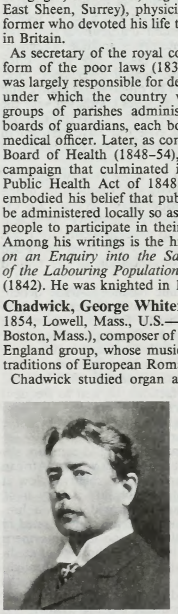
The most important Chadic language is the Hausa language (*q.v.*), which serves as the official language of northern Nigeria and is used as a second language for literary and commercial purposes throughout much of western Africa.

Chadwick, Sir Edwin (b. Jan. 24, 1800, Longsight, Lancashire, Eng.—d. July 6, 1890, East Sheen, Surrey), physician and social reformer who devoted his life to sanitary reform in Britain.

As secretary of the royal commission on reform of the poor laws (1834–46), Chadwick was largely responsible for devising the system under which the country was divided into groups of parishes administered by elected boards of guardians, each board with its own medical officer. Later, as commissioner of the Board of Health (1848–54), he conducted a campaign that culminated in passage of the Public Health Act of 1848. This legislation embodied his belief that public health should be administered locally so as to encourage the people to participate in their own protection. Among his writings is the historic *Report . . . on an Enquiry into the Sanitary Condition of the Labouring Population of Great Britain* (1842). He was knighted in 1889.

Chadwick, George Whitefield (b. Nov. 13, 1854, Lowell, Mass., U.S.—d. April 4, 1931, Boston, Mass.), composer of the so-called New England group, whose music is rooted in the traditions of European Romanticism.

Chadwick studied organ and music theory in Boston and in 1877 went to Germany to study under Karl Reinecke, Salomon Jadassohn, and Josef Rheinberger. Returning to the United States in 1880, he was engaged as instructor in music theory at the New England Conservatory in Boston; in 1897 he became its director and held this post until his death. As an educator he played an important role in American music; among his pupils were the composers Horatio Parker, Henry Hadley, and Frederick Converse. He also conducted orchestral and choral concerts.



George Chadwick
The Bettmann Archive

Chadwick was a firm believer in the representational meaning of music; most of his orchestral works bear programmatic titles. In his harmonic writing he followed the procedures of German Romantic music, with some Wagnerian characteristics.

The list of Chadwick's works is considerable and includes three symphonies (1882, 1885, 1894), five concert overtures, three symphonic poems, two cantatas, a burlesque opera (*Tabasco,* 1894), a lyric drama (*Judith,* 1901), numerous choruses, five string quartets, a piano quintet, and many songs and organ pieces. Chadwick also published a textbook, *Harmony* (1897).

Chadwick, H. Munro, in full HECTOR MUNRO CHADWICK (b. Oct. 22, 1870, Thornhill Lees, Yorkshire, Eng.—d. Jan. 2, 1947, Cambridge, Cambridgeshire), English philologist and historian, professor of Anglo-Saxon at the University of Cambridge (1912–41), who made a notable contribution to the development of an integral approach to Old English studies.

The son of an Anglican vicar in Yorkshire, Chadwick attended Wakefield Grammar School and Clare College, Cambridge (1889–93). In 1893 he became a fellow of his college.

Chadwick began his career as a classical philologist but early turned to the history and literature of Britain in the early Middle Ages, first the Germanic and later also the Celtic. *Studies in Anglo-Saxon Institutions* (1905); *The Origin of the English Nation* (1907); *The Heroic Age* (1912); and, in collaboration with his wife, Nora, *The Growth of Literature,* 3 vol. (1932–40) are his most important works. The first two are valuable for the light that they throw on the early history of the Anglo-Saxons. The third shows Chadwick developing a method of comparative literature and, by comparison of Greek and Germanic heroic poetry, elaborating the concept of the "Heroic Age" as a stage in the growth of civilization reflected in early epics. In *The Growth of Literature* this is applied to every kind of early literature, thus illuminating the origin and development of many literary genres in Greek, Germanic, Celtic, Slavonic, Sanskrit, Eskimo, Polynesian, and so on.

Chadwick always insisted on treating a civilization as a whole. Britain in the early Middle Ages meant to him not only history and institutions but also the literature, archaeology, art, languages, place-names, etc., of all the peoples who lived there. He founded at Cambridge the School of Archaeology and Anthropology, section B.

Chadwick, Sir James (b. Oct. 20, 1891, Manchester, Eng.—d. July 24, 1974, Cambridge, Cambridgeshire), English physicist who received the Nobel Prize for Physics in 1935 for the discovery of the neutron.

Educated at the universities of Manchester and Cambridge, Chadwick also studied under Hans Geiger at the Technische Hochschule, Berlin. From 1923 he worked with Ernest Rutherford in the Cavendish Laboratory, Cambridge, where they studied the transmutation of elements by bombarding them with alpha particles and investigated the nature of the atomic nucleus, identifying the proton, the nucleus of the hydrogen atom, as a constituent of the nuclei of other atoms.

In 1932 Chadwick observed that beryllium,

when exposed to bombardment by alpha particles, released an unknown radiation that in turn ejected protons from the nuclei of various substances. Chadwick interpreted this radiation as being composed of particles of mass approximately equal to that of the proton, but without electrical charge—neutrons.

This discovery provided a new tool for inducing atomic disintegration, since neutrons, being electrically uncharged, could penetrate undeflected into the atomic nucleus. Chadwick was knighted in 1945.

Chaeronea, in ancient Greece, fortified town on Mt. Petrachus, guarding the entry into the northern plain of Boeotia. Controlled by the Boeotian city of Orchomenus (*q.v.*) in the 5th century BC, it was the scene of the battle in which Philip II of Macedon defeated Thebes



Lion statue, Chaeronea
Art Resource—EB Inc

and Athens (338 BC). The battle is commemorated by a statue of a large lion sitting on its haunches. In 86 BC Chaeronea was the scene of a victory of the Roman general Sulla over Mithradates VI of Pontus. The site is occupied by the modern town of Khairónia, Greece.

chaetognath: *see* arrowworm.

Chafarinas Islands, also spelled ZAFARIN, or DJAFERIN, three small rocky islets of the Spanish *plaza* (enclave) of Melilla, located off northeastern Morocco, 7 mi (11 km) northwest of the mouth of the Oued Moulouya. Probably the *tres insulae* (three islands) of the 3rd-century Roman roadbook *Itinerarium Antonini,* they have been occupied by Spain since 1847. Waterless and uncultivated, they form the best anchorage along the Moroccan Mediterranean coast. Isabella II contains the lighthouse and garrison. Congreso and Rey are uninhabited. Pop. (1970) 195.

Chafee, Zechariah, Jr. (b. Dec. 7, 1885, Providence, R.I., U.S.—d. Feb. 8, 1957, Boston), U.S. legal scholar known for his advocacy of civil liberties. His first book, *Freedom of Speech* (1920), was evoked by measures aimed at political dissenters in World War I. A rewritten and expanded version, *Free Speech in the United States* (1941), became a leading text of U.S. libertarian thought.

From 1916 until he retired 40 years later, Chafee was a professor at the Harvard Law School, of which he was a graduate. He was an authority on equity, negotiable instruments, and unfair business competition.

chafer, any of several beetles of the insect subfamily Melolonthinae (family Scarabaeidae, order Coleoptera). The leaf chafers (*Macrodactylus*) eat foliage; the grub feeds underground on plant roots. The adult female deposits her eggs in the soil, and the larvae live underground for several years. They pupate in the fall, but the adults remain underground until the following spring.

A well-known, destructive chafer is the rose



Rose chafer (*Macrodactylus subspinosus*)
Grant Heilman—EB Inc

chafer (*M. subspinosus*), a tan, long-legged beetle that feeds on the flowers and foliage of grapes, roses, and other plants. Poultry that eat rose chafer grubs may be poisoned. Other scarab subfamilies are also called chafers; *see also* flower chafer; shining leaf chafer.

Chaffee, Adna R(omanza) (b. Apr. 14, 1842, Orwell, Ohio, U.S.—d. Nov. 1, 1914, Los Angeles), U.S. army officer who enlisted in the Union cavalry in 1861 and rose in rank to become chief of staff of the U.S. army.

After long service against the Indians in the West, Chaffee was promoted to the rank of brigadier general (1898) at the outbreak of the Spanish-American War, during which he gained distinction at the Battle of El Caney in the Santiago campaign and won the admiration of Theodore Roosevelt. He commanded the U.S. contingent of the relief expedition sent to China during the Boxer Rebellion (1900) and U.S. forces in the Philippines (1901–02). He was promoted to lieutenant general in 1904 and served as chief of staff of the U.S. army (1904–06).

Chaffee, Emory Leon (b. April 15, 1885, Somerville, Mass., U.S.—d. March 8, 1975, Waltham, Mass.), U.S. physicist known for his work on thermionic vacuum (electron) tubes.

Chaffee received the Ph.D. from Harvard University in 1911. His dissertation established the "Chaffee gap"—a method of producing continuous oscillations for long-distance telephone transmissions. He taught at Harvard (1913–53) and in 1940 succeeded G.W. Pierce as director of the Cruft Laboratory. He was also co-director of the Lyman Laboratory of Physics (1940–53) and director of the Laboratories of Engineering, Science, and Applied Physics (1948–53).

Chaffee's research focussed on electric oscillations, vacuum tubes, and optics, and he secured a number of patents for radio devices. During World War II he directed research leading to improvements in radar. He also did early work on weather control, using airplanes in 1924 to break up clouds by means of electrically charged grains of sand.

Chaffee, Roger B(ruce) (b. Feb. 15, 1935, Grand Rapids, Mich., U.S.—d. Jan. 27, 1967, Cape Kennedy, Fla.), U.S. astronaut who was a member of the three-man Apollo 1 crew killed when a flash fire swept their space capsule during a simulation of a launching scheduled for Feb. 21, 1967. Chaffee died along with the veteran space travellers Virgil I. Grissom and Edward H. White II. They were the first casualties of the U.S. space program.

After earning his B.S. in aeronautical engineering from Purdue University, West Lafayette, Ind., in 1957, Chaffee became a Navy pilot. He was chosen as one of the third group of astronauts in 1963.

chaffinch (*Fringilla coelebs*), songbird of the family Fringillidae (order Passeriformes) that breeds in gardens and farmlands of Europe and northern Africa to central Asia (and, by introduction, South Africa). It is the commonest finch in western Europe. The 15-centimetre (6-inch) male is bluish crowned, with rust-brown back, greenish rump, and pinkish to rust face and breast; the female is greenish brown.



Chaffinch (*Fringilla coelebs*)
H. Schunemann—Bavaria-Verlag

The Canary Islands, or blue, chaffinch (*F. teydea*) is similar.

Chaga, also spelled CHAGGA, or SHAKA, Bantu-speaking people living on the fertile southern slopes of Mt. Kilimanjaro in northern Tanzania. They are one of the wealthiest and most highly organized of African peoples.

Their methods of cultivation support a very dense population. They practice an intensive irrigated agriculture on terraced fields, keeping them under permanent cultivation through the use of animal manure as fertilizer. The staple crop is millet; plantains are also important. Since the 1920s coffee has been the major cash crop.

Chaga society follows patrilineal rules of descent and inheritance. Polygyny is general. Males are grouped in age sets similar to those of the Masai.

The Chaga are descended from immigrants of various groups who migrated into the once forest-covered foothills. Most of the 400 main clans are of Kamba origin; others are from Teita, Masai, and other peoples. The Chaga have a relatively egalitarian social system. Traditionally, Chagaland was divided into a number of politically independent chiefdoms. There was, however, no paramount chief until Marealle was established in that position by the German administration in 1893.

Chāgai, district in Quetta Division, Baluchistan Province, Pakistan. It is bounded on the north by Afghanistan, on the east and south by Kalāt and Khārān districts, and on the west by Iran and has an area of 19,516 sq mi (50,546 sq km), consisting of a level plain in the east, part of the Baluchistan desert in the west, the Chāgai Hills in the north, and the Rās Koh Range in the south. Sparse scrub vegetation is characteristic, with some cultivation around Nushki, the district headquarters. Camel, sheep, and goat breeding is widespread. Chromite, copper, gypsum, iron and lead ore, asbestos, sulfur, and marble deposits are abundant. The Nushki–Seistan trade route connects Pakistan with Iran. Historically a part of Khārān and Kalāt states, its areas were progressively leased by the British from Kalāt state in the late 19th century and were reconstituted a district in 1901. Pop. (1981 prelim.) 120,000.

Chagall, Marc (b. July 7, 1887, Vitebsk, Russia—d. March 28, 1985, Saint-Paul, Alpes-Maritimes, Fr.), Russian-born painter, printmaker, and designer whose works combine images from personal experience with formal symbolic and aesthetic elements by virtue of their inner poetic force, rather than by rules of pictorial logic. Preceding Surrealism, his early

works, such as "I and the Village" (1911), were among the first expressions of psychic reality in modern art. His works in various mediums include sets for plays and ballets, etchings illustrating the Bible, and stained-glass windows.

Chagall was born in a small city in western Russia not far from the Polish frontier. His family, which included eight children besides himself, was devoutly Jewish and, like the majority of the some 20,000 Jews in Vitebsk, humble without being poverty-stricken; the father worked in a herring warehouse, and the mother ran a shop where she sold fish, flour, sugar, and spices. The boy attended the heder, the Jewish elementary school, and later on he went to the local public school, where instruction was in Russian. After learning the elements of drawing at school, he studied painting in the studio of a local realist, Jehuda Pen, and in 1907 went to St. Petersburg, where he studied intermittently for three



Chagall, photograph by Arnold Newman, 1956
© Arnold Newman

years, eventually under Léon Bakst, who at the time was beginning a brilliant career as a stage designer. Characteristic works of this period of early maturity are the nightmarish "The Dead Man" (1908), in which a roof violinist is already present, and "My Fiancée with Black Gloves" (1909), in which a portrait becomes an occasion for experimenting with an arrangement in black and white.

In 1910, with a living allowance provided by a St. Petersburg patron, Chagall went to Paris. After a year and a half in rooms in Montparnasse, he moved into a studio on the edge of town in the ramshackle settlement for bohemian artists that was known as La Ruche ("the Beehive"). He met the avant-garde poets Blaise Cendrars, Max Jacob, and Guillaume Apollinaire, as well as a number of young painters destined to become famous: the Expressionist Chaim Soutine, the abstract colourist Robert Delaunay, and the Cubists Albert Gleizes, Jean Metzinger, Fernand Léger, and André Lhote. In such company nearly every sort of pictorial audacity was encouraged, and Chagall responded to the stimulus by rapidly developing the poetic and seemingly irrational tendencies he had begun to display in Russia. At the same time, under the influence of the Impressionist, Postimpressionist, and Fauvist pictures he saw in Paris museums and commercial galleries, he gave up the usually sombre palette he had employed at home.

The four years of this first stay in the French capital are often considered his best phase. Representative works are the "Self-Portrait with Seven Fingers" (1912), "I and the Village" (1911), "Hommage à Apollinaire" (1911–12), "Calvary" (1912), "The Fiddler" (1912), and "Paris Through the Window" (1913). In these pictures Chagall was already, in essentials, the artist he would continue to be for the next 60 years. His colours, although occasionally thin, are beginning to have their eventually characteristic complexity and resonance. The often whimsical figurative elements, frequently upside down, are distributed on the canvas in an arbitrary fashion, producing an effect that sometimes resembles a film montage and can suggest, as it is evidently intended to, the inner space of a reverie. The general atmosphere can imply a Yiddish joke, a Russian fairy tale, or a vaudeville turn. Often the principal personage is the romantically handsome, curly-headed, rather Oriental-looking young painter himself. Memories of childhood and of Vitebsk are already one of the main sources for imagery.

After exhibiting in the annual Paris Salon des Indépendants and Salon d'Automne, Chagall had his first one-man show in Berlin in 1914, in the gallery of the modernist publication *Der Sturm,* and made a strong impression on German Expressionist circles. After visiting the exhibition, he went on to Vitebsk, where he was caught by the outbreak of World War I. Working for the moment in a relatively realistic style, he painted local scenes and a series of studies of old men; examples of the series are "The Praying Jew" (or "The Rabbi of Vitebsk"; 1914) and "Jew in Green" (1914). In 1915 he married Bella Rosenfeld, the daughter of a wealthy Vitebsk merchant; among the many paintings in which she appears from this date onward are the depiction of flying lovers entitled "Birthday" (1915–23) and the high-spirited, acrobatic "Double Portrait with a Glass of Wine" (1917).

The Russian Revolution of October 1917 found Chagall at first enthusiastic; he became commissar for art in the Vitebsk region and launched into ambitious projects for a local academy and museum. But after two and a half years of intense activity, marked by increasingly bitter aesthetic and political quarrels, he gave up and moved to Moscow. There he turned his attention for a while to the stage, producing the sets and costumes for plays by the Jewish writer Sholem Aleichem and murals for the Kamerny Theatre. In 1922 he left Russia for good, going first to Berlin, where he discovered that a large number of the pictures he had left behind in 1914 had disappeared. In 1923, this time with a wife and daughter, he settled once again in Paris.

Chagall had learned the techniques of engraving while in Berlin. Through his friend Cendrars he met the Paris art dealer Ambroise Vollard, who immediately commissioned a series of etchings to illustrate a special edition of Nikolay Gogol's novel *Dead Souls* and thus launched Chagall on a long career as a printmaker. During the next three years, 107 full-page plates for the Gogol book were executed. But by then Vollard had arrived at another idea: an edition of Jean de La Fontaine's *Fables* with coloured illustrations resembling 18th-century prints. Chagall prepared 100 gouaches for reproduction, but it soon became evident that his colours were too complex for the printing process envisaged, and so he switched to black-and-white etchings, completing the plates in 1931. By this time Vollard had come up with still another idea: a series of etchings illustrating the Bible. Sixty-six plates were completed by Chagall by 1939, when World War II and the death of Vollard halted work on the project; after the war the total was raised to 105. The Paris publisher E. Tériade, picking up at the many places where Vollard had left off, brought out *Dead Souls* in 1948 (with 11 more etchings for the chapter headings, making 118 in all), La Fontaine's *Fables* in 1952 (with two cover etchings, making 102 in all), and the Bible in 1956. Along with these much delayed ventures, Chagall was the producer of a number of smaller collections of engravings, many single plates, and an impressive quantity of coloured lithographs and monotypes.

During the 1920s and the early '30s, his painting declined in the total of large canvases turned out and also, in the opinion of many critics, in quality; at any rate it became more obviously poetical and more and more popular with the general public. Examples are the "Bride and Groom with Eiffel Tower" (1928) and "The Circus" (1931). With the rise of Adolf Hitler, however, and the growing threat of a new world conflict, the artist began to have visions of a very different sort, which are reflected in the powerful "White Crucifixion" (1938). Throughout this interwar period he traveled extensively, working in Brittany in 1924, in southern France in 1926, in Palestine in 1931 (as preparation for the Bible etchings), and, between 1932 and 1937, in Holland, Spain, Poland, and Italy. In 1931 he published, in a French adaptation, *My Life,* which he had written earlier in Russian. His reputation as a modern master was confirmed by a large retrospective exhibition in 1933 at the Kunsthalle, Basel, Switz.

With the outbreak of World War II, he moved to the Loire district of France and then, as the Nazi menace for all European Jews became increasingly real, further and further south. Finally, in July 1941, he and his family took refuge in the United States; he spent most of the next few years in New York City or its neighbourhood. For a while Chagall continued in his painting to develop themes he had already treated in France; typical works of this period are the "Yellow Crucifixion" (1943) and "The Feathers and the Flowers" (1943). But in 1944 his wife Bella died, and memories of her, often in a Vitebsk setting, became a recurring pictorial motif. She appears as a weeping wife and a phantom bride in "Around Her" (1945) and, again, as the bride in "The Wedding Candles" (1945) and "Nocturne" (1947).

In 1945 Chagall designed the backdrops and costumes for a New York City production of Igor Stravinsky's ballet *The Firebird.* American art critics and collectors, who had not always been favourably disposed toward his work, were given an opportunity to revise their opinions in a large retrospective exhibition at the Museum of Modern Art in New York City in 1946 and at the Art Institute of Chicago a few months later.

In 1948 he settled again in France, first in the suburbs of Paris and finally on the French Riviera at Vence and nearby Saint-Paul. In 1952 he married Vava Brodsky and began, at the age of 65, what might almost be called a new career—although the familiar, poetic, memory-derived motifs continued to appear in his work. Between 1953 and 1956, without forgetting his native Vitebsk, he produced a series of paintings inspired by his affection for Paris. In 1958 he did the sets and costumes for a production of Maurice Ravel's ballet *Daphnis et Chloé* at the Paris Opéra. After 1958 he designed a number of stained-glass windows, first for the Cathedral of Metz (1958–60) and the synagogue of the Hadassah-Hebrew University Medical Center in Jerusalem (1960–61). In 1964 he unveiled a window for the United Nations building in New York City and completed a new ceiling for the Paris Opéra, and two years later he completed two large mural paintings, "The Sources of Music" and "The Triumph of Music," for the new home of the New York Metropolitan Opera at Lincoln Center. In 1967 he created the sets and costumes for a Metropolitan Opera production of W.A. Mozart's *Magic Flute.* In 1973 the Museum of the Marc Chagall Biblical Message was dedicated at Nice, France, and in 1977 France honoured him with a retrospective exhibition at the Louvre in Paris. In 1977 Chagall's "The American Windows" were unveiled at the Art Institute of Chicago.

A repertory of images that includes massive bouquets, melancholy clowns, flying lovers, fantastic animals, biblical prophets, and fiddlers on roofs helped to make Chagall one



"The Fiddler," oil on canvas by Marc Chagall, 1912, in the Stedelijk Museum, Amsterdam

Stedelijk Museum, Amsterdam, on loan from The Netherlands Office for Fine Arts, The Hague. © 1993 ARS, New York City/ADAGP, Paris

of the most popular of the major innovators in the 20th-century school of Paris. This dreamlike subject matter is presented in rich colours and in a fluent, painterly style that—while reflecting an awareness of such pre-1914 movements as Expressionism, Cubism, and even abstraction—remained invariably personal. Although critics sometimes complained of facile sentiments, uneven quality, and an excessive repetition of motifs in the artist's large total production, there is agreement that at its best it reached a level of visual metaphor seldom attempted in modern art. (R.McMu.)

BIBLIOGRAPHY. Sidney Alexander, *Marc Chagall* (1978, reprinted 1989), is an excellent biography. Critical works include Franz Meyer, *Marc Chagall* (1964); Jean Cassou, *Chagall* (1965), easily accessible, emphasizing the painter's aesthetic and philosophical outlook; Susan Compton, *Chagall* (1985), an exhibition catalog; Aleksandr Kamensky, *Chagall: The Russian Years, 1907–1922* (1989); and Andrew Kagan, *Marc Chagall* (1989).

Chagas' disease, also called AMERICAN TRYPANOSOMIASIS, infection with the flagellate protozoan *Trypanosoma cruzi*, transmitted to humans by bloodsucking bugs and endemic in most rural areas of Central and South America. About a week following inoculation, local signs appear, including edema (swelling) and regional lymph node enlargement; the patient may have fever and prostration for several weeks. The disease may then enter a chronic stage, characterized chiefly by heart symptoms, mainly disturbances of the rhythm; heart failure sometimes occurs because of the development of the parasite in the muscle fibres of the heart and because of the accompanying inflammatory reaction. The infection may end in death, especially in children, or the course may be mild. No known drug will cure *T. cruzi* infections, although some quinoline derivatives have a transient suppressive action in the acute stage. Prevention is centred on control of the insect carrier.

Chagatai, also spelled TSAGADAI, JAGATAI, or CHAGHATAI (d. 1241), the second son of Genghis Khan who, at his father's death, received Kashgaria (now the southern part of Uygur Autonomous Region of Sinkiang, China) and most of Transoxania between the Amu Darya and the Syr Darya (rivers) as his vassal kingdom. His capital was at Almarikh near the present I-ning, in western Sinkiang. Chagatai appears to have been a just and energetic ruler for about 14 years. Although he is recorded to have left numerous children, he was succeeded by a grandson, Kara Hülegü.

Chagga (people): *see* Chaga.

Chagos Archipelago, island group, a major geographic feature of the British Indian Ocean Territory, located in the central Indian Ocean about 1,000 miles (1,600 km) south of the tip of the Indian subcontinent. The archipelago has a total area of 23 square miles (60 square km) and constitutes a semicircular group, open to the east, comprising (counterclockwise from the north) the Salomon Islands; Peros Banhos atoll; Three Brothers, Eagle, and Danger islands; the Egmont Islands; and Diego Garcia atoll, the largest landmass in the group.

Because it is strategically situated at the centre of the Indian Ocean region and lies out of the path of cyclonic storms, the archipelago was developed, especially at Diego Garcia, as an air and naval refueling and support station by the United States and Great Britain. This development took place in the 1960s and '70s over the strong opposition of the littoral and island states of the area, who wish to preserve the "zone of peace" status of the ocean embodied in United Nations resolutions.

Chagres River, Spanish RÍO CHAGRES, stream in Panama forming part of the Panama Canal system. It rises in the Cordillera de San Blas, flows south-southwest, and broadens to form Madden Lake (22 square miles [57 square km]) at Madden Dam, which was built in 1935 for navigation, flood control, and hydroelectric power. Below the dam it continues southwest to Gamboa, where it joins the Panama Canal at the north end of the Gaillard Cut. Its course then turns northward through Gatún Lake, created by the Gatún Dam (1912) with which are associated locks and a hydroelectric plant. The Chagres there leaves the canal and flows into the Caribbean Sea west of Limón Bay. Originally characterized by rapids throughout, the river is navigable only in its canalized portions.

Consult the INDEX *first*

Chahar, also spelled CHAKHAR, eastern tribe of Mongols, prominent in the 15th and 16th centuries. The Chahar were part of the empire of Dayan Khan (1470–1543), the last great khan of a united Mongolia. After his death the khanate remained formally among the Chahar, although it was substantially weakened. The last noteworthy Chahar khan, Ligdan (1604–34), attempted strenuously to reassert his authority, but he was defeated by the rising Manchus and by rival Mongol tribes. After Ligdan's death most of the remnants of the Chahar submitted to the Manchus, and their descendants can be found today in the Inner Mongolia autonomous *ch'ü* (region) of the People's Republic of China.

Chaibāsā, city, southern Bihār state, northeastern India. It lies just west of the Rāru River, which is a tributary of the Subarnarekhā. Although known as a road and agricultural-trade centre, the city is also heavily engaged in the mining (especially chromite) industry. Shellac is manufactured, and silk growing is important. Chaibāsā became a municipality in 1875. Pop. (1991 prelim.) 56,657.

Chaikovsky, Nikolay Vasilyevich: *see* Chaykovsky, Nikolay Vasilyevich.

Chaillu Massif, mountain range in south-central Gabon, rising to more than 3,300 feet (1,000 m) between the Ngounié and the Ogooué rivers; it forms the country's main watershed. The range contains Mount Milondo (3,346 feet [1,020 m]), the highest peak in Gabon, 53 miles (85 km) southwest of Koula-Moutou. Other high points in the range are Mount Iboundji (3,215 feet [980 m]) and Mount Mimongo (2,822 feet [860 m]). The granite massif is named for the explorer Paul du Chaillu, who is said to have discovered the mountains during his journeys up the Ngounié River (1855–65).

chain, series of links, usually of metal, joined together to form a flexible connector for various purposes, such as holding, pulling, hoisting, hauling, conveying, and transmitting power.

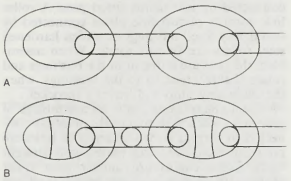


Figure 1: (A) coil chain, (B) stud-link chain

From Vallance and Doughtie, *Design of Machine Members*, 3rd ed. (1951); reproduced by permission of McGraw-Hill Inc.

The simplest and oldest type of chain is the coil chain, which is made from straight metal bars that are bent to an oval shape, looped together, and welded shut. These bars were traditionally made of wrought iron, but chains made of steel have gained favour in recent years. This type of chain was traditionally used in slings, cranes, and power shovels, but it has partly been replaced by cable or wire rope. On some hoists, coil chains run on special pulleys with recesses in which the chain fits. A variant of the coil chain is the stud-link chain, each of whose links has a bar or stud across its inside width. These studs add weight, keep the chain from fouling or kinking, and help prevent deformation; stud-link chains are preferred for use as anchor and cable chains on ships. (See Figure 1.)

Chain drives are widely used for the transmission of power where shafts are separated at distances greater than that for which gears

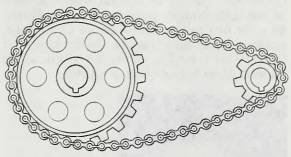


Figure 2: chain and sprocket

are practical. In such cases, sprockets take the place of gears but, being widely separated, drive one another by means of the chain passing over the sprocket teeth. (A sprocket is a wheel with teeth shaped to mesh with the chain; see Figure 2.) The chains used in conveyor belts are commonly block chains, which consist of solid or laminated blocks connected by side plates and pins. (See Figure 3.) The

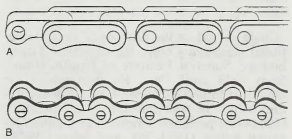


Figure 3: (A) block chain, (B) roller chain

By courtesy of Diamond Chain Co., Inc.

blocks engage with teeth on sprocket wheels. Depending on the material being moved, buckets, hooks, or other devices are connected to the blocks.

A roller chain is a development of the block chain in which the block is replaced by two side plates, a pair of bushings, and rollers. (See Figure 3.) This type of chain is used on bicycles and is adaptable to many other needs, from small-strand drives for microfilm projectors to multiple-strand chains for heavy-duty service in oil-drilling equipment. Roller chains are assembled from pin links and roller links. A pin link consists of the two side plates connected by two tightly fitted pins. A roller link consists of two side plates connected by two tightly fitted bushings on which hardened steel rollers are free to rotate. When assembled, the pins are a free fit in the bushings and rotate slightly, relative to the bushings, when the chain goes onto and leaves a sprocket.

A silent chain is essentially an assemblage of gear racks, each with two teeth, pivotally connected to form a closed chain. The links are pin-connected, flat steel plates with straight teeth. Silent chains are quieter than roller chains, can operate at higher speeds, and can transmit more load for the same width.

Small, weldless chain types include knotted chain, stamped-link chain, bead chain, and jewelry chain; these find use in electric fixtures, key chains, jewelry, and other small articles. *See also* linkage.

chain, also called GUNTER'S CHAIN, in surveying, a unit of length. *See* surveyor's chain.

Chain, Sir Ernst Boris (b. June 19, 1906, Berlin, Ger.—d. Aug. 12, 1979, Ireland), German-born British biochemist who, with pathologist Howard Walter Florey (later Baron Florey), isolated and purified penicillin (which had been discovered in 1928 by Sir Alexander Fleming) and performed the first clinical trials of the antibiotic. For their pioneering work on penicillin Chain, Florey, and Fleming shared the 1945 Nobel Prize for Physiology or Medicine.

Chain graduated in chemistry and physiology from the Friedrich Wilhelm University of Berlin and then engaged in research at the Institute of Pathology, Charité Hospital, Berlin (1930–33). Forced to flee Germany because of the anti-Semitic policies of Adolf Hitler, he went first to the University of Cambridge, working under Sir Frederick G. Hopkins, and then (1935) to the University of Oxford, where he worked with Florey on penicillin.



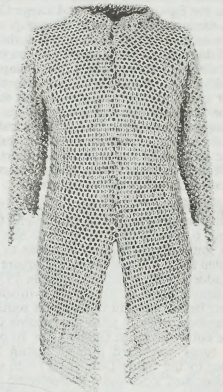
Chain
EB Inc.

Chain served as the director of the International Research Centre for Chemical Microbiology, Superior Institute of Health, Rome, from 1948 until 1961. He then joined the faculty of Imperial College, University of London, where he was professor of biochemistry (1961–73), professor emeritus and senior research fellow (1973–76), and fellow (1978–79). Chain was knighted in 1969.

In addition to his work on antibiotics, Chain studied snake venoms; the spreading factor, an enzyme that facilitates the dispersal of fluids in tissue; and insulin.

chain lightning: *see* bead lightning.

chain mail, also called MAIL, form of body armour worn by European knights and other military men throughout most of the medieval period. An early form of mail, made by sewing iron rings to fabric or leather, was worn in late Roman times and may have originated in Asia, where such mail continued to be worn for many centuries.



Turkish coat of chain mail, 16th century
By courtesy of The John Woodman Higgins Armoury Museum

Medieval armourers improved on the early version by fabricating mail independent of cloth or leather and by interlacing the rings, which were firmly closed by welding or riveting. In earlier versions, such as that worn by Charlemagne in a representation of 773, the shirt, or coat, was short, with a separate sleeve for the sword arm. In later models, such as those depicted in the Bayeux tapestry (1066), the coat was long, fully sleeved, and divided to facilitate horseback riding. A hood, usually fitting under a helmet, covered the head and neck. A padded undergarment was worn to protect against bruises. By the 12th century, mail was fitted to feet and legs, and to hands in the form of mittens or gauntlets. The addition of plates to increase protection for breast and back gradually evolved in the 14th century into complete plate armour, displacing mail. *See also* armour.

Chain of Being (Western philosophy): *see* Great Chain of Being.

chain reaction, in chemistry and physics, process yielding products that initiate further processes of the same kind, a self-sustaining sequence. Examples from chemistry are burning a fuel gas, the development of rancidity in fats, "knock" in internal-combustion engines, and the polymerization of ethylene to polyethylene. The best-known examples in physics are nuclear fissions brought about by neutrons. Chain reactions are in general very rapid but are also highly sensitive to reaction conditions, probably because the substances that sustain the reaction are easily affected by substances other than the reactants themselves.

A chemical chain reaction proceeds by a sequence generally subdivided into three stages: (1) Initiation, in which a reactive intermediate, which may be an atom, an ion, or a neutral molecular fragment, is formed, usually through the action of an agent such as light, heat, or a catalyst. (2) Propagation, whereby the intermediate reacts with the original reactants, producing stable products and another intermediate, whether of the same or different kind; the new intermediate reacts as before, so a repetitive cycle begins. (3) Termination, which may be natural, as when all the reactants have been consumed or the containing vessel causes the chain carriers to recombine as fast as they are formed, but more often is induced intentionally by introduction of substances called inhibitors or antioxidants.

So-called branching chain reactions are a form of chain reaction in which the number of chain carriers increases in each propagation. As a result the reaction accelerates very rapidly, sometimes being completed in less than 1/1,000th of a second. This condition sometimes is referred to as a chemical explosion.

Nuclear chain reactions are series of nuclear fissions (splitting of atomic nuclei), each initiated by a neutron produced in a preceding fission. For example, 2½ neutrons on the average are released by the fission of each uranium-235 nucleus that absorbs a low-energy neutron. Provided that no more than 1½ neutrons per fission on the average are lost through leakage and non-fission-producing capture by other nuclei, one neutron per fission on the average remains to sustain the series. Thus the chain reaction is self-sustaining if the ratio of the number of daughter neutrons that cause fission to the number of parent neutrons is 1 (as in nuclear reactors) or greater than 1 (as in nuclear explosions). The Italian-born physicist Enrico Fermi and his coworkers achieved the first self-sustaining fission chain reaction in 1942 at the University of Chicago.

chain store, any of two or more retail stores having the same ownership and selling the same lines of goods. Chain stores account for an important segment of retailing operations in the Americas, western Europe, and Japan. Together with the department store and the mail-order company, chain stores represent the first successful application of large-scale integrated methods to a form of retailing.

The distinguishing feature of a chain store organization is its ownership of two or more units that handle the same kind of business. But regular chain stores must be distinguished from franchises and from voluntary or cooperative chains, in which the retail units preserve their individual ownership. The latter get to keep their own profits and bear their own financial losses, while in regular chains, the central organization assumes full responsibility for the financial condition of its selling units.

Chain distribution methods existed in China as early as 200 BC and in 17th-century Japan. An early American chain of trading posts was operated by the Hudson's Bay Company before 1750. For the most part, however, retail chain stores were not significant until the end of the 19th century. Their most substantial growth, both in Europe and in the United States, occurred between 1890 and the 1920s. The pressure of small retailers during the 1930s resulted in legislation that restricted chains in a number of European countries, but the majority of the laws were repealed after World War II.

The strongest chains have been those of department stores, grocery stores, limited-price variety stores, ready-to-wear apparel stores, and drugstores. Many banks, hotels, and motion-picture theatres also belong to chains. Chains vary in size from local ones (*i.e.,* serving a single city or metropolitan area) to regional ones (serving a major part of the country) to national or even international ones. They also vary in the class of goods sold, ranging from the inexpensive goods of an F.W. Woolworth

Company to the elitist jewels of a Van Cleef and Arpels.

Most large chain store organizations link together a central unit with warehouse units (*i.e.*, wholesale-distribution centres) and selling units (*i.e.*, retail stores). The central unit contains the administrative offices, while the warehouses handle inbound shipments of goods and send outbound shipments to the individual retail stores. Buying may be a function of both the central unit and the warehouses, but selling and related operations are performed only in the separate retail units. Some chain store organizations even have their own manufacturing facilities, thus carrying vertical integration a step further.

The principal advantages of chain stores include the ability of the central purchasing unit to buy on favourable terms; lower operating costs; the ability to place advertising for all selling units at one time; and the freedom to experiment in one selling unit without risk to the whole operation. Chains are able to buy on more favourable terms than single-unit stores owing to the volume of the central unit's purchases and its ability to bring specialized buying skills to bear in those purchases. Chains can also achieve significant economies by combined wholesaling and retailing operations within the same business organization, since this structure improves coordination between the two branches and spares the wholesaler from both credit risks and the need for a sales staff. Many chains achieve further economies by limiting their stocks of merchandise to items in widespread demand. The low operating costs achieved by all these factors have enabled chain stores to reduce their selling prices in relation to single-unit stores, as well as to operate on slimmer profit margins. Besides selling in large volume at low prices, the large-scale chains' most significant innovations have been in the area of improved retailing practices. Chain stores pioneered the clean, modern-appearing, well-planned store that has an excellent layout and arrangements and modern interior lighting.

The main competitive disadvantage of chain store organizations is their centralized direction and their rigidly standardized operating procedures, which tend to limit individual selling units' flexibility and hinder useful innovations. Chain stores also tend to offer fewer customer services than individual stores.

chair, seat with a back, intended for one person. It is one of the most ancient forms of furniture, dating from the 3rd dynasty of ancient



Empire chair in the form of a Greek klismos, painted maple, attributed to John and Hugh Finlay, Baltimore, *c.* 1820; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, purchase, Mrs. Paul Moore Gift, 1965

Egypt (*c.* 2650–*c.* 2575 BC). It was common for early Egyptian chairs to have legs shaped like those of animals. The seats were corded or dished (hollowed) in wood and topped with a pad or cushion. The ancient Greek klismos (*q.v.*) was one of the most elegant chair designs. The seat, of plaited cord, was supported on sharply curved sabre-shaped legs, tapering to the feet. The horizontal back rail, curved to fit the body, was supported on three uprights. The scissors chair (*q.v.*), or X-chair, which had a seat supported on an X-shaped frame, dates back at least to Roman times. It was especially popular in the 14th and 15th centuries in western Europe and reached great heights of elegance in Italy during the Renaissance. Renaissance chairs were of two principal varieties: those light enough to be moved easily, and heavy, thronelike seats used by the head of a household or other important people.

In Tudor England, the chair for the master of the house, which had a heavy boxlike frame, was placed on a dais in the great hall. Turned (shaped on a lathe) chairs, which had been used from early times, reached their most elaborate forms at this time, their frames consisting of turned posts and spindles. Many chairs in the 16th century depended on upholstery for decoration. Square in outline, this type had a back formed by a pair of uprights spanned by a strip of velvet or brocade trimmed with fringes or a strip of leather, sometimes tooled. The material was held in place by large-headed brass nails. In the 17th century large numbers of richly carved chairs were produced. In Italy many pieces of furniture were the work of sculptors, the most outstanding of whom was Andrea Brustolon. His suite of chairs (now in the Ca' Rezzonico in Venice), with legs and arms carved as gnarled tree trunks and branches, arms supported by Negro boys with heads and arms of ebony and breeches of boxwood, marked his zenith.

In France the square lines of 16th-century chairs gradually gave way to more luxurious padding and carved arms ending in scrolls or animals' heads. During the reign of Louis XIV, furniture became grander. Chairbacks became higher and had curved tops, arms were sometimes upholstered, seats were wider, and woodwork was finely carved and gilded or painted.

In England the Restoration brought a similar trend toward more luxurious living, but the exuberant styles imported by large numbers of immigrant continental craftsmen had to be modified for English tastes. A finely carved front stretcher became fashionable but was abandoned at the end of the 17th century with the introduction of the cabriole leg (*q.v.*).

The gently curved back and cabriole legs of chairs first used in the Queen Anne period in England remained popular for half a century. Rococo design showed itself in the ribbonback, or ribband-back, chairs (chairs whose splats are curved in an intricate pattern of ribbons and bows) and "French chairs" illustrated in Thomas Chippendale's *Gentleman and Cabinetmaker's Director,* which also recorded the popularity of Gothic and chinoiserie (Chinese-style) designs.

American furniture adapted simplified versions of English styles from the late 17th century. Windsor chairs were particularly popular in the 18th century and were developed to a greater degree than in England (*see* Windsor chair).

The Neoclassical movement in the 1760s led a return to straight but more delicate lines, with England and France setting the fashion for Europe. Straight tapering and reeded legs and square, oval, or shield-shaped backs were the mode. The most elegant English chairs of the Regency period and French chairs of the Empire period adapted the sabre leg of the Greek klismos. French chairs after the Revolution of 1789 were much simpler and more austere.

England and France continued to dominate chair fashions throughout most of the 19th century, but styles were largely adaptations of those of previous eras. After World War I, the architect and designer Marcel Breuer developed the first tubular steel chair, a cantilevered form with a frame made from a continuous tubular strip. Ludwig Mies van der Rohe's Barcelona chair of 1929, with its gently curved steel supports and buttoned leather upholstery, is a modern classic. Le Corbusier, a Swiss-born architect, experimented with laminated bentwood chairs, as did the Finn Alvar Aalto. Molded forms were extended to entire chairs in both plywood and plastic by the American Charles Eames and the Finn Eero Saarinen. One of the developments of recent years has been an inflatable plastic chair. *See also* ladder-back chair; wainscot chair.

Consult the INDEX *first*

chaise (French: "chair"), originally a closed, two-wheeled, one-passenger, one-horse carriage of French origin, adapted from the sedan chair. The carrying poles, or shafts, were attached to the horse's harness in front and fixed to the axle in back. The body of the carriage was set in front of the axle with its bottom lower than the shafts. The chaise body's position between the shafts provided stability but made side doors impossible, so that the passenger had an awkward climb over (or else had to duck under) the shafts in order to enter the carriage by a front door that opened downward. At first, the passenger drove the horse from within; later, the chaise was managed by a driver riding the horse.



Chaise, United States, *c.* 1810; in The Museums at Stony Brook, New York

The Museums at Stony Brook, New York, gift of Elizabeth L. Godwin, 1951

The chaise was adapted and widely used in both 18th-century England and the United States. The New England, or Boston, chaise, which was suspended on a combination of leather thoroughbraces and wooden cantilever springs, was uniquely American. The term *shay,* as in "one-horse shay," was an American corruption of *chaise.* The chaise was one of the most important passenger vehicles of the 18th century, and in America its popularity foreshadowed that of the buggy a hundred years later. The word chaise was also applied indiscriminately to numerous varieties of carriage.

chaise longue (French: "long chair"), plural CHAISE LONGUES, a long seat for reclining on. Developed in the 18th century, it closely resembled the daybed of the late 17th century and the bergère armchair, but with an extension of the seat beyond the front of the arms. Some chaise longues, said to be *brisée,* or broken, were divided into two or three parts, thus forming a chair and stool, sometimes with a separate footrest.

Chajang Yulsa, also called CHAJANG (fl. 7th century AD, Korea), Buddhist monk who attempted to make Buddhism the Korean state religion.

Chajang entered the Buddhist priesthood in Korea and then in 636 went to T'ang-dynasty

China, where he spent seven years studying and practicing Buddhist teachings. On returning home, he brought with him some supposed remains of the historical Buddha, creating a great sensation in Korea. Appointed to the highest post in the official Buddhist hierarchy of his native state of Silla, one of the three kingdoms into which Korea was then divided, he propagated the theory that Silla was the exemplary Buddhist land and that the other Korean kingdoms should humbly follow Silla's lead. With official aid, he erected a nine-tiered tower on the compound of the Hwangyong Temple in order to protect the Buddha remains he had brought from China. The tower was considered a sign of Silla's national spirit. Moreover, Chajang pushed ahead with policies to further friendly relations between T'ang China and Silla and obtain Chinese aid in Silla's wars with the rest of Korea.

At the same time, he embarked on a program to make Buddhism the official state ideology; to that end he helped to develop national morale by embarking on a program of mass enlightenment. He also built the Tongdo Temple near Pusan in order to uphold monastic austerity as the model for the nation and thus enhance the general morality and foster patriotism among the people.

Chaka (Zulu leader): *see* Shaka.

Chakhar (Mongol tribe): *see* Chahar.

Chakri DYNASTY, Chakri also spelled CHAKRI, Thailand's ruling house, founded by Rama I, who, under the title of Chao Phraya Chakkri (military commander of the Chao Phraya area), had played an important role in the struggle against Burma. Chakkri became king of Thailand in 1782 following the execution of his predecessor. As Rama I (*q.v.*), Chakkri reigned until 1809. His reign marked the reorganization of Siamese defenses to repel Burmese attacks in 1785, 1786, 1787, 1797, and 1801. His descendants reigned in an unbroken line after him.

For more than 100 years, Thai kings followed an isolationist policy toward Europeans after the so-called Phaulkon-Tachard conspiracy of 1688, but the reign of Rama II (*q.v.*; 1809–24) witnessed a renewal of official contacts with foreigners at the end of the Napoleonic wars. Agreements were reached with Portugal in 1818. A mission of the British East India Company visited Bangkok in 1822, followed shortly thereafter by the first British resident merchant.

The reign of Rama III (*q.v.*; ruled 1824–51) was marked by a limited increase of trade with European powers. A treaty was negotiated with the East India Company in 1826, followed by a similar treaty with the United States in 1833.

The strongly traditionalist concept of monarchy embodied by the first three rulers of the Chakkri dynasty did not survive under the rising tide of Western power and influence. King Mongkut (*q.v.*), Rama IV (reigned 1851–68), reoriented the policy of his government to accommodate that influence. He was forced to surrender a degree of Thai legal and fiscal independence, but his nation was saved from suffering Western invasion or permanent domination. His policies were continued and developed by his son King Chulalongkorn (*q.v.*), Rama V (reigned 1868–1910). Both monarchs endeavoured to modernize their state along Western lines with the help of European advisers. The reforms of Mongkut and Chulalongkorn, along with the need of Britain and France for a buffer state between their colonies, enabled Thailand, alone among Southeast Asian nations, to escape Western colonial rule.

The reign of King Vajiravudh (*q.v.*), Rama VI (reigned 1910–25), was characterized by social reforms. Although the king was somewhat isolated from his people, he negotiated a series of treaties restoring full fiscal autonomy to Thailand. A plot to restrict the king's power and impose a constitution was aborted in 1912.

King Prajadhipok (*q.v.*), Rama VII (reigned 1925–35), was the last of the absolute monarchs. He advocated constitutional government but failed to promote popular understanding of such a policy or enlist support from the political elite. On June 24, 1932, the so-called Promoters Revolution ended absolutism and instituted constitutionalism, though from 1933 the government was generally dominated by the military. Prajadhipok abdicated in 1935.

King Ananda Mahidol (*q.v.*), Rama VIII (reigned 1935–46), was allied with Japan and during World War II declared war on Great Britain and the United States. In June 1946 the king was shot and his younger brother, Bhumibol Adulyadej (*q.v.*), succeeded him as Rama IX (reigned 1946–). As a constitutional monarch, Bhumibol wielded little real political power, functioning instead as the ceremonial head of state.

Chakma, largest of the tribal populations in the Chittagong area in southeastern Bangladesh, numbering 350,000 in the late 20th century. The Chakma dwell in Kassalong and in the middle Karnafuli valleys and are ethnically related to the Mongoloid Arakanese of southwestern Burma; they live in close proximity with smaller tribes such as the Maghs, Tipra, and Tenchungya. Their original culture has been gradually obscured by their partial adoption of Bengali culture. The Chakma have discarded their original Burmese language and today speak a variant Bengali dialect.

Lacking statehood, the Chakma have protected themselves by clan organization, not found in the other Chittagong-area tribes. They practice mixed shifting and permanent agriculture, growing paddy rice as well as millet, corn (maize), vegetables, and dry mustard. They traditionally used hoe cultivation but have recently begun to use the plow. The women weave distinctive fabrics to supplement family income and provide clothing. The Chakma have observed a mixture of animism, Hinduism, and Buddhism and today are almost entirely Buddhist. Buddhist tradition, such as sacrificing a pig when a bride arrives at the groom's village, is mixed with a custom of eating pork, a practice disdained by the Bengalis.

chakra, also spelled CAKRA, Sanskrit ÇAKRA ("wheel"), any of a number of psychic-energy centres of the body, prominent in the occult physiological practices of certain forms of Hinduism and Tantric Buddhism. The chakras are conceived of as focal points where psychic forces and bodily functions merge with and interact with each other. Among the supposed 88,000 chakras in the human body, six major ones located roughly along the spinal cord and another one located just above the crown of the skull are of principal importance. Each of these seven major chakras (in Buddhism, four) is associated with a specific colour, shape, sense organ, natural element, deity, and mantra (monosyllabic prayer formula). The most important of these are the lowest chakra (*mūlādhāra*), located at the base of the spine, and the highest (*sahasrāra*), at the top of the head. The *mūlādhāra* encircles a mysterious divine potency (*kuṇḍalinī*) that the individual attempts, by Yogic techniques, to raise from chakra to chakra until it reaches the *sahasrāra* and self-illumination results. *See also* kuṇḍalinī.

chakravartin, also spelled CAKRAVARTIN, Sanskrit ÇAKRAVARTIN, the ancient Indian conception of the world ruler, derived from the Sanskrit *çakra,* "wheel," and *vartin,* "one who turns." Thus, a chakravartin may be understood as a ruler "whose chariot wheels roll everywhere," or "whose movements are unobstructed."

Buddhist and Jaina sources distinguish three types of secular chakravartin: *cakravāla cakravartin,* a king who rules over all four of the continents posited by ancient Indian cosmography; *dvipa cakravartin,* a ruler who governs only one of those continents and is, therefore, less powerful than the first; and *pradeśa cakravartin,* a monarch who leads the people of only a part of a continent, the equivalent of a local king. The first reference to a secular king who achieved the status of a universal monarch, *cakravāla cakravartin,* appears in texts and monuments from the Maurya dynasty that praise the exploits of King Aśoka (3rd century BC). Buddhist and Jaina philosophers of this period conflated the notion of the universal monarch with the idea of a king of righteousness and maintainer of moral law. The chakravartin was considered to be the secular counterpart of a Buddha, with whom he shared many attributes.

Chalatenango, city, northern El Salvador. It lies along the Tamulasco and Cholco rivers at an altitude of 1,660 feet (506 m). Originally an Indian settlement, it was placed under the Spanish colonial governor Carardalet in 1791 and was declared a town in 1847 and a city in 1871. The city's annual agricultural fair is a national event. Wheat, sugarcane, cassava, sisal (for cordage), indigo, coffee, and fruits are grown in the surrounding area. There is also some light-industrial development (pottery, rope making, and indigo processing) in Chalatenango itself. The town was damaged during clashes between government troops and leftist guerrillas in the early 1980s. Pop. (1985 est.) 11,654.

chalcanthite, a widespread sulfate mineral, naturally occurring hydrated copper sulfate, $CuSO_4 \cdot 5H_2O$. It occurs in the oxidized zone of copper deposits and is frequently found on the timbers and walls of mine workings, where it has crystallized from mine waters. It was formerly an important ore mineral in Chile and was a minor ore at Butte, Mont. At one time large quantities were shipped to the Comstock Lode in Nevada, where it was used to reduce silver ores. Its blue crystals dehydrate to an opaque greenish-white powder on exposure to dry air. For detailed physical properties, *see* sulfate mineral (table).

Chalcedon, modern KADIKÖY, ancient maritime town on the eastern shore of the Bosporus, opposite modern Istanbul, Turkey. It was originally a Megarian colony founded in the early 7th century BC on a site so obviously inferior to that of Byzantium (Istanbul) on the opposite shore that it was accorded the name of the "city of the blind." In its early history it shared the fortunes of Byzantium, vacillated long between Spartan and Athenian interests, and was bequeathed to the Romans by Attalus III of Pergamum (133 BC). It was partly destroyed by the Pontic king Mithradates VI but recovered under the Roman Empire, despite frequent ravages of barbarian raiders. In AD 451 it was the seat of the Council of Chalcedon, the fourth ecumenical council of the Christian Church. The Turks used the site as a quarry for building materials (including chalcedony) for Constantinople. It is now a district of Istanbul. Pop. (1980) 455,465.

Chalcedon, Council of, the fourth ecumenical council of the Christian Church, held in Chalcedon (modern Kadiköy, Tur.) in 451. Convoked by the emperor Marcian, it was attended by about 520 bishops or their representatives and was the largest and best-documented of the early councils. It approved the creed of Nicaea (325), the creed of Con-

stantinople (381; subsequently known as the Nicene Creed), two letters of Cyril against Nestorius, which insisted on the unity of divine and human persons in Christ, and the *Tome* of Pope Leo I confirming two distinct natures in Christ and rejecting the Monophysite doctrine that Christ had only one nature. The council then explained these doctrines in its own confession of faith.

Besides reinforcing canons of earlier church councils as well as declarations of some local synods, the council issued disciplinary decrees affecting monks and clergy and declared Jerusalem and Constantinople patriarchates. The overall effect was to give the church a more stable institutional character.

chalcedony, also spelled CALCEDONY, a very fine-grained (cryptocrystalline) variety of the silica mineral quartz (*q.v.*). A form of chert, it occurs in concretionary, mammillated, or stalactitic forms of waxy lustre and has a compact fibrous structure, a fine splintery fracture, and a great variety of colours—usually bluish-white, gray, yellow, or brown. Other physical properties are those of quartz (*see* silica mineral [table]).

In all ages chalcedony has been the stone most used by the gem engraver, and many coloured varieties are still cut and polished as ornamental stones. Chalcedonic pseudomorphs after other minerals often give rise to very interesting specimens. Hollow nodules of chalcedony containing water and an air bubble that is visible through the semitransparent wall have been found.

Chalchiuhtlicue, also spelled CHALCHIHUITLICUE (Nahuatl: She Who Wears a Jade Skirt), also called MATLALCUEYE (She Who Wears a Green Skirt), Aztec goddess of rivers,



Chalchiuhtlicue, carved stone, 4th–9th century AD
Giraudon—Art Resource/EB Inc.

lakes, streams, and other freshwaters. Wife (in some myths, sister) of the rain god Tlaloc, in Aztec cosmology she ruled over the fourth of the previous suns; in her reign, maize (corn) was first used. Like other water deities, she was often associated with serpents.

Not to be confused with Chalchiuhtlicue was Huixtocihuatl (Salt Lady), the goddess of salt water, of the salters guild, and of dissolute women.

chalcid, any member of the more than 25,000 species of the superfamily Chalcidoidea, a large group of rather small, widely distributed insects of the order Hymenoptera. The average size is about 2 to 3 millimetres (0.08 to 0.12 inch). Chalcids are usually black or yellow with transparent wings. The adults feed on plant nectar or on the fluids from the wounds of animals. The larvae of most species are parasitic on insects that are pests of food crops; thus, they are beneficial to man.

The Chalcidoidea are divided into about 19 families, chief among which are the Mymaridae (fairyfly), Trichogrammatidae, Eulophidae, Encyrtidae, Eupelmidae, Perilampidae, Agaonidae (fig wasp, *q.v.*), Torymidae, Pteromalidae, Eurytomidae (seed chalcid), and Chalcididae. Some of the Leucospidae, largest of the chalcids, reach 15 mm in length.

Chalcidian alphabet, also called CHALCIDIC, one of several variants of the Greek alphabet, used in western Greece (Évvoia) and in some of the Greek colonies in Italy (Magna Graecia); probably ancestral to the Etruscan alphabet. *See* Greek alphabet.

Chalcidian League (432–348 BC), confederacy of the Greek cities of Chalcidice in northeastern Greece directed at first against Athens and later, after the defeat of Athens in the Peloponnesian War, against encroachment by Macedonia. Founded by Olynthus as a league with complete equality and identical citizenship, commerce, and marriage laws among the member states, it included almost all the cities on the Macedonian coast by 382 BC.

Sparta, initially sending a small force to the Chalcidice peninsula to protect Acanthus and Apollonia, which were resisting forcible incorporation, soon interpreted the league as a threat to its aspirations in Greece and starved Olynthus into surrender in 379 BC, dissolving the confederation. In a few years, however, the Chalcidian cities again federated. In 349, after Olynthus had become suspicious of the expansionist designs of his ally Philip II of Macedon, the cities entered an alliance with Athens, only to be conquered by Philip in 348.

Chalcidice, Modern Greek KHALKIDHIKÍ, peninsula, northern Greece, and a *nomós* (department) terminating in (east–west) the three fingerlike promontories of Kassándra, Sithonía, and Áyion Óros (Mt. Athos). The promontories were once islands, and their isthmuses consequently are composed of loose sediments through which the Kassándra Canal was cut (1937). In antiquity, a canal was dug through the isthmus of Áyion Óros by the Persian king Xerxes I (483–481 BC). The steep sides of the northwest–southeast-trending promontories are the result of recent geological rifting and uplift, and the area is subject to severe earthquakes. The axis of the main Chalcidice Peninsula is composed of the granitic mass of the Kholomón Massif. Sithonía also is composed of ancient rocks; but Áyion Óros, famous for the Byzantine monasteries of Mt. Athos, terminates in the great marble headland of Mt. Athos.

The most accessible and fertile parts of the *nomós* are the low plateaus of the Kassándra promontory and the west coast around the town of Néa Moudhaniá. Most of the rest is remote, wooded mountain country, with some mining villages. It is very popular with foreign tourists and several large hotels and holiday compounds were built there in the 1970s. Pop. (1981) 79,036.

Chalcis, Modern Greek KHALKÍS, capital, *nomós* (department) of Euboea, on the island of Euboea (Évvoia), Greece, at the narrowest point (measured only in yards) of the Euripus (Evrípos) channel, separating Euboea from the Greek mainland and dividing the Gulf of Euboea into northern and southern gulfs.

A crossroads for trade from Thessaly, Thrace, Macedonia, and Attica, Chalcis fought with its neighbour Eretria for possession of the Lelantine Plain, emerging victorious in the 7th-century-BC Lelantine War. The Ionians of Chalcis were prolific colonists in Sicily, Italy, Syria, and the Chalcidice Peninsula. The city sided with the Boeotians against Athens (506 BC) and in defeat found its land divided among Athenian settlers. It fought against the Persians at Plataea (479), and later it joined the Delian League and until 411 BC led a series of insurrections against Athens. Aristotle died at Chalcis (322 BC).

Under Rome the city grew to great importance but suffered reprisals when it joined the Achaeans (146 BC) in their last war against Rome. In the early Christian Era it was known as Euripus. The Venetians (*c.* 1209–1470) made it the capital of the kingdom of Negropont (Euboea) and retained it until the Turkish conquest of 1470. Chalcis became part of the kingdom of Greece in 1830. From 1940 to 1944 the city was occupied by the Germans.

The growth and prosperity of Chalcis since World War II has partly been due to its popularity as a resort for Athens, and partly to a brisk agricultural trade; livestock and butter are marketed. A major cement factory at Avlón exports its output through local ports. The city includes the old town, or Kástro, and the industrial district (distilleries and agricultural tools) of Proástion. Nothing remains of the ancient city. An unusual phenomenon is the irregular tidal current of the Evrípou (Swift Current), which changes direction six to seven times a day and seasonally more often. The swing bridge (1962) linking Euboea with the mainland is the latest in a series of spans dating back to 411 BC. Pop. (1981) 44,825.

chalcocite, a sulfide mineral that is one of the most important ores of copper. Valuable occurrences include deposits of sulfide minerals at Ely, Nev., and Morenci, Ariz., where



Chalcocite from Bristol, Conn.
Emil Javorsky—EB Inc.

other components of the original rock have been dissolved away; it is also found with bornite in the sulfide veins of Tsumeb, South West Africa/Namibia, and Butte, Mont. For detailed physical properties, *see* sulfide mineral (table).

Chalcocite (Cu_2S) belongs to a group of sulfide minerals formed at relatively low temperatures (*see also* argentite). Chalcocite alters to native copper and other copper ores.

Chalcocondyles, Laonicus, also spelled LAONICUS CHALCONDYLES (b. *c.* 1423—d. 1490?), Byzantine historian, the author of the valuable work *Historiarum demonstrationes.*

Chalcocondyles came of a distinguished Athenian family and was educated at the Palaeologan court at Mistra in the Peloponnese. His history is prefaced by a survey of the Greek role in world affairs and a discussion of the relationship between Greeks and Romans. It treats the years 1298–1463 in more detail, describing the decline of the Byzantine Empire and its conquest by the Ottomans. Its information on Manuel II includes his experiences when travelling in western European countries in search of aid against the Turks. Chalcocondyles was a great admirer of Herodotus and roused the interest of contemporary Italian humanists in that ancient historian. He strove for objectivity and, in spite of some inaccuracies and the interpolation of farfetched anecdotes, is one of the most valuable of the later Greek historians.

chalcogen: *see* oxygen group element.

Chalcolithic Age, beginning of the Bronze Age (*q.v.*).

Chalcondyles, Demetrius: *see* Demetrius Chalcondyles.

chalcopyrite, the most common copper mineral, a copper and iron sulfide, and a very important copper ore. It typically occurs in ore veins deposited at medium and high temperatures, as in Río Tinto, Spain; Ani, Japan; Butte, Mont.; and Joplin, Mo. Chalcopyrite ($CuFeS_2$) is a member of a group of sulfide minerals that crystallize in the tetragonal system; the group also includes stannite. Both



Chalcopyrite crystals from Oklahoma

By courtesy of Earth Science, Washington University, St. Louis, Mo.; photograph, John H. Gerard

minerals have crystalline structures related to sphalerite. For detailed physical properties, *see* sulfide mineral (table).

chalcotrichite, variety of the copper oxide mineral cuprite (*q.v.*).

Chaldea, also spelled CHALDAEA, Assyrian KALDU, Babylonian KASDU, Hebrew KASDIM, land in southern Babylonia (modern southern Iraq) frequently mentioned in the Old Testament. Strictly speaking, the name should be applied to the land bordering the head of the Persian Gulf between the Arabian desert and the Euphrates delta.

Chaldea is first mentioned in the annals of the Assyrian king Ashurnasirpal II (reigned 884/883–859 BC), though earlier documents referred to the same area as the "Sealand." In 850 Shalmaneser III of Assyria raided Chaldea and reached the Persian Gulf, which he called the "Sea of Kaldu." On the accession of Sargon II to the Assyrian throne (721), the Chaldean Marduk-apla-iddina II (the biblical Merodach-baladan), ruler of Bit-Yakin (a district of Chaldea), seized the Babylonian throne and, despite Assyrian opposition, held it from 721 to 710. He finally fled, however, and Bit-Yakin was placed under Assyrian control.

With this decline of Assyrian power, a native governor, Nabopolassar, was able, in 625, to become king of Babylon by popular consent and to inaugurate a Chaldean dynasty that lasted until the Persian invasion of 539 BC. The prestige of his successors, Nebuchadrezzar II (reigned 605–562) and Nabonidus (reigned 556–539), was such that "Chaldean" became synonymous with "Babylonian."

"Chaldean" also was used by several ancient authors to denote the priests and other persons educated in the classical Babylonian literature, especially in traditions of astronomy and astrology.

Chaldean Catholic Church, Eastern rite church prevalent in Iraq, Iran, and Lebanon, united with the Roman Catholic Church since 1830, and intermittently from 1551.

Christianity in Iraq and Iran dates from the late 2nd century. In the 5th century, the Church of the East embraced Nestorianism, a heresy that declared Christ to be man and God the son to be his divine counterpart. The church prospered and expanded into China, the steppes of Mongol Asia, and the Malabar Coast of India until the 14th century, when the Mongol leader Timur completely destroyed the Nestorian Church east of Iraq, except in India.

Union with Rome was first realized in 1551, when the elected patriarch John Sulaka went to Rome and made his profession of the Catholic faith. From this period on, those Nestorians who became Catholics were referred to as Chaldeans. Other unions were realized in 1672, 1771, and 1778, the current unbroken line of "patriarchs of Babylonia" originating in 1830. The patriarchal residence was at first in the monastery Rabbān Hormizd, then in Mosul, and finally in Baghdad. Besides the patriarchal diocese of Baghdad, there are four archdioceses (Basra, Kirkuk, Sehna, Iran—residence at Tehrān—and Urmia, to which is united the diocese of Salmas) and seven dioceses (Aleppo, Alkosh, Amadya, Akra, Beirut, Mosul, and Zakho). The Chaldeans have preserved the ancient East Syrian liturgy of Addai and Mari, which they celebrate in Syriac.

Chaldean language: *see* Urartian language.

Chaldean rite, also called EAST SYRIAN RITE, system of liturgical practices and discipline historically associated with the Church of the East, or Nestorian Church, and also used today by the Catholic patriarchate of Babylon of the Chaldeans, where it is called the East Syrian rite. Found principally in Iraq, Iran, and Syria, it is also the original rite of the Christians of St. Thomas (Malabar Christians) in India, established by Nestorian missionaries in the 6th century.

The Chaldean rite originally grew out of the Jerusalem–Antioch liturgy. Its Christians were from Mesopotamia and Chaldea, descendants of the ancient Babylonians, later extending throughout Asia and into India. The term Chaldean was first used in 1445 by Pope Eugenius IV to distinguish the Nestorians of Cyprus, newly reconciled to Rome, from Nestorians proper, henceforth called Assyrians. The term came into popular use following the profession of faith to Rome by John Sulaka, appointed patriarch of "Catholic Nestorians" by Pope Julius III in 1551. The successors of Sulaka later assumed the name Simon and bore the title of "Patriarch-Catholicos of Babylon of the Chaldeans."

In India, the Malabar Church retained the Syriac language of the Chaldean rite and was governed by Chaldean (Babylonian) bishops. In the modern church, however, the vernacular Malayalam is gradually replacing Syriac as the liturgical language of the Malabarese.

The Chaldean rite, in comparison with other Eastern rites, is simpler in form, lacking, for instance, a detailed lectionary of scriptural verses and commemorating fewer saints. The liturgy is sometimes accompanied with cymbals and triangle and is always chanted.

Chāldirān, Battle of (Aug. 23, 1514), military engagement in which the Ottomans won a decisive victory over the Ṣafavids of Iran and went on to gain control of eastern Anatolia.

In 1514 the Ottoman sultan Selim I launched a campaign against Shāh Esmāʿīl I, founder of the Ṣafavid dynasty, to put an end to Ṣafavid influence among the Turkmen tribes (the Kizilbash [Red Heads]) who were in open revolt against Ottoman domination and who expressed their discontent by defying orthodoxy. The Ṣafavid state, based on mysticism, and the Turkmen in Azerbaijan and Iran, offered the Anatolian Turkmen religious and political alternatives, and Ṣafavid envoys conducted extensive missionary activity throughout Anatolia.

Selim first subdued the Anatolian Kizilbash, then proclaimed that his expedition against the Shāh was a holy war against heretics who were corrupting Islām. The two armies finally met at Chāldirān, northeast of Lake Van in eastern Anatolia. Selim, taking precautions against followers of the Shāh among his own troops, ordered an immediate attack on August 23 and won an overwhelming Ottoman victory.

Although Selim entered Tabriz in western Iran (September 7), the victory did not lead to immediate Ottoman conquest because of unrest among the Janissaries (elite Ottoman troops). Selim soon returned to Anatolia. The most significant outcome of the Battle of Chāldirān, however, was the subsequent incorporation into the Ottoman state of the Kurdish principalities in eastern Anatolia and the Turkmen principality of Dulkadir in the Maraş-Elbistan region (1515). Thenceforth Ottomans not only had a rampart against eastern invaders but also controlled the Tabriz-Aleppo and Tabriz-Bursa silk trade routes.

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chalet, timber house characteristic of Switzerland, the Bavarian Alps, Tirol, and the French Alps. The name originally referred to a sheepherder's dwelling and, later, to any small house in the mountains.

The chalet is distinguished above all by the frank and interesting manner in which its principal material, wood, is used. The timber is generally cut into heavy planks, from 3 to 6 inches (7.5 to 15 centimetres) thick, and carefully framed together somewhat in the manner of a log house. Sidewalls, generally low, often extend beyond the ends, forming porches, or loggias. Upper floors almost universally project over the stories below and are decorated with interesting and varied types of brackets. Balconies across the front are common and are frequently embellished with carved railings.

Windows, hung as casements, are small, and in general roofs are of low pitch and project enormously, both at the eaves and at the gable ends, which are occasionally snubbed with a small triangle of sloping roof at the top. The roof surfaces are covered with large wood shingles or slabs of slate or stone; in districts with severe weather conditions, planks weighted with boulders are often laid over the roof covering to prevent damage from heavy gales. In plan, the chalet tends toward the square. Frequently, not only the house proper but also stables and storage barns are included under one roof.

Chaleur Bay, French BAIE DES CHALEURS, inlet of the Gulf of St. Lawrence, extending between Quebec's Gaspé Peninsula and northern New Brunswick, Canada, and called by the Indians the "sea of fish". It is a submerged valley of the Restigouche River and is 90 mi (145 km) long and 15 to 25 mi wide. The bay receives many rivers besides the Restigouche, including the Nepisiguit, Cascapédia, and Matapédia. The islands of Miscou and Shippegan are located near its mouth. Major settlements along the bay shore are Campbellton, Dalhousie, and Bathurst (in New Brunswick) and New Richmond and New Carlisle (in Quebec). The bay is noted for its mackerel fishing, and salmon and trout are caught in nearby streams.

Jacques Cartier, the French explorer, navigated the bay in July 1534 and named it Chaleur (meaning "heat") because of the high temperatures he experienced there.

Chalfont St. Giles, parish, Chiltern district, county of Buckinghamshire, England, 24 mi (39 km) northwest of London. Much frequented by visitors because of its Quaker associations as well as its old-world charm, it is the site of the cottage (now preserved as a museum) in which John Milton completed *Paradise Lost* while living there in 1665–66 to escape the Great Plague then raging in London.

In the 17th century the Society of Friends, a religious sect commonly called the Quakers, met nearby in what is today the old Jordans hostel. The present-day Friends' Meeting House was built in 1688. The burial ground contains the graves of William Penn, founder of Pennsylvania (U.S.), and other renowned Quakers. Pop. (1981) 6,978.

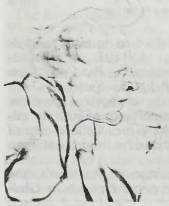
Chalgrin, Jean-François-Thérèse (b. 1739, Paris, France—d. Jan. 21, 1811, Paris), French architect, developer of an influential Neoclassical architectural style and designer of the Arc de Triomphe in Paris.

Chalgrin was trained by the celebrated architect E.-L. Boullée and in the office of G.N. Servandoni. He took the Academy of Architecture's Grand Prix de Rome in 1758, at the age of 19, traveled to Rome the following year, and returned to France in 1763. His patrons included the Count de Saint-Florentin, for whose mistress Chalgrin built a house on the Champs-Élysées that was subsequently leased by Thomas Jefferson during the years that he served as U.S. minister to the French government.

Chalgrin participated in the reintroduction of the basilican style of church architecture. His Saint-Philippe-du-Roule (designed 1764) was the main church of this type in Paris. Prominent features of the interior are twin rows of columns, extending down the sides of the nave and around the periphery of the apse, that support a coffered barrel-vault ceiling. The structure is characterized by an essential simplicity of design that was in stark contrast to the complex interiors of existing Gothic and Renaissance churches.

Following the marriage of the Count de Provence (later Louis XVIII), Chalgrin became first architect to his household (1775) and designed for the countess a small pavilion at Versailles, which still survives. At this time he also helped to complete the Church of Saint-Sulpice. Under the Directory, Chalgrin was commissioned to transform the Luxembourg Palace into a government building. The *salle des séances* that he built now serves as the hall of the French Senate. Chalgrin's final project, which he did not live to see completed, was the famous Arc de Triomphe in Paris, begun in 1806 to commemorate Napoleon's victorious battles.

Chaliapin, Feodor, original Russian FYODOR IVANOVICH SHALYAPIN (b. Feb. 13 [Feb. 1, Old Style], 1873, near Kazan, Russia—d. April 12, 1938, Paris, France), Russian operatic bass whose vivid declamation, great resonance, and dynamic acting made him the best-known singer-actor of his time.



Chaliapin, drawing by Edmond X. Kapp, 1924; in the Barber Institute of Fine Arts, Birmingham, Eng.
Edmond X. Kapp

Chaliapin was from a poor family and participated in a local church choir until he was accepted by the local opera company in 1890. Two years later he went to study with Dimitri Usatov in Tiflis (now Tbilisi, Georgia), and in 1896 he became a member of the private Mamontov opera company, where he mastered the Russian, French, and Italian roles that made him famous.

Chaliapin's interpretation of the title role in Modest Mussorgsky's *Boris Godunov* was his most famous. His major dramatic parts also included Philip II in Giuseppe Verdi's *Don Carlos,* Ivan the Terrible in Nikolay Rimsky-Korsakov's *Maid of Pskov,* and the title role in Arrigo Boito's *Mefistofele.* His great comic characterizations were Don Basilio in Gioacchino Rossini's *Il barbiere di Siviglia* and Leporello in Wolfgang Amadeus Mozart's *Don Giovanni.*

Chaliapin appeared at the major opera houses in Milan (1901, 1904), New York City (1907), and London (1913). Unsympathetic to the Bolshevik Revolution, he left the Soviet Union in 1921 and thereafter performed frequently with the Metropolitan and Chicago opera companies in the United States and with Covent Garden in London. He also toured every continent, frequently with his own opera company. Although occasionally considered unorthodox, he was admired as a versatile and expressive recitalist. He made some 200 recordings from 1898 to 1936, starred in the movie *Don Quixote* (1933), and wrote the autobiographical *Pages from My Life* (1926) and *Man and Mask* (1932). In 1984 his remains were disinterred from Batignolles Cemetery in Paris and reburied in the Novodevichy Cemetery in Moscow.

chalice, a cup used in the celebration of the Christian Eucharist. Both the statement of St. Paul about "the cup of blessing which we



"Chalice of Antioch," partially gilded silver, Early Christian, 4th–5th century AD; in The Metropolitan Museum of Art, The Cloisters Collection, New York City
Copyright © 1978 by The Metropolitan Museum of Art, New York City. The Cloisters Collection, 1950

bless" (1 Corinthians 10:16) and the accounts of the institution of the Eucharist in the first three Gospels indicate that special rites of consecration attended the use of the chalice from the beginning. It was not until the recognition of Christianity by the Roman Empire in the 4th century that silver and gold became the usual materials for the chalice. In the Middle Ages the legend of the Holy Grail surrounded the origins of the eucharistic chalice with a magical aura.

The precious stones and elaborate carvings employed for the embellishment of chalices have made them an important part of the history of ecclesiastical art.

Chalicotherium, genus of extinct perissodactyls, the order including the horse and rhinoceros. Fossil remains of the genus are common in deposits of Asia, Europe, and Africa from the Miocene Epoch (23.7 to 5.3 million years ago). The genus persisted into the following Pliocene Epoch, and remains of a related genus, *Moropus,* are found in North America.

Chalicotherium and its relatives, collectively known as the chalicotheres, were very unusual in appearance and structure. In overall appearance the body and slim skull were horselike. The front limbs were longer than the hind limbs, and the back sloped downward. The teeth were distinctive in structure and unhorselike. The feet were quite distinctive. There were no hooves; instead, each of the three toes on each foot terminated in a strongly developed claw. It is probable that the development of claws was related to the feeding habits of the animal. *Chalicotherium* may have browsed on branches of trees, pulling them down with the front claws; the claws may also have been employed to dig up roots and tubers.

chalk, soft, fine-grained, easily pulverized, white-to-grayish variety of limestone. Chalk is composed of the shells of such minute marine organisms as foraminifera, coccoliths, and rhabdoliths. The purest varieties contain up to 99 percent calcium carbonate in the form of the mineral calcite. The sponge spicules, diatom and radiolarian tests (shells), detrital grains of quartz, and chert nodules (flint) found in chalk contribute small amounts of silica to its composition. Small proportions of clay minerals, glauconite, and calcium phosphate also are present.

Extensive chalk deposits date from the Cretaceous Period (144 to 66.4 million years ago), the name of which is derived from the Latin word (*creta*) for chalk. Such deposits occur in western Europe south of Sweden and in England, notably in the chalk cliffs of Dover along the English Channel. Other extensive deposits occur in the United States from South Dakota south to Texas and eastward to Alabama.

Like any other high-purity limestone, chalk is used for making lime and portland cement and as a fertilizer. Finely ground and purified chalk is known as whiting and is used as a filler, extender, or pigment in a wide variety of materials, including ceramics, putty, cosmetics, crayons, plastics, rubber, paper, paints, and linoleum. The chief use for chalk whiting, however, is in making putty, for which its plasticity, oil absorption, and aging qualities are well suited. The chalk commonly used in classrooms is a manufactured substance rather than natural chalk.

chalk drawing, in the visual arts, technique of drawing with chalk, a prepared natural stone or earth substance that is usually available in black (made either from soft black stone or from a composition including lampblack), white (made from various types of limestone), and red, or sanguine (made from red earths such as red ochre). The earliest chalk drawings date from Paleolithic times.

This technique has been favoured primarily as a medium for making quick preliminary sketches, occasionally for roughing in the background of a larger work, and increasingly since the late Renaissance as a medium in its own right for finished drawings. In the 16th and 17th centuries, Peter Paul Rubens and other artists often combined black and white chalk, a technique known as *aux deux crayons.* As developed by Rococo artists such as Antoine Watteau and François Boucher, the expressive range of chalk drawings grew as broad as that of watercolours or pastels. The devices employed in the 18th century to achieve this subtlety of effect included the use of coloured paper; combining red, black, and white chalk (a technique known as *aux trois crayons*); and manipulating the medium to create an effect of mass rather than of line. In the 20th century, chalk has been princi-



Portrait of a young woman, chalk drawing by Peter Paul Rubens; in the Museum Boymans-van Beuningen, Rotterdam

By courtesy of the Museum Boymans-van Beuningen, Rotterdam

pally used by artists adhering to traditional art styles but also by such avant-garde painters as Henri Matisse, Pablo Picasso, and Willem de Kooning. *See also* sanguine.

Chalk River, village, Renfrew county, southeastern Ontario, Canada. The village lies along the Chalk River near its mouth on the Ottawa River, 90 miles (145 km) northwest of Ottawa. It was a small frontier settlement until after World War II, when it became the site of Canada's first nuclear reactor and of the Chalk River Nuclear Laboratory, one of several research and development centres operated by Atomic Energy of Canada, Limited, concerned with the peaceful uses of atomic energy. The Trans-Canada Highway and the main line of the Canadian Pacific Railway serve the village and Deep River, a residential community for persons working at the laboratory. Inc. 1954. Pop. (1991) 874.

Challans, Mary: *see* Renault, Mary.

Challenger Expedition, prolonged oceanographic exploration cruise from Dec. 7, 1872, to May 26, 1876, covering 127,600 km (68,890 nautical miles) and carried out through cooperation of the British Admiralty and the Royal Society.

HMS *Challenger,* a wooden corvette of 2,306 tons, was commanded by Captain (later Sir) George Strong Nares, while Sir C. Wyville Thomson supervised the scientific staff. The expedition gathered observations from 362 stations and made 492 deep soundings and 133 dredgings. Among the results of the Challenger Expedition were determinations of oceanic temperature, ocean currents, and the depths and contours of the great ocean basins; charting, surveying, and biological investigations were also carried on. Later explorations supplemented the findings of the *Challenger* group but did not materially alter them; the scope and thoroughness of the expedition made it a landmark in the history of undersea exploration. The *Report on the Scientific Results of the Voyage of H.M.S Challenger* was issued in 50 volumes between 1880 and 1895; many of the data gathered at that time are still used today.

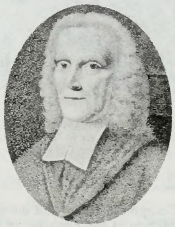
Challis, James (b. Dec. 12, 1803, Braintree, Essex, Eng.—d. Dec. 3, 1882, Cambridge, Cambridgeshire), British clergyman and astronomer, famous in the history of astronomy for his failure to discover the planet Neptune. Elected a fellow of Trinity College, Cambridge, in 1826 and ordained in 1830, Challis became Plumian professor of astronomy and director of the Cambridge Observatory in 1836. He contributed 225 mathematical, physical, and astronomical papers to scientific journals and published, in 12 volumes, *Astronomical Observations Made at the Observatory of Cambridge* (1832–64), the chief results of his work.

In September 1845 John Couch Adams, another Cambridge astronomer who had been making calculations of perturbations of the orbit of Uranus, asked Challis to look for an unknown planet in a specific position. Challis procrastinated but on further urging finally began making observations in July 1846. On September 23 the Berlin Observatory announced the discovery of Neptune, very close to where Adams' calculations had predicted it would be. On checking his observations, Challis found that he had actually observed the planet one night in August but, because he failed to compare his observations of that night with those of his previous night of search, had not realized it.

This failure did not appreciably interfere with his career. Although he was succeeded at the observatory by Adams in 1861, he retained the Plumian chair until his death.

Challoner, Richard (b. Sept. 29, 1691, Lewes, Sussex, Eng.—d. Jan. 12, 1781, London), leader of English Roman Catholics whose revision of the Douai-Reims version of the Bible became the authorized edition for English Catholics.

Challoner was educated at the English College at Douai, France, where he was ordained (1716) and appointed vice president and professor of theology (1720). In 1730 he was sent to London, where the Roman Catholic community was small and harassed, and in 1741 was consecrated titular bishop of Debra. In 1758 he became vicar apostolic of the London district, where he increased the number of converts to Catholicism, founded the Benevolent Society for the Relief of the Aged and Infirmed Poor, and strengthened Roman Catholics against the persecution prevalent in 18th-century England.



Challoner, detail of an engraving

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd

Challoner was the author of many books, including *The Garden of the Soul* (1740), a popular manual of prayer, and *Meditations for Every Day of the Year* (1753), frequently reprinted and used by non-Catholics. His carefully researched historical works include *Britannia Sancta,* an account of the lives of traditional British saints (1745), and *British Martyrology* (1761). Challoner's purpose in his revision of the Douai-Reims version (1749–50) was to make the Bible more readable by modernizing the language and to correct earlier errors.

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Chalmers, Alexander (b. March 29, 1759, Aberdeen, Scot.—d. Dec. 10, 1834, London, Eng.), Scottish editor and biographer best known for his *General Biographical Dictionary* (1812–17), a 32-volume revision of work first published in 11 volumes (1761).

Chalmers' *Glossary to Shakespeare* (1797) was followed by *The Works of the English Poets from Chaucer to Cowper* (1810), a revised and expanded version of Dr. Johnson's *Lives of the Poets* (1779–81). A prolific editor, Chalmers published *The British Essayists: With Prefaces Historical and Biographical* in 45 volumes (1817), as well as the works of the Scottish poet and philosopher James Beattie, the novelist Henry Fielding, the historian Edward Gibbon, and others.

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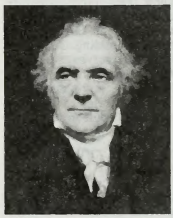
Chalmers, James (b. Aug. 4, 1841, Ardrishaig, Argyll, Scot.—d. April 9, 1901, Dopima, Goaribari Island), Scottish Congregationalist missionary who explored the southwest Pacific, where he became known as "the Livingstone of New Guinea."

Ordained in 1865, Chalmers was sent by the London Missionary Society to Rarotonga in 1866. Having facilitated the establishment of British rule in northern New Guinea (1888), Chalmers strove to form an indigenous church free of westernized culture but was killed and eaten by cannibals on an island off the south coast of Papua. In his *Pioneering in New Guinea* (1887), he presented new geographic details.

Chalmers, Thomas (b. March 17, 1780, Anstruther, Fife, Scot.—d. May 30, 1847, Edinburgh), Presbyterian minister, theologian, author, and social reformer who was the first moderator of the Free Church of Scotland.



Thomas Chalmers, detail from an oil painting by Sir John Watson Gordon, c. 1837; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

Chalmers was ordained as minister of Kilmeny parish, Fife, in 1803. After reading William Wilberforce's *Practical View of the Prevailing Religious System* (1797), Chalmers adopted the evangelical position, which stressed the importance of faith for salvation. From 1815 he gained fame as one of the great pulpit orators in his ministry of Tron parish, Glasgow.

On becoming minister at St. John's, the largest and also the poorest parish in Glasgow, in 1819, Chalmers addressed himself to the problems of poverty. Receiving permission from the city to administer all the charitable funds donated in the churches, he had great success in ameliorating the condition of the poor while reducing costs. In 1823 he accepted the chair of moral philosophy at the University of St. Andrews, which he left five years later to become professor of divinity at the University of Edinburgh. At this time he was gaining recognition as a leader of the Evangelical party in the Church of Scotland, those who desired independence for

the church from civil interference and who advocated the right of parishioners to choose their minister. The factional conflict culminated in the Disruption of 1843, when on May 18 a group of 203 commissioners walked out of the General Assembly of the Church of Scotland in protest against the government's refusal to grant spiritual independence to the church. Chalmers was made moderator of the new Free Church of Scotland. He was subsequently chosen as principal of the church's New College, founded in Edinburgh for ministerial training.

Chalmers was more concerned with the solution of human problems than with theological doctrines, and he sought to apply Christian ethics to economic issues. In *An Enquiry into the Extent of and Stability of National Resources* (1808) he argued that Napoleon's policy of continental blockade, far from ruining British trade, would merely cut off certain luxuries and turn to other, perhaps better, uses the funds that had supplied those luxuries. His work among the poor of Glasgow helped to fix his economic views, set forth in *Christian and Civic Economy of Large Towns,* 3 vol. (1821–26), and in *On Political Economy* (1832). His most significant theological study, *On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man,* was written in 1833 and later incorporated in his *Institutes of Theology* (1849).

Châlna, port, southwestern Bangladesh. It lies 72 miles (116 km) north of the Bay of Bengal, on the navigable Pusur River. It is connected to the major inland river ports and to the railhead at Khulna. Established in 1950 to relieve pressure on the port of Chittagong, Châlna was made permanent in 1952 after it proved to be a self-supporting project. Because of the proximity of dangerous eddies, the port's anchorage was moved a few miles downstream to Mangla. The port's chief export is jute; imports include grain, cement, fertilizer, coal, and salt. Pop. (1981) 19,304.

Chalon-sur-Saône, town, Saône-et-Loire *département,* Bourgogne (Burgundy) *région,* east-central France, south of Dijon. Chalon's fine quays border the Saône River at its junction with the Canal du Centre. An important town of the Gallic tribe of Aedui, it was called Cabillonum by the Romans. In the 6th century King Guntram chose it as the capital of Burgundy. In feudal times it was the seat of a countship, and in 1237 Jean le Sage exchanged it for other fiefs in the Jura but reserved the title to his descendants. The other party to the exchange, Hugh IV, duke of Burgundy, granted the town a charter in 1256. In 1814 Chalon held out against troops of the Austrian army.

The former cathedral, now church, of Saint-Vincent was built in the 13th and 14th centuries. The church of Saint-Pierre, with two lofty steeples, was built in the late 17th century. There are a number of old houses, a 15th-century episcopal palace, and remains of ancient ramparts. The town's museum of fine arts and archaeology is one of the finest in Burgundy. Chalon is the second most important manufacturing town (after Le Creusot) of Burgundy and is also an administrative seat. It is the commercial centre of the Saône valley. Besides being a river port and railway centre, it manufactures iron, steel, and machinery and has light and heavy industry (glassworks, photographic equipment, and boilermaking). Pop. (1982) 53,893.

Châlons-sur-Marne, city, capital of Marne *département,* Champagne-Ardenne *région,* northeastern France. It lies along the right bank of the Marne River, in the heart of the rolling Champagne country. Small branches of the Marne River flow through the city. Chief town of a Gallic tribe, the Catalauni, it was called Durocatalaunum by the Romans. At the Battle of the Catalaunian Plains (AD 451), which took place somewhere nearby, a mixed force of Romans and Visigoths defeated Attila and stopped the advance of the Huns in Europe. In the 10th century the city attained great prosperity under its bishops, who were ecclesiastical peers of France. The local militia served at the Battle of Bouvines (1214), and Châlons's citizens twice repelled the English from their walls in the 15th century. During the Wars of Religion, the city sided with Henry IV, who transferred the Parliament of Paris to Châlons in 1589.

The Châlons military camp, 16 miles (26 km) north, was founded under Napoleon III in 1856. Occupied by the Germans from 1940 to 1944 in World War II, the city was heavily bombed in April and July of 1944. The 13th-century cathedral of Saint-Étienne suffered some damage then but has been restored. The cathedral has a 17th-century west facade, fine 13th-century stained-glass windows, and a remarkable main altar. The collegiate church of Notre-Dame-en-Vaux (12th century) is a mixture of Gothic and Romanesque styles and has stained-glass windows dating from 1525 and 1526, a Gothic choir, and a carillon of 56 bells. Stained-glass windows are also a feature of the churches of Saint-Alpin and Saint-Jean-Baptiste. Near the town hall is a 13th-century house containing manuscripts from the 12th to the 15th century and incunabula.

Châlons has seen much industrial development; the manufacture of electrical and mechanical machinery and detergents adjoins more traditional economic activities, such as hat-making, paper-making, confectionaries, and breweries. The city is also a commercial centre. Pop. (1982) 49,941.

Chalotais, Louis-René de Caradeuc de La: *see* La Chalotais, Louis-René de Caradeuc de.

Châlukya DYNASTY: *see* Cālukya dynasty.

chalumeau, plural CHALUMEAUX, also called MOCK TRUMPET, single-reed wind instrument, forerunner of the clarinet. Chalumeau referred to various folk reed pipes and bagpipes, especially reed pipes of cylindrical bore sounded by a single reed, which was either tied on or cut in the pipe wall. Soon after this type of chalumeau became fashionable in urban society, about 1700, Johann Christoph Denner of Nürnberg added an extra finger hole and two keys; his further experimentation led to the clarinet.

The chalumeau was a stopped pipe (an octave lower in pitch than a comparable open pipe) and, unlike the clarinet, did not overblow to a register above the fundamental (the clarinet's low range is still termed its chalumeau range).

chalybite (mineral): *see* siderite.

Cham, people who, in central Vietnam referred to as Eastern Cham, are the surviving inhabitants of Champa and who, in Cambodia referred to as Western Cham, are a mixture of Cham and Malay. Their original Cham language belongs to the Austronesian (Malayo-Polynesian) family. In Cambodia the Western Cham number about 200,000 and preserve some original cultural traits—*e.g.,* the predominance of the maternal uncle—but otherwise they are entirely integrated into Cambodian life, speaking the Khmer language. From the Malay they adopted Islām. The Eastern Cham of Vietnam (about 80,000) have been largely assimilated by the surrounding Vietnamese, but some speak Western Cham, the link between the Thai-Kadai languages of southern China and Indonesian. Self-supporting rice cultivators, they traditionally carried on a small bartering trade (salt, rare woods) between the hill tribes and the Vietnamese.

The traditional Cham family was matrilocal and matrilineal. The cult of nature spirits was all important, because ancestors' souls were supposed to settle in the earth when the tomb—near the rice fields—was abandoned after seven years of worship. The Indian culture of ancient Champa left some influences; for example, in ancient Cham temples, "brahmanes," with female mediums, performed rites in honour of Po Rome, Po Nagar, and Po Klaung Garai, deified heroes of the past.

Chamba, city, northwestern Himāchal Pradesh state, northwestern India. The city lies on the Rāvi River between two mountain ridges. It is built on two terraces; on



Field of corn (maize) in the mountainous Chamba region, Himāchal Pradesh, India

B Bhansali—Shostal/EB Inc

the lower are public offices and the Bhuri Singh museum, while on the upper is the residential area. Chamba has some industry, including clothweaving and the manufacture of pharmaceuticals, and has an active trade in agricultural produce. The area is noted for its 10th-century temples.

The surrounding area's economy is almost entirely agricultural, and there are large forested areas. The independent princely state of Chamba was founded in the 6th century AD and fell under Kashmir, Mughal, and Sikh rule before becoming part of British India in 1846. It was merged with Himāchal Pradesh in 1948. Pop. (1981) 13,761.

Chambal River, river, northern India. The Chambal is the chief tributary of the Yamuna and rises in the Vindhya Range just south of Mhow, western Madhya Pradesh state. From its source it flows north into southeastern Rājasthān state. Turning northeast, it flows past Kota and along the Rājasthān–Madhya Pradesh border; shifting east-southeast, it forms a portion of the Uttar Pradesh–Madhya Pradesh border and flows through Uttar Pradesh to empty into the Yamuna after a 550-mile (900-kilometre) course. The Banās, Kāli Sindh, Siprā, and Pārbati are its chief tributaries. The Chambal's lower course is lined by a 10-mile (16-kilometre) belt of badland gullies resulting from accelerated soil erosion and is the site of a major project in soil conservation.

chamber music, music composed for small ensembles of instrumentalists (usually two to eight) and traditionally performed without a conductor. The music traditionally was written for performance in a room or reception hall before a small audience but now is commonly performed in concert halls.

A brief treatment of chamber music follows. For full treatment, *see* MACROPAEDIA: Musical Forms and Genres.

Chamber music could be said to have started with the madrigals and consorts of the 16th century. Most of the instrumental works consisted of fantasias, dances, and suites written in the late Renaissance and early Baroque periods. Domestic music began to flourish in the

aristocratic houses of England, Italy, and Germany of the 17th century, and the musicians were often members of the household. During the 18th century, chamber music flourished in literary and artistic circles throughout Europe. Much of it consisted of solo and trio sonatas by such composers as Arcangelo Corelli, often for continuo instrument and strings. From this developed the classical trio with a much more prominent role for the pianoforte.

It was left to Joseph Haydn almost to invent and develop the new form of the string quartet, which ideally reflected the 18th century's sense of classical form, with four instruments "conversing" on equal terms. Wolfgang Amadeus Mozart and Ludwig van Beethoven further enhanced the form, and—with Haydn—gave chamber music the status it has today. They poured their most sustained invention and their most profound ideas into their quartets (and, in Mozart's case, quintets). Works written at this time for mixed ensembles were usually lighter in character, and indeed were often termed serenades or divertimenti.

As the 19th century progressed not only did composers such as Franz Schubert, Robert Schumann, Felix Mendelssohn, Johannes Brahms, and Antonín Dvořák add immeasurably to the store of chamber music, but it was also being performed more and more frequently in public. Professional quartets came into being to fulfill demand for public performance, though amateurs continued to perform chamber music in the drawing room.

In the 20th century, the repertory has been further enriched by Maurice Ravel, Claude Debussy, Béla Bartók, Dmitry Shostakovich, and Benjamin Britten among others, and the genre shows no sign of languishing even in a musical world often more concerned with experimental forms. This century has also seen a renewal of interest in combining the voice with chamber groups. Arnold Schoenberg, Ralph Vaughan Williams, Gustav Holst, and, more recently, Pierre Boulez and Maxwell Davies have shown interest in adapting the form to their somewhat esoteric needs. The technical difficulty of much recent chamber music has taken it outside the range of most amateur players in the home, but chamber groups nevertheless continue to perform the classical repertory enthusiastically for small groups in the private house.

Chamber music, particularly the quartet, is still considered by many persons to be the "purest" form of music by virtue of its ideal balance of instruments. Because it is still often performed for pleasure by small groups of people, it probably gives the most lasting pleasure to more music lovers than any other kind of music.

chamber of commerce: *see* commerce, chamber of.

chamber process, also called LEAD-CHAMBER PROCESS, method of producing sulfuric acid by oxidizing sulfur dioxide with moist air, using gaseous nitrogen oxides as catalysts, the reaction taking place primarily in a series of large, boxlike chambers of sheet lead. The lead-chamber process has been largely supplanted in modern industrial production by the contact process (*q.v.*).

chamber sonata, Italian SONATA DA CAMERA, a type of trio sonata (*q.v.*) intended for secular performance.

chambered nautilus, any of a genus (*Nautilus*) of cephalopod mollusks. *See* nautilus.

Chamberlain, Sir (Joseph) Austen (b. Oct. 16, 1863, Birmingham, Warwickshire, Eng.—d. March 16, 1937, London), British foreign secretary from 1924 to 1929, who helped bring about the Locarno Pact (1925), a group of treaties intended to secure peace in western Europe by eliminating the possibility of border disputes involving Germany. The pact gained for Chamberlain a share (with Vice Pres. Charles Gates Dawes of the United States) of the Nobel Peace Prize for 1925.

The eldest son of the statesman Joseph Chamberlain, Austen was half-brother to the future prime minister Neville Chamberlain. Entering the House of Commons in 1892, he rose to be postmaster general (1902) and chancellor of the exchequer (1903–05). He was a strong candidate to succeed former prime minister Arthur James Balfour as Conservative Party leader (1911) but withdrew in favour of Bonar Law. During World War I, Chamberlain was secretary of state for India (1915–17) and a member of the war Cabinet (1918–19). After the war, he became chancellor of the exchequer once more (1919–21) and lord privy seal (1921–22). From March 1921 until October 1922 he was Conservative Party leader. He then remained outside the government during the ministries of Bonar Law and Stanley Baldwin (1922–24) but returned to office as foreign secretary in Baldwin's second government (1924–29).

The Locarno Pact, concluded on Chamberlain's 62nd birthday (Oct. 16, 1925) by Great Britain, France, Italy, Belgium, and Germany, was the high point of his foreign secretaryship; he lost popularity after the failure of the Geneva Conference on naval limitations (August 1927) and the abortive and needlessly secret Anglo-French disarmament negotiations (July 1928). He left office with Stanley Baldwin's second ministry in June 1929, returned briefly (August–October 1931) as first lord of the admiralty, and then passed the rest of his life as an elder statesman.

Chamberlain, Charles Joseph (b. Feb. 23, 1863, near Sullivan, Ohio, U.S.—d. Feb. 5, 1943, Chicago), U.S. botanist whose research into the morphology and life cycles of the cycads, a primitive gymnosperm family possessing structural features found in both ferns and conifers, enabled him to postulate a course of evolutionary development for the spermatophyte (seed plant) ovule and embryo and led to speculation about a cycad origin for angiosperms (flowering plants).



Charles Chamberlain, 1925

By courtesy of the Harshberger Collection, University of Pennsylvania, Philadelphia, and the Hunt Institute, Pittsburgh

Chamberlain organized and directed the botanical laboratories at the University of Chicago (1897–1931), where he became professor of plant morphology and cytology (1915). With plants collected in Mexico, Australia, New Zealand, South Africa, and Cuba, he created in the university greenhouses the world's foremost collection of living cycads, which remained unsurpassed until a decade after his death. With the U.S. botanist John Coulter he prepared textbooks on the morphology of spermatophytes (1901), angiosperms (1903), and gymnosperms (1910). He also wrote *The Living Cycads* (1919) and *Gymnosperms, Structure and Evolution* (1935).

Chamberlain, Houston Stewart (b. Sept. 9, 1855, Southsea, Hampshire, Eng.—d. Jan. 9, 1927, Bayreuth, Ger.), British-born Germanophile political philosopher, whose advocacy of the racial and cultural superiority of the so-called Aryan element in European culture influenced pan-German and German nationalist thought, particularly Adolf Hitler's National Socialist movement.

Educated at Versailles, Geneva, and Vienna, Chamberlain became an admirer of Richard Wagner, publishing his first work, *Notes sur Lohengrin* ("Notes on Lohengrin"), in 1892. An analysis of Wagner's drama (1892) and a biography (1895) followed. In these publications, Chamberlain emphasized the heroic Teutonic aspects in the composer's works. In 1899 he published *Die Grundlagen des neunzehnten Jahrhunderts* (*The Foundations of the Nineteenth Century,* 2 vol., 1911), a broad but biased analysis of European culture, in which he claimed that the Western Aryan peoples have been responsible for the greatness and creativity of Europe, and that the Jewish influence has been primarily negative. Chamberlain's theories owed much to the writings of Joseph Arthur, comte de Gobineau, who was the first to claim to prove the superiority of the "Nordic" race.

Chamberlain's later works included studies of Kant (1905) and Goethe (1912), various essays defending Germany's military efforts and aims during World War I, the autobiographical *Lebenswege meines Denkens* (1919; "Paths of My Thought"), and *Rasse und Persönlichkeit* (1925; "Race and Personality"). In 1907 he settled in Bayreuth and married Wagner's only daughter Eva, his second wife. Remaining in Germany during World War I, Chamberlain received the German Military Cross in 1915 and became naturalized the next year.

Chamberlain, John (Angus) (b. April 16, 1927, Rochester, Ind., U.S.), U.S. Abstract Expressionist sculptor whose work is characterized by an emotional approach to concept and execution.

After study at the Art Institute of Chicago, where he began working in metals, and at Black Mountain College in North Carolina (1955–56), he had his first one-man show in Chicago in 1957. Chamberlain's sculptures are typified by "Mr. Press" (1961), a construction of fragments from automobiles, crumpled and jammed together to create an effect of isolated, frozen movement. He often coated his pieces with bright industrial paints.

Chamberlain, Joseph (b. July 8, 1836, London—d. July 2, 1914, London), British businessman, social reformer, radical politician, and ardent imperialist. At the local, national, or imperial level, he was a constructive radical, caring more for practical success than party loyalty or ideological commitment. The ideas with which he is most closely associated—tariff reform and imperial unity—were in advance of his time and pointed the direction that British policy would take in the 20th century.

The son of a prosperous shoe manufacturer in London, Chamberlain was reared in an atmosphere of political Liberalism and Nonconformist religion and, eschewing a university career, entered the family business at 16. Two years later he moved to Birmingham to join his cousin's screw-making concern, and there his tycoon characteristics came to the fore. His relentless energy and organizational genius drove out his competitors, and in 1874, at age 38, he was able to retire with a substantial fortune.

Meanwhile he had become involved in civic affairs and was elected mayor of Birmingham in 1873. His pioneer efforts in educational reform, slum clearance, improved housing, and municipalization of public utilities vaulted him into national prominence. At 40, the "gas-and-water Socialist," widely caricatured for his spare frame, incisive features, and ribboned



Joseph Chamberlain, detail of an oil painting by Frank Holl, 1886; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

monocle, was one of the most successful men in England.

Wasting no time, in 1876 he was elected to Parliament, where he was distrusted as a Dissenter and an upstart, and his genuinely radical speeches, delivered with a haughty confidence, frightened the Conservatives. Yet his industrial middle class constituency in Birmingham adored him, and his efficient party organization there (the "caucus") turned out big Liberal votes in the Midlands. Known as a wire puller, he became Prime Minister William Ewart Gladstone's lieutenant in the House of Commons and in 1882 was appointed president of the Board of Trade in Gladstone's second ministry (1880–85). Chamberlain, along with his fellow radical Sir Charles Wentworth Dilke, led the left wing of the Liberal Party, and in 1885 they stumped the country in support of their "unauthorized programme," calling for a graduated income tax, free education, improved housing for the poor, local government reform, and "three acres and a cow" for agricultural labourers.

During the 1880s, when Irish demands for land reform and an autonomous parliament (Home Rule) increasingly bedevilled British politics and caused a deep rift in the Liberal Party, Chamberlain favoured Irish reform, especially at the local level, and stood with Gladstone in opposition to the use of repressive force in quashing Irish agitation. Chamberlain's instincts, however, were already on the side of imperial unity, and he could not go along with Gladstone in 1885, when the latter committed the party to Home Rule for Ireland. In 1886, when the Home Rule issue came to a vote in Commons, Chamberlain joined with other dissident Liberals (Liberal Unionists) to defeat the government.

The split in the Liberal Party proved permanent; the Conservatives, supported by the Liberal Unionists, dominated British politics for most of the period from 1886 until 1906. Chamberlain used his control of the Liberal Unionists to pressure the Conservatives into adopting a more progressive social policy; before 1892 he had the satisfaction of seeing the Conservatives pass various measures of social reform.

The Conservative hegemony reflected a growing disenchantment with social reform in the country and marked a new emphasis upon empire and foreign affairs. Chamberlain, too, began to abandon his radicalism and turned increasingly to imperialist rhetoric, popular with the increasingly jingoistic industrial masses. In 1895 he joined the Conservative Cabinet of Robert Cecil, 3rd marquess of Salisbury, asking to be made secretary of state for the colonies.

In that office Chamberlain quickly became involved in South African affairs and was accused of complicity in the Jameson Raid, an abortive invasion of the Boer republic of Transvaal by British settlers from the neighbouring Cape Colony (December 1895). Though he was later cleared by a Commons investigation, his anti-Boer stance was evident. When worsening Anglo-Boer relations erupted in the South African War (1899–1902), Chamberlain supported it enthusiastically.

This war, in which Great Britain was roasted in world opinion as a bully, brought home to Chamberlain the fact that Britain was militarily vulnerable and diplomatically isolated in Europe. Germany, with which he had always wanted an alliance, had proved particularly hostile. In view of Britain's isolation, Chamberlain looked to the self-governing colonies, which had given encouraging support to Britain during the war. Returning from his negotiation of the peace settlement in South Africa in 1902, Chamberlain announced a new tariff scheme that he hoped would draw Britain and its dependencies together in a kind of common market. Protected by stiff tariffs without and united by preferential tariffs within, the new union would add to Britain's international security, protect manufactures threatened by new competition from the United States and Germany, and raise revenue for social projects at home.

Characteristically, Chamberlain energetically set out to convert his party to the new scheme. When Conservative leader Arthur Balfour (later 1st earl of Balfour) refused to commit himself, Chamberlain resigned his cabinet post and from 1903 to 1906 conducted a forceful private campaign, exhorting his listeners to "think imperially." But protection was a political bombshell. Free trade (which to the English meant cheap imported food) had been the touchstone of Britain's conventional wisdom for more than a half century. Liberals everywhere raised the cry of cheap bread, and Conservatives split as irrevocably as the Liberals had 20 years earlier over Home Rule. In the general elections of 1906 the Conservatives and Liberal Unionists went down to a resounding defeat, in great part because of Chamberlain's abandonment of free trade. Chamberlain, however, was reelected in his native Birmingham by an astonishing majority.

It was his last political victory, for shortly after, in July 1906, he suffered a paralytic stroke that left him a helpless invalid for the rest of his life. (Ga.P.)

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Chamberlain, (Arthur) Neville (b. March 18, 1869, Birmingham, Warwickshire, Eng.—d. Nov. 9, 1940, Heckfield, near Reading, Hampshire), British prime minister from May 28, 1937, to May 10, 1940, whose name is identified with the policy of "appeasement" toward Adolf Hitler's Germany in the period immediately preceding World War II.



Neville Chamberlain, photograph by Bassano

Camera Press

The son of the statesman Joseph Chamberlain and younger half brother of Sir Austen Chamberlain, he managed his father's sisal plantation on Andros Island, Bahamas, and then prospered in the metalworking industry in Birmingham. Chosen lord mayor of that city in 1915, he organized in 1916 a municipal savings bank, the only one in Great Britain. In December 1916 he joined David Lloyd George's World War I coalition government as director general of national service, but, having insufficient powers, he resigned in August 1917. A Conservative member of the House of Commons from December 1918, Chamberlain served as postmaster general (1922–23), paymaster general of the armed forces (1923), minister of health (1923, 1924–29, 1931), and chancellor of the exchequer (1923–24, 1931–37). He became prime minister on May 28, 1937.

In a futile attempt to sway Fascist Italy away from German influence, he agreed (April 16, 1938) to recognize Italian supremacy in Ethiopia and kept Great Britain out of the Spanish Civil War (1936–39), in which Italy was deeply involved. A few days later (April 25) he also undertook to abandon British naval bases in Ireland, a move opposed by some as weakening Britain's defense capability.

On three occasions in September 1938, Chamberlain went to Germany in efforts to prevent the outbreak of a general European war over Hitler's demand that Czechoslovakia cede the Sudetenland to Germany. By the Munich Agreement of September 30, he and Premier Édouard Daladier of France granted almost all of Hitler's demands and left Czechoslovakia defenseless. He returned to England a popular hero, speaking of "peace with honour" (echoing an earlier prime minister, Benjamin Disraeli) and "peace in our time." Nonetheless, he immediately ordered the acceleration of the British rearmament program. When Hitler seized the rest of Czechoslovakia (March 10–16, 1939), Chamberlain definitely repudiated appeasement, and he soon published Anglo-French guarantees of armed support for Poland, Romania, and Greece in the event of similar attacks. The next month, peacetime military conscription was instituted for the first time in British history.

The Soviet–German nonaggression treaty (Aug. 23, 1939), frustrating Chamberlain's plan for a mutual assistance agreement among Great Britain, France, and the U.S.S.R., was followed by an Anglo-Polish pact (August 24). When the Germans attacked Poland (Sept. 1, 1939), Chamberlain countered with a British declaration of war (September 3). He remained prime minister during the "phony war" period of sporadic military action, taking into his war Cabinet his foremost critic, Churchill, as first lord of the admiralty.

After the failure of a British expedition to Norway in April 1940, Chamberlain lost the support of many Conservatives in the House of Commons, and he resigned on May 10, the day of the German invasion of the Low Countries. In Churchill's coalition government he served loyally as lord president of the council until Sept. 30, 1940, when ill health forced him to resign that office and the Conservative Party leadership. He died a few weeks later.

Neville Chamberlain (1961), by Iain Macleod (Conservative Party chairman, 1961–63), is somewhat more favourable than *The Life of Neville Chamberlain* (1946), by Keith Feiling. *The Appeasers* (1963), by Martin Gilbert and Richard Gott, deals with Chamberlain's foreign policy.

Chamberlain, Owen (b. July 10, 1920, San Francisco), U.S. joint winner, with Emilio Segrè, of the Nobel Prize for Physics in 1959 for their discovery of the antiproton. This previously postulated subatomic particle was the



Owen Chamberlain
EB Inc

second antiparticle to be discovered and led directly to the discovery of many additional antiparticles.

Chamberlain worked on the U.S. atom bomb project from 1942 to 1946. Later, while completing his Ph.D. at the University of Chicago, he worked at Argonne National Laboratory, in Illinois. In 1948 he joined the faculty of the University of California at Berkeley, where he became a full professor in 1958. There he conducted research on alpha particle decay, neutron diffraction in liquids, and high-energy nuclear particle reactions. He and Segrè used the bevatron (a powerful particle accelerator) to produce antiprotons in 1955, and the following year they confirmed the existence of the antineutron.

Chamberlain, Wilt, also called WILT THE STILT, byname of WILTON NORMAN CHAMBERLAIN (b. Aug. 21, 1936, Philadelphia), U.S. professional basketball player, who is considered to be one of the greatest offensive players in the history of the game. As the



Wilt Chamberlain (right), 1965
AP/Wide World

first outstanding centre more than seven feet tall, Chamberlain, in the 1961–62 season, became the first player to score more than 4,000 points in regular-season National Basketball Association (NBA) games.

Chamberlain was sought after by more than 100 colleges and universities after his play at Overbrook High School (Philadelphia). He played two years (1956–58) at the University of Kansas (Lawrence) and played with the barnstorming professional Harlem Globetrotters (1958–59) before joining the NBA Philadelphia Warriors (1959–65, in San Francisco 1962–65), the Philadelphia 76ers (1965–68), and the Los Angeles Lakers (1968–73) before retiring as a player in 1973.

During his NBA career he scored 31,419 points (with a game average of 30.1), 100 points in a single game (March 2, 1962), 36 field goals in a game (March 2, 1962), and 55 rebounds (Nov. 24, 1960), and he played 47,859 minutes—all NBA records. Kareem Abdul-Jabbar broke Chamberlain's career point record in 1984. Late in his career he improved on defense and as a team player.

His autobiography, written with David Shaw, *Wilt: Just Like Any Other 7-Foot Black Millionaire Who Lives Next Door*, was published in 1973. Chamberlain was elected to the Basketball Hall of Fame in 1978.

Chamberlain's Men, a theatrical company with which Shakespeare was intimately connected for most of his professional career as a dramatist and the most important company of players in Elizabethan and Jacobean England.

Their early history is somewhat complicated. A company known as Hunsdon's Men, whose patron was Henry Carey, 1st Lord Hunsdon, is traceable to 1564–67. Hunsdon took office as Lord Chamberlain in 1585, and another company (the Lord Chamberlain's Men) under his patronage is traceable to 1590. Two years later the theatres closed because of plague; when they reopened in 1594, a good deal of reorganization and amalgamation between various theatre companies took place. A strong Lord Chamberlain's company emerged. After their patron's death in 1596, the company came under the protection of his son, George Carey, 2nd Lord Hunsdon. Once more it was known as Hunsdon's Men, until their new patron himself took office as Lord Chamberlain in 1597. Thereafter, it was known as the Lord Chamberlain's Men, until the accession of James I in March 1603, when, by letters patent, it was taken under royal patronage and henceforth known as the King's Men.

The records of performances given at court show that they were by far the most favoured of the theatrical companies. Their only rival was a company known during Elizabeth I's reign as the Admiral's Men (*q.v.*) and after that as Prince Henry's Men. From the summer of 1594 to March 1603 the Chamberlain's Men seem to have played almost continuously in London. They undertook a provincial tour during the autumn of 1597, however, and travelled again in 1603 when the plague was in London. They went on tour during part of the summers or autumns in most years thereafter.

In 1594 their London home was for a time a theatre in Newington Butts (a village not far south of London Bridge) and after that most probably at the Cross Keys Inn in the city itself. Later, they presumably used The Theatre, situated in Shoreditch, since this was owned by the father of Richard Burbage, their leading actor. In the autumn of 1599, the company was rehoused in the Globe Theatre, built by Richard Burbage and his brother Cuthbert on the south bank of the Thames, due west of London Bridge at Southwark. This was their most famous home. Profits there were shared between members of the company as such and the owners of the theatre (called "housekeepers"), who included the two Burbages and five others, one of them Shakespeare. Shakespeare was the company's principal dramatist (he also acted with them), but in addition to his plays, works by Ben Jonson, Thomas Dekker, and the partnership of Francis Beaumont and John Fletcher were also presented. In about 1608 another theatre, in the converted monastery of the Blackfriars, became the winter headquarters of the King's Men. This was also managed by the Burbages, and profits were shared in a manner similar to that followed at the Globe.

Shakespeare, who had retired to his home town of Stratford, died in 1616. Richard Burbage died in 1619. The longest surviving member of the original company was John Heminge, who died in 1630. The company itself ceased to exist when, at the outbreak of Civil War in 1642, the theatres were closed and remained so until the Restoration 18 years later.

Chamberlen, Hugh, THE ELDER (b. 1630, London—d. *c.* 1720), British male midwife, prominent member of a family of medical men remembered for the parts they played in the introduction of the obstetrical forceps. Hugh was the grandnephew of Peter Chamberlen the Elder, inventor of the forceps, and was its chief exploiter.

A midwife to the queen of Charles II, Chamberlen used his place at court and contacts abroad to enhance his commercial use of the instrument, which had since its invention been rigidly guarded as a family secret. While in Paris (1670), he unsuccessfully offered the secret of the instrument to the French government in exchange for 10,000 talers (about $3,800). Two years later he produced an English translation of the celebrated French surgeon François Mauriceau's treatise on midwifery, making reference to the forceps in the preface. The book became a standard obstetrical text for 75 years. The failure of several of his sensational projects relating to land banks, state medical services, and prevention of plague forced him to leave England for Scotland, from which he went to the Netherlands. It was in the latter country that Hugh, probably impoverished near the end of his life, sold his secret to the Dutch surgeon Roger Van Roonhuysen.

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Chamberlen, Peter, THE ELDER (b. 1560, Paris—d. 1631, London), surgeon, a French Huguenot whose father, William, emigrated with his family to England in 1569. A celebrated *accoucheur* ("obstetrician"), he aided the wives of James I and Charles I in childbirth.

Chamberlen is credited with the invention (*c.* 1630) of the obstetrical forceps, designed to draw the infant through the mother's vagina more easily. It consisted of two metal blades placed firmly on either side of the child's head and locked into place at the crossing of the handles. He refused to describe the instrument publicly, intending to use it in securing financial success for himself and his descendants. Although highly favoured at the royal court, Peter fell into constant conflict with the College of Physicians, who accused him of malpractice.

Chamberlin, Edward Hastings (b. May 18, 1899, La Conner, Wash., U.S.—d. July 16, 1967, Cambridge, Mass.), U.S. economist known for his theories on industrial monopolies and competition.

Chamberlin studied at the University of Iowa, where he came under the influence of the economist Frank H. Knight, and pursued graduate work at the universities of Michigan and Harvard. He obtained his Ph.D. from Harvard (1927) and spent his academic career there. It was from his Ph.D. thesis that his *Theory of Monopolistic Competition* (1933) emerged. From this book springs the majority of subsequent discussions of competition between firms where consumers have preferences for particular products and where firms have control over the prices of their products without being monopolists.

The solutions which Chamberlin reached are mathematically identical, for the most part, to those reached by British economist Joan

Robinson at Cambridge, whose work was published the same year. But it is Chamberlin's work which is full of insight into the workings of an economy in which firms actively compete, and he was responsible for the introduction of the term "product differentiation" into the literature. Even though Chamberlin's work did not solve the problems associated with interdependence between firms, it was a major landmark in the development of the theory of industrial competition.

Chamberlin, Thomas Chrowder (b. Sept. 25, 1843, Mattoon, Ill., U.S.—d. Nov. 15, 1928, Chicago), U.S. geologist and educator



Thomas Chrowder Chamberlin
By courtesy of the University of Wisconsin Archives, Madison

who proposed the planetesimal hypothesis, which held that a star once passed near the Sun, pulling away from it matter that later condensed and formed the planets.

In 1873 Chamberlin became assistant state geologist with the newly formed Wisconsin Geological Survey and three years later was appointed chief geologist. The four-volume survey report *Geology of Wisconsin* (1877–83) reflects his deep interest in the glacial deposits of the state as well as in the ancient coral reefs.

In 1881 he was appointed geologist in charge of the glacier division of the U.S. Geological Survey, and in 1887 he became president of the University of Wisconsin, Madison. When offered the chairmanship of the geology department of the University of Chicago in 1892, he accepted and in the next 26 years developed one of the leading geology departments in the world. In 1894 Chamberlin was geologist for the Peary Relief Expedition in Greenland. He also established *The Journal of Geology.*

He retired in 1918, but during his last years he produced much of his finest work. His research into the cause of glaciers and the effects of atmospheric composition led him to question the Laplacian hypothesis, the accepted theory of the Earth's formation. He sought the aid of the U.S. astronomer Forest R. Moulton, and together they shaped the planetesimal hypothesis. Their work, which was independent of the similar work of the noted British astronomer Sir James Jeans, was published in *The Two Solar Families* (1928). Chamberlin is also associated with the method of multiple working hypotheses, by which the correct solution to geological and other problems is attained by a process of elimination.

Chambers, Dorothea (Katharine) Lambert, *née* DOUGLASS (b. Sept. 13, 1878, Ealing, Middlesex, Eng.—d. Jan. 7, 1960, London), British tennis player who was the leading female competitor in the period prior to World War I.

Chambers won the Wimbledon singles seven times (1903–04, 1906, 1910–11, 1913–14), a record surpassed only by Helen Wills Moody in the 1930s. In the 1919 Wimbledon singles championship, Chambers lost to Suzanne Lenglen of France in a memorable game. In 1925, at the age of 46, she reached the quarterfinals of the U.S. championships and played on the British doubles team for the Wightman Cup. An outstanding all-around athlete, Chambers was also a champion badminton and field hockey player.

Chambers, Ephraim (b. *c.* 1680, Kendal, Westmorland, Eng.—d. May 15, 1740, London), British encyclopaedist whose work formed a basis for the 18th-century French Encyclopaedists.

The first edition of his *Cyclopaedia: or, An Universal Dictionary of Arts and Sciences* appeared in 1728, and its success led to Chambers' election to the Royal Society. The *Encyclopédie* of Diderot began as a French translation of Chambers' work, though it eventually went far beyond the *Cyclopaedia.* Chambers also wrote for the *Literary Magazine* (1735–37) and translated the *Practice of Perspective* from the French of Jean Dubreuil and, with John Martyn, the botanist, the *History and Memoirs of the Royal Academy of Sciences at Paris* (1742).

Chambers, John Graham (b. Feb. 12, 1843, Llanelly, Carmarthenshire, Wales—d. March 4, 1883, London), British sportsman and journalist who in 1867 devised the Marquess of Queensberry rules, which helped to define the rules in boxing.

After a distinguished college career rowing for Cambridge, Chambers coached the Cambridge team from 1871 to 1874. In 1866 he founded the Amateur Athletic Club and was instrumental in organizing the Amateur Athletic Association in 1880. He edited the weekly journal *Land and Water* from 1871 until his death.

Chambers, Robert (b. July 10, 1802, Peebles, Tweeddale, Scot.—d. March 17, 1871, St. Andrews, Fifeshire), Scottish author, publisher, and, with his brother William (1800–83), founder of the firm of W. & R. Chambers, Ltd., and of *Chambers's Encyclopaedia.*

In 1818 Robert began business as a bookstall keeper in Edinburgh and befriended many literary figures, including Sir Walter Scott, who greatly admired his *Traditions of Edinburgh* (1825). Numerous other historical, literary, and geological works followed, many based on his personal research. *Vestiges of the Natural History of Creation* (1844) caused great controversy, but was praised by Charles Darwin as having "done excellent service . . . in removing prejudice, and in thus preparing the ground for the reception of analogous views." In 1832 Robert and William started *Chambers's Edinburgh Journal,* and this led to the establishment of the publishing firm of W. and R. Chambers, Ltd. *Chambers's Encyclopaedia* was edited by Andrew Findlater but supervised by the brothers.

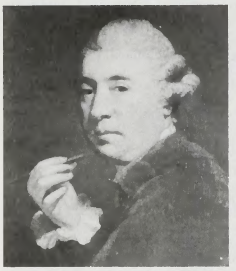
After Robert's death, William continued as head of the firm until his own death; he was succeeded by his brother's son, Robert (1832–88).

Chambers, Whittaker, original name JAY VIVIAN CHAMBERS (b. April 1, 1901, Philadelphia—d. July 9, 1961, near Westminster, Md., U.S.), U.S. journalist, Communist Party member (1923–38), and a principal figure in the Alger Hiss (*q.v.*) case. (He assumed his mother's maiden name, Whittaker, in the 1920s, and he subsequently used a number of aliases.)

At various times he was an editor of the *New Masses, The Daily Worker,* and *Time* magazine. In August 1948, before a congressional committee, he identified Alger Hiss as a fellow member of a Communist spy ring in Washington, D.C., during the 1930s. Chambers produced copies of State Department documents typed on Hiss's typewriter, and he led federal agents to the "pumpkin papers"—microfilms of government documents, allegedly supplied by Hiss, which were hidden in a pumpkin on Chambers' farm.

Chambers' autobiography, *Witness,* was published in 1952. In 1964 selections from his diaries and letters, edited by Duncan Norton-Taylor, were published as *Cold Friday.*

Chambers, Sir William (b. 1726, Göteborg, Swed.—d. March 8, 1796, London), British eclectic architect of the Georgian period who was one of the leading Palladian-style architects of his day.



Sir William Chambers, detail of an oil painting by Sir Joshua Reynolds; in the Royal Academy of Arts, London
By courtesy of the Royal Academy of Arts, London

Son of a merchant of Scottish descent living in Sweden, Chambers, at 16, after education in England, entered the service of the Swedish East India Company. A voyage to Canton supplied the materials for his *Designs of Chinese Buildings* (1757). In 1749 he studied architecture, first in Paris with the influential architectural theorist J.-F. Blondel, and then in Rome. Returning to England in 1755, he became architectural tutor to the prince of Wales, the future George III. This appointment led to an extremely successful career as an official architect. In 1768 he helped found the Royal Academy and was its first treasurer in 1770, upon receiving the knighthood of the polar star from the king of Sweden, he was allowed by George III to assume the rank and title of an English knight.

His best known works are Somerset House, London (1776–86); the casino at Marino, near Dublin (*c.* 1761–80); Duddingston House, Edinburgh (1762–64); and the ornamental buildings (including the pagoda; 1757–62) at Kew Palace, Surrey. In the last he went as far in the direction of Romantic eclecticism as any architect of his time. In general, however, he was an architectural conservative who used a profound knowledge of European (especially French) architecture to give a new look to the accepted motifs of Palladianism. His books, notably *A Treatise on Civil Architecture* (1759), had widespread influence.

John Harris and others, *Sir William Chambers: Knight of the Polar Star* (1971), is the standard monograph.

Chambers, William: *see* Chambers, Robert.

Chambersburg, borough, seat (1784) of Franklin County, southern Pennsylvania, U.S., in the Cumberland Valley, 50 mi (80 km) southwest of Harrisburg. It was settled in 1730 by Benjamin Chambers, who built sawmills and gristmills and a stockade for protection against Indians. John Brown maintained his headquarters there while planning his raid on Harpers Ferry (1859), and Gen. Robert E. Lee massed Confederate troops there for the attack at Gettysburg (26 mi east-southeast) in July 1863. In July 1864 the Confederates burned the town in retaliation for a Union raid into Virginia after Chambersburg citizens

had refused to pay an indemnity of $100,000 in gold.

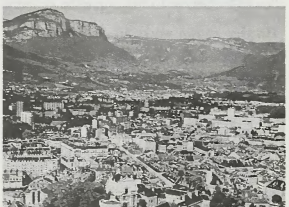
Situated in the midst of a rich farming area (grain, apples, and peaches), Chambersburg also has diversified manufactures, including metal, paper, and clothing. Wilson College was established there in 1869. The Letterkenny Army Depot and Caledonia State Park are nearby. President James Buchanan's log cabin birthplace is near Mercersburg, 15 miles (24 km) southwest. Inc. 1803. Pop. (1991 est.) 16,758.

Chambers's Encyclopaedia, British encyclopaedia published in Oxford, Eng., and named after its original publishers, Robert and William Chambers. The first edition in 10 volumes (1859–68) was based on a translation of the 10th edition of the German *Konversations-Lexikon* (now *Brockhaus Enzyklopädie*). *Chambers's Encyclopaedia* is not to be confused with the *Cyclopaedia* of Ephraim Chambers. The modern *Chambers's* appeared as a 15-volume set in 1950.

The scope of the encyclopaedia is international, but its emphasis is primarily British, as are the scholarly contributors. Not having a continuous revision system makes much of the material dated; the most recent edition (1973; not ordinarily available in the United States) is a reprint with corrections of the 1966 revised edition published by Pergamon, which had a new format, new entry selections, and a reapportionment of space. *Chambers's* has a reputation for reliable, scholarly, and literate treatment of historical subjects, especially in the humanities, geography, and biography. Its format is conservative.

Chambéry, town, capital of Savoie *département,* Rhône-Alpes *région,* southeastern France. It lies in the Leysse Valley between the massifs of Beauges and La Grande Chartreuse, northeast of Grenoble.

The Roman station of Lemincum gave its name to the Rock of Lémenc, which overlooks the town on the north. In the 14th century the counts of Savoy made Chambéry their capital. In 1792 it became the capital



Chambéry, France, with the ducal château in the foreground

Club Iris

of Mont Blanc *département* under the French Revolutionary government. It was returned to the house of Savoy by the treaties of Paris and Vienna and in 1860 was joined to France after a plebiscite.

The northern part of the town, which was badly bombed in 1944, has been rebuilt with wide streets, but the southern sector retains its 17th-century aspect, with reminders of the 15th and 16th centuries. The 12th-century ducal château, rebuilt in the 15th century, reputedly sheltered in its Sainte-Chapelle the Holy Shroud from 1502 to 1578. The country house at Les Charmettes, 1 mile (1.6 km) south, was the home of Jean-Jacques Rousseau and Madame de Warens. The Museum of Savoy in the town contains historical documents relating to the house of Savoy, while the Museum of Fine Arts has a fine collection of Italian paintings.

Chambéry possesses many centralized functions in commerce, rail transportation, air transportation, and others. The University of Savoy was created in 1970. The town's industry, long stagnant, has revived: in addition to metallurgy and construction materials, there are now glass-fibre, confectionary, and shoe factories. The urban development of Chambéry is merging with that of neighbouring Aix-les-Bains. Pop. (1990) 55,603.

Chambeshi River, also spelled CHAMBEZI, river in northeastern Zambia. It rises in hills on the Tanzanian border and flows 300 miles (480 km) southwest to the Lake Bangweulu swamps. The swamps act as a check to the annual flooding, releasing the flood waters slowly through a myriad of channels and lagoons, to issue as the Luapula River where the slope increases once more.

Chambly, city, Montérégie region, southern Quebec province, Canada. The city lies along the Chambly Basin—a widening of the Richelieu River. Its site, 14 miles (23 km) east of Montreal city, was first occupied by Fort-Chambly, a wooden stockade built in 1665 by Captain Jacques de Chambly, a French army officer and leader of the Carignan Regiment. Destroyed by Iroquois Indians in 1702, it was later rebuilt in stone. Surrendered to the British in 1760, the fort played an important part during the American invasion of 1775 and during the War of 1812.

The city is now an agricultural market centre of a cash crop, dairying, and fruit-growing region. A nearby hydroelectric plant supplies power for Chambly and much of Montreal. Among the city's many historical sites are Fort-Chambly National Historic Park, the monument and home of Colonel de Salaberry (a hero of the War of 1812), and Jacques-de-Chambly Historical Village, a collection of 18th- and 19th-century buildings. Inc. 1951. Pop. (1991) 15,893.

Chambly Canal, waterway bypassing a series of rapids on the Richelieu River between the Chambly Basin and Saint-Jean-sur-Richelieu, in Quebec province, Canada. Built between 1833 and 1843 and improved in 1850, it is nearly 12 miles (19 km) long and has nine locks, a lift of 80 feet (24 m), and a normal draught of 6.5 feet (2 m). Vessels up to 112 feet (34 m) long and 22 feet (7 m) wide can be accommodated. With the smaller Saint-Ours Canal, south of Sorel, it permits uninterrupted water communication for about 90 miles (145 km) from the main body of Lake Champlain to the St. Lawrence River.

Chambonnières, Jacques Champion de (b. *c.* 1602—d. 1672, Paris, France), first of the great 17th-century school of French harpsichord players and composers (*clavecinistes*).

Chambonnières came from an old and distinguished family of musicians and succeeded his father as a musician to Louis XIII, a position he retained under Louis XIV. He also was employed at the courts of Sweden and Brandenburg and thus became one of the most widely known harpsichord players of his time.

His *Pièces de clavecin* (published 1670) reflect in style and texture the compositions of the noted lutenist-composer Denys Gaultier and thus emphasize the roots of the early harpsichord style in lute music. The *Pièces* are highly ornamented and rich in harmony and are grouped by key into suites of dances (allemande, courante, sarabande, gigue) and miniature pieces with fanciful titles. There is no thematic relationship between the movements of a single suite, the aim being rather for contrast within a given key. This flexible scheme was a model for later composers, including those of south Germany. Chambonnières was one of the first to attach tables of ornaments to his works, indicating the manner of performance of the many embellishments so vital to his free-voiced style.

Chambonnières was a noted teacher and included among his students many of the outstanding *clavecinistes* of the next generation, notably Louis Couperin, Nicolas Lebègue, and Jean-Henri d'Anglebert.

Chambord, village, Loir-et-Cher *département,* Centre *région,* central France. It lies on the left bank of the Cosson River, east of Blois. The only *commune* in France owned entirely by the state (since 1932), it lies in the 13,600-acre (5,500-hectare) National Hunting Reserve and Breeding Park, which is surrounded by the longest wall (20 miles [32 km]) in France. Its famed Renaissance château, with 440 rooms, is the largest of the Loire group. Originally a hunting lodge of the counts of Blois, it was completely rebuilt by Francis I and Henry II, beginning in 1519. Molière wrote *Monsieur de Pourceaugnac* and some of *Le Bourgeois Gentilhomme* at the château, where he performed them for Louis XIV. Louis XV loaned the château to his father-in-law, Stanisław I Leszczynski, from 1725 to 1733, and then rewarded Marshal Maurice de Saxe for the victory of Fontenoy by deeding the domain to him. Napoleon made a gift of the neglected property to Marshal Louis-Alexandre Berthier, from whose widow it was purchased by public subscription in 1821 for the Duke de Bordeaux, who took the title of Count de Chambord. The château was purchased by the state in 1930. Tourism is the village industry. Pop. (1990) 214.

Chambord, Henri Dieudonné d'Artois, Count (comte) **de,** DUKE (duc) DE BORDEAUX, in full HENRI-CHARLES-FERDINAND-MARIE DIEUDONNÉ D'ARTOIS, COUNT DE CHAMBORD (b. Sept. 29, 1820, Paris, France—d. Aug. 24, 1883, Frohsdorf, Austria), last heir of the elder branch of the Bourbons and, as Henry V, pretender to the French throne from 1830.

The posthumous son of the assassinated Charles-Ferdinand, Duke de Berry, and grandson of King Charles X, he was forced to



Chambord, detail of a portrait by C.-J. Fuhr, b. 1832

Giraudon—Art Resource

flee France in 1830 when his cousin Louis-Philippe seized the throne. He spent most of his young life in Austria, where he nourished a hatred for the French Revolution and constitutionalism.

Chambord was relatively inactive during the July Monarchy (1830–48), the Second Republic (1848–52), and the early stages of the Second Empire. Apparently the antipapal policies of Napoleon III provoked him to revive his Legitimist claim to the monarchy (in rivalry alike with Bonapartist and with Orleanist claims).

On Oct. 9, 1870, after Napoleon's fall, Chambord issued a proclamation inviting all of France to reunite under the Bourbons. The

elections of 1870 returned only a minority of committed Republicans and, for a time, restoration seemed a real possibility. He was, however, hostile to the glories of the revolutionary past (as evidenced later in three publications, *Mes idées* [1872], *Manifestes et programmes politiques, 1848–73* [1873], and *De l'institution d'une régence* [1874]), and his instinctive intransigence led him to declare that he would not become "legitimate king of the Revolution." These views undermined even the support of the royalist-inclining president of the republic, Marshal Patrice de MacMahon. A motion to restore the Bourbon monarchy was defeated in June 1874 in the National Assembly by a vote of 272 to 79, and on January 30 of the following year the republic was formally adopted by a slim margin of one vote. Chambord, who had come very near to fulfilling his claims, lived out the remainder of his life in exile.

Chambre des Comptes (French: Chamber of Accounts), in France under the ancien régime, sovereign court charged with dealing with numerous aspects of the financial administration of the country. Originally part of the king's court (Parlement), it was established in 1320 as a separate, independent chamber. Structurally, the court was modelled after the Parlement, with a premier president and numerous other presidents, counsellors, auditors, and *procureurs* (prosecutors). Initially held by appointment, offices in the Chambre des Comptes had by the 16th century become both hereditary and venal.

The Chambre des Comptes was more than simply a financial court; it had various administrative and legislative duties concerned with the king's accounts and the royal domain (the crown lands). One of its primary responsibilities was to conduct the annual audit of the king's financial agents throughout the country, particularly the bailiffs. If an agent's accounts did not balance, he was subject to dismissal and suit for the return of the missing funds. Initially, the Chambre des Comptes had control over all the finances in the realm. The Chambre was also responsible for much financial policy until the late 15th century, when the Cour des Aides and the central treasury began to take over some of the Chambre's functions, particularly taxation.

The Chambre des Comptes also directed much of the administration of the royal domain (the crown lands). It received and registered letters of appanage, land given to the royal children enabling them to have incomes suitable to their positions. The Chambre also was empowered to register, or refuse to register, alienations of domainal land and to reunite to the domain land that had been alienated from it.

As a court, the Chambre des Comptes handled all litigation on the king's accounts. In these matters, the Chambre des Comptes was the court of final appeal, and only the king could overturn its decisions. The court's status in financial areas brought it into conflict with the Parlement as early as the 14th century. In the 17th century the Grand Counsel was given the right to overturn decisions of the Chambre des Comptes. In 1807 the Chambre des Comptes was replaced by the Cour des Comptes, which continues as the court of accounts in modern France.

Consult the INDEX *first*

Chambre des Enquêtes (French: Chamber of Inquiries), in France under the ancien régime, a chamber of the Parlement of Paris that was responsible for conducting investigations ordered by the Grand Chambre of the Parlement. The Chambre des Enquêtes grew out of sessions or enquiries that were conducted at the place of the crime or suit.

Instead of adopting the jury system to replace the ordeal or duel as a means of determining guilt or innocence, the French in the 13th century took over the basic structure of the canon-law inquest, in which court officials secretly questioned witnesses. Auditors were sent out into the country from the court to conduct investigations; often they were aided by the *bailli* (bailiff) of the district. As Parlement became the court of appeal, the investigators had to report on the proceedings from other jurisdictions. The results of these investigations were turned over to the *rapporteur*, who analyzed them and made recommendations to the rest of the court. To handle the growing number of auditors and investigations, the Chambre des Enquêtes was organized in the early 14th century as a separate chamber within Parlement.

The Chambre des Enquêtes was not initially an independent body, however. Issues were first sent to the Grand Chambre, which then referred them to the Chambre des Enquêtes. After the Chambre made its decision, the judgment was sent back to the Grand Chamber, where it could be corrected or annulled, before final pronouncement by the Grand Chambre itself. In the 16th century the Grand Chambre had acquired so much work that it began to send to the Chambre matters that it was unable, because of time, to consider. Since the Grand Chambre did not have time to review the decisions of the Chambre des Enquêtes, the Chambre began to issue its own decisions. In the 15th century the press of business had already brought about the creation of a second chamber; in the 16th century a third was added. The number was later raised to five, only to be reduced to three in the mid-18th century. The Chambre disappeared with the rest of Parlement during the French Revolution. *See also* Parlement.

Chambre des Requêtes (French: Chamber of Petitions), in France under the ancien régime, a chamber of the Parlement of Paris with responsibilities for examining the petitions of parties desiring to bring a case before the Parlement and for acting as a court of first instance for those with *committimus* (exemption from justice in lower courts).

The Chambre des Requêtes grew out of what were known as the "courts at the gate," which handled petitions sent to the king. Those requesting pardons were sent to the *maîtres des requêtes de l'hôtel* ("masters of petitions to the king's household"), which was directly under the control of the king's council. The Chambre des Requêtes du Palais handled the other petitions for royal grace and gradually allied itself with the Parlement of Paris.

Through the years its functions were narrowed to those involving citizens with *committimus* and the issuing of letters of justice that authorized the bringing of a case in Parlement. A second chamber was created in the 16th century. The issue of the abuses of the power of *committimus* was sometimes raised in the years immediately prior to the French Revolution, but efforts to force Louis XVI to abolish the Chambre des Requêtes were mostly unsuccessful. The Chambre was abolished briefly in 1774 but was reinstituted in 1775 and remained in existence until the Revolution. *See also* Parlement.

chameleon, any member of the reptile family Chamaeleontidae, a group of Old World, primarily tree-dwelling lizards characterized chiefly by their ability to change body colour; by zygodactylous toes (*i.e.*, fused into opposed bundles of two and three); acrodont dentition (*i.e.*, teeth attached to the jaw edge); and a long, slender, extensile tongue. The name is also applied to the false chameleon, or anole (*q.v.*), a New World lizard of the family Iguanidae.

Two genera of true chameleons have been described: *Brookesia* (19 species) and *Chamaeleo* (70 species). About half the species occur only in Madagascar; the others occur mostly in Africa south of the Sahara. Two species occur in western Asia, one in southern India and Sri Lanka (Ceylon), and one (the European chameleon, *Chamaeleo chamaeleon*) is found from the Near East westward across northern Africa and into southern Spain.



European chameleon (*Chamaeleo chamaeleon*)
Stephen Dalton—Oxford Scientific Films Ltd.

Most chameleons are 17–25 centimetres (7–10 inches) long; the longest grows to 60 cm. The body is flattened from side to side, and the tail is sometimes curled. The bulged eyes are independently movable. In certain chameleons the head is helmet shaped.

Some species have conspicuous head ornamentation that may include as many as three long horns projecting forward. Such features are either better or exclusively developed in males. At least some are related to territorial defense: a dominant male responds to an invading male by expanding the body, puffing out the throat, and elevating or waving special head flaps. If this display fails to intimidate an intruder, the defender charges and snaps his jaws.

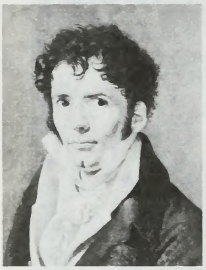
Each species is capable of undergoing a particular range of colour change. The mechanism involves dispersion or concentration of pigment in cells containing pigment granules (melanophore cells) that are under the control of the autonomic nervous system. Many can assume green, yellow, cream, or dark brown, frequently with lighter or darker spots on the ground colour. Colour change is determined by such environmental factors as light and temperature as well as by emotions such as fright and those associated with victory or defeat in battle with another chameleon. It is a popular misconception that the chameleon changes its colour to match that of the background.

Insects are the main diet, but large chameleons also eat birds. Most species are egg layers and descend from their shrub or tree to bury 2 to 40 eggs in the soil or rotting logs. Incubation lasts about three months. A few south African species bear live young.

Chamfort, Sébastien-Roch Nicolas (b. April 1740/41, Clermont, Fr.—d. April 13, 1794, Paris), French playwright and conversationalist, famous for his wit, whose maxims became popular bywords during the French Revolution.

An illegitimate child raised by a grocer's wife, Chamfort was educated as a free scholar and then supported by a worldly Parisian society

that appreciated his conversational genius. His comedies *La Jeune Indienne* (produced 1764; "The Young Indian Girl") and *Le Marchand de Smyrne* (produced 1770; "The Merchant of Smyrna") and a tragedy, *Mustapha et Zéangir* (produced 1776), established his reputation. *Eloge de Molière* (1769) won him entry into the French Academy, but he later attacked academies with his *Discours sur les Académies* (1791).



Chamfort, painting by an unknown artist
H. Roger-Viollet

Disillusioned with the society that sponsored him, he turned antiroyalist and wrote the revolutionary *Pensées, maximes et anecdotes* (1795); Chamfort collaborated with the count de Mirabeau on the newspaper *Mercure de France* and became secretary to the radical Jacobin Club. Many of his sayings, such as "War to the châteaux, peace to the cottages," became famous. Later, shocked by the excesses of the Reign of Terror, Chamfort joined the Moderates and was denounced in the Committee of General Safety.

Threatened with prison, he attempted suicide, eventually dying of the wounds. "Be my brother or I'll kill you," one of his later sayings, summed up the Terror's concept of the Revolutionary principle of fraternity.

Chamic languages, group of languages spoken in Vietnam and Cambodia, classified as West Indonesian languages in the Hesperonesian group of the Austronesian language family. Of the nine Chamic languages, Jarai and Cham (including Western and Eastern) are the largest, with about 230,000 and 280,000 speakers respectively. Cham borrows heavily from Vietnamese and resembles both the Mon-Khmer and Malayo-Polynesian languages. The Chamic languages with fewer numbers of speakers than either Jarai or Cham are Rade, Bih, Cac Gia Roglai, Curu, Haroy, Northern Roglai, and Southern Roglai.

Chamillart, Michel (b. Jan. 10, 1652, Paris, Fr.—d. April 14, 1721, Paris), controller general who, under King Louis XIV, directed the financing and provisioning of the French army during the first half of the War of the Spanish Succession (1701–14).

After serving as intendant at Rouen, Chamillart was made intendant of the finances of the kingdom in 1690. He was appointed controller general of finances in 1699 and minister of state the following year. He became secretary of state for war in 1701, shortly before France engaged the Austrians, the British, and the Dutch in the War of the Spanish Succession.

Chamillart had originally won the king's favour through his honesty and his skill at billiards. He lacked talent for fiscal administration and relied heavily on his able assistant, Nicolas Desmarets, to raise money for the war. Forced to resort to unpopular and unsound financial measures, he was blamed by his countrymen for the severe economic hardships they were suffering. Nevertheless, Chamillart deserves much of the credit for reorganizing the French armies after the defeats of 1704, 1706, and 1708. Recognizing the impossibility of his task, he attempted to resign in 1706, but Louis XIV insisted that he remain in office. Ill health caused him to turn over the finances to Desmarets in February 1708, and the following year Louis removed him from his remaining posts.

Chaminade, Cécile (Louise Stéphanie) (b. Aug. 8, 1857, Paris, Fr.—d. April 18, 1944, Monte-Carlo), French composer and pianist known chiefly for her light piano pieces, which she performed on numerous concert tours, particularly in England.

Chaminade studied composition with Benjamin Godard, among others. She gave her first public recital at age 18 and made her London debut in 1892. At her American debut in 1908 she played the solo part of her *Concertstück* with the Philadelphia Orchestra.

Although her piano salon music won widespread popularity, her more serious works, which include an opera, a ballet, and orchestral suites, were unsuccessful. She also wrote numerous songs.

Chamisso, Adelbert von, original name LOUIS-CHARLES-ADÉLAÏDE CHAMISSO DE BONCOURT (b. Jan. 30, 1781, Château de Boncourt, Champagne, Fr.—d. Aug. 21, 1838, Berlin, Prussia [Germany]), one of the most gifted lyricists of the Berlin Romanticists and best remembered for the *Faust*-like fairy tale *Peter Schlemihls wundersame Geschichte* (1814; *Peter Schlemihl's Remarkable Story*).

When he was nine, Chamisso's family escaped the terrors of the French Revolution



Chamisso, detail of an engraving by X. Steifensand after a drawing by D. Weiss
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

by taking refuge in Berlin. After abandoning his native French language for German, Chamisso published his first works in the *Berliner Musenalmanach,* which he coedited from 1804 to 1806. In 1804 he founded the *Nordsternbund,* a society of Berlin Romanticists. From 1807 to 1808 Chamisso toured France and Switzerland, participating in the literary circle of Madame de Staël.

In 1814 Chamisso published the peculiar tale of Peter Schlemihl, which, more than any other work, won lasting recognition for its author. The story of a man who sold his shadow to the devil, it allegorized Chamisso's own political fate as a man without a country. Though rewarded with an inexhaustible purse, Schlemihl soon discovers that the lack of a shadow involves him in unexpected difficulties. He refuses, however, an offer to restore the shadow in exchange for his soul and instead, with the help of a pair of seven-league boots, wanders through the world searching for the peace of mind he has bartered away.

Chamisso's early poetry—as, for example, the cycle of poems *Frauen-Liebe und Leben* ("Woman's Love and Life"), set to music by Robert Schumann—depicted simple emotions with a sentimental naïveté common to German Romantic verse of the period. His narrative ballads and poems, such as "Vergeltung" ("Reward") and "Salas y Gomez," sometimes inclined to bizarre and mournful subjects. Chamisso's later poetry, however, became more realistic and was praised by the poet Heinrich Heine. Many of these later poems were patterned after the political lyrics of the French poet Pierre-Jean de Béranger, whose works Chamisso translated in 1838. Because these translations, together with his own imitations, helped to introduce the element of political lyricism into German poetry, Chamisso is considered by many critics to be the forerunner of the political poets of the 1840s.

Chamisso was also a noted scientist involved in the discovery of the metagenesis of certain mollusks and a philologist known for his studies of Australasian languages. When he was botanist on a scientific voyage around the world (1815–18), he kept a diary, *Reise um die Welt mit der Romanzoffischen Entdeckungs-Expedition* (1836; "Voyage Around the World with the Romanzov Discovery Expedition"), which became a classic of its kind.

chamois, plural CHAMOIS, or CHAMOIX (species *Rupicapra rupicapra*), goatlike animal, belonging to the family Bovidae (order Artiodactyla), native to the mountains of Europe.

A chamois is about 80 cm (31 inches) tall at the shoulder and weighs 25–50 kg (55–110 pounds). Both sexes possess hollow, vertical horns that hook sharply backward at the ends. Colour is variable, but all races of chamois have black-and-white face markings and a black tail and dorsal stripe. The alpine race is chestnut brown in summer, lighter and grayer in winter. A thick underfur develops in cold weather.

Chamois live in small herds. The older males join these only during the rutting season (October), when they engage in fierce battles for mates. Gestation lasts 20 weeks, and the usual number of offspring is one. In summer the surefooted chamois ascend to the snow line; in winter they descend to wooded regions. Chamois hunting, a popular sport, has reduced the populations of chamois in many areas. They are now preserved in the Swiss National Park in the Upper Engadin valley. Agile and exceedingly wary, chamois are difficult to approach. They feed in summer on herbs and flowers, in winter on young pine shoots.

The soft, pliant skin of the chamois is made into the original "chammy," or "shammy," leather. The flesh is prized as venison. In the 20th century the chamois was successfully introduced into New Zealand. *Gemsbock,* a German name for the male chamois, is applied, as gemsbok, to a southern African antelope.



Chamois (*Rupicapra rupicapra*)
Tierbilder Okapia—Frankfurt am Main

chamomile, also spelled CAMOMILE, plant of the genus *Anthemis,* containing more than 100 species of Eurasian herbs in the family Asteraceae; also, a similar plant in the genus *Chamaemelum* of the same family. Both genera have yellow or white ray flowers and yellow disk flowers in the compact flower heads.

Several species of *Anthemis* are cultivated as garden ornamentals, especially golden marguerite, or yellow chamomile (*A. tinctoria*). Mayweed (*A. cotula*) is a strong-smelling weed that has been used in medicines and insecticides. Chamomile tea, used as a tonic and



Chamomile (*Anthemis tomentosa*)
Anthony J. Huxley—EB Inc.

an antiseptic and in many herbal remedies, is made from *Chamaemelum nobile,* or *Anthemis nobilis.*

Chamonix-Mont-Blanc, internationally known mountain resort in the French Alps, Haute-Savoie *département,* Rhône-Alpes region, west of Annecy. It is situated at an elevation of 3,402 feet (1,037 m) on both sides of the Arve River, which rises in the Sea of Ice, largest of Mont Blanc's glaciers. The peaks of the rugged mountain chain of Brévent and Rouges rise to the northwest above the right bank, while the snow-clad chain that includes Mont Blanc (15,771 feet [4,807 m]), the highest mountain in western Europe, towers on the southeast above the left bank. Chamonix is the starting point for the ascent of Mont Blanc. The resort is connected by the highest cable-car system in the world, almost to the summit of Mount Midi (12,605 feet [3,842 m]); the cable car begins its ascent at 3,399 feet (1,036 m) and rises to 12,434 feet (3,790 m). Several other cable cars connect the town to Alpine heights. Pop. (1982) 7,406.

Chamorro, the native people of Guam. Numbering about 50,600 in the late 20th century, they are of Indonesian stock with a considerable admixture of Spanish, Filipino (based on Tagalog), and other strains. Their vernacular, called the Chamorro language, is not a Micronesian dialect but a distinct language with its own vocabulary and grammar. Pure-blooded Chamorros are no longer found in Guam, but the Chamorro language is still used in many native homes, though English is the island's official language. The Chamorro are predominately Roman Catholic.

Chamorro Vargas, Emiliano, byname LION OF NICARAGUA, Spanish LEÓN DE NICARAGUA (b. 1871—d. Feb. 26, 1966, Managua, Nicaragua), prominent diplomat and politician, president of Nicaragua (1917–21).

Born to a distinguished Nicaraguan family, Chamorro early became an opponent of the regime of José Santos Zelaya. From 1893 on, Chamorro organized and was active in many of the revolts against this regime. He served as representative in Washington (1913–16 and 1921–23) and signed the Bryan–Chamorro Treaty (1914), which, in part, gave the United States the right in perpetuity to build an interoceanic canal across Nicaragua in exchange for foreign aid amounting to $3,000,000. In 1926 Chamorro seized the government from President Carlos Solorzano but was forced to resign when neither the United States nor other Central American countries recognized his government. In 1949 Chamorro returned from exile and, having lost the 1950 presidential election to Anastasio Somoza, worked with Somoza on the writing of a new constitution that guaranteed a percentage of government positions to Conservatives. Chamorro also prevented the incumbent president from succeeding himself. Somoza's threatened repudiation of the pact, as well as his increasingly dictatorial rule, brought about an assassination attempt in 1954. Chamorro was convicted of complicity and temporarily exiled. He was president for life of Nicaragua's Conservative Party.

chamosite, mineral of the chlorite group. *See* chlorite.

Chamoun, Camille (Nimer), Chamoun also spelled SHAM'UN (b. April 3, 1900, Dayr al-Qamar, Lebanon—d. Aug. 7, 1987, Beirut), political leader who served as president of Lebanon in 1952–58.

Chamoun spent his early political years as a member of a political faction known as the Constitutional Bloc, a predominantly Christian group that emphasized its Arabic heritage in an attempt to establish a rapport with the Muslim groups. By the late 1940s Chamoun had emerged as one of the bloc's most prominent members. When his expectations of succeeding Bishara al-Khuri as president of Lebanon were denied in 1948 by a renewal of Khuri's term, Chamoun began to organize a parliamentary opposition. By the summer of 1952 he had made an alliance with Kamal Jumblatt, leader of the Progressive Socialist Party, and had won extensive support throughout the country. That September a general strike forced Khuri's resignation, and Chamoun was elected president. Although Jumblatt had helped secure his election, Chamoun ignored him when it came to formulating government policies.

As president, Chamoun reorganized governmental departments in an attempt to realize a more efficient administration. In some respects his regime was thoroughly democratic; the press and rival political parties, for example, enjoyed full freedom. But Lebanese political life remained geared to serving special interests, and Chamoun's reforms bore little fruit.

Chamoun faced a crisis in 1956 when Muslim leaders demanded that he break relations with Britain and France, which had just attacked Egypt over rights to the Suez Canal. Chamoun not only refused to do this but also named a pro-Western minister of foreign affairs. In May 1958 armed rebellion broke out in Beirut, supported mostly by Muslim elements. The Lebanese army commander, refusing to quell the rebellion, acted only to prevent its spread to other areas. Chamoun appealed to the United States for aid, and U.S. marines landed near Beirut in July, ending the military threat to the government. Demands persisted that Chamoun resign; he refused but did not seek a second term. After a brief retirement he was elected to Parliament in 1960. When civil war erupted in 1975, he became involved in defending Lebanon against Syrian intervention and held a succession of ministerial posts, including minister of finance in 1984–85. He supported a plan for the creation of provinces along religious lines.

He published several autobiographical works, including *Crise au Leban* (1977; "Crisis in Lebanon") and *Mémoires et souvenirs* (1979; "Memories and Remembrances").

Champa, Chinese LIN-YI, ancient Indochinese kingdom lasting from the 2nd to the 17th century AD and extending over the central and southern coastal region of Vietnam from roughly the 18th parallel in the north to Point Ke Ga (Cape Varella) in the south. Established by the Cham, a people of Malayo-Polynesian stock and Indianized culture, Champa was finally absorbed by the Vietnamese, who in turn were strongly influenced by Cham culture.

Champa was formed in AD 192, during the breakup of the Han dynasty of China, when the Han official in charge of the region established his own kingdom around the area of the present city of Hue. Although the territory was at first inhabited mainly by wild tribes involved in incessant struggles with the Chinese colonies in Tonkin, it gradually came under Indian cultural influence, evolving into a decentralized country composed of four small states, named after regions of India—Amaravati (Quang Nam); Vijaya (Binh Dinh); Kauthara (Nha Trang); and Panduranga (Phan Rang)—whose populations remained concentrated in small coastal enclaves. It had a powerful fleet that was used for commerce and for piracy.

In about AD 400 Champa was united under the rule of King Bhadravarman. In retaliation for Cham raids on their coast, the Chinese invaded Champa in 446, bringing the region under their suzerainty once again. Finally, under a new dynasty in the 6th century, Champa threw off its allegiance to China and entered into an era of great independent prosperity and artistic achievements. The centre of the nation began to shift from north to south; around the middle of the 8th century Chinese sources cease to mention Lin-yi and begin to refer to the kingdom as Huan-wang, a Sinicization of the name of the northernmost province, Panduranga (Phan Rang). In the late 8th century the Chams were distracted by attacks from Java, but in the 9th century they renewed their pressure on the Chinese provinces to the north and the growing Khmer (Cambodian) Empire to the west. Under Indravarman II, who established the Indrapura dynasty (the sixth in Champan history) in 875, the capital of the country was moved back to the northern province of Amaravati (Quang Nam), near present Hue, and elaborate palaces and temples were constructed.

In the 10th century the Vietnamese kingdom of Dai Viet began to exert pressure on Champa, forcing it to relinquish Amaravati in 1000 and Vijaya in 1069. Harivarman IV, who in 1074 founded the ninth Cham dynasty, was able to stave off further Vietnamese and Cambodian attacks, but in 1145 the Khmers, under the aggressive leadership of Suryavarman II, invaded and conquered Champa. Two years later a new Cham king, Jaya Harivarman I, arose and threw off Khmer rule, and his successor, in 1177, sacked the Cambodian capital at Angkor. Between 1190 and 1220 the Chams again came under Cambodian suzerainty, and later in the 13th century they were attacked by the Tran kings of Vietnam, as well as by the Mongols in 1284. By the late 15th century, incessant wars of aggression and defense had for all practical purposes wiped out the Champa kingdom; one by one their provinces were annexed until Champa was entirely absorbed in the 17th century.

Its end marked the demise of the only culture of mainland Asia with Oceanian features. Cham painting is known only from the inscriptions on the temples. Cham sculptors, under the influence of Indian Gupta art, evolved a very personal style, characterized by forms springing with wild energy. Architecture generally was confined to tiered brick towers.

champac, also spelled CHAMPAK (*Michelia champaca*), Asian tree of the magnolia family (Magnoliaceae). Lustrous leaved, pyramidal,

and about 30 m (100 feet) tall, the mature plant bears fragrant, star-shaped yellow flowers, which are the source of champac perfume and of a yellow dye. It is often grown as a boulevard tree in the tropics, and is also



Champac (*Michelia champaca*)
W.H. Hodge

frequently planted on Hindu temple grounds because it is considered sacred to the god Vishnu. The tree has smooth gray bark, oval-shaped 25-centimetre- (10-inch-) long evergreen leaves, and 6.5-centimetre yellow-to-orange, narrow-petaled flowers that bloom in spring and fall. Scarlet or brown seeds cluster along a long stalk. Champac wood takes a good polish and is used for making boats, drums, and religious images. In India, however, where it is revered, the tree is rarely cut. A related species, *Michelia compressa,* is a 12-metre Japanese tree with 2.5-centimetre, fragrant yellow flowers.

Champagne, historical and cultural region encompassing the present-day northeastern French *département* of Marne and parts of Ardennes, Meuse, Haute-Marne, Aube, Yonne, Seine-et-Marne, and Aisne *départements.* The region is coextensive with the former province of Champagne, which was bounded on the north by the bishopric of Liège and by Luxembourg, on the east by Lorraine, on the south by Burgundy, and on the west by Ile-de-France and by Picardy. Historical Champagne is also coextensive with the modern-day *région* of Champagne-Ardenne (*q.v.*).

The name of Champagne is probably derived from the Latin Campania ("Land of Plains"); mentions of Campania appear in chronicles from the early 6th century AD. The area of the province of Champagne was first formed into a political unit in the 10th century with the union of the counties of Troyes and Meaux under the house of Vermandois. The count of Blois and Chartres acquired Champagne in the early 11th century. For the next 100 years Champagne was dependent on Blois and was split among members of the house of Blois. In 1125, Thibaut IV became Thibaut II the Great of Champagne, reuniting the counties. The wide extent of their holdings made Thibaut and his successors major feudal lords, and it was during the 12th and 13th centuries that Champagne reached its apogee. The counts of Champagne were a real threat to the kings of France because their lands encircled the royal domain, and the counts alternately strove to dominate the kings or to free themselves from royal control. Thibaut II was frequently at odds with Louis VI and Louis VII. The conflict ended in 1284 when Joan of Navarre and Champagne, heiress to the county, married the future king of France, Philip IV. When Joan's son became King Louis X in 1314, Champagne was united to the crown of France.

In the 12th and 13th centuries, Champagne became the site of commercial fairs at the crossing of roads from Flanders, Germany, Italy, and Provence. There were six great fairs in Champagne, each of which lasted 49 days: one at the town of Lagny, one at Bar-sur-Aube, two at Provins, and two at Troyes. These fairs, at which northern cloth was exchanged for spices, dyes, and precious objects from Mediterranean lands, made Champagne the commercial and financial centre of Europe for a time. Transactions by merchants at the fairs were often made through letters that promised payment at a future fair and that were transferable to another person. Such transactions were the beginnings of the use of credit, and by the 13th century the fairs served as a regular banking centre for Europe. By the end of the 14th century, however, the fairs had declined in importance. Commerce was diverted from the region by the growth of new trade routes and because of political disruption in Champagne stemming from the Hundred Years' War (1337–1453).

In the first half of the 16th century, the territories of the former county were merged with the extensive former domains of the bishops of Reims, Chalons, and Langres to form the military *gouvernement* of Champagne. Economically, Champagne prospered because of the textile industries of Reims and Troyes, the metallurgy of Saint-Dizier, and the region's great vineyards. Along with the other traditional French provinces, Champagne was abolished as a separate entity in 1790.

As a frontier region, Champagne has been invaded whenever France is attacked from the east—from Louis XIV's wars with the Habsburgs to the Battle of Valmy (1792) and thence to World War I, when the Marne River valley was fiercely contested by France and Germany for almost the entire duration of the war (1914–18).



The province of Champagne

Champagne consists mostly of flat plains interrupted by low hills and by the valley of the Marne River. The region itself is traditionally divided into two parts, the Dry (Pouilleuse) Champagne in the west and the Wet (Humide) in the east. In the Dry Champagne crops can be raised easily only in the river valleys, the areas between them being restricted to pasturage and fodder crops. The Wet Champagne, in contrast, can be farmed almost everywhere. Large modern farms predominate. The region gave its name to the most famous type of wine produced from its extensive vineyards.

champagne, classic sparkling wine named for the site of its origin and exclusive production, the traditional region of Champagne in northeastern France. The term champagne is also applied generically, with restrictions, outside France, to many white or rosé wines that are characterized by effervescence. In the United States, sparkling wines made in a similar manner are designated first by place of origin, as in New York state champagne. Similar wines from Spain and elsewhere are often called "champagne-style."

The region that produces champagne includes certain parishes in the *départements* of Marne, Aisne, Seine-et-Marne, Aube, and Haute-Marne. The best champagne comes from vineyards along the Marne River from Château-Thierry eastward to Épernay and on the plain from Épernay stretching north to Reims, which is dominated by a hill called the Montagne de Reims. Champagne is made from only three grapes: pinot and meunier, both black, and chardonnay, white. Characteristic of champagne is a crisp, flinty taste, sometimes ascribed to the chalky soil. A small amount made from green grapes only is called *blanc des blancs.* Pink champagne is made by adding a little red wine, or by leaving the crushed grapes in contact with their skins for a time.

Champagne is initially fermented in stainless steel vats, after which the wine is blended. If the year has been excellent, only wines of that year are used and the product is vintage champagne; if not, a blend with wines of different years will be made, improving and strengthening the wine and producing a non-vintage champagne. After blending, a mixture of wine, sugar, and yeast is added to the wine before it is transferred to pressure tanks or to strong, dark bottles for a second fermentation that yields carbon dioxide and effervescence. This second fermentation is completed after a few weeks or months. Wine thus fermented in tanks is then transferred to another tank, where it is chilled, sweetened, and bottled. Wine in bottles is left to mature; during this period the bottles are shaken daily and gradually turned and tipped until they are upside down and the impurities (sediment) have settled onto the bottom of the cork. This procedure, called riddling, or *remuage,* has been largely mechanized since the 1970s. When the wine is mature and ready for the market, the deposits are removed in a process called *dégorgement.* In this process, the cork is carefully pried off, allowing the internal pressure in the bottle to shoot the sediment out; this is sometimes done after the neck of the bottle and the deposits have been frozen. After *dégorgement,* a small amount of syrup melted in old champagne is added to the bottle and the wine is recorked. Champagne to which little or none of this sugar is added is labeled brut, or extra dry; somewhat sweeter is sec, and wine with larger quantities is demi-sec. All of these are sweeter than the words indicate.

Champagne bottles are made in many sizes: the split (equal to 1/4 bottle), the half-bottle, the bottle (0.75 litres), the magnum (equal to two bottles), the jeroboam (equal to four bottles), the methuselah (equal to eight bottles), the salmanazar (equal to 12 bottles), the balthazar (equal to 16 bottles), the nebuchadnezzar (equal to 20 bottles), and the most recent creation, the sovereign (equal to more than 34 bottles). The larger bottles (from the balthazar on up), originally handblown, proved to be so dangerous that they were discontinued until 1986, when a safer method of production was introduced.

Champagne-Ardenne, *région* encompassing the northern French *départements* of Haute-Marne, Aube, Marne, and Ardennes and roughly coextensive with the historical province of Champagne. The capital is Châlons-sur-Marne. The region has an area of 9,887 square miles (25,606 square km) and is bounded by the *départements* of Meuse and Vosges to the east, Haute-Saône to the southeast, Côte-d'Or and Yonne to the south, and Seine-et-Marne and Aisne to the west. Belgium lies to the north. The region is drained by the Marne, Aube, and Meuse rivers.

The region is sparsely populated; as in much of nonurban France in the 20th century, the population decreased by more than 16 percent between 1901 and 1946, with emigration to Paris and the steel and coal employment of Lorraine accounting for much of the decrease. Since World War II it has continued

to grow at a rate below the national average, and with the continued decline of the northern industrial regions in the late 20th century, immediate prospects for change were slim. Emigration continues to deplete the population.

Farms in Champagne-Ardenne are large and rely heavily on fertilizers. Viticulture centres on Épernay, Reims, and southeastern Aube; large quantities of champagne and table wine are produced annually. Cereals are widely cultivated and account for one-third of the agricultural output. The cultivation of corn (maize) has spread rapidly since 1969. Alfalfa and sugar beets are major crops. Afforestation necessitated by centuries of small-industrial and domestic overcutting was undertaken in the 19th century.

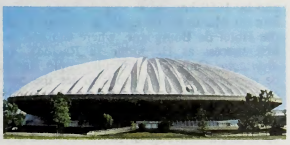
Industries must largely import raw materials and energy, and they thus remain underdeveloped. Textiles are produced in the Meuse valley and around Troyes; metalworking is concentrated in Ardennes and Haute-Marne. Investment capital from Germany has helped to establish a number of new industries in Champagne-Ardenne. There is a nuclear power station at Chooz in Ardennes. Hydroelectric power is generated from the Meuse River at Revin (Ardennes). Pop. (1985 est.) 1,352,000.

Champagny, Jean-Baptiste Nompère de, DUC (duke) DE CADORE (b. Aug. 4, 1756, Roanne, Fr.—d. July 3, 1834, Paris), French statesman and diplomat, foreign minister under Napoleon I.

Elected deputy to the States General by the *noblesse* of Forez in 1789, he was later a member of the Constituent Assembly's committee for the Navy and took part in the reorganization of the fleet. Imprisoned as a former nobleman in 1793, he was elected to the directory of the Loire *département* in 1795, nominated a member of the Council of State by Napoleon in 1799, and appointed ambassador to Vienna in 1801. In 1804 he became minister of the interior, succeeding Talleyrand as foreign minister in 1807. Champagny was responsible for the annexation of the Papal States, for the abdication of Charles IV of Spain, for the Franco-Russian negotiations at the Congress of Erfurt (all in 1808), and for the Treaty of Schönbrunn between France and Austria (Oct. 14, 1809), for which he was made duc de Cadore. He also negotiated Napoleon's marriage to Marie-Louise (1810). In 1811 a disagreement with Napoleon led to Champagny's resignation as foreign minister, but he continued in ministerial and senatorial offices.

After Napoleon's fall Champagny adhered to the restored monarchy and was made a peer of France. His *Souvenirs* appeared posthumously.

Champaign, city, Champaign county, east-central Illinois, U.S., adjoining Urbana, with which it shares the University of Illinois. The cities are often called Champaign–Urbana. In 1853 Illinois Central Railroad tracks were laid and a depot built 2 miles (3 km) west of Urbana. In 1855 a bill incorporating Urbana and including the depot within its limits was defeated in the state legislature. The settlement around the depot was incorporated in 1857 as West Urbana, which in 1860 was reincorporated and renamed for the county (which in 1833 had derived its name from Champaign County, Ohio).



Assembly Hall, University of Illinois, Champaign

By courtesy of the Illinois Department of Business and Economic Development

The University of Illinois (founded in 1868) is the community's chief economic asset, but agriculture (mainly corn [maize], soybeans, livestock, and dairy foods) and related industries are also important. Light manufacturing has also developed. Parkland (junior) College was opened in 1966. A memorial (relief-sculpture plaque with an eternal light) to Abraham Lincoln was erected in 1964 in the shopping district. Pop. (1990) city, 63,502; Champaign-Urbana-Rantoul MSA, 173,025.

Champaigne, Philippe de (b. May 26, 1602, Brussels—d. Aug. 12, 1674, Paris), portrait, historical, and religious painter of the French Baroque.

Trained in Brussels, Champaigne arrived in Paris in 1621 and was employed with the classical Baroque painter Nicolas Poussin on the decoration of the Luxembourg Palace, under the direction of Nicholas Duchesne. His career progressed rapidly under the patronage of the queen mother Marie de Médicis and the Cardinal de Richelieu, for whom he produced religious paintings and portraits. Appointed painter royal to the queen mother, Champaigne succeeded Duchesne in that position in 1628. He became a professor at the Royal Academy (1653), later its rector, and produced many pieces for the palaces and churches of Paris.



"Ex Voto de 1662," painting by Philippe de Champaigne; in the Louvre, Paris

Telarc—Giraudon from Art Resource/EB Inc

Champaigne decorated a gallery in the Palais Royal for Richelieu and executed a masterful portrait of the powerful French figure ("Cardinal Richelieu"; *c.* 1635, Louvre, Paris). His strongest works are the natural and lifelike psychological portraits he produced of eminent contemporaries. Blending Flemish, French, and Italian elements, his work is characterized by a brilliant colour sense, a monumental conception of the figure, and a sober use of composition. His portrait style shows the influence of Peter Paul Rubens and Sir Anthony Van Dyck.

In 1643 Champaigne became involved with Jansenism, an ascetic sect, and he rejected previous Baroque techniques. His paintings became simplified and more austere, and his portraits, which often portray the sitter dressed in black, demonstrate his sensitivity toward and understanding of people. One of the masterpieces of his later period is "Ex Voto de 1662" (1662, Louvre), which depicts the miraculous cure of his daughter, a nun at the Jansenist convent of Port Royal. In his theory of art Champaigne emphasized drawing and was possibly the originator of the drawing-versus-colour controversy that embroiled the French Academy until well into the 18th century.

Champasak, also spelled CHAMPASSAK, also called BASSAC, town, southern Laos. The town lies on the west bank of the Mekong River, within an agricultural region of rolling plains and alluvial lowlands whose mountainous core is an eastern outlier of the Dângrêk Mountains. The town lies some 30 miles (48 km) east of the Laos–Thailand border and about 82 miles (132 km) north of the border with Cambodia. The rolling Plateau des Bolovens to the northeast, at 3,500 feet (1,100 m) in elevation, is the wettest region of Laos, with 160 inches (4,100 mm) of rainfall per annum. The Mekong River area is largely alluvial lowland.

Once the third kingdom of Laos, Champasak was established in 1713. Its lands lay on both sides of the Mekong and included Vat Phou (monumental ruins dating from the 8th–12th centuries), where a provincial centre of the Cambodian Kingdom of Angkor was located. In the 19th century, the western part was absorbed by Siam; but the Franco-Siamese treaties of 1904–05 reunited the area to the Laotian territory of Champasak. From 1941 to 1945, Thailand (Siam) held the land west of the Mekong, this time with the encouragement of Japan. In August 1946, Prince Boun Oum of Champasak renounced his sovereign territorial rights over the region in favour of the united kingdom, with the royal capital at Luang Prabang (now spelled Louangphrabang).

The populace of the region, predominantly valley Lao, raises rice and corn (maize) and traditionally were Thammayut Buddhists. The Plateau des Bolovens, sparsely populated by Lao-Theng (Lao-Theung; Mountain Mon-Khmer) peoples, supports coffee, cardamom, teak, and tobacco and is one of two major cotton-growing regions in Laos. Much of the local trade of lac, kapok, timber, tobacco, and rice is carried on through Muang Không, a Mekong port located on 100-square-mile (259-square-kilometre) Không Island just north of the Kampuchean border. Pop. (latest est.) 4,000.

Champerico, town and port, southwestern Guatemala, on the Pacific Ocean. Linked by paved highway with Retalhuleu, Champerico is the nation's third most important port and its best on the Pacific, even though it is open and unprotected and ships have to anchor about 1 mile (1.6 km) offshore. It handles chiefly coffee, timber, and sugar. Pop. (1981) 6,891.

Consult the INDEX *first*

Champfleury, pseudonym of JULES-FRANÇOIS-FÉLIX HUSSON (b. Sept. 17, 1821, Laon, Fr.—d. Dec. 6, 1889, Sèvres), French novelist and journalist, theoretician of the Realist movement, which he analyzed in *Le Réalisme* (1857). Although his reputation has declined, he was an influential figure whose writings helped to popularize the work of the painter Gustave Courbet, then controversial for his frank portrayal of scenes from common life.

After an interrupted education, Champfleury went to Paris and lived a bohemian existence in a literary group that included the poet Charles Baudelaire. One of his best-known works, in which he tried to realize his theory that novels should be "daguerreotypes" of everyday life, is *Chien-Caillou* (1847), the story of an unhappy love affair. His massive output also included a history of caricature. A discriminating collector of pottery and popular engravings, he was appointed curator in 1872 of the porcelain collections in the Sèvres Museum.

champion, one who fights in behalf of another. During the Middle Ages a feature of

Anglo-Norman law was trial by battle, a procedure in which guilt or innocence was decided by a test of arms. Clergy, children, women, and persons disabled by age or infirmity had the right to nominate champions to fight by proxy.

The King's Champion (*campio regis*) is an office peculiar to England and dates there probably from the 14th century. Originally the champion's function was to ride, clad in full armour, into Westminster Hall during the coronation banquet. Flanked by the high constable and the earl marshal, he threw down the gauntlet three times, challenging to mortal combat any who would dispute the king's right to reign. There is no record that the challenge was ever accepted. The ceremony last took place at the coronation of George IV in 1821. Since 1902 the King's Champion has carried the standard of England.

Champlain, Lake, lake extending 107 miles (172 km) southward from Missisquoi Bay and the Richelieu River in Quebec province, Can., where it empties into the St. Lawrence River, to South Bay, near Whitehall, N.Y., U.S. It forms the boundary between Vermont and New York for most of its length and lies in a broad valley between the Adirondack and Green mountains. The lake has a maximum width of 14 miles (23 km) and a total area of 435 square miles (1,127 square km) of water surface and 55 square miles (142 square km) of islands (including Grand Isle and Isle La Motte, Vermont, and Valcour Island, New York). Lake George partly parallels Champlain along its narrow southwestern shore and drains into it near Ticonderoga, N.Y., via a short channel.

A link in the international waterway between New York City's harbour and the lower St. Lawrence, Lake Champlain is extensively used for commercial and pleasure-boat navigation. The most important ports are Burlington, Vt., and Rouses Point, Plattsburgh, and Port Henry, N.Y. Streams emptying into the lake include Otter Creek and the Mettawee, Poultney, Winooski, Lamoille, Missisquoi, Boquet, Ausable, Saranac, and Chazy rivers.

The lake was visited in 1609 by the French explorer Samuel de Champlain, whence its name. Of considerable historical significance, it was used by early settlers as a gateway between French Canada and the English colonies and was the scene of battles in the French and Indian Wars, the American Revolution, and the War of 1812. In 1731 the French built a fort at Crown Point, N.Y., on a promontory on the western shore and, in 1755, another at Ticonderoga, on the route between Lake Champlain and Lake George; both were strategic points. The first encounter between an American and a British fleet, the Battle of Valcour Island, was fought on the lake on Oct. 11, 1776. During the War of 1812 a naval battle (Sept. 11, 1814) in Cumberland Bay, near Plattsburgh, resulted in a victory for the American fleet under Commodore Thomas Macdonough, causing the British to abandon the invasion of New York.

Consult the INDEX *first*

Champlain, Samuel de (b. 1567, Brouage, Fr.—d. Dec. 25, 1635, Quebec, New France [now in Quebec, Can.]), French explorer, acknowledged founder of the city of Quebec (1608), and consolidator of the French colonies in the New World. He discovered the lake that bears his name (1609) and made other explorations of what are now northern New York, the Ottawa River, and the eastern Great Lakes.

Champlain was probably born a commoner, but, after acquiring a reputation as a navigator (having taken part in an expedition to the West Indies and Central America), he received an honorary if unofficial title at the court of Henry IV. In 1603 he accepted an invitation to visit what he called the River of Canada (St. Lawrence River). He sailed, as an observer in a longboat, upstream from the mother ship's anchorage at Tadoussac, a summer trading post, to the site of Montreal and its rapids. His report on the expedition was soon published in France, and in 1604 he accompanied a group of ill-fated settlers to Acadia, a region surrounding the Bay of Fundy.

Champlain spent three winters in Acadia—the first on an island in the St. Croix River, where scurvy killed nearly half the party, and the second and third, which claimed the lives of fewer men, at Annapolis Basin. During the summers he searched for an ideal site for colonization. His explorations led him down the Atlantic coast southward to Massachusetts Bay and beyond, mapping in detail the harbours that his English rivals had only touched. In 1607 the English came to Kennebec (now in Maine) in southern Acadia. They spent only one winter there, but the threat of conflict increased French interest in colonization.

Heading an expedition that left France in 1608, Champlain undertook his most ambitious project—the founding of Quebec. On earlier expeditions he had been a subordinate, but this time he was the leader of 32 colonists.

Champlain and eight others survived the first winter at Quebec and greeted more colonists in June. Allied by an earlier French treaty with the northern Indian tribes, he joined them in defeating Iroquois marauders in a skirmish on Lake Champlain. That and a similar victory in 1610 enhanced French prestige among the allied tribes, and fur trade between France and the Indians increased. In 1610 he left for France, where he married Hélène Boullé, the daughter of the secretary to the king's chamber.

The fur trade had heavy financial losses in 1611, which prompted Quebec's sponsors to abandon the colony, but Champlain persuaded Louis XIII to intervene. Eventually the king appointed a viceroy, who made Champlain commandant of New France. In 1613 he reestablished his authority at Quebec and immediately embarked for the Ottawa River on a mission to restore the ruined fur trade. The following year he organized a company of French merchants to finance trade, religious missions, and his own exploration.

Champlain next went to Lake Huron, where native chiefs persuaded him to lead a war party against a fortified village south of Lake Ontario. The Iroquois defenders wounded him and repulsed his Huron-Algonquin warriors, a somewhat disorganized but loyal force, who carried him to safety. After spending a winter in their territory, he returned to France, where political maneuvers were endangering the colony's future. In 1620 the king reaffirmed Champlain's authority over Quebec but forbade his personal exploration, directing him instead to employ his talents in administrative tasks.

The colony, still dependent on the fur trade and only experimenting in agriculture, hardly prospered under his care or under the patronage of a new and strong company. English privateers, however, considered Quebec worth besieging in 1628, when England and France were at war. Champlain manned the walls until the following summer, when his distressed garrison exhausted its food and gunpowder. Although he surrendered the fort, he did not abandon his colony. Taken to England as a prisoner, he argued that the surrender had occurred after the end of French and English hostilities. In 1632 the colony was restored to France, and in 1633, a year after publishing his seventh book, he made his last voyage across the Atlantic Ocean to Quebec.

Only a few more settlers were aboard when his ships dropped anchor at Quebec, but others continued to arrive each year. Before he died of a stroke in 1635, his colony extended along both shores of the St. Lawrence River.

(C.T.R.)

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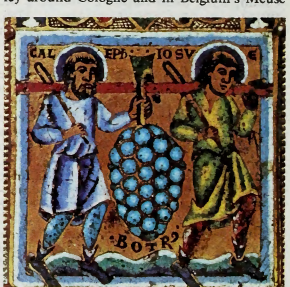
champlevé, in the decorative arts, an enameling technique or an object made by the champlevé process, which consists of cutting away troughs or cells in a metal plate and filling the depressions with pulverized vitreous enamel. The raised metal lines between the cutout areas form the design outline. Champlevé can be distinguished from the similar technique of cloisonné by a greater irregularity in the width of the metal lines (*see* cloisonné). After the enamel has annealed and cooled, it is filed with a Carborundum stone file, smoothed with pumice stone, and polished.

Knowledge about the early development of champlevé is uncertain. It figured in the Celtic art of western Europe in the Roman period and beyond. Centring in the Rhine River valley around Cologne and in Belgium's Meuse



Detail of a champlevé crucifix by Godefroid de Claire, 12th century; in the British Museum

By courtesy of the trustees of the British Museum

River valley, champlevé production flourished especially during the late 11th and 12th centuries. Among the finest and best-known work was that of the Mosan school centred at the Benedictine abbey of Stavelot near Liège, now in Belgium. Among the period's most famous enamelers were Nicholas of Verdun, who flourished in Cologne from the second half of the 12th century to the early 13th century, and Godefroid de Claire, who was largely active at Stavelot from around 1130 to 1150. *See also* Mosan school.

Champmeslé, Marie, byname LA CHAMPMESLÉ, *née* MARIE DESMARES (b. Feb. 18, 1642, Rouen, Fr.—d. May 15, 1698, Auteuil), French tragedienne who created the heroines in many of Jean Racine's plays.

The daughter of an actor, she married the actor Charles Chevillet Champmeslé in 1666, and by 1669 both were members of the Théâtre du Marais in Paris. In 1670 they joined the Hôtel de Bourgogne, where she had her first success as Hermione in Racine's *Andromaque*. Only with difficulty could Racine be persuaded by his friends to see the newcomer's debut, but after the performance he swore to write more roles for her. Thereafter her greatest triumphs were in such Racinian parts as the title role of *Bérénice,* Roxane in *Bajazet,* Monime in *Mithridate,* and the heroines of *Iphigénie* and *Phèdre.* Racine, who became her lover, tutored her in her parts

and imparted to her the system of musical declamation he had developed. The art with which she employed her voice attracted playgoers, who came, according to Mme de Sévigné, to admire the actress, not the play. In 1679 she left the Hôtel for the amalgamated Molière-Marais company, which was to form the nucleus of the Comédie-Française (1680). She became the leading lady of the Comédie-Française, playing opposite Michel Baron.

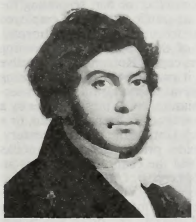


Champmeslé, detail of an oil painting by an unknown French artist, 17th century; in the collection of the Comédie-Française

Cliche Musees Nationaux

Champollion, Jean-François (b. Dec. 23, 1790, Figeac, Fr.—d. March 4, 1832, Paris), French historian and linguist who founded scientific Egyptology and played a major role in the deciphering of Egyptian hieroglyphics.

At 16 Champollion had already mastered six ancient Oriental languages, in addition to Latin and Greek, and delivered a paper before the academy of Grenoble, Fr., in which he asserted, incorrectly, that Coptic was the ancient language of Egypt. At 19, following studies in Paris, he became professor of history at the lycée of Grenoble (1809–16). Deciphering hieroglyphics became his constant preoccupation. Following the modest success of the English physicist Thomas Young in attempting to decipher the Rosetta Stone, which was engraved with a Greek text along with hieroglyphic and demotic translations, Champollion at last began to piece together the puzzle of the hieroglyphics. In 1821–22 he started publishing papers on the hieroglyphic and hieratic elements of the Rosetta Stone, and he went on to establish an entire list of hieroglyphic signs and their Greek equivalents. He was first to recognize that some of the signs were alphabetic, some syllabic, and some determinative—*i.e.*, standing for a whole idea or object previously expressed. Though many doors still awaited opening, the key to understanding ancient Egypt had at last been found. His brilliant discoveries met with opposition, however, often bitter and personal, from some other scholars.



Champollion, oil painting by Léon Cogniet, 1831; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

He became curator of the Egyptian collection at the Louvre (1826), conducted an archaeological expedition to Egypt (1828), and received the chair of Egyptian antiquities, created specially for him, at the Collège de France (1831). In addition to an Egyptian grammar (1836–41) and dictionary (1841–43), his published works include *Précis du système hiéroglyphique, etc.* (1824; "Primer of the Hieroglyphic System, etc.") and *Panthéon égyptien, ou collection des personnages mythologiques de l'ancienne Egypte* (incomplete, 1823–25; "Egyptian Pantheon, or Collection of the Mythological Figures of Ancient Egypt").

Champollion-Figeac, Jacques-Joseph (b. Oct. 5, 1778, Figeac, Fr.—d. May 9, 1867, Fontainebleau), French librarian and paleographer remembered for his own writings and for editing several works of his younger brother, Jean-François Champollion, the brilliant Egyptologist who deciphered Egyptian hieroglyphics.

In 1809 Champollion-Figeac published a work on French dialects and popular idioms. His support of Napoleon during the Hundred Days (1815) lost him his position as professor of Greek and librarian at the University of Grenoble (1816). He subsequently became curator of manuscripts at the Bibliothèque Nationale and professor at the École des Chartes (school of paleography), Paris. In 1849 Champollion-Figeac became librarian of the palace at Fontainebleau.



Champollion-Figeac, portrait by an unknown artist

By courtesy of the Bibliotheque Nationale, Paris

Champs-Élysées, officially AVENUE DES CHAMPS-ÉLYSÉES (French: "Avenue of the Elysian Fields"), broad avenue in Paris, one of the world's most famous, which stretches 1.17 miles (1.88 km) from the Arc de Triomphe to the Place de la Concorde. It is divided into two parts by the Rond-Point ("roundabout") des Champs-Élysées. The lower part, toward the Place de la Concorde (and beyond, the Tuileries Gardens), is surrounded by gardens, museums, theatres, and a few restaurants. The upper part, toward the Arc de Triomphe, was traditionally the site of luxury shops and hotels, restaurants and pavement cafés, theatres, banks, and offices but, since World War II, has steadily declined, becoming the scene of fast-food restaurants, garish movie houses, souvenir vendors, sidewalk hawkers, airline offices, and shopping malls.

When first designed in the 17th century, the Champs-Élysées consisted of fields, an open area then on the outskirts of Paris, containing the Cours de la Reine ("Queen's Drive"), an approach road running along the Seine River to the Tuileries Palace. Later in the same century, André Le Nôtre landscaped the broad, shady avenue and extended it to the crest of the hill on which the Arc de Triomphe now stands. In the 18th century the whole came to be called the Champs-Élysées. The Arc de Triomphe was inaugurated in 1836, and by the 1860s, when Baron Georges-Eugène Haussmann was grandly redrawing the boulevards of Paris, the Champs-Élysées had become a prestigious thoroughfare of palaces, hotels, and restaurants.

Chan, also called ANG CHAN, name of Cambodian kings, grouped below chronologically and indicated by the symbol •.

• **Chan I** (d. 1566), one of the most illustrious Cambodian kings (reigned 1516–66) of the post-Angkor era. He successfully defended his kingdom against Cambodia's traditional enemies, the Thais, invaded Siam (Thailand), and brought peace to Cambodia.

Chan succeeded his uncle, King Dharmarajadhiraja (Thommoreachea). After quelling rebellions inspired by a pretender to the throne, he was crowned at Pursat (Poŭthisăt), south of the Tonle Sap ("Great Lake"), in 1516. Ruling from Pursat until 1528, he reorganized the Cambodian army and held the Thais in abeyance. When he gained control of the city of Lovek (between the present Cambodian capital, Phnom Penh, and the Tonle Sap), he established his capital there. Chan nearly lost his new capital to the Thais until threats from the Myanmar (Burmese) drew their attention from Cambodia. Taking advantage of the time to consolidate his forces, he secured his kingdom by 1540.

Chan may have played a part in the reoccupation and rehabilitation of the former Khmer capital of Angkor (abandoned in the 15th century). This rehabilitation is, however, most correctly associated with the reign of his son, Barom Reachea I (1566–76). In 1553 Chan built a new palace at Lovek and was crowned again. Under his leadership, Cambodian forces attacked the Thai capital during the period 1559–64; from then until his death there was an interlude of peace.

• **Chan II** (b. 1791—d. 1835), king of Cambodia who sought to balance Siam (Thailand) against Vietnam. Both countries had traditionally contested for the Cambodian territory that lay between their domains.

When Chan's father, King Eng, died in 1796, the Thais had superiority. In 1802 Chan was recognized as the king of Cambodia by the Thais, and he was crowned in the Thai capital of Bangkok in 1806. The advisers to the young king sought to preserve peace; it was their primary concern that neither Vietnam nor Siam use Cambodia as a site to wage wars or overrun and divide the country between them. Therefore, Chan followed a policy of vassalage; he sent tribute to both courts.

Chan's friendly relations with Gia Long, the emperor of Vietnam, aroused the suspicions of the Thais. Hoping to have a more compliant ruler in Cambodia, Siam supported Chan's brother, Snguon, who attempted to usurp the throne. The usurper's army arrived in 1811, with additional support from the Thai king, Rama II, and temporarily unseated Chan, who fled to Saigon in southern Vietnam. Gia Long sent an army to help, and Chan regained his throne. After his death, Siam and Vietnam gained control of most of Cambodia, with Vietnam making major advances in the eastern part of the country.

Chan's successor, the young princess Mey, was defenseless against the political intrigues of the dominant powers. Not until Chan's younger brother, Duong, was invested as king in 1848, with the agreement of Siam and Vietnam, did the Cambodian state have a chance to reassert itself.

Ch'an, form of Mahāyāna Buddhism that arose in China and reached its culmination in the Zen school of Japan. *See* Zen.

Chan Chan, great ruined and abandoned pre-Inca city on the present-day northern Peruvian coast, the capital of the Chimú kingdom (*c.* AD 1200–1400). The site is about 300 miles (480 km) north of Lima in the Moche Valley, between the Pacific and the city of Trujillo. The ruins, which cover nearly 14 square miles (36 square km), are in good condition because the area is rainless. The city was watered by irrigation ditches, now neglected. The building material used was adobe brick, and the



Death mask of gold and silver alloy with copper eyes and ears. Chimú culture, *c.* 1000–*c.* 1465, centred at Chan Chan; in a private collection
Ferdinand Anton

buildings were finished with mud frequently adorned with relief arabesques in repetitive textile patterns. The centre of the city consists of 10 walled citadels, or quadrangles, each containing pyramidal temples, cemeteries, gardens, reservoirs, and symmetrically arranged rooms. These quadrangles presumably were the living quarters, burial places, and warehouses of the aristocracy. The bulk of the city's population lived outside of the quadrangles in modest quarters of much more flimsy construction.

The Chimú kingdom was the chief state in Peru before the establishment of the Inca empire; it extended approximately from Piura in the north to Paramonga in the south. Its cultural antecedents were the Moche, or Mochica, formerly called the Proto-Chimú.

The Chimú economy was basically agricultural, aided by irrigation works. Chimú craftsmen produced fine textiles and gold, silver, and copper objects; a polished blade pottery was mold-made and produced according to standardized designs.

The Chimú spoke Yunca (Yunga, or Mochica), a now-extinct language, but had no writing. Between 1465 and 1470 the Chimú came under Inca rule, apparently persuaded that Inca arms were invincible. The Chimú seem to have elaborated a system of social-class stratification. Chimú historical and mythological traditions were recorded by Spanish writers after the conquest (*c.* 1532).

Chan-chiang, Pinyin ZHANJIANG, formerly TSAMKONG, city in southwestern Kwangtung *sheng* (province), China. Chan-chiang is an important port on Chan-chiang Bay on the eastern side of the Luichow Peninsula and is protected by Nao-chou Island and Tung-hai Island.

Originally Chan-chiang was a minor fishing port in the area dominated by the city of Hai-k'ang (Lei-chou), some 22 miles (35 km) to the southwest, and at one time harboured a notorious nest of pirates. It first came to prominence when it was occupied by the French in 1898. In 1899 the Chinese were forced to grant France a 99-year lease of the port, the two major islands nearby, and a strip of coastal land totaling 325 square miles (842 square km). Administratively it was subject to French Indochina. It was then opened as a free port and renamed Fort Bayard. The port, however, did not develop, as the hinterland was not prosperous; instead the French developed access to their sphere of influence in Southwest China via the railway to Hanoi in what is now northern Vietnam. Chan-chiang was occupied by the Japanese early in 1943 and was returned to Chinese control in 1945.

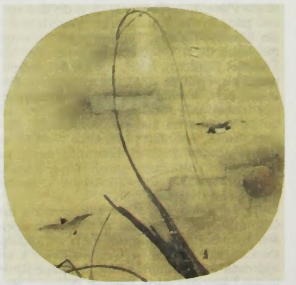
Since 1949, under the Communist government, Chan-chiang has developed new importance. In 1955 a rail link was built to Li-t'ang in Kwangsi province, where it joined the Hunan–Kwangsi rail system. Since that time Chan-chiang has been developing into a major modern port serving southwest China, usable by ships of up to 10,000 tons. In 1984 Chan-chiang was designated one of China's "open" cities in the new open-door policy inviting foreign investment. Chan-chiang has also begun to develop industrially. It has small shipyards and engineering works, textile plants, and sugar-refining, flour- and rice-milling, and chemical works. Pop. (1988 est.) 364,000.

Chan-kuo (China): *see* Warring States.

Chan language: *see* Laz language.

Ch'an painting, Pinyin CHAN, school of Chinese painting inspired by the "meditative" school of Buddhism called, in Chinese, Ch'an (Japanese: Zen). Although Ch'an originated in China with an Indian monk, Bodhidharma, it came to be the most Chinese of Buddhist schools. The ideals of the school later frequently found expression in a special kind of art, typically of broad surfaces of ink monochrome that suggest the sudden, intuitive, and individual awareness—without the secondary aid of either teacher or sacred text—that comes to the Ch'an devotee in moments of illumination.

Given the emphasis upon individual achievement desired by the school, there is no single style of Ch'an painting; the most notable of the early Ch'an painters in China were masters of the Five Dynasties (907–960) period, including Kuan-hsiu and Shih-k'o in Szechwan. Other famous Ch'an painters, especially in the Southern Sung (1127–1279) period, include Mu-ch'i Fa-ch'ang and Liang K'ai (*qq.v.*). These two painters were accomplished artists within the by-then traditional subject matter of landscape; yet they are also known to have painted seemingly spontaneous paintings of more obvious Ch'an inspiration, which include representations of great patriarchs of the school as well as disarmingly simple depictions of fruits or flowers. Ch'an art is suggestive rather than literally representational, though it sometimes includes subjects such as the bodhisattva Kuan-yin (in a white robe) and meticulously drawn and coloured portraits of great masters and historical figures. Chinese painters of post-Sung times often had contact with Ch'an thought, but there is little in their art that can be directly related to the experience.



"Two Crows and a Weeping Willow," Ch'an fan painting by Liang K'ai (*c.* 1140–*c.* 1210), ink on silk; in the Imperial Palace Museum, Peking
Cliche, Editions Cercle d'Art, Paris

The Chinese have not particularly revered Ch'an painting. Its often brilliant ink displays have, however, attracted the Japanese. In the Muromachi period (1338–1573), Ch'an painting and the philosophy behind it began to have a pervasive influence, stimulating arts ranging from painting and architecture to flower arrangement, from haiku poetry to the tea ceremony.

Chanak (India): *see* Barrackpore.

Chanak, Treaty of (1809): *see* Çanak, Treaty of.

Chanakya (Hindu statesman): *see* Kauṭilya.

chance music: *see* aleatory music.

chancel, portion of a church that contains the choir, often at the eastern end. Before modern changes in church practice, only clergy and choir members were permitted in the chancel. The name derives from the Latin word for "lattice," describing the screen that during some eras of church history divided the chancel from the nave and crossing.

This lattice is now more commonly called a chancel screen, which during the Middle Ages largely replaced a chancel rail to set the area apart. Modern churches tend to have neither screen nor significant rail, but the area is still called the chancel, and the word today is often interchangeable with choir or sanctuary.

Chancelade skeleton, human fossil remains discovered in a rock shelter at Chancelade in southwestern France in 1888. The skeleton was found in a curled posture—an indication of a deliberate burial—below the lower Magdalenian occupation floors of the shelter; it is assumed to be of Magdalenian age (about 17,000 years old). The Chancelade skull was studied by the French anatomist Jean-Léo Testut, who declared it to be of Eskimo type and established it as the type specimen of a supposed "Chancelade race." Although its Eskimo affinities were long accepted by many reputable anthropologists, later experts generally agreed that, like the Grimaldi fossils, originally presumed to be a Negroid type, the Chancelade skull falls within the range of variation of Cro-Magnon man.

To make the best use of the Britannica, consult the INDEX *first*

chancellor, in western Europe, the title of holders of numerous offices of varying importance, mainly secretarial, legal, administrative, and ultimately political in nature. The Roman *cancellarii,* minor legal officials who stood by the *cancellus,* or bar, separating the tribune from the public, were later employed in the imperial *scrinia* (writing departments). After the fall of the empire, the succeeding barbarian rulers copied Roman administrative practice; thus it came about that the writing offices of medieval territorial rulers, both secular and ecclesiastical, were presided over by a chancellor (sometimes an archchancellor, or a vice-chancellor). Until about the 13th century, few people besides priests, clerks, and monks were literate, and the chancellor was thus an ecclesiastic. As keeper of the great seal used to authenticate royal documents, the chancellor became, in most medieval kingdoms, the most powerful official. The office was finally abolished in Austria (1806), in France (1848), and in Spain (1873). In England no chancellor wielded primatial political power after Cardinal Wolsey; the lord high chancellor is now, as head of the judiciary and president of the House of Lords, a member of the Cabinet. In Germany from 1871 and in Austria from 1918, the title *Kanzler* ("chancellor") has been held by the prime minister.

The title chancellor is also the name in many

countries of the heads of small archive offices, of the heads of universities, and of some orders of chivalry.

In England the member of the Cabinet in charge of finance is called the chancellor of the Exchequer; another Cabinet member, the chancellor of the duchy of Lancaster, is a minister without departmental responsibility whose title derives from that of the official originally employed by the crown to manage the palatine duchy of Lancaster.

chancellor, lord (British officer of state): *see* lord chancellor.

Chancellor, Richard (d. Nov. 10, 1556, Pitsligo Bay, Aberdeen, Scot.), British seaman whose visit to Moscow in 1553–54 laid the foundations for English trade with Russia.

In 1553 Chancellor was appointed pilot general of Sir Hugh Willoughby's expedition in search of a northeast passage from England to China. The three-vessel fleet was to rendezvous at Vardø, Nor., but because of stormy weather Chancellor's was the only ship to make it to Vardø. Willoughby and his crew died in Lapland, but Chancellor continued on into the White Sea, then journeyed overland to Moscow. There Tsar Ivan IV greeted him with warm hospitality and gave him a letter granting the English favourable conditions for trade with Russia. Chancellor rejoined his ship in the summer of 1554 and returned to England. His successful negotiations with the tsar resulted in the formation (1555) of the Muscovy Company, which was given a monopoly of Russian trade.

From October 1555 to July 1556 Chancellor was again in Moscow on a trading mission, but on the return voyage he lost his life in a shipwreck off the coast of Scotland.

Chancellorsville, Battle of (May 1–5, 1863), in the American Civil War, bloody assault by the Union army in Virginia that failed to encircle and destroy the Confederate army of northern Virginia. Following the "horror of Fredericksburg" (Dec. 13, 1862), the Confederate army of General Robert E. Lee and the Union force under General Joseph Hooker had spent the winter facing each other across the Rappahannock River, Virginia. On April 27 Hooker dispatched his cavalry behind Lee's army, intending to cut off a retreat. Two days later he sent a small diversionary force across the Rappahannock below Fredericksburg and crossed upriver with the main body of his army. By May 1 his superior forces were massed near Chancellorsville, a crossroads in a densely forested lowland called the Wilderness. Deprived of his cavalry, however, Hooker was blind to Lee's movements, and on May 2, when Lee ordered General T.J. "Stonewall" Jackson's "foot cavalry" to swing around and attack the Union right, Hooker's surprised flank was routed. The Union general withdrew, and Lee's pressure over the next three days forced a Union retreat north of the river. The South's greatest casualty was the loss of Jackson, who died May 10 of battle wounds. Of 130,000 Union soldiers engaged at Chancellorsville, more than 17,000 were lost; of 60,000 Confederates, more than 12,000 were lost.

Chancery, Court of, in England, the court of equity under the lord high chancellor that began to develop in the 15th century to provide remedies not obtainable in the courts of common law. Today, the court comprises the Chancery Division of the High Court of Justice. Courts of chancery or equity are still maintained as separate jurisdictions in certain areas of the commonwealth and in some states of the United States.

In England the common-law courts became firmly established as the principal organs of royal justice by the 14th century. In earlier days they had exercised a wide jurisdiction in framing and applying the rules of the common law, but their most creative period was over. A large body of rules, many of them highly technical and artificial, had come into existence; the common law was increasingly rigid and inflexible. In civil cases the relief available was largely limited to payment of damages and to the recovery of the possession of land and chattels. The court refused to extend and diversify types of relief so as to meet the needs of new and more complex situations. In their insistence on the letter of the law, the courts often failed to deal fairly and equitably between the parties. Another cause of dissatisfaction was that, in the growing political chaos of the 15th century, powerful local lords were able to bribe or intimidate juries and defy court orders.

Disappointed litigants consequently turned to the king and council with petitions for justice. These petitions were referred to the lord chancellor, who by the 15th century had begun to build up a series of equitable remedies, together with policies governing their operation. In the exercise of his equitable jurisdiction, the chancellor initially was not bound by precedent, as were the common-law judges. He had wide powers to do justice as he saw fit, and he exercised them with a minimum of procedural formality. The chancery was relatively cheap, efficient, and just; during the 15th and 16th centuries, it developed spectacularly at the expense of the common-law courts. During the 17th century, opposition developed from the common-law judges and Parliament; they resented chancery's encroachment upon the province of the common-law courts, and the chancellor was forced to agree not to hear any case in which there was adequate remedy, such as damages, at common law.

By the early 16th century, the development of a system of precedent exercised another restrictive influence on the continued growth of equitable remedies. Although most of the early chancellors had been clerics, the later ones were usually lawyers who used the newly initiated reports of cases to begin shaping equity into an established set of rules. By the middle of the 17th century, the equity administered by the Court of Chancery had become a recognized part of the law of the land. By the Judicature Act of 1873, the competitive, separate common-law law and equity courts in England, with their attendant delays, expense, and injustice, were abolished.

chancery cursive (calligraphy): *see* cancellaresca corsiva.

chancre, typical skin lesion of the primary stage of infectious syphilis, usually appearing on the penis, labia, cervix, or anorectal region. (Because in women the chancre often occurs internally, it may go unnoticed.) The lesion often occurs in combination with a painless swelling of the regional lymph nodes, and together these symptoms are the major characteristics of syphilis in its earliest stage.

The chancre usually occurs approximately three weeks after infection; it is a single, red papule that gradually begins to erode, forming a painless, clean ulcer with a smooth, raised border. The fluid expressed from the lesion contains the spirochete *Treponema pallidum*, the causative agent of syphilis. The size of the eroded area ranges from a few millimetres to several centimetres; usually chancres that occur at extragenital sites (most often on the lips and tongue) are larger than genital chancres. Although the chancre itself can heal without treatment in two to six weeks, the underlying syphilis will progress to the secondary phase unless treatment with penicillin is undertaken.

Lesions that look like the chancres typical of syphilis may occur in people infected with one form of tuberculosis; these lesions appear two to three weeks after the tubercle bacillus penetrates the skin and heal spontaneously over a 12-month period. True chancres, however, have a syphilitic origin, and examination of the causative organism (in material taken from the base of the ulcer) can reveal the nature of the lesion.

chancroid, acute, localized, chiefly sexually transmitted disease, usually of the genital area, caused by the bacillus *Haemophilus ducreyi*. It is characterized by the appearance, 3–5 days after exposure, of a painful, shallow ulcer at the site of infection. Such an ulcer is termed a soft chancre, as opposed to a hard chancre, which is the characteristic lesion of the primary stage of infectious syphilis. The appearance of the soft chancre is followed by enlargement and inflammation of the regional lymph nodes. Sulfonamide drugs inhibit the growth of the microorganism; erythromycin and streptomycin are among the most effective drugs used for treatment of the disease.

Chandelā, also spelled CĀNDELLĀ, Rājput clan of Gond origin that for some centuries ruled Bundelkhand in north-central India and fought against the early Muslim invaders. The first Chandelā is thought to have ruled early in the 9th century AD. Chandelā dominion extended from the River Jumna in the north to the region of Saugor (Sāgar) and from the Dhasān River to the west to the Vindhya Hills. Their strongholds were the famous fortress of Kālinjar, together with Khajurāho, Mahoba, and Ajaigarh. The Chandelā raja Nanda, or Gaṇḍa, assisted Jaipāl at Lahore in his campaigns against the Muslim Turks and shared in the great defeat of 1001 near Peshāwār by Maḥmūd of Ghazna (Ghaznī). In 1023 the Chandelās lost Kālinjar, which was thenceforth an object of contention between Hindus and Muslims. In 1082 they were reduced to vassalage by Ajmer. Chandelā rule was replaced eventually by that of the Bundelās.

chandelier, a branched candleholder—or, in modern times, electric-light holder—suspended from the ceiling. Hanging candleholders made of wood or iron and simply shaped were used in Anglo-Saxon churches before the Norman Conquest (1066). In the 12th and 13th centuries huge openwork hoops of iron or bronze supported numerous prickets (spikes) for candles.

Brass chandeliers were made in the late European Middle Ages, mostly for churches. In the 18th century the Netherlands became known for its brass chandeliers, which had a boldly shaped baluster stem terminating in a large, burnished, reflecting sphere; from the stem sprang S-shaped branches ending in sockets.

In England and France fine chandeliers in



Venetian glass chandelier from Murano, 18th century; in the Ca' Rezzonico, Venice
Photo Fratelli Fabbri Editori, Milan

silver and carved and gilded wood were made during the 18th century. The earliest English glass chandeliers date from the 1720s and were of plain design with a ball at the base. Eventually they became very elaborate, with glass icicles around the shaft and long cascades of pear-shaped drops. On the European continent the finest chandeliers were usually of rock crystal, but many glass chandeliers were made in Venice and Bohemia in the 18th century. Venetian chandeliers were known for their multicoloured glass and floral ornament.

Chandernagore, also called CHANDANNAGAR, city, southeastern West Bengal state, northeastern India, just west of the Hooghly River and part of the Calcutta urban agglomeration. It is connected by road and rail with Calcutta and Burdwān. Settled in 1673 by the French and expanded commercially, it was captured by the English in 1757 and again in 1794 but was restored to France in 1815. Following the 1949 plebiscite, it merged with India. Chandernagore has several colleges affiliated with the University of Burdwān. Pop. (1991 prelim.) 122,351.

Chandīgarh, city, joint capital of Haryāna and Punjab states and a union territory of India, situated in the plain just south of the Shiwālik Hills.

A brief treatment of Chandīgarh follows. For full treatment, *see* MACROPAEDIA: India.

A major communications junction, the city of Chandīgarh is connected by road and rail with Delhi, Ambāla, Kālka, and Shimla. The site was selected to replace the former capital city, Lahore, lost to Pakistan at partition in 1947. Planned by the Swiss-born architect Le Corbusier, in collaboration with Indian architects, it is divided into rectangular sectors. Government buildings are located in the north, and there is a large artificial lake in the northeast. The industrial areas in the southeast are separated from the city by a greenbelt. Chandīgarh is the seat of Panjab University and many affiliated colleges, including nursing and engineering institutes. There is also a government museum and art gallery.

The union territory of Chandīgarh has an area of 44 square miles (114 square km); it contains the city of Chandīgarh and the immediate surrounding region. Pop. (1991 prelim.) city, 502,992; metropolitan area, 574,646; union territory, 640,725.

Chandler, city, Maricopa county, south-central Arizona, U.S. Founded in 1915 by A.J. Chandler, the city is a winter resort in a cotton, alfalfa, citrus-fruit, pecan, sugar-beet, and cattle-raising region of the irrigated Salt River valley. Raw diamonds are processed there. Williams Air Force Base (1941), home of the nation's first jet air school, is 10 miles (16 km) east. The Gila Bend Reservation is immediately to the west. Inc. 1920. Pop. (1990) 90,533.

Chandler, Happy, byname of A.B. CHANDLER, in full ALBERT BENJAMIN CHANDLER (b. July 14, 1898, Corydon, Ky., U.S.—d. June 15, 1991, Versailles, Ky.), U.S. senator (1939–45), governor of Kentucky (1935–39, 1955–59), and controversial commissioner of American baseball (1945–51).

Chandler attended Transylvania College, Lexington, Ky. (A.B., 1921), and, after a year at the Harvard Law School, attended the University of Kentucky (LL.B., 1924). Turning to politics after a brief stint in private law practice, he was elected to the Kentucky Senate in 1929 and became his state's lieutenant governor in 1932 and governor in 1935. He modernized the state's government and then resigned so that he could be appointed to an unexpired seat in the U.S. Senate; he was elected to a full term in 1942.

After the first baseball commissioner, Kenesaw Mountain Landis, died in 1944, the baseball owners chose Chandler to replace him. During the course of his tenure he became noted for his independence. He advocated players' rights by supporting a new pension plan and a $5,000 minimum salary for major-league players; he suspended the Brooklyn Dodgers manager Leo Durocher for the 1947 season for "an accumulation of unpleasant incidents . . . detrimental to baseball"; and he cleared the way for Jackie Robinson to become the first black player in modern major-league history (despite a 15–1 negative vote by club owners). The club owners did not reelect Chandler in 1951.

Paradoxically, Chandler, the backer of Robinson, supported the segregationist Dixiecrats in the 1948 presidential elections. But, after being reelected governor of Kentucky in 1955, he used National Guard troops to enforce school integration. Then, in another turnabout, in 1968 he sought, unsuccessfully, the vice-presidential spot on segregationist George Wallace's team.

Chandler was inducted into the Baseball Hall of Fame in 1982.

Chandler, Norman (b. Sept. 14, 1899, Los Angeles, Calif., U.S.—d. Oct. 20, 1973, Los Angeles), American newspaper publisher who helped change the *Los Angeles Times* from a conservative regional journal to one of the largest and most influential newspapers in the world.

Chandler was the son of Harry Chandler, who owned the *Los Angeles Times*. After attending Stanford University, Norman joined the *Times* in 1922 as secretary to his father. He became president and general manager of the paper in 1941. In 1960 he stepped aside as publisher in favour of his son, Otis. In 1966 he became chairman of the board and chief executive officer of the parent Times-Mirror Company. He modernized the Times-Mirror Company's operation and made the *Times* one of the most automated newspapers in the United States. After he relinquished the day-to-day operations of the *Times* in 1960, Norman Chandler concentrated on expansion and diversification, buying the daily *Newsday* in Garden City, N.Y., the *Orange Coast Daily Pilot* in Orange County, Cal., and the *Dallas Times Herald.*

Chandler's son Otis became assistant to the president of the *Mirror-News* in 1957. (Its publication was subsequently suspended.) In 1960 he succeeded his father as publisher of the *Times.* Under Otis's direction the still-conservative newspaper also gave more space to liberal and opposing viewpoints.

Chandler, Raymond, in full RAYMOND THORNTON CHANDLER (b. July 23, 1888, Chicago, Ill., U.S.—d. March 26, 1959, La Jolla, Calif.), American author of detective fiction, the creator of the private detective Philip Marlowe, whom he characterized as a poor but honest upholder of ideals in an opportunistic and sometimes brutal society in Los Angeles.

From 1896 to 1912 Chandler lived in England with his mother, a British subject of Irish birth. Although he was an American citizen and a resident of California when World War I began in 1914, he served in the Canadian army and then in the Royal Flying Corps (afterward the Royal Air Force). Having returned to California in 1919, he prospered as a petroleum company executive until the Great Depression of the 1930s, when he turned to writing for a living. His first published short story appeared in the "pulp" magazine *Black Mask* in 1933. From 1943 he was a Hollywood screenwriter. Among his best-known scripts were for the films *Double Indemnity* (1944), *The Blue Dahlia* (1946), and *Strangers on a Train* (1951), the last written in collaboration with Czenzi Ormonde.

Chandler completed seven novels, all with Philip Marlowe as hero: *The Big Sleep* (1939), *Farewell, My Lovely* (1940), *The High Window* (1942), *The Lady in the Lake* (1943), *The Little Sister* (1949), *The Long Goodbye* (1953), and *Playback* (1958). Among his numerous short-story collections are *Five Murderers* (1944) and *The Midnight Raymond Chandler* (1971). The most popular film versions of Chandler's work were *Murder, My Sweet* (1945; also distributed as *Farewell, My Lovely*), starring Dick Powell, and *The Big Sleep* (1946), starring Humphrey Bogart, both film noir classics.

Chandler, William Eaton (b. Dec. 28, 1835, Concord, N.H., U.S.—d. Nov. 30, 1917, Concord), American politician and Republican Party official who played a major role in swinging the disputed 1876 presidential election to Rutherford B. Hayes.

After graduating from Harvard Law School in 1854, Chandler began a dual career in law and journalism. In 1863 he was elected to the New Hampshire legislature. He entered national politics when President Abraham Lincoln assigned him to investigate fraud in the Philadelphia navy yard. Chandler later performed other functions in the Navy Department before President Andrew Johnson made him assistant secretary of the treasury. In 1867 Chandler returned to his private law practice in New Hampshire.

After serving as secretary of the Republican National Committee during the presidential elections of 1868 and 1872, Chandler became deeply involved in the political maneuvering during the contested election of 1876. He refused to concede the contest to Samuel J. Tilden, and he led the fight that eventually made Hayes president. Passed over by Hayes for political office, Chandler turned against the president and in 1877 publicly charged that the election had been decided by a "corrupt bargain." Hayes, according to Chandler, had agreed to end the military occupation of the South in exchange for the crucial electoral votes that he needed to secure the presidency.

In 1882 President Chester A. Arthur appointed Chandler secretary of the navy. Although later charged with scandal, Chandler did preside over the momentous shift in naval construction from wood to steel ships. He returned to New Hampshire in 1885 but two years later was back in Washington filling an unexpired Senate term. He was elected to two full terms in the Senate, 1889–95 and 1895–1901.

Chandler, Zachariah (b. Dec. 10, 1813, Bedford, N.H., U.S.—d. Nov. 1, 1879, Chicago, Ill.), American politician, one of the leaders of the Radical Republicans during the American Civil War and Reconstruction.

After a public school education in Bedford, N.H., Chandler in 1833 moved to Detroit, Mich. There, starting first with a general store and later going into banking and land speculation, he became quite wealthy.

Chandler, who was a Whig, campaigned for presidential candidate Zachary Taylor in 1848 and served as mayor of Detroit from 1851 to 1852. He was defeated when he ran as the Whig candidate for governor of Michigan in 1852. With the collapse of the Whig Party, Chandler became one of the founders of the Republican Party, signing the call for the historic meeting at Jackson, Mich. (July 6, 1854). A delegate to the Republican national convention in 1856, he became a member of the party's national committee. He was elected to the U.S. Senate and served there from 1857 to 1875.

During his Senate tenure, Chandler emerged as a leader of the Radical Republicans; he urged President Lincoln to prosecute the Civil War more forcefully, he vigorously advocated emancipation of the slaves, and he later backed the Reconstruction Acts. He was a member of

the Joint Committee on the Conduct of the War and a leading supporter of a new national bank.

In spite of the efforts of a patronage army that gave him complete control over the Republican Party in Michigan throughout his senatorial career, Chandler was defeated by his Democratic opponent in 1874. Appointed secretary of the interior by President Ulysses S. Grant in October 1875, Chandler reorganized the department before his brief tenure ended in March 1877.

Chandos, DUKES AND BARONS OF, titled English nobility of several creations, notably in the Brydges family, grouped below chronologically and indicated by the symbol •.

• Chandos (of Sudeley), John Brydges, 1st Baron (b. 1490?—d. April 12, 1557, Sudeley Castle, Gloucestershire, Eng.), knight prominent in England's Tudor period.

Brydges was descended from Sir John Chandos, a famous medieval knight, and served in the French wars of Henry VIII. He was knighted in 1513. During Queen Mary I's reign he was lieutenant of the Tower of London (1553–54) and, having helped in the suppression of Sir Thomas Wyat's rebellion, was created a baron in 1554. He led Lady Jane Grey, as his prisoner, to the scaffold, and for a time he was the jailer of the princess Elizabeth (the future Elizabeth I).

• Chandos (of Sudeley), Grey Brydges, 5th Baron (b. *c.* 1579/80—d. Aug. 10, 1621, Spa [now in Belgium]), British nobleman whose lavish lifestyle earned him the nickname "King of the Cotswolds."

Brydges was member of Parliament for Cricklade in 1597–98. Because of his family's friendship with Robert Devereux, 2nd Earl of Essex, Brydges was imprisoned in 1601 after Essex' unsuccessful revolt against Queen Elizabeth I; he was soon released. He succeeded to the barony on the death of his father in 1602. With this succession, Sudeley House was opened to neighbours three times a week, and it gained a reputation as the site of generous and extravagant parties. About 1613 Chandos' health began to fail, and he took the waters in Spa, where he died in 1621. He was succeeded by his eldest son, George.

• Chandos, James Brydges, 1st Duke of, MARQUESS OF CARNARVON, EARL OF CARNARVON, VISCOUNT WILTON, 9TH BARON CHANDOS OF SUDELEY (b. Jan. 6, 1673—d. Aug. 9, 1744), English nobleman, patron of composer George Frideric Handel.

The son and heir of James Brydges, 8th Baron Chandos of Sudeley, he was a member of Parliament from 1698 to 1714. For eight years (1705–13) during the War of the Spanish Succession, he was paymaster general of the forces abroad, whereby he amassed great wealth. Three days after his father's death in 1714, he was created Viscount Wilton and Earl of Carnarvon, and in 1719 Marquess of Carnarvon and Duke of Chandos.

Chandos is chiefly remembered for his connections with Handel and with Alexander Pope. He built a magnificent house at Canons near Edgware in Middlesex; and for more than two years Handel, employed by Chandos, lived at Canons, where he composed his oratorio *Esther.* Pope, who in his *Moral Essays* (*Epistle to the Earl of Burlington*) doubtless described Canons under the guise of "Timon's Villa," referred to the duke in the line "Thus gracious Chandos is belov'd at sight."

Chandos, who was lord lieutenant of the counties of Hereford and Radnor and chancellor of the University of St. Andrews, became involved in financial difficulties, and after his death Canons was pulled down for the sale of its materials.

He was succeeded by his son Henry, 2nd duke (1708–71), and grandson James, 3rd duke (1731–89). On the death of the latter without sons in September 1789, all of his titles, except that of Baron Kinloss, became extinct. The 3rd duke's only daughter, Anna Elizabeth, who became Baroness Kinloss on her father's death, was married in 1796 to Richard Grenville, afterward Marquess of Buckingham; and in 1822 this nobleman was created Duke of Buckingham and Chandos.

Chandos, Sir John (d. Jan. 1, 1370, Mortemer, France), English military captain, soldier of fortune, and a founding member of the Order of the Garter (1349).

Chandos was a lifelong follower and companion of Edward the Black Prince, fighting under him at Crécy (1346), Poitiers (1356), and Nájera (1367). Given the lands of the Viscount de Saint-Sauveur in the Cotentin, Chandos was made constable of Guyenne in 1362 and was seneschal of Poitou from 1360 to 1372. He had administrative talent and was esteemed by friend and foe as an honourable negotiator. His great rival, the French captain Bertrand du Guesclin, was among his admirers. Wounded in a skirmish at Lussac-les-Châteaux near Poitiers, Chandos, who was unmarried, died at Mortemer. His herald wrote a biography of the Black Prince that is a valuable source of contemporary information.

Chāndpur, river port, south-central Bangladesh, situated at the confluence of the Dākātia and Meghna rivers. It is a major jute-shipping centre, connected by road and rail with Comilla and Noākhāli and by river steamer with Calcutta (through the Sundarbans), Goalundo Ghāt, and Nārāyanganj. Industries served by its thermal power station include jute presses, oilseed and plywood mills, and match and chemical factories. Chāndpur was constituted a municipality in 1897. Pop. (1991 prelim.) 84,067.

Chandra Gupta, also spelled CHANDRAGUPTA (Indian rulers): *see under* Candra Gupta.

Chandra Shekhar (b. 1927, Ibrahimpatti, India), politician and legislator who served as prime minister of India from November 1990 to June 1991.

Shekhar was a leading member of the Socialist Party before he joined the ruling Congress Party in 1964. He was a member of India's upper legislative chamber, the Rajya Sabha, from 1962 to 1967, and he held a seat in the lower chamber, the Lok Sabha, in 1977–79, 1980–84, and from 1989 until he became prime minister. Shekhar split with the leader of the Congress Party, Indira Gandhi, in 1975 and spent time in prison during the national emergency she subsequently declared.

In 1977 Shekhar became president of the Janata Party, which headed a coalition government under Prime Minister Morarji Desai from 1977 to 1979. In 1988 Shekhar's Janata Party merged with several other opposition parties to form the Janata Dal Party under the leadership of V.P. Singh, who subsequently became prime minister. After leading an internal rebellion against Singh, Shekhar broke with the Janata Dal Party on Nov. 5, 1990, and quickly formed the Janata Dal–Socialist faction. With the support of Rajiv Gandhi's Congress (I) Party, he replaced Singh as India's prime minister on Nov. 10, 1990, as head of a weak minority government. He resigned the office on March 6, 1991, after the Congress (I) Party withdrew its support, but he remained in office as a caretaker until national legislative elections could be held in May and June.

Chandragiri, town in southeastern Andhra Pradesh state, southeastern India. It lies about 80 miles (130 km) northwest of Madras. Chandragiri is historically important for its connection with the Āravīdu dynasty of Vijayanagar in South India. When the dynasty's empire was overthrown at the Battle of Tālikota (1565) and the great city of Vijayanagar was taken by the Deccan allied Muslim army, the reigning Āravīdu raja fled to Penukonda, nearly 200 miles (320 km) northwest of Madras.

In 1585 the Āravīdu dynasty's capital was moved to Chandragiri, site of a fort dating from AD 1000, which was then improved. There the rajas maintained themselves and a crumbling empire until 1646, when Chandragiri was taken by the sultan of Golconda (modern Hyderābād), from whom it passed to the Mughals (1687). It was from a dependent of the last Āravīdu rajas that the English East India Company obtained permission, in 1639, to build a fort and factory in the district, known as Madraspatnam, which became Fort St. George and the city of Madras.

Chandrapur, formerly CHĀNDA, city, eastern Mahārāshtra state, western India, situated along the Wardha River. The name means "village of the Moon." Chandrapur was the capital of the Gond dynasty from the 12th to the 18th century, and it was later conquered by the Marāthā Bhonsles from Nāgpur. It formed part of the British Central Provinces from 1854 until Indian independence in 1947.

Located on major rail and road routes, the city is a commercial centre for the cotton, grain, and other crops grown in the surrounding area. Industries, based on local minerals, include several collieries and glassworks. The city is also noted for the production of such luxury goods as silk fabrics and ornamental slippers. Chandrapur has a college affiliated with the University of Burdwan. Tadoba National Park lies north of Chandrapur. Pop. (1991 prelim.) 225,841.

Chandrasekhar, Subrahmanyan (b. Oct. 19, 1910, Lahore, India [now in Pakistan]—d. Aug. 21, 1995, Chicago, Ill., U.S.), Indian-born American astrophysicist who, with William A. Fowler, won the 1983 Nobel Prize for Physics for formulating the currently accepted theory on the later evolutionary stages of massive stars.

Chandrasekhar was the nephew of Sir Chandrasekhara Venkata Raman, who won the Nobel Prize for Physics in 1930. Chandrasekhar was educated at Presidency College, at the University of Madras, and at Trinity College, Cambridge. From 1933 to 1937 he held a position at Trinity.

By the early 1930s, scientists had concluded that, after converting all of their hydrogen to helium, stars lose energy and contract under the influence of their own gravity. These stars, known as white dwarf stars, contract to about the size of the Earth, and the electrons and nuclei of their constituent atoms are compressed to a state of extremely high density. Chandrasekhar determined what is known as the Chandrasekhar limit—that a star having a mass more than 1.44 times that of the Sun does not form a white dwarf but instead continues to collapse, blows off its gaseous envelope in a supernova explosion, and becomes a neutron star. An even more massive star continues to collapse and becomes a black hole. These calculations contributed to the eventual understanding of supernovas, neutron stars, and black holes.

Chandrasekhar joined the staff of the University of Chicago, rising from assistant professor of astrophysics (1938) to Morton D. Hull Distinguished Service Professor of Astrophysics (1952), and became a U.S. citizen in 1953. He did important work on energy transfer by radiation in stellar atmospheres and convection on the solar surface. He also attempted to develop the mathematical theory of black holes, describing his work in *The Mathematical Theory of Black Holes* (1983).

Chandrasekhar was awarded the Gold Medal of the Royal Astronomical Society in 1953 and the Royal Medal of the Royal Society in 1962. His other books include *An Introduc-*

tion to the Study of Stellar Structure (1939), *Principles of Stellar Dynamics* (1942), *Radiative Transfer* (1950), *Hydrodynamic and Hydromagnetic Stability* (1961), and *Truth and Beauty: Aesthetics and Motivations in Science* (1987).

Chandrasekhar limit, in astrophysics, maximum mass theoretically possible for a stable white dwarf star.

This limiting value was named for the Indian-born astrophysicist Subrahmanyan Chandrasekhar, who formulated it in 1930. Using Albert Einstein's special theory of relativity and the principles of quantum physics, Chandrasekhar showed that it is impossible for a white dwarf star, which is supported solely by a degenerate gas of electrons, to be stable if its mass is greater than 1.44 times the mass of the Sun. If such a star does not completely exhaust its thermonuclear fuel, then this limiting mass may be slightly larger.

All direct mass determinations of actual white dwarf stars have resulted in masses less than the Chandrasekhar limit. A star that ends its nuclear-burning lifetime with a mass greater than the Chandrasekhar limit must become either a neutron star or a black hole.

Chanel, Gabrielle, byname coco (b. Aug. 19, 1883, Saumur, Fr.—d. Jan. 10, 1971, Paris), French dress designer who ruled over Parisian haute couture for almost six decades. Her elegantly casual designs inspired women of fashion to abandon complicated, uncomfortable clothes and to adopt her now-classic innovations—*i.e.,* jersey dresses and suits, bell-bottom trousers, bobbed hair, trench coats, turtleneck sweaters, costume jewelry, and the "little black dress."

Born in the French countryside, Chanel was orphaned at the age of six. Little is known about the rest of her early life. In 1913 she opened a tiny millinery shop in Deauville, Fr. She quickly added sweaters, skirts, and accessories to the shop. Within five years her original use of jersey fabric to create a "poor girl" look had attracted the attention of influential wealthy women seeking relief from prevalent corseted styles. Her nonconformist designs stressing simplicity and comfort revolutionized the fashion industry for the next 30 years. At the height of her career, the



Coco Chanel
By courtesy of Chanel

Chanel industries employed 3,500 people and included a fashion house, a textile business, perfume laboratories, and a workshop for costume jewelry. The financial basis of this empire was Chanel No. 5, the phenomenally successful perfume introduced in 1922.

Chanel retired in 1938 but returned in 1954 to introduce her highly copied suit design: a collarless, braid-trimmed cardigan jacket with a graceful skirt.

Chanel never married, but her liaisons with the wealthy and famous earned her notoriety in the social and artistic circles of Paris.

Chaney, Lon, original name ALONSO CHANEY (b. April 1, 1883, Colorado Springs, Colo., U.S.—d. Aug. 26, 1930, Los Angeles, Calif.), American film actor called the "Man of a Thousand Faces," whose macabre characterizations are classics of the silent screen.

Born of deaf-mute parents, Chaney learned pantomime as a boy. He became a prop man, transportation agent, producer, and actor in his brother's traveling show. Beginning in films as an extra and bit player, he had an important supporting role in *Hell Morgan's Girl* (1917). Two years later his role in *The Miracle Man* (1919) made him a star. During the next 10 years Chaney earned a reputation as the finest character actor in films. Often working with the director Tod Browning, he played such memorable characters as the legless ruler of the underworld in *The Penalty* (1920); Quasimodo the hunchback in *The Hunchback of Notre Dame* (1923); the



Lon Chaney
Brown Brothers

acid-scarred musician who haunted the subterranean passages of the Paris Opéra in *The Phantom of the Opera* (1925); and the dual role of police inspector and vampire in *London After Midnight* (1927). Chaney was also acclaimed for straight performances in *Tell It to the Marines* (1927), *While the City Sleeps* (1928), and *Thunder* (1929).

His son, Lon Chaney, Jr. (1907–73), originally named Creighton Chaney, also appeared in horror films, chiefly as a werewolf.

chang, Pinyin ZHANG, an old Chinese measure of length equal to 10 *ch'ih,* or 3.58 m (11 feet 9 inches). The value was agreed upon by China in treaties (1842–44 and 1858–60) with England and France. It was thereafter used by Chinese maritime customs as the standard value for assessing all tariff duties. The length of one *ch'ih* varied throughout China from 27.9 to 40 cm (11 to 15.8 inches). The so-called treaty *ch'ih* was defined for customs purposes as 35.8 cm (14.1 inches).

Ch'ang-an, ancient site, China. Formerly the capital of the Han, Sui, and T'ang dynasties, it is located near the modern city of Sian (*q.v.*).

Chang and Eng (b. May 1811, Meklong, Siam [Thailand]—d. Jan. 16/17, 1874, Mount Airy, N.C., U.S.), congenitally joined twins who gained worldwide fame for their anatomical anomaly. As a result of their fame, the term Siamese twin came to denote the condition of being one of a pair of congenitally united twins (of any nationality).

Chang and Eng, joined at the waist by a tubular band of tissue about 3.25 inches (8 cm) long and about 1.5 inches (3.8 cm) in diameter, were born of a half-Chinese mother and a Chinese father. Their anatomical peculiarity caused them to be sought after as children, and they even had an audience with the king of Siam. In 1829 Chang and Eng in the "hire" of a British merchant left Siam, and throughout the following decade they traveled around the



Siamese twins, Chang and Eng
The Granger Collection, New York City

eastern United States and in Canada, Cuba, and Europe. Until they reached the age of 21, they traveled with their sponsor, who received the earnings from their exhibition. After that, they took charge of their own tours and together accumulated a small fortune. They settled in Mount Airy, N.C., bought a farm, and took up farming. They became naturalized citizens, adopting the surname Bunker, and in April 1843 they married a pair of sisters, Adelaide and Sarah Yates. Chang and Eng maintained separate households 1.5 miles (2.5 km) apart. They alternated three-day visits with their respective spouses, and each twin fathered several children. During the American Civil War they lost much of their money (in addition to their slaves), and in 1869 they once more went on tour in Europe.

Chang, who was moodier than Eng, had begun to drink heavily. In 1870, while returning to the United States from their successful tour, Chang had a paralytic stroke. Some four years later, during the night, Chang and Eng died, Chang preceding Eng by about three hours.

The suggestion had been made upon their arrival in America that Chang and Eng could be surgically separated. Some doubts as to the safety of the operation, as well as the twins' apparent consideration for each other's comfort and remarkable adaptation to their condition, led them to reject surgery. They were expert marksmen and could run and swim, and in short they functioned very capably as a unit. Though attached, each twin was a complete individual (*i.e.,* there were no shared organs), and each had a distinct personality. Indeed, among Siamese twins, the originals were in most ways quite independent of each other, as their sizable families attest.

Chang-chia-k'ou (city, China): *see* Kalgan.

Ch'ang Chiang (China): *see* Yangtze River.

Ch'ang Chiang P'ing-yüan (China): *see* Yangtze Plain.

Chang Ch'ien, Pinyin ZHANG QIAN (d. 114 BC), Chinese explorer, the first man to bring back a reliable account of the lands of central Asia to the court of China. He was dispatched by the Han dynasty emperor Wu Ti in 138 BC to establish relations with the Yüeh-chih people, a central Asian tribal group that spoke an Indo-European language. Captured by the Hsiung-nu, nomadic enemies of China, he was detained for 10 years. Nevertheless, he managed to reach his destination and returned to China after an absence of 13 years. Seven years later he was sent on another mission, this time to the Wu-sun, another Indo-European tribe living in the Ili Valley north of the Tarim

Basin (now in Russia). In addition to travelling himself, he sent his assistant to visit Fergana (Uzbekistan), Bactria (Afghanistan), and Sogdiana (west Turkestan, now in Uzbekistan). He gathered information on Parthia, India, and other states in the area. His mission brought the Chinese into contact with the outposts of Hellenistic culture established by Alexander the Great, opened the way for exchanges of envoys between these Central Asian states and the Han, and led to the introduction into China of a superior breed of horses and new plants, such as grapes and alfalfa.

Chang Chien, Pinyin ZHANG JIAN (b. July 1, 1853, Haimen, Kiangsu Province, China—d. Aug. 24, 1926, Nant'ung, Kiangsu), a leading social reformer and industrial entrepreneur in early 20th-century China.

Chang received a traditional Confucian education and, at the age of 41, he passed the top level of the civil service examination. The following year China was defeated in the Sino-Japanese War, and Chang retired from office to develop industry in his native prefecture and make it an example of modernization for all of China. With government encouragement and tax benefits, he built the famous Dah Sun Cotton Mill, which became the only private mill in China operating at a profit. He expanded this enterprise to include a flour mill, an oil mill, shipping lines, a distillery, and a machine shop. Concerned about the welfare of his workers, he built schools, roads, parks, orphanages, medical clinics, libraries, and a home for the aged.

After a short trip to Japan in 1903 he became an ardent advocate of constitutionalism and, in 1909, was elected president of the Provisional Assembly of Kiangsu. After the Republican Revolution of 1911, he served as minister of agriculture and commerce in the new government.

Ch'ang-chih, Pinyin CHANGZHI, formerly (until 1912) LU-AN, city in southeast Shansi Province (*sheng*), China. It is situated in the Lu-an plain—a basin surrounded by the western highlands of the T'ai-hang Shan (mountains), watered by the Cho-chang-pei Yüan (stream), a tributary of the Wei Ho. It is a communication centre; to the east a route via Li-ch'eng, in Shansi, crosses the T'ai-hang Shan to Han-tan, Hopeh, on the North China Plain. To the northwest a route leads to the Fen Ho Valley, south of T'ai-yüan, Shansi. To the south a route leads over comparatively low mountains to Kao-p'ing, Shansi, and to the plain of the Huang Ho (Yellow River). A railway following this route has been built to the coalfields of Chiao-tso in Honan with further connections to Cheng-chou.

This area was of major importance during the Shang dynasty (18th–12th century BC) and also during the state of Li within the Chou dynasty (about 1111–255 BC); it later became the site of an important city named Shang-tang in the state of Han. In Ch'in (221–206 BC) and Han (206 BC–AD 220) times it became the commandery (district under the control of a commander) of Shang-tang. In the late 6th century it was called Lu-chou—a name retained through the T'ang dynasty (618–907), when it was a strategic centre in the conflict between the central government and the provincial warlords of Hopeh. In the 840s it was itself the seat of a major rebellion. During the last years of the T'ang dynasty and during the Five Dynasties (907–960), the area was continually fought over and constantly changed hands. Under the Sung (960–1279) it was called Lung-te, a name it maintained under the Mongols (1279–1368). Under the Ming (1368–1644) it was named Lu-an and became a part of Shansi. In 1528 the county (*hsien*) was given the name Ch'ang-chih, and the superior prefecture of which it was the seat was named Lu-an Fu. In 1912 the superior prefecture was abolished.

The historical city was relatively extensive, with strong walls 7½ mi (12 km) in circumference; but after the 19th century it declined in importance. It was a regional market centre for the agricultural produce (grain, hemp, wool, and felt) of the locality and also for products of the local metalworking industry. The area was a centre of both iron- and bronze-working from the earliest times. In the 1950s, excavations at Fen-shui-ling, north of the city, revealed large numbers of bronze artifacts and molds used for casting iron tools.

After 1949 Ch'ang-chih was developed into a secondary industrial centre. Because of the utilization of the nearby coal mines and rich iron deposits, its population nearly doubled between 1953 and 1958. The city produces pig iron and steel, and there are a number of engineering and machine-building plants. The area also produces asbestos and other minerals. Traditionally, it is famous for the local ginseng, called *Shang-tang jen-tsen* (a plant having an aromatic root used in medicine) and for the local wine (*Lu-chiu*). Pop. (1989 est.) 301,700.

Chang Chih-tung, Pinyin ZHANG ZHIDONG, courtesy name (Wade–Giles romanization) HSIAO-TA (b. Sept. 2, 1837, Hsing-i, Kweichow Province, China—d. Oct. 4, 1909), Chinese classicist and provincial official, one of the foremost reformers of his time.

Chang was born to a family of scholar–officials in Kweichow Province, but, in accordance with Chinese custom, he was considered native to Nan-p'i, Chihli (modern Hopeh) Province, where his ancestors had settled in the 15th century. He was unusually precocious as a student, passing his first-level civil service examinations at the age of 13 and all of the examinations by the time he was 26. His literary talent and the fame he won from it were the foundations on which his career rested.

Chang's experience as an official fell into two broad phases: from 1862 to 1882 he was a scholar and educational director, and from 1882 to 1907 he rose steadily from a provincial to a national leader. Politically he was a supporter of the dowager empress, Tz'u-hsi, who in turn favoured him with many promotions. Appointed governor of Shansi in 1882, he became governor general of Kwangtung and Kwangsi in 1884. He was transferred to Hunan and Hupeh in 1889 and remained in that post for 18 years, including three spent on missions to Nanking and Peking. In 1907 he was summoned to the court to become a grand secretary and grand councillor.

Apart from being a capable and benevolent administrator, Chang was deeply concerned with the rejuvenation of China. His life nearly spanned the period from the Opium War to the revolution of 1911, an era of unprecedented pressures on China from the West and from Japan. The most pressing problem that Chang and other officials faced was how China might survive and adapt itself to the modern world. In the search for a solution, Chang retained his faith in the traditional Chinese system but urged the acquisition of Western knowledge. As his conception of the latter changed, so did the stress of his programs, but in his basic stand he never wavered.

It was for defense reasons that he launched the first iron-and-steel works in China. In his total ignorance of metallurgical intricacies, Chang ordered a complete smelting plant from England, without knowing what ore would be available. He also failed to locate the plant near a coal-mining area. Consequently, the works incurred severe losses after production began in 1894. The debacle exposed Chang to ridicule and placed him in political jeopardy.

Chang's transfer to Hunan and Hupeh was occasioned by his proposal to build a railway from Hankow to a point near Peking. Giving its assent, the court also appointed Chang in charge of the construction. After a long delay the line was completed in 1906. Meanwhile, Chang had set about industrializing the territory under his jurisdiction. Among the industries he founded were a mint, tanneries, tile and silk factories, and paper, cotton, and woollen mills. While on temporary duty in Nanking, he trained a new army with the assistance of German instructors.



Chang Chih-tung, engraving
The Bettmann Archive

In 1895 China fought against Japan and lost, thus demonstrating the ineffectiveness of its previous reforms. This setback turned Chang's attention to education and China's need for better trained bureaucrats. In 1898 he published his famous *Ch'üan-hsüeh p'ien* ("Exhortation to Learning"), in which he reaffirmed his faith in Confucianism but detailed the measures needed for the acquisition of Western knowledge: study abroad by Chinese students, establishment of a school system, translation of Western and Japanese books, and acquisition of knowledge from foreign newspapers. Accordingly, schools, newspapers, and translation bureaus were established in Hupeh, and students were sent abroad to study; in 1908 the province supported 475 students in Japan and 103 in Western countries.

At the national level Chang was charged, in 1904, with the task of drafting regulations for the entire school system. As submitted and approved six months later, the regulations, eight volumes long, dealt with all aspects of education—including basic principles, administration, curricula, study abroad, vocational training, and structures of kindergartens and research academies. Chang repeatedly urged the abolition of the civil service examinations, and this was done in 1905. Largely through Chang's persistent efforts, the number of schools and students in China increased 73 and 225 times, respectively, between 1904 and 1909.

A striking feature of Chang's career was his immunity to major political setbacks. Perhaps the severest test of his political sagacity occurred during the Boxer Rebellion in 1900. He was faced, as a loyal official, with the prospect of disobeying the imperial edict declaring war on foreign nations. After consultation with other governors, Chang decided that this decree should not be obeyed because it did not represent the true intention of the throne. Accordingly, Chang and other officials maintained peace in their territories by concluding an agreement with the foreign consuls. As the Boxers collapsed, this action was endorsed and praised by the dowager empress.

Chang was married three times, but all his wives died early. He had six sons and four daughters. In spite of his long tenure of office,

he amassed no personal fortune and was not even well-to-do—he pawned his belongings once, when he was a governor general. He was canonized as Wen-hsiang (Learned and Accomplished), a coveted posthumous title.

(Y.C.W.)

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Chang-chou, also called LUNG-CH'I, Pinyin ZHANGZHOU, or LONGXI, city in southeastern Fukien Province (*sheng*), China. The city is situated on the north bank of the Hsi Hsi (stream), some 25 mi (40 km) upstream from Amoy in the small alluvial plain formed by the Hsi Hsi and the Chiu-lung Chiang (stream), which flow together into the Chang Chiang estuary.

Chang-chou was first established as a county in AD 502–515 and became a prefecture under its present name in 686. It was, however, only a minor Chinese outpost of about 1,600 families in the mid-8th century; and it was only in the 9th century that, with the rapid colonization of Fukien (which continued until the 13th century), the city began to grow. After the fall of the T'ang dynasty (618–907), it was renamed Nan-chou and began to flourish under the Fukienese kingdom of Min (909–944). Under the Sung dynasties (960–1279) it rapidly grew into a great city and was a major trading centre on the southeast coast and an entrepôt for overseas trade with Indonesia and Southeast Asia. During the Ming period (1368–1644) it developed a brisk trade with the Philippines and was famous for its sugar and its silk textiles, particularly satins. In 1604 it was first visited by Dutch ships; but with the gradual silting up of the river, its trade was transferred first to Ma-ma-chen, further downstream at the junction of the Chiu-lung Chiang and Hsi Hsi, and then to Amoy, which, in the 17th and 18th centuries, took over its role as a major port.

Since then Chang-chou has become a regional city and the commercial and market centre for southeast Fukien Province, with which it has good river and highway connections. It is a collecting centre for fruit, jute, sugarcane, and timber from its hinterland; they are shipped on to Amoy, which dominates it commercially and through which most of its imports pass. It has rail connections with central China and all parts of inland Fukien. There is some small-scale industry, mostly based on local agriculture. Flour milling, wine making, tea curing, the manufacture of jute sacking, glass manufacture, papermaking, and printing are the main trades. Pop. (1989 est.) 174,000.

Ch'ang-chou, Pinyin CHANGZHOU, city in southern Kiangsu Province (*sheng*), China. It was a part of the commandery (a district under the control of a commander) of K'uai-chi under the Ch'in (221–206 BC) and Han (206 BC–AD 220) dynasties and, after AD 129, a part of Wu Commandery (*chün*). It first became an independent administrative unit under the Chin (Western Chin) in AD 280–290, when it became the seat of Pi-ling Commandery (*chün*), renamed Chin-ling Commandery in 304. It was given the name Ch'ang Prefecture (*chou*) under the Sui dynasty (581–618) in 589. After 609, with the completion of the southern section of the Grand Canal, it became a canal port and transshipment point for grain produced in the area. At the end of the Sui it was the centre of a rebel regime led by Li Tzu-t'ung, suppressed in 621. During the Five Dynasties (907–960) it formed part first of the Wu kingdom and then of the Southern T'ang, and it continued to prosper. In Sung (960–1279) and Yüan (1279–1368) times it was a rich and flourishing centre of commerce. After 1368 it was for a while renamed Ch'ang-ch'un Prefecture (*fu*), but it then became the superior prefecture of Ch'ang-chou, subordinated to the government of Nanking (Nanching). In 1912 the prefecture was reduced to a county (*hsien*) for some years and took the name Wu-chin, but it continued to be known colloquially as Ch'ang-chou. The city has thus retained the name for 14 centuries.

Ch'ang-chou's traditional role has been that of a commercial centre, particularly a collecting centre for agricultural produce, which was shipped by canal to the north and, later, to Shanghai. It began to develop a cotton textile industry in the 1920s, and cotton mills were established in the late 1930s, when Japanese pressures drove many Chinese businesses to invest outside Shanghai. It has remained a textile centre, the most important in Kiangsu for weaving. It also has large food-processing plants and flour-milling, rice-polishing, and oil-pressing industries. After 1949 it also developed as a centre of engineering industry. Ch'i-shu-yen, some 6 mi (10 km) southeast of Ch'ang-chou, has one of the largest locomotive and rolling stock plants in China. Other engineering works in Ch'ang-chou produce diesel engines, generators, transformers, and agricultural and textile machinery. At the time of the Great Leap Forward in 1958 a steel plant was also built there to provide raw material for heavy industry. Since 1908, Ch'ang-chou has been linked by rail with Shanghai and Nanking. Pop. (1989 est.) 501,700.

Chang Chü-cheng, Pinyin ZHANG JUZHENG (d. 1582, China), powerful Chinese minister during the last years of the reign (1566/67–72) of Lung-ch'ing and the first decade of the reign (1572–1620) of Wan-li, both of the Ming dynasty. His benevolent rule and strong foreign and economic policies are generally considered by Chinese and Western historians to have brought the Ming dynasty (1368–1644) to its peak.

Chang gained power through his position as tutor to Lung-ch'ing. He worked to centralize the government, limit special privileges, and reclaim the tax-exempt lands owned by members of the Imperial family and official classes. By 1580 there were 106,000,000 acres in the tax registers.

Chang's efforts to limit government spending, however, were a failure. Wan-li spent lavishly, and after Chang's death state resources were depleted. Partisan wrangling, temporarily abandoned under Chang's iron rule, ensued, and the dynasty rapidly declined. Although during his lifetime Chang was showered with honours and tributes, within two years after his death the Emperor had his family's land confiscated, his titles rescinded, and the record of his accomplishments blackened.

Ch'ang-ch'un, Pinyin CHANGCHUN, monastic name CHIU CHU-CHI, Pinyin JIU ZHUJI (b. 1148, Chi-hsia, China—d. 1227, Peking), Taoist monk and alchemist who journeyed from China across the heartland of Asia to visit Genghis Khan, the famed Mongol conqueror, at his encampment north of the Hindu Kush mountains. The narrative of Ch'ang-ch'un's expedition, written by his disciple-companion Li Chih-chang, presents faithful and vivid representations of the land and people between the Great Wall of China and Kābul (now in Afghanistan), and between the Yellow Sea and the Aral Sea.

Ch'ang-ch'un was a member of a Taoist sect known for extreme asceticism and for the doctrine of *hsing-ming*, which held that man's "natural state" had been lost but could be recovered through prescribed practices. In 1188 he was invited to give religious instruction to the Juchen dynasty emperor Shih Tsung, then reigning over northern China.

In 1215 the Mongols captured Peking, and in 1219 Genghis Khan sent for Ch'ang-ch'un. He went first to Peking, and, having also received an invitation from the Khan's younger brother, Temüge, who lived in northeastern Mongolia, he crossed the Gobi Desert and visited Temüge's camp near Buir Nor. Ch'ang-ch'un arrived in Samarkand, now in Uzbekistan, in midwinter (1221–22) and reached the Khan's Hindu Kush mountain camp in the spring. He returned to Peking in 1224. The account of the journey, *Hsi-yu chi* ("Journey to the West"), appeared in an annotated English translation, *The Travels of an Alchemist* (1931), by Arthur Waley.

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Ch'ang-ch'un, Pinyin CHANG-CHUN, city and provincial capital of Kirin Province (*sheng*), China.

The area around the city was originally the grazing ground of a Mongol banner (army division). In 1791 the Mongol duke requested and was granted permission from the Manchu court to open this area to Chinese colonization. In 1799 Ch'ang-ch'un subprefecture was consequently established to administer the considerable numbers of peasants from the provinces of Shantung and northern Hopeh who were already settled in the area. A subprefect responsible for Chinese settlers was appointed in 1802; and in 1825 the administration was moved to its present site, a settlement formerly called K'uan-ch'eng-tzu. It was raised to prefectural status as Ch'ang-ch'un Fu in 1882; and in the last years of the 19th century, as the pace of colonization increased, it was subdivided into a number of counties. Up to then it had been primarily an administrative centre subordinate to the city of Kirin (now Chi-lin) and a local collecting and market centre. A new period of growth began with the completion in 1901 of the Chinese Eastern Railway.

At the conclusion of the Sino-Japanese War of 1894–95, the section of the railway south of Ch'ang-ch'un was transferred to Japanese control; after 1906 the town marked the northern limit of the Japanese-dominated South Manchurian Railway zone. A new Japanese railway town then grew up to the north of the old Chinese city. At the time of the Japanese seizure of Manchuria (the Northeast) in 1931, the military commanders of the Japanese Kwantung Army decided to move the administrative capital of Japan's puppet state, Manchukuo, from Mukden (Shen-yang), the old Manchu capital, and in 1932 designated Ch'ang-ch'un as the new capital, renaming it Hsin-ching, or Hsinking (Chinese: New Capital). A spacious city with broad streets and many open spaces was constructed, and a national university was established there in 1938. Hsin-ching was designed to be an administrative, cultural, and political capital, whereas industrial development was to be concentrated primarily in Harbin (Ha-erh-pin), Kirin, Mukden, and Tan-tung, with only a limited amount of light industry in Hsin-ching. The city, nevertheless, grew at a phenomenal rate.

Events at the end of World War II badly disrupted Ch'ang-ch'un. The city was occupied, heavily damaged, and looted by Soviet forces in the last days of the war. When they withdrew in March 1946, the city for some weeks was occupied by the Chinese

Communist armies; but at the end of May, Chinese Nationalist forces entered it. Later in the year the Japanese population was repatriated. Although the Nationalists controlled the city itself, the Communists retained control of the surrounding rural areas, from which they waged guerrilla warfare, causing extensive damage. In 1948 Communist forces again took Ch'ang-ch'un.

Under Communist rule, the character of Ch'ang-ch'un changed radically. Although it remained an administrative centre and the provincial capital of Kirin, it became one of the principal centres for industrial expansion in Northeast China. Previously industry had been largely confined to small plants engaged in food processing, timber processing, clothing manufacturing, and light engineering, but the city now became the centre of a heavy engineering industry. Industrial production increased 24-fold between 1948 and 1957. Ch'ang-ch'un became the chief centre of China's automotive industry, manufacturing a variety of trucks, tractors, and cars, while numerous ancillary plants were established to provide components. Other plants produced tires, buses, and railroad cars. In addition, Ch'ang-ch'un also became a centre for machine-tool manufacture, precision engineering, and instrument making, and by the early 1970s a large chemical and pharmaceutical industry had also developed. It is connected by rail with Shen-yan Tsitsihar, Harbin, and Chi-lin.

Ch'ang-ch'un is the principal cultural and educational centre of Kirin Province. The former Japanese university has become Kirin University, and a branch of the Chinese Academy of Sciences has been established in the city. Other institutions include a normal university, industrial and agricultural colleges, and a wide variety of technical colleges and research institutes. Pop. (1984 est.) 1,509,000.

Chang Chün-hsiang (Chinese playwright): *see* Zhang Jun-xiang.

chang go (musical instrument): *see* changko.

Chang Heng-ch'ü: *see* Chang Tsai.

Chang Hsien-chung, Pinyin ZHANG XIANZHONG, byname YELLOW TIGER (b. 1606, Yenan-wei, Shensi Province, China—d. Jan. 2, 1647, Hsi-ch'ung, Szechwan Province), Chinese rebel leader at the close of the Ming dynasty (1368–1644). Following a disastrous famine in the northern province of Shensi in 1628, Chang became the leader of a gang of freebooters. Using hit-and-run tactics, he and his men plundered widely throughout North China. Although his forces were bought off several times and were defeated by government troops, they retreated into the hills, regrouped, and continued their raids.

In 1644, the year of the fall of the Ming dynasty, Chang advanced into Szechwan Province in west-central China with about 100,000 men and enthroned himself as the *ta hsi kuo wang* ("king of the western kingdom"). He coined money and set up an examination system to recruit talented men. Despite these attempts to establish a civilian government, he was chiefly concerned with military control, which he pursued with utter ruthlessness. The officially published *Ming History* reports that 600,000,000 persons were put to death under his rule. Obviously a gross exaggeration, the figure is nevertheless indicative of the great suffering under his rule.

Chang met his end soon after the Manchu tribes of Manchuria established the Ch'ing dynasty (1644–1911/12) in North China. In 1647, when they advanced into southwest China, they attacked and defeated him and then put him to death.

Chang Hsüeh-liang, byname YOUNG MARSHAL (b. 1898, Hai-ch'eng, Liaoning Province, China), Chinese warlord who, in the Sian Incident (*q.v.*; 1936), compelled the Nationalist leader Chiang Kai-shek to form a wartime alliance with the Chinese Communists against Japan.

Chang Hsüeh-liang was the oldest son of the warlord Chang Tso-lin (*q.v.*), who dominated Manchuria and parts of North China. The younger Chang was prepared for a military career and joined his father's army at the age of 19. Rising swiftly through the ranks, he was promoted to the command of one of his father's armies in 1922. Upon Chang Tso-lin's murder by Japanese officers in 1928, Chang Hsüeh-liang assumed control of Manchuria and, ignoring both the warnings and the growing power of the Japanese in Manchuria, aligned himself with the newly formed Nationalist government at Nanking. The Japanese then drove his forces from Manchuria and occupied the region; Chang withdrew his troops into Shensi in northwestern China.

It was in Shensi in 1935–36 that Chiang Kai-shek used Chang's troops in his military campaigns against the Chinese Communists based in nearby Yen-an, in that province. However, the increasingly patriotic Chang became convinced that his military units and those of the Nationalists should be fighting the Japanese invaders, not their fellow Chinese. When Chiang Kai-shek came to Chang's headquarters at Sian in Shensi in 1936 to take personal charge of the Nationalist war against the Chinese Communists, Chang Hsüeh-liang arrested the Nationalist leader. He released him only when Chiang Kai-shek agreed to form a united front with the Chinese Communists against the Japanese. Unwisely returning to Nanking with Chiang Kai-shek, Chang was soon placed under house arrest. When Chiang's government fled to Taiwan in 1948, Chang was taken there and continued to be kept under house arrest. Although the government reportedly lifted house arrest in 1961, Chang remained at his home near Taipei.

Chang-hua, *hsien* (county), west central Taiwan, occupying an area of 415 sq mi (1,074 sq km). It is bordered by the *hsien*s of T'ai-chung (north), Nan-t'ou (east), and Yün-lin (south) and by the Formosa Strait (west). Its northern and southern boundaries are roughly parallel to the Ta-tu Hsi (river) and the Hsi-lo Ch'i (river), respectively. The Pa-kua Shan (hills), a western extension of the Chung-yang Shan-mo (Central Range), are in the southeast; the rest of the region is a fertile alluvial deltaic plain. The economy is based on irrigated agriculture; crops produced include paddy rice, sugarcane, peanuts (groundnuts), corn (maize), jute, wheat, and sweet potatoes. Livestock and poultry are also raised. Rice and sugar milling, weaving, paper and hat making, sawmilling, and food canning are the major industries. Asbestos and marble deposits are worked. What is now Chang-hua *hsien* was a Chinese outpost during the reigns of K'ang-hsi (1661–1722) and Yung-cheng (1722–35), both of the Ch'ing dynasty. The region has many Confucian and Buddhist temples and relics; Lung-shan ("Dragon Mountain") temple at Lu-chiang was the first Buddhist temple built (1665) in Taiwan and the Pa-kua Shan, a granite image of Buddha 72 ft (22 m) high, is—with the 72-ft bronze Daibutsu at Nara, Japan—the world's tallest statue of Buddha. The hot springs of Chang-hua are in the northwest and a "highway flower garden," a horticultural research station and tourist attraction, has been developed in T'ien-wei. Lu-chiang is the only port in the *hsien* and Chang-hua city is the administrative seat. Pop. (1984 est.) 1,203,970.

Chang-hua, *shih* (municipality) and seat of Chang-hua *hsien* (county), west central Taiwan, situated southwest of T'ai-chung in the centre of the western coastal plain. Founded in the 17th century, the city was fortified in 1734 and in the succeeding century became the chief market and commercial centre of the island's central region. In the late 19th and early 20th centuries it was surpassed in importance by T'ai-chung. Chang-hua is now a railway junction, and, while T'ai-chung has developed into a major administrative city, Chang-hua has regained some of its old prosperity as a market for locally produced sugarcane, rice, pineapples, oranges, and other citrus fruits. Sugar refining is a major industry, and textile production is also important. The public Taiwan Provincial College of Education and the private Chien-kuo Junior College of Technology are located there. Pop. (1982 est.) 185,816.

Chang Kuo-lao, Pinyin ZHANG GUOLAO, also called (Wade–Giles romanization) CHANG KUO, in Chinese mythology, one of the Pa Hsien, the Eight Immortals of Taoism. In art he is depicted carrying a phoenix feather and the peach of immortality; he rides (often backward) on a marvelous mule that is capable of being folded like paper when not in use.

Chang claimed to have been born in prehistoric times. Legends about him, however, seem to have accrued to a historical personality who lived in the 7th century and was summoned to the Imperial palace by two T'ang



Chang Kuo-lao, wood sculpture, 18th century; in the Musée Guimet, Paris
By courtesy of the Musee Guimet, Paris

dynasty emperors. Chang, much preferring a secluded life to government appointments, refused to go. It is related, nonetheless, that on one occasion Chang visited the court of Emperor Hsüan Tsung (reigned 712–756) to perform feats of magic. In later times his picture adorned nuptial chambers, for he reputedly bestowed children on newly married couples.

Chang Kuo-t'ao, Pinyin ZHANG GUOTAO (b. 1897, Chi-shui, Kiangsi Province, China—d. Dec. 3, 1979, Toronot), founding member and leader of the Chinese Communist Party in the late 1920s and 1930s. After briefly contesting the leadership of the party with Mao Zedong in 1935 (the last time Mao's leadership was contested), Chang fell from power and in 1938 defected to the Chinese Nationalists.

Chang gained prominence as a student leader of the antigovernment May Fourth Movement, the political and cultural upheaval that began with a series of demonstrations on May 4, 1919. Originally an anarchist, he was influenced by Marxism and took part in the meeting in July 1921 that marked the official founding of the Chinese Communist Party. He then directed many of the initial Communist

attempts to organize the small Chinese urban proletariat, leading the Peking–Hankow Railroad strike that was crushed by the warlord Wu P'ei-fu on Feb. 7, 1923.

After the formation of the first alliance between the Kuomintang Party of the Nationalist leader Sun Yat-sen and the Chinese Communist Party, Chang became an official of the Kuomintang. When this alliance collapsed, he participated in the Aug. 1, 1927, Communist-led uprising at Nan-ch'ang, considered the official founding of the Chinese Red Army. Chang then went to the Soviet Union, where he remained until 1931, when he was dispatched to assume control of a small Communist enclave in the north central Chinese province of Hupeh.

Under pressure from Nationalist troops, Chang shifted his base several times, and finally in June 1935 he rendezvoused with the Communist forces of Mao Zedong, which were on their Long March to northwest China. A short time before, Mao had been elected head of the Chinese Communist Party, of which Chang was a senior member, as well as being head of an independent Communist enclave. Hence Chang represented a challenge to Mao's power. Their quarrel over where to establish the new Communist base split the party; the majority followed Mao into Shensi Province, and another faction went with Chang into extreme southwestern China, almost on the Tibetan border. As Mao had predicted, Chang was unable to find support in that desolate region, and he was eventually forced to rejoin Mao in Shensi in the spring of 1937.

Although Chang remained an active member of the party's ruling Politburo, his influence slipped greatly. In 1938 he took advantage of an appointment as a delegate to a conference between the Communists and the Nationalists to defect to the latter. He lived in the Nationalist capital at Chungking throughout World War II but was given little political power. After Mao's victory in the Chinese Civil War in 1949, Chang moved to the British colony of Hong Kong.

Chang Ling, in full CHANG TAO-LING, Pinyin ZHANG DAOLING (b. AD 34?, P'ei, Kiangsu, China—?d. 156, Han-chung), the founder and the first patriarch of the Taoist church in China.

Chang settled in the Szechwan area and there studied the Tao ("Way") sometime during the reign (125–144) of Emperor Shun Ti of the Eastern Han dynasty. Later he composed a Taoist work to propagate his cult, which attracted many followers among both the Chinese and the indigenous ethnic groups in Szechwan. Like other Taoists of his day Chang Ling promised physical immortality and longevity to his followers, but unlike the others, he emphasized the importance of religious organization. Thus he founded the first Taoist church, the T'ien-shih Tao, or Taoism of the Celestial Master, popularly known as the Way of the Five Pecks of Rice because it required its members as well as its patients to contribute five pecks of rice a year, presumably for the upkeep of the organization.

What made Chang Ling's church particularly attractive to the common people was its faith healing method. Illness, it taught, was a result of sinful-mindedness, which could be most effectively cured by making confession to the minister in the church; purification of the soul formed the solid foundation of physical health. Probably in imitation of the Han imperial throne, the patriarchate of the church was made hereditary. It passed from Chang Ling to his son Chang Heng and then to his distinguished grandson Chang Lu, collectively known as the Three Changs. Chang Lu even succeeded in establishing a Taoist theocratic state in Han-chung (modern Szechwan and part of Shensi) toward the end of the Han dynasty (*c.* 188–215). The basic text used for religious instruction in the Taoist church was the *Tao-te ching* of Lao-tzu. The famous Hsiang-erh commentary to Lao-tzu, traditionally attributed to Chang Ling, however, shows that this ancient philosophical treatise was much distorted to suit the religious needs of his church. *See also* Five Pecks of Rice.

Ch'ang O, Pinyin CHANG O, the Chinese moon goddess whose loveliness is celebrated in poems and novels. She sought refuge in the moon when her consort, Hou I (the Lord Archer), discovered she had stolen the drug of



Ch'ang O, terra-cotta statuette; in the Musée Guimet, Paris

By courtesy of the Musee Guimet, Paris; photograph, Giraudon—Art Resource/EB Inc.

immortality given to him by the gods. Hou I's pursuit was impeded by the Hare, who would not let the irate husband pass until he promised reconciliation.

Each year on the 15th day of the eighth lunar month, Chinese celebrate the memory of Ch'ang O with a "Mid-Autumn Festival" (Chung-ch'iu Chieh). With a full moon shining in the heavens, "moon cakes" are eaten and offered as gifts to friends and neighbours. Many go outside to view the supposed outline of a toad on the surface of the moon, for this creature, according to one legend, is now Ch'ang O. At one time she was called Heng O, but the name became taboo when two Chinese emperors took it as their own.

A typical painting shows Ch'ang O floating toward the moon, often with her palace in the background. The Hare is sometimes present, preparing the drug of immortality. Statues more often represent her holding a moon disk in her raised right hand.

Ch'ang-pai Mountains, Wade–Giles romanization CH'ANG-PAI SHAN, Pinyin CHANGBAI SHAN, Korean CHANGBAEKSANMAEK, mountain range forming the border between the Chinese provinces of Liaoning and Kirin and North Korea. The name in Chinese means the "forever white mountains"; the Korean name means "white-topped mountains." Consisting of a series of parallel ranges with a general southwest to northeast axis, the mountains are a continuation of the uplands of the Liaotung and Shantung peninsulas. The ranges are for the most part made up of ancient granites and metamorphic rocks and are broken up by a number of large intermontane fault troughs. The eastern sections were the site of considerable volcanic activity in recent geological times, usually along ancient fault lines; widespread lava eruptions occurred, resulting in the formation of many extinct volcanic cones and crater lakes. The terrain is rugged, and the mountains have been cut up by many deeply incised river valleys. These rivers are fast flowing, with steep gradients and frequent rapids. The area is by far the wettest part of the Northeast (Manchuria) region of China; its annual precipitation, including both rain and snow, ranges from 30 to 50 in. (760 to 1,270 mm). The whole area is under solid snow cover for two months a year, and the higher peaks, which range from 5,000 to 8,000 ft (1,500 to 2,400 m) above sea level, are snow covered for more than six months. The region is densely covered with mixed deciduous and coniferous forest. Alpine meadows occur on only the highest peaks above 6,500 ft.

The name Ch'ang-pai Mountains first appeared in the 12th century. Before this the mountains were known as the Pu-hsien Shan or the Tan-tan Shan Ling. Until comparatively recent times, they formed a wild and inaccessible frontier region in which government control was tenuous. It was only in the late 19th century that its population, consisting of prospectors and trappers, was brought under a Chinese administration. Colonies of Koreans were settled in some of the mountain basins before and during the Japanese occupation of Manchuria (1931–45), and a considerable area forms the Yen-pien Korean Autonomous Prefecture (*tzu-chih-chou*) in Kirin Province.

The mountains contain substantial mineral deposits of gold, iron, copper, magnesite, graphite, and various rare metals. The Ch'ang-pai Mountains Natural Reserve was established in 1960 and covers 550,000 ac (220,000 ha). It contains a great variety of vegetation and wildlife, as well as a crater lake, a high waterfall, and hot springs.

Chang Ping-lin, Pinyin ZHANG BINGLIN (b. Dec. 25, 1868, Yühang, Chekiang Province, China—d. June 14, 1936, Soochow), Nationalist revolutionary leader and one of the most prominent Confucian scholars in early 20th-century China.

Chang received a traditional education during which he was influenced by Ming dynasty (1368–1644) loyalist writers who had refused to serve the foreign Ch'ing dynasty (1644–1911/12) established by the Manchu tribes of Manchuria. As a newspaper editor, Chang expressed his belief that China's problems resulted from Manchu rule. Arrested in 1903 for his anti-Manchu views, he was released from prison three years later and then went to Japan, where he became one of the chief polemicists for the T'ung-meng hui ("Alliance Society"), the revolutionary group organized in Tokyo the year before by the Chinese Nationalist leader Sun Yat-sen.

After the Republican Revolution of 1911, however, Chang was one of the first to sever his connection with the T'ung-meng hui. Yüan Shih-k'ai, president of the Chinese Republic, feared that Chang was stirring up opposition to his regime, and he placed Chang under house arrest. Yüan's death in 1916 brought about Chang's release, and a year later he joined Sun Yat-sen's new revolutionary government at Canton in South China. After 1918, however, he retired from politics.

Chang was better known for his scholarly works than for his revolutionary activity. As a staunch defender of his country's ethical and cultural heritage, he was one of the major opponents of the movement to replace China's highly stylized 2,000-year-old literary language with a written language that more closely approximated the spoken, or vernacular, tongue. Chang's own prose and poetic writings are

considered among the finest examples of the classical form.

Ch'ang-sha, Pinyin CHANGSHA, city and capital of Hunan *sheng* (province), China. Ch'ang-sha is on the Hsiang River 30 miles (50 km) south of Tung-t'ing Lake and has excellent water communications to southern and southwestern Hunan. Neolithic sites have been discovered in the district since 1955.

During the 1st millennium BC, it was the centre of the southern part of the Yangtze River valley state of Ch'u. In 1935–36 some Ch'u graves excavated nearby produced important evidences of Ch'u culture. The city's most ancient name was Ch'ing-yang. Under the Ch'in dynasty (221–206 BC) it became a staging post for Ch'in expeditions into Kwangtung province. From Han times (206 BC–AD 220) it was named Lin-hsiang county and was the seat of the Ch'ang-sha commandery. The county was renamed Ch'ang-sha in 589, when it became the administrative seat of T'an prefecture. It lost some importance at this period, however, because traffic from Kwangtung was mostly diverted up the Kan River valley in Kiangsi. After the fall of the T'ang dynasty (618–907), it became the capital of the independent Ch'u state and later fell to the Later T'ang dynasty (923–937). Between 750 and 1100, as Ch'ang-sha became an important commercial city, the population of the area increased tenfold.

Under the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties it was made a superior prefecture and from 1664 onward was the capital of Hunan and prospered as one of China's chief rice markets. During the Taiping Rebellion the city was besieged by the rebels (1854) but never fell; it then became the principal base for the suppression of the rebellion. Ch'ang-sha was opened to foreign trade in 1904. It also became the seat of some Western schools, including a missionary medical college. Further development followed the opening of the railway to Han-k'ou in Hupeh province in 1918, which was extended to Canton in Kwangtung province in 1936. Although Ch'ang-sha's population grew, the city remained primarily commercial in character and before 1937 had little industry, apart from some small cotton-textile, glass, and nonferrous-metal plants and handicraft enterprises.



The Hsiang River at Ch'ang-sha, Hunan province, China
Andrew J. Watson

During the Sino-Japanese War (1937–45), Ch'ang-sha was the site of three major battles. The city itself was virtually destroyed by fire in 1938–39, and it was captured by the Japanese in 1944.

Rebuilt since 1949, its population nearly tripled between the late 1940s and the early 1980s. The city is now a major port, handling rice, cotton, timber, and livestock, and is also a collection and distribution point on the railway from Han-k'ou to Canton. It is a centre of rice milling and also has oil-extraction, tea- and tobacco-curing, and meat-processing plants. Its textile industry produces cotton yarn and fabrics and engages in dyeing and printing. Agricultural chemicals and fertilizers, farm implements, and pumping machinery are also produced.

Ch'ang-sha has a large thermal generating station linked by a power grid with the nearby industrial centres of Chu-chou and Hsiang-t'an; the three cities were designated in the 1970s as the nucleus of a major industrial complex. In the 1960s there was some development of heavy industry. The manufacture of machinery, especially machine tools and precision tools, became important, and Ch'ang-sha became a centre of China's aluminum industry. The city also has cement, rubber, ceramic, and papermaking plants and is a centre for many types of traditional handicrafts, producing *hsiang* embroidery, leather goods, umbrellas, and buttons. Coal is mined in the vicinity.

Ch'ang-sha was the seat of many ancient schools and academies. It is the site of Hunan Medical University (1914) and has several colleges and institutes of higher learning. Pop. (1990 est.) 1,113,212.

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Ch'ang-shu, Pinyin CHANGSHU, city in southern Kiangsu *sheng* (province), China. Situated in the coastal plain some 22 miles (35 km) north of Su-chou, it first became an independent county in AD 540 under the Liang dynasty (502–557). From Sui times (581–618) it was a subordinate county under Su-chou, to which it has always been intimately linked. Its seat was moved to the present site under the Sung dynasty (960–1279). Under Yüan occupation (1279–1368) it was made the seat of a full prefecture, Ch'ang-shu, in 1295 and in the early 14th century was rebuilt and fortified. In 1370 the Ming dynasty (1368–1644) reduced it once again to a county. During the later Ming period in the 15th and 16th centuries it was several times attacked by Japanese pirates. A centre for the production and collection of tax grain from early times, after the introduction of cotton to the area in the 13th century, it became a major cotton-producing district, supplying the textile industry of such towns as Sung-chiang (now in the Shanghai municipality) and Ch'ang-chou on the Grand Canal. Its role as a collecting centre was based on the dense network of canals and waterways that covers the whole plain between the Grand Canal and the sea coast. Although the city itself has been extremely prosperous, it has remained relatively small. Pop. (1990 est.) 181,805.

Chang Süng-ŏp, also called OWON (Korean: "My Garden") (b. 1843, Taewŏn, Korea [now in South Korea]—d. 1897, Seoul), an outstanding painter of the late Yi dynasty (1392–1910) in Korea.

An orphan, Chang worked as a servant to a wealthy family, learning his art by watching the master's son study painting. Although he later worked with Chinese painting manuals, he had no formal teachers and was so illiterate that he was unable to sign his own paintings. Nevertheless, he was the first Korean to master the art of painting on the thin, fast-reacting Chinese paper instead of the thick, slow-reacting traditional Korean paper.

Chang Ta-ch'ien (b. May 10, 1899, Neichiang, Szechwan province, China—d. April 2, 1983, Taipei, Taiwan), Chinese painter, collector, and connoisseur.

Chang Ta-ch'ien left China in 1949 and resided in various countries in the West, including the United States and Brazil. He settled in Taipei, Taiwan, in 1977. His paintings, all in the traditional style, reveal the marks of virtually every age of Chinese painting, but he was particularly adept at the styles of 17th- and 18th-century Individualists. Some of his later work, strong in colour and free in execution, shows the influence of Western Abstract Expressionism.

Chang Tao-Ling (Taoist patriarch): *see* Chang Ling.

Ch'ang-te, Pinyin CHANGDE, city in northern Hunan *sheng* (province), China. Situated on the north bank of the Yüan River above its junction with the Tung-t'ing Lake system, Ch'ang-te is a natural centre of the northwest Hunan plain. In historical times it was also a centre from which governments controlled the mountain tribes of western Hunan. A county, named Lin-yüan, was established there in the 2nd century BC. In 589 its name was changed to Wu-ling, and under the T'ang dynasty (618–907) it became the seat of Lang prefecture. Under the Sung dynasty (960–1279) the name of the prefecture was changed to T'ing-chou, and in 1164–74 it became a superior prefecture called Ch'ang-te. This status was retained until 1912, when the superior prefecture was abolished and the city became a county seat.

In the late 19th century Ch'ang-te became a prosperous commercial centre and the chief agricultural central market of the Yüan River basin. Many Chinese firms, and—after 1905, when it was opened to foreign trade—foreign firms as well, maintained branches there to buy rice, cotton, tung oil, and timber, so that Ch'ang-te's economic influence reached out into northern Kweichow, southwestern Hupeh, and parts of southeastern Szechwan provinces. The merchants of the Ta-ho quarter of the city controlled much of the northwestern Hunan economy, and early in the 20th century Ch'ang-te was the second city of Hunan, after Ch'ang-sha. Although the commercial dominance of Ch'ang-te firms disappeared with the advent of communist rule in 1949, the city remained an important centre of trade, with the majority of its population engaged either in commerce or in transportation. Grain, oil, cotton, and other commodities are loaded into medium-sized ships and taken to Yüeh-yang, Ch'ang-sha, or Han-k'ou (Wu-han, Hupeh province) for onward shipment. Timber is also rafted there and floated across the Tung-t'ing Lake to Hüeh-yang, and thus to the Yangtze River. After 1949 the city developed some light industry, mostly based on such local products as wood, leather, and bristles. Pop. (1990 est.) 301,276.

Chang-ti, Pinyin ZHANG DI (posthumous name, or *shih*), personal name (*hsing-ming*) LIU TA, temple name (*miao-hao*) (TUNG-HAN) SU-TSUNG (b. AD 57, China—d. 88, China), emperor (reigned AD 75/76–88) of the Han dynasty, whose reign witnessed the dissipation of Han rule.

In many ways, Chang-ti's reign seemed to bring the Han to new heights; the famous general Pan Ch'ao continued his conquests of Central Asia, while internally Chang-ti followed a mild, peaceful policy. Nevertheless, eunuchs increased their power at court, and the great landed families grew more powerful in the countryside. Scheming officials and eunuchs completely dominated the country after Chang-ti's death, and, of the nine rulers who ascended the throne during the century following his demise, the oldest was 14.

Chang-tien (China): *see* Tzu-po.

Chang T'ien-i (Chinese author): *see* Zhang Tianyi.

Chang Tsai, Pinyin ZHANG ZAI, Wade-Giles romanization CHANG HENG-CH'Ü (b. 1020, Ch'ang-an, China—d. 1077, China), realist philosopher of the Sung dynasty, a leader in giving Neo-Confucianism a metaphysical and epistemological foundation.

The son of a magistrate, Chang studied Bud-

dhism and Taoism but found his true inspiration in the Confucian Classics. In his chief work, *Cheng-meng* ("Correct Discipline for Beginners"), he declared that the universe is a unity, with myriad aspects, and all existence is an eternal integration and disintegration. *Ch'i* ("matter") is identified with the Great Ultimate, the ultimate reality. When *ch'i* is influenced by yang (male) elements, it floats and rises, dispersing its substance. When the yin (female) element is prevalent, *ch'i* sinks and falls, thus condensing and forming the concrete things of the material world.

In the realm of ethics, the one basic virtue is *jen* ("humaneness"), but in its various manifestations (*i.e.*, in various human relations) *jen* becomes many things: filial piety toward parents or respect for an elder brother. Man was once *ch'i*, like all other aspects of the universe, and he has an original nature that is one with all the things of the world. His physical nature, however, derives from the physical form into which his *ch'i* has been dispersed. Moral self-cultivation consists in man's attempting to do his duty as a member of society and as a member of the universe. He does not try to prolong or extend his life. The superior man understands that "life entails no gain nor death any loss."

Chang influenced some of the most eminent later Neo-Confucian thinkers; the brothers Ch'eng Hao (1032–85) and Ch'eng I (1033–1107) were his pupils. His theory of mind was adopted by the great philosopher Chu Hsi (1130–1200), and Wang Fu-chih (1619–92) developed Chang's philosophy into a system that has recently come to be recognized as one of the major achievements of Chinese thought.

Chang Tso-lin, Pinyin ZHANG ZUOLIN, byname OLD MARSHAL (b. 1873, Hai-ch'eng, Sheng-ching [now Liaoning] province, China—d. *c.* June 7, 1928, Manchuria), Chinese soldier and later a warlord who dominated Manchuria and parts of North China between 1913 and 1928. He maintained his power with the tacit support of the Japanese; in return he granted them concessions in Manchuria.

Born into a peasant family, Chang Tso-lin enlisted in the Chinese army and fought in the Sino-Japanese War of 1894–95. After the war he organized a self-defense militia in his native district, and in 1905 Chang's growing military unit was organized into a regiment by the governor of the renamed Feng-t'ien (formerly Sheng-ching) province. By 1912 Chang had risen to the command of a division, in 1916 he became the military governor of Feng-t'ien province, and in 1918 he was appointed inspector general of Manchuria's three provinces. From then on he controlled Manchuria as a virtually autonomous state within the Chinese republic.

In 1920 Chang began to try to expand his power southward into North China proper. By 1924 his position was strong enough for him to extend his control to Peking, the capital, where he established himself, assuming the powers of a military dictator.

Chang's ambitions were threatened by the armies of the Nationalist Party (Kuomintang), which in 1927 advanced into North China under the leadership of Chiang Kai-shek in an attempt to complete the unification of the country. Disheartened by military reverses, Chang Tso-lin ordered his troops to abandon Peking to the advancing Nationalists. On June 4, 1928, his train was destroyed by a bomb planted by Japanese extremists who hoped that his death would provoke the Japanese army into occupying Manchuria. His son Chang Hsüeh-liang succeeded in command of his forces.

Ch'ang-tu, Pinyin QAMDO, Tibetan CHAB-DO, mountainous area in the far eastern part of Tibet, China, bordering on the Indian state of Arunāchal Pradesh and on Myanmar (Burma) to the south and on the Chinese provinces (*sheng*) of Yunnan and Szechwan to the southeast and east. In Ch'ang-tu the great fold systems of the Himalayas and the northern Nien-ch'ing-t'ang-ku-la Mountains swing southeast, forming a series of high parallel ranges with a predominantly northwest to southeast axis, between which the upper streams of the Salween (Nu Chiang), Mekong (Lan-ts'ang Chiang), and Chin-sha Chiang (a tributary of the Yangtze River) flow from northwest to southeast through deep, forested chasms. The Ning-ching Mountains between the Mekong and the Chin-sha have peaks rising to 14,000 feet (4,200 m). The range to the west of the Salween, the Po-shu-la Ling, is even higher, with peaks above 21,000 feet (6,400 m). Most of the area is uninhabited, and large parts remain virtually unexplored. In the 1950s a highway was built through the northern part of this area from Ch'eng-tu in Szechwan, via Ch'ang-tu, where it divides into two routes that ultimately reach Lhasa, capital of Tibet.

Chang Tzu-p'ing, Pinyin ZHANG ZIPING (b. 1893, Mei-hsien, Kwangtung province, China—d. 1947?), Chinese author of popular romantic fiction and a founder of the Creation Society, a literary association devoted to the propagation of romanticism.

After receiving a classical Chinese education and studying in Japan, Chang took a degree in geology in 1922 but chose to pursue a literary career. While in Japan he met Kuo Mo-jo and other Chinese writers, with whom he founded the Creation Society and edited the group's magazine. At this time the first of his many novels and short stories was published. After a brief flirtation with political themes in support of the Chinese republic, he returned to his romantic conceptions. During the Sino-Japanese War (1937–45), he worked with the Japanese and, after their defeat, was tried in 1947 by the Chinese on charges of collaboration. Nothing further is known of his fate.

Changai Mountains (Mongolia): *see* Hangayn Mountains.

Changamire DYNASTY, dynasty that ruled a vast area in central Africa between the Zambezi and Limpopo rivers (now in Zimbabwe). The dynasty was the greatest power in central Africa from the 15th century until its destruction about 1830; it succeeded even in driving the Portuguese out of the interior of Africa.

Its founder, Changamir, was a lowly son of Matope, the ruler of the Mbire (or Monomotapa) empire, who appointed him governor of its central and southern provinces. He declared his independence of Matope's successor and founded a kingdom that he called Rozwi. He established trade contacts with Arab traders, and his son (Changamire II, who used the name as a dynastic title) established contacts with the Portuguese settlements on the east African coast (*c.* 1500).

Although contacts with the Portuguese were initially encouraged, from 1693 to 1695 the Changamire empire drove the Portuguese from all their stations in the interior during a campaign against the remainder of the Mbire empire. Changamire's empire was destroyed by the coming of the Ngoni and Ndebele tribes during the Mfecane (a period of vast migrations occasioned by Zulu wars in South Africa).

Changbai Shan (China): *see* Ch'ang-pai Mountains.

Changde (China): *see* Ch'ang-te.

change ringing, traditional English art of ringing a set of tower bells in an intricate series of changes, or mathematical permutations (different orderings in the ringing sequence), by pulling ropes attached to bell wheels. On five, six, or seven bells, a peal is the maximum number of permutations possible (120, 720, and 5,040, respectively); on more than seven bells, the full extent of possible changes is impracticable, so that 5,000 or more changes are said to constitute a peal. The number of possible changes on any series of bells may be determined, using the mathematical formula of permutations, by multiplying the number of the bells together. On 3 bells, only 6 changes, or variations, in the order $1 \times 2 \times 3$ can be produced; on 5 bells, $1 \times 2 \times 3 \times 4 \times 5 = 120$; and so on up to the astronomical total of 479,001,600 changes on 12 bells. A touch is any number short of a peal.

In ringing a peal, no bell moves more than one place forward or backward in the ringing order in each successive change, nor is it repeated or omitted, nor is any sequence (change) repeated. A set, or ring, of 4 bells is known as Minimus, or Singles; 5, Doubles; 6, Minor; 7, Triples; 8, Major; 9, Caters; 10, Royal; 11, Cinques; and 12, Maximus. A complete peal of 4 bells (24 changes), requires about 30 seconds; one of 12 bells (479,001,600 changes), about 40 years. A system of permutation is called a method; the entire ringing fraternity, the exercise.

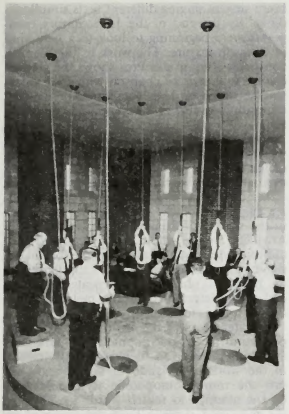
Groups of swinging bells in English church towers date from the 10th century, and, at least by the 15th, orderly ringing took place involving changing note patterns. This practice evolved from first rendering descending scales (called rounds). The practice was stimulated by the Reformation in England, and it remains particularly associated with the Anglican church. By the 17th century, intricate mathematical formulas had evolved.

Change ringing was originally a gentleman's recreation. Its early participants, aristocrats and intelligentsia, often students, were later joined by ecclesiastics, labourers, and others. Women were excluded, and participation was a mark of social status. The first society, or ringing organization, the Ancient Society of College Youths, was founded in 1637. The earliest treatises on the subject were Fabian Stedman's *Tintinnalogia* (1668) and his *Campanologia* (1677), which introduced his Grandsire Method and his Stedman's Principle (a method).

When swung, change-ringing bells rotate slightly less than 360°. A bell is gradually swung back and forth until it reaches a nearly vertical balance position with the mouth of the bell uppermost. Handstroke (a pull on the rope that rotates the bell almost 360° to the other balance position) alternates with backstroke (a pull on the rope that returns the bell to its initial position), two successive revolutions constituting a whole pull.

In the ringing sequence a bell makes three basic movements. (1) It "hunts," or changes position one place forward or backward and continuing in the same direction. "Hunting up" is moving toward last place, called "behind;" "hunting down," toward first place, in which a bell "leads." (2) It "dodges" by suddenly reversing course—taking a step backward in the hunt, then proceeding in the original direction. (3) It "makes a place" by remaining in the same position it occupied in the previous change (also called "lying still"); this term refers to a bell in an inside position, rather than at lead or behind. A bell's movement is its "duty," and various methods are identified by the duty given each bell. In plain hunting, a bell moves change by change toward last place, where it lies behind for an additional stroke; it then moves toward first place, where it leads for a whole pull, or two strokes.

Change-ringing bells are relatively short waisted, with their axis at midwaist for easier swinging. They are tuned in just intonation (pitches derived from certain ratios rather



Change ringing by members of the Ancient Society of College Youths, London, in the ringing chamber of Washington National Cathedral, Washington, D.C., during the dedication of the cathedral bell tower and 10-bell ring (1964)

Stewart Brothers, Inc.

than from equal division of the octave). Until the end of the 19th century, tuning of their partials (component tones) was not seriously undertaken and so lacked uniformity. The largest and last bell in a ring is the tenor; the smallest, the treble. Most tenor bells range from several hundred pounds to two tons; that of the Cathedral Church of Christ, Liverpool, weighs 4.6 tons. The two founders, both English, who cast bells for change ringing are the Whitechapel Bell Foundry and John Taylor and Company of Loughborough, Leicestershire, Eng.

Change Ringing

row	changes	row	changes
1	123456	14	312546
2	214365	15	321456
3	241635	16	234165
4	426153	17	243615
5	462513	18	426351
6	645231	19	462531
7	654321	20	645213
8	563412	21	654123
9	536142	22	561432
10	351624	23	516342
11	315264	24	153624
12	132546	25	156342
13	135264		

changeling, in European folklore, a deformed or imbecilic offspring of fairies or elves substituted by them surreptitiously for a human infant. According to legend, the abducted human children are given to the devil or used to strengthen fairy stock. The return of the original child may be effected by making the changeling laugh or by torturing it; this latter belief was responsible for numerous cases of actual child abuse.

The existence of changelings is believed to stem from the idea that infants are susceptible to demonic possession. In the *Medieval Chronicles,* by Ralph of Coggeshall, and in other sources, the fairies are said expressly to prey upon unbaptized children.

Ch'anggang: *see* Cho Sok.

changko, also spelled CHANG GO, large two-headed, hourglass-shaped (waisted) drum common to much Korean traditional music. In its construction it resembles the Japanese *tsuzumi* (*q.v.*) drums. It is 66 cm (26 inches) long.

The changko's two heads are stretched over hoops. One is struck by hand, the other with a stick.

Changzhi (China): *see* Ch'ang-chih.

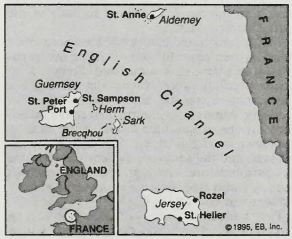
Channel, The (U.K.-France): *see* English Channel.

Channel Country, pastoral region situated primarily in southwestern Queensland, Australia, but extending slightly into northeastern South Australia and northwestern New South Wales.

The region's area of 60,000 square miles (155,000 square km) includes flat alluvial terrain that is drained by the Georgina, Thomson, Diamantina, and Barcoo rivers and by Cooper Creek. Its name is from the many channels the rivers have cut in their floodplains during times of high water. After the annual flood, which sometimes lasts for six months, nutritious grasses appear, and the land becomes excellent for cattle grazing. The region was first opened to pastoralists in 1877; the development of "beef roads," to carry "trains" of linked cattle trucks, has enabled the area to develop as a cattle-raising area.

Channel Islands, French ÎLES NORMANDES, or ANGLO-NORMANDES, archipelago in the English Channel, west of the Cotentin peninsula of France, at the entrance to the Gulf of Saint-Malo, 80 miles (130 km) south of the English coast. The islands are dependencies of the British crown (and not strictly part of the United Kingdom), having been so attached since the Norman Conquest of 1066, when they formed part of the duchy of Normandy. They comprise four main islands, Jersey, Guernsey, Alderney, and Sark (*qq.v.*), with lesser islets and a labyrinth of rocks and reefs. The total land area is 75 square miles (194 square km). They are administered according to local laws and customs, being grouped into two distinct bailiwicks of Guernsey and Jersey, with differing constitutions. Alderney, Sark, Herm, Jethou, Lihou, and Brecqhou are Guernsey's dependencies, and the Ecrehous rocks and Les Minquiers are Jersey's. The last two were the source of long-standing dispute between England and France until 1953, when the International Court of Justice confirmed British sovereignty. In the late 20th century, the dispute revived, as sovereignty of these islands determines allocation of rights to economic development (specifically, petroleum) of the continental shelf.

Fine scenery, flowering vegetation, and a mild maritime climate have made the Channel Islands popular resort areas. The islands, the only British territory to endure German occupation during World War II, are famous for their breeds of cattle and for the export of fruit, flowers, tomatoes, and early potatoes. They enjoy tax sovereignty, and their exports are protected by British tariff barriers. English and French are commonly spoken (though use of the latter is declining), and a Norman-French patois survives. St. Helier, on Jersey, and St. Peter Port (*qq.v.*), on Guernsey, are the islands' main population centres. Pop. (1990 est.) 143,683.



Channel Islands

Channel Islands (California, U.S.): *see* Santa Barbara Islands.

Channel-Port aux Basques, town on the southwestern tip of Newfoundland, Canada. It is the terminal for car ferries across Cabot Strait from North Sydney, Nova Scotia, and is the connecting point for the 570-mile (917-kilometre) semicircular final stage of the Trans-Canada Highway to St. John's (east). Fishing and fish processing are local industries. A monument commemorates those who died when the ferry *Caribou* was torpedoed in 1942 during World War II while en route from Nova Scotia. The town was incorporated in 1945 when Port aux Basques was merged with nearby Channel. Pop. (1991) 5,644.

Channel Tunnel, also called EUROTUNNEL, rail tunnel between England and France that runs beneath the English Channel. The Channel Tunnel, 31 miles (50 km) long, consists of three tunnels: two for rail traffic and a central tunnel for services and security. The tunnel runs between Folkestone, Eng., and Sangatte (near Calais), France, and is used for both freight and passenger traffic. Passengers can travel either by ordinary rail coach or within their own motor vehicles, which are loaded onto special rail cars. Trains can travel through the tunnel at speeds as high as 100 miles (160 km) per hour; the trip takes about 35 minutes.

The often-considered idea of constructing a tunnel under the English Channel was revived in 1986 by the United Kingdom and France. A rail tunnel was chosen over proposals for a very long suspension bridge, a bridge-and-tunnel link, and a combined rail-and-road link, and the project was privately financed by a consortium of British and French corporations and banks; the Anglo-French company operating the tunnel is called Eurotunnel. Digging began on both sides of the Strait of Dover in 1987–88 and was completed in 1991. The tunnel was officially opened in May 1994.

channeling, also spelled CHANNELLING, in solid-state physics, the directionally selective penetration of crystalline solids by a beam of atoms. The effect was predicted in 1912 by the German physicist Johannes Stark but was not confirmed until 1960. The directions in which penetration is greatest characteristically are parallel to crystallographic axes, or planes, and the paths followed by the particles are called channels. For example, heavy atoms pass almost unobstructed through suitably oriented aluminum crystals, traversing distances thousands of times those achieved in nonchanneling directions. The phenomenon is useful in studies of crystal structure and in atomic, nuclear, and solid-state physics and holds promise with regard to the fabrication of semiconductors.

Channing, Edward, in full EDWARD PERKINS CHANNING (b. June 15, 1856, Dorchester, Mass., U.S.—d. Jan. 7, 1931, Cambridge, Mass.), American historian best remembered for a monumental study of his country's development from AD 1000 through the American Civil War (1861–65).

Channing, a son of the clergyman William Ellery Channing, was associated throughout his career with Harvard University, where he taught from 1883 to 1929. Channing's outlook was influenced by social Darwinism, which led him to stress the forces of union over those of particularism as the dominant theme in U.S. history. Based on original sources,

his research stressed the unique contribution of each section to the whole. In emphasizing the significance of urbanization and of improvements in transportation, he challenged



Edward Channing
By courtesy of Harvard University Archives

the frontier thesis of his illustrious colleague Frederick Jackson Turner. Although Channing was sometimes chided for his New England bias, his *History of the United States,* 6 vol. (1905–25) ranks as a major accomplishment in American historical writing. The sixth volume was awarded the Pulitzer Prize for History.

Channing, Walter (b. April 15, 1786, Newport, R.I.—d. July 27, 1876, Brookline, Mass. U.S.), U.S. physician and one of the founders of the Boston Lying-In Hospital (1832), brother of the clergyman William Ellery Channing; he was the first (1847) to use ether as an anesthetic in obstetrics and the first professor of obstetrics at Harvard University (1815).

A graduate in medicine (1809) of the University of Pennsylvania, Channing studied in Europe, returning in 1812 to an obstetrical practice. He was a coeditor of the *New England Journal of Medicine and Surgery* and wrote the classic *Treatise on Etherization in Childbirth* (1848).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

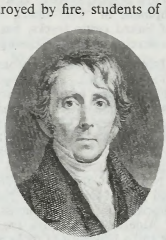
Channing, William Ellery (b. April 7, 1780, Newport, R.I.—d. Oct. 2, 1842, Bennington, Vt., U.S.), U.S. author and moralist, Congregationalist and, later, Unitarian clergyman. Known as the "apostle of Unitarianism," Channing was a leading figure in the development of New England Transcendentalism and of organized attempts in the U.S. to eliminate slavery, drunkenness, poverty, and war.

He studied theology in Newport and at Harvard and soon became a successful preacher in various churches in the Boston area. From June 1, 1803, until his death he was minister of the Federal Street Church, Boston. Preferring to avoid abstruse points of doctrine, he preached morality, charity, and Christian responsibilities. He became a popular speaker on ceremonial occasions and reached an even larger audience by writing for liberal Boston periodicals, one of which was *The Christian Disciple* (from 1824 called *The Christian Examiner*). In 1815 he was attacked by the orthodox Calvinist periodical *The Panoplist,* whose editor, Jedidiah Morse, denounced the Boston clergy as "Unitarian" rather than Christian. During the next five years Channing issued several defenses of his position, especially "Unitarian Christianity," a sermon delivered at an ordination in Baltimore in 1819.

Reluctantly accepting the label of Unitarianism, Channing described his faith as "a rational and amiable system, against which no man's understanding, or conscience, or charity, or piety revolts." Although he did not wish to found a denomination, believing that a Unitarian orthodoxy would be just as oppressive as any other, he formed (1820) a conference of liberal Congregational ministers, later (May 1825) reorganized as the American Unitarian Association.

Channing sympathized with the beliefs of several social and educational reform movements but did not believe that society could be improved by collective action. He denied that government—the only legitimate function of which was, in his view, the essentially negative one of maintaining public order—could advance the moral sensibility of the human race.

In his time, Channing's reputation as a man of letters was based on several long essay-reviews, among the first of their kind in the U.S. One took John Milton's "Treatise on Christian Doctrine" as a starting point; another, Sir Walter Scott's biography of Napoleon I, in whose career Channing saw the great social danger of taking prominent soldiers for heroes. Since most of his manuscripts were destroyed by fire, students of Channing



William Ellery Channing, engraving after a portrait by S. Gambardella, 1839
By courtesy of the Library of Congress, Washington, D.C.

have drawn on *The Life of William Ellery Channing, D.D.,* 3 vol. (1848), by his nephew William Henry Channing. *The Philosophy of William Ellery Channing* (1952), by R.L. Patterson, is an analysis of Channing's thought. *Channing the Reluctant Radical* (1971), by Jack Mendelsohn, is a biography.

chanson (French: "song"), French art song of the Middle Ages and the Renaissance. The chanson before 1500 is preserved mostly in large manuscript collections called chansonniers.

Dating back to the 12th century, the monophonic chanson reached its greatest popularity with the trouvères of the 13th century, and can still be found in the mid-14th-century lais (a verse-song form) of the composer and poet Guillaume de Machaut. Only the melodies survive. The monophonic chansons show the development of intricate musico-poetic forms deriving from the songs of the slightly earlier counterparts of the trouvères, the troubadours. These forms were eventually simplified to become the *formes fixes* ("fixed forms") of the accompanied chanson.

The accompanied chanson—for a solo voice with written parts for one or more accompanying instruments—dominated French song from Machaut until Hayne van Ghizeghem and Antoine Busnois at the end of the 15th century. Almost all accompanied chansons adhere to one of the three *formes fixes:* ballade, rondeau, or virelai (*qq.v.*). The style is sophisticated, and the songs are evidently written for a court audience with high artistic aspirations and a cultivated taste. The general subject matter was courtly love.

The chanson for vocal ensemble had several antecedents. A chanson designed for two or three had appeared; around 1460 the polytextual chanson was in evidence, with two or more singers singing different texts simultaneously. By the end of the 15th century composers were beginning to look to a new kind of chanson texture. The work of the Flemish composer Josquin des Prez shows the gradual change to a style of chanson with four voices singing the same text, sometimes in melodic imitation but also in a homophonic (chordal) style.

In the next century the four-voice style gave way to five and six. Although the *formes fixes* of the previous two centuries were no longer used, the formal control and standard patterns of the chansons separates them from the Italian madrigals of the same years. Only later, in the work of Adriaan Willaert and Jacques Arcadelt (both of whom also wrote madrigals) did the styles begin to merge as the formal design of the chanson became less strictly reliant on balanced phrases and repeated material and more determined by the melodic imitation as a basis for structure.

The later years of the 16th century saw the perfection of the polyphonic (multipart, usually with interwoven melodic lines) chanson in the work of Orlando di Lasso; and they saw the more homophonic style influenced by the attempt to match words to music in the measured verse *à l'antique* proposed by the members of La Pléiade (a French society seeking a return to classical poetry and music) exemplified in the work of Claude Le Jeune. After 1600 the chanson yielded to a new kind of song: the *air de cour* for solo voice with lute accompaniment.

chanson de geste (French: "song of deeds"), any of the Old French epic poems forming the core of the Charlemagne legends. More than 80 chansons, most of them thousands of lines long, have survived in manuscripts dating from the 12th to 15th centuries, but they deal chiefly with events of the 8th and 9th centuries during the reigns of Charlemagne and his successors. In general, the poems contain a core of historical truth overlain with legendary accretions. Whether they were composed under the inspiration of the events they narrate and survived for generations in oral tradition, or whether they were the independent compositions of professional poets of a later date is still a disputed question. A few poems have authors' names, but most are anonymous.

The background of the chansons is the struggle of Christian France against a conventionalized polytheistic or idolatrous "Muslim" enemy. The emperor Charlemagne is portrayed as the champion of Christendom. He is surrounded by his court of Twelve Noble Peers, among whom are Roland, Oliver, Ogier the Dane, and Archbishop Turpin.

Besides the stories grouped around Charlemagne, there is a subordinate cycle of 24 poems dealing with Guillaume d'Orange, a loyal and long-suffering supporter of Charlemagne's weak son, Louis the Pious. Another cycle deals with the wars of such powerful barons as Doon de Mayence, Girart de Roussillon, Ogier the Dane, or Raoul de Cambrai, against the crown or against each other.

The earlier chansons are heroic in spirit and theme. They focus on great battles or feuds and on the legal and moral niceties of feudal allegiances. After the 13th century elements of romance and courtly love came to be introduced, and the austere early poems were supplemented by *enfances* (youthful exploits) of the heroes and fictitious adventures of their ancestors and descendants. The masterpiece and probably the earliest of the chansons de geste is the 4,000-line *La Chanson de Roland* (*q.v.*). Appearing at the threshold of French epic literature, *Roland* was the formative influence on the rest of the chansons de geste. The chansons, in turn, spread throughout Europe. They strongly influenced Spanish heroic poetry; the mid-12th-century Spanish epic *El cantar de mío Cid* ("The Song of

the Cid"), in particular, is indebted to them. In Italy stories about Orlando and Rinaldo (Roland and Oliver) were very popular and formed the basis for the Renaissance epics *Orlando innamorato* (Matteo Boiardo; 1495) and *Orlando furioso* (Ludovico Ariosto; 1532). In the 13th century the German poet Wolfram von Eschenbach based his epic *Willehalm* on Guillaume d'Orange, and the chansons were recorded in prose in the Icelandic *Karlamagnús saga.* Charlemagne legends, referred to as "the matter of France," were long staple subjects of romance. In the 20th century the chansons continued to enjoy a strange afterlife in folk ballads of the Brazilian backlands, called *literatura de la corda* ("literature on a string") because, in pamphlet form, they were formerly hung from strings and sold in marketplaces. Frequently in these ballads, through a misunderstanding of a Portuguese homonym, Charlemagne is surrounded by a company of 24 knights; *i.e.,* "Twelve Noble Pairs."

Chanson de Roland, La, English THE SONG OF ROLAND, Old French epic poem that is probably the earliest (*c.* 1100) and certainly the masterpiece of chanson de geste (*q.v.*). The poem's probable author was a Norman poet, Turold, whose name is introduced in the last line of the poem. The song deals with the historical Battle of Roncesvalles (Roncevaux) in 778. Though the encounter was actually an insignificant skirmish against the Basques, the poem transforms Roncesvalles into a battle against Saracens and magnifies it to the heroic stature of Thermopylae.

The poem opens as Charlemagne, having conquered all of Spain except Saragossa, receives overtures from the Saracen king and sends the knight Ganelon, Roland's stepfather, to negotiate peace terms. Angry because Roland proposed him for the dangerous task, Ganelon plots with the Saracens to achieve his stepson's destruction and, on his return, ensures that Roland will command the rear guard of the army when it withdraws from Spain. As the army crosses the Pyrenees, the rear guard is surrounded at the pass of Roncesvalles by an overwhelming Saracen force. Trapped against crushing odds, the headstrong hero Roland is the paragon of the unyielding warrior victorious in defeat. (*See also* Roncesvalles, Battle of.)

The composition of the poem is firm and coherent, the style direct, sober, and, on occasion, stark. Placed in the foreground is the personality clash between the recklessly courageous Roland and his more prudent friend Oliver, which is also a conflict between divergent conceptions of feudal loyalty. Roland, whose judgment is clouded by his personal preoccupation with renown, rejects Oliver's advice to blow his horn and summon help from Charlemagne. On Roland's refusal, the hopeless battle is joined, and the flower of Frankish knighthood is reduced to a handful of men. The horn is finally sounded, too late to save Oliver, Turpin, or Roland, who has been struck in error by the blinded Oliver, but in time for Charlemagne to avenge his heroic vassals. Returning to France, the emperor breaks the news to Aude, Roland's betrothed and the sister of Oliver, who falls dead at his feet. The poem ends with the trial and execution of Ganelon.

chant royal, fixed form of verse developed by French poets of the 13th to the 15th centuries. Its standard form consisted in the 14th century of five stanzas of from 8 to 16 lines of equal measure, without refrain, but with an identical rhyme pattern in each stanza and an envoi using rhymes from the stanzas. In the 15th century, the chant royal acquired a refrain, and the envoi was normally about half the length of the stanza, which had usually from 10 to 12 lines, the number being dictated by the number of syllables in the refrain.

Like the ballade, the chant royal admitted of variations. As the *serventois,* for example, a poem in honour of the Virgin Mary, it early acquired, then lost, the refrain; similar varieties were the *amoureuse* ("love poem"), the *sotte amoureuse* ("playful love poem"), and the *sotte chanson* ("comic poem").

Clément Marot in the 16th century was a master of this form, and his *Chant royal chrétien,* with its refrain "Santé au corps et Paradis à l'âme" ("Health to the body and Paradise to the soul"), was famous. The 17th-century fabulist La Fontaine was the last exponent of the chant royal before its eclipse. Revived in the 19th century, it essentially belonged to a time when its subject could be the exploits of a royal hero or the processional splendours of religion. Although introduced into England by Sir Edmund Gosse in his poem "The Praise of Dionysus" (1877), it is practically unknown in any literature but French.

Chantal, Saint Jane Frances of, French SAINTE JEANNE-FRANÇOISE DE CHANTAL, original name JEANNE-FRANÇOISE FRÉMIOT, BARONE (baroness) DE CHANTAL (b. Jan. 28, 1572, Dijon, Fr.—d. Dec. 13, 1641, Moulins; canonized 1767; feast day August 21), French cofounder of the Visitation Order.

In 1592 she married Baron de Chantal, who was killed in a hunting accident (1601), leaving her with four children. In 1604 she heard St. Francis de Sales preach the Lent at Dijon and placed herself under his direction. In 1610, after her eldest daughter had married and her 14-year-old son was provided for, she took her two remaining daughters to Annecy, where with Francis she founded the Visitation Order. She was bereaved by the death of Francis (1622), and in 1627 her son died in battle. She transformed her convent at Annecy into a hospital during the plague of 1628. She died in her convent at Moulins en route from Paris, to which city she had been invited by Queen Anne of Austria. The Visitation Order had 86 houses at her death.

chanter (religious official): *see* cantor.

chantey, also spelled CHANTY: *see* shanty.

Chanthaburi, also called CHANTABUN, town and *changwat* (province) in the Central region of Thailand. Chanthaburi town, the provincial capital, is a commercial centre near the mouth of the Mae Nam (river) Chanthaburi, serving the region's pepper, rubber, fruit, and coffee plantations. The province has an area of 2,447 sq mi (6,338 sq km). The Chanthaburi Range is in the north and the Gulf of Thailand on the south. Pop. (1980) town, 21,056; province, 297,631.

Chanthakuman, also called CHANDAKUMARA, CHANTHARAD, TIANTHA-KOUMANE (b. 1799—d. Aug. 23, 1870, Luang Prabang), ruler of the Lao kingdom of Luang Prabang who was confronted by increasingly serious local, regional, and international threats to his state's survival.

Chanthakuman was the second son of King Mangthaturat, and succeeded his elder brother Suk Soem (Souka-Seum) in 1852 as a vassal of the king of Siam. As king, Chanthakuman received several noted Western explorers, including Henri Mouhot, a French naturalist who arrived in 1861, and the mission of Doudart de Lagrée and Francis Garnier (later involved in French expansion in Tonkin, northern Vietnam), which reached Luang Prabang in 1867.

In 1864 Chanthakuman with difficulty held off an invasion of Chinese (Ho or Haw) freebooters and bandits who were to plague his state for a generation. He worked to free the principality of Xieng Khouang from Vietnamese domination, and succeeded in getting it recognized as a vassal of both Vietnam and Luang Prabang. The high point in his reign came in 1866, when the Siamese king Mongkut returned the statue of the Prabang Buddha, taken by the Siamese from Vientiane in 1828, to its original home in Luang Prabang, where it served as the palladium of the kingdom. Chanthakuman was succeeded by his brother Un Kham in 1872.

Chantilly, residential town and holiday resort, Oise *département,* Picardie region, France, 26 mi (42 km) north of Paris by road. Situated near the forest of Chantilly, it is celebrated for its château, park, and racecourse. In the 18th century Chantilly became famed for its fine lacework and beautiful porcelain. The town derives its name from Cantilius, a Gallo-Roman, who built the first villa there. The château, on a small rocky island in an artificial lake, was built in the 14th century and has since been restored several times. Now housing the Musée Condé, in 1886 it was bequeathed, together with its collections of the museum, library, and surrounding park, to the Institut de France by the Duc d'Aumale. The fine art collections of the museum include works by the Italian Renaissance painter Raphael (1483–1520) and rare portraits by the 16th-century court painters Jean and François Clouet. The great 18th-century stables, built to house 240 horses and more than 400 hounds, are also open to the public. The racecourse was in-



The Château at Chantilly, Fr.

Shostal—EB Inc.

augurated in 1834. The annual races of the French Jockey Club are run in June. Chantilly is one of France's principal horse-training centres. The town has also given its name to a kind of whipped cream. Pop. (1990) 11,341.

Chantilly lace, lace made at Chantilly, Oise *département*, north of Paris. Lace was made



Chantilly lace from France, *c.* 1870; in the Institut Royal du Patrimoine Artistique, Brussels

By courtesy of the Institut Royal du Patrimoine Artistique, Brussels; photograph, © A.C.L., Brussels

there from the 17th century, but the silk laces for which Chantilly was famous date from the 18th century. In the 19th century black, white, and blonde (made from silk in its natural colour of beige; *see* blonde lace) laces were made. By 1840 good machine-made imitations were available; both they and the more expensive handmade kind were fashionable from midcentury, when shawls and even whole mantles of Chantilly were worn with the crinoline. Designs were of naturalistic flowers, ribbons, and the like, often on a spotted background.

Chantilly porcelain, celebrated soft-paste porcelain produced from 1725 to *c.* 1789 by a factory established in the Prince de Condé's château at Chantilly, Fr. Two periods can be distinguished, according to the composition of the porcelain; in the first, up to about 1740, a unique, opaque milk-white tin glaze was applied on a rather yellowish body; in the second (1741–89), a traditional, transparent lead glaze was used.

The preoccupation of Chantilly, until the Prince died in 1740, was with Japanese Kakiemon designs. Some of his designs were directly inspired by his large collection of the ware, others derived from Meissen versions of these Oriental motifs, such as the "Red Dragon" service, which, in iron-red and gilding, became the Chantilly Prince Henri pattern. Other Japanese patterns simplified and adopted included the quail, partridge, flying squirrel, and pomegranate.

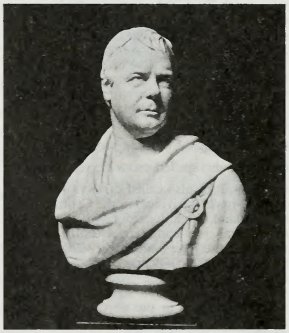
Porcelain produced in the second period was influenced first by Meissen and then by Sèvres, both in modelling and in the use of coloured grounds. Some rare figures reflecting Chinese influence were modelled, as well as bird figures and small statuette flower holders. The main production, however, consisted of domestic ware—plates, jugs, basins, and jardinieres—enhanced by an effective economy of decoration painted in underglaze blue only or at best with a limited palette, which was the result of Royal edicts in favour of the Sèvres. The motif was often small flower bouquets known as Chantilly sprigs or more formal scrolls and plait work.



Chantilly porcelain plate decorated with dragons, *c.* 1725; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Chantrey, Sir Francis Legatt (b. April 7, 1781, Norton, Derbyshire, Eng.—d. Nov. 25, 1841, London), prolific early 19th-century English sculptor. Of his many works, he considered his sculpture "Lady Frederica Stanhope at Chevening Church" (1824) to be the best. He began his career as a wood-carver, receiving his first sculpture commission in 1805. In



Sir Walter Scott, marble bust by Sir Francis Chantrey, 1828; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

1811, after his bust of the radical reformer John Horne Tooke was exhibited at the Royal Academy, Chantrey's success was assured. Numerous commissions followed: statues of George IV in Windsor Castle and at Brighton; George Washington in the state house, Boston; William Pitt in Hanover Square, London; and equestrian statues of George IV in Trafalgar Square, London, and of the Duke of Wellington outside the Royal Exchange, London. Chantrey also produced a large number of busts, including two of Sir Walter Scott. He was knighted in 1835.

chantry, chapel, generally within a church, endowed for the singing of masses for the founder after his death. The practice of founding chantries, or chantry chapels, in western Europe began during the 13th century. A chantry was added to the cathedral of Notre-Dame in Paris in 1258. During the 14th century, the chantry movement so established



Bishop Richard Fleming chantry, Lincoln cathedral, Lincolnshire, England, *c.* 1430

By courtesy of the Courtauld Institute of Art, London

itself as a manifestation of religious life that these chapels became a part of the original plan of cathedrals, as at Tours and Bordeaux. The earliest recorded chantry in England is that of Bishop Hugh of Wells in Lincoln cathedral, *c.* 1235. When the number of foundations rapidly increased after the plague known as the Black Death in 1349, chantries were established not only in churches but in monasteries, hospitals, and grammar schools in memory of the founders.

Such chapels are almost invariably screened; sometimes they are merely enclosures surrounded by oak screens, but more often they are handsome stone-traceried structures, with heraldry and carving; and in many instances there is an effigy of the founder on a stone tomb chest. Among well-known chantries are the Chapel of Henry VII in Westminster Abbey, Bishop Alcock's Chapel in Ely cathedral, and the Beauchamp Chapel in St. Mary's, Warwick.

Chanty-Mansijsk (Russia): *see* Khanty-Mansiysk.

Chanukah, also spelled CHANUKKAH (Judaism): *see* Ḥanukka.

Chanute, city, Neosho county, southeastern Kansas, U.S., on the Neosho River. Settled *c.* 1870 and named for Octave Chanute, a civil engineer and aviation pioneer, Chanute developed as a trading and shipping centre for an agricultural and oil-producing region. Manufactures include drilling equipment, work clothes, chemicals, and cement. Chanute is the site of Neosho County Community Junior College (1936). The city's Safari Museum has collections pertaining to the work of African explorers Martin and Osa Johnson (she was born in Chanute in 1894). Inc. 1873. Pop. (1990) 9,488.

Chanute, Octave (b. Feb. 18, 1832, Paris—d. Nov. 23, 1910, Chicago), U.S. aeronaut whose work and interests profoundly influenced Orville and Wilbur Wright and the invention of the airplane.

Brought to the U.S. at an early age, Chanute was educated as a civil engineer and built railroads and railroad bridges before turning to aviation. Attracted by the work of Otto Lilienthal and other Europeans who were experimenting with gliding flight, Chanute (then in his 60s) established a glider camp on the sand dunes of Lake Michigan near Chicago. There he and his associates made about 2,000 gliding flights without accident in machines of his own design. Chanute was particularly interested in problems of control and equilibrium, and the data he accumulated proved



Octave Chanute

By courtesy of the National Air and Space Museum, Smithsonian Institution, Washington, D.C.

extremely useful to the Wright brothers in evolving their earlier designs. He was in constant correspondence with the Wrights and on several occasions visited Kitty Hawk, N.C., during the period (1901–02) of their gliding experiments, which preceded their successful powered flights.

Chao, Pinyin ZHAO, ancient Chinese feudal state, one of the seven powers that achieved ascendency during the Warring States Period (475–221 BC) of Chinese history. In 403 Chao Chi, the founder of Chao, and the leaders of the states of Wei and Han partitioned the state of Chin. The state of Chao extended through northeastern and central Shansi and southwestern Hopeh. The state prospered for a time, seizing large areas of land within the territories of the states of Ch'i and Wei. It eventually became the strongest contender against the state of Ch'in, but its military strength was utterly destroyed by Ch'in in 260 BC; some 50,000 men were killed in battle, and most of the approximately 400,000 men who surrendered were slaughtered.

Ch'ao-an (China): *see* Ch'ao-chou.

Chao Chen (Chinese emperor): *see* Jen-tsung (1010–1063).

Chao Cheng (Chinese emperor): *see* Shih huang-ti.

Chao Chi: *see* Hui-tsung.

Chao-ch'ing, also called KAO-YAO, Pinyin ZHAOQING, or GAOYAO, city in western Kwangtung *sheng* (province), China. Chao-ch'ing lies on the north bank of the Hsi River, 50 miles (80 km) west of Canton, just above the famous Ling-yang Gorge, commanding the river route to Canton.

Chao-ch'ing is an ancient city. A county town was established there in the 1st century BC, and a commandery, Kao-yao, was set up in AD 502–519. From 589 onward it was known as Tuan, until in 1118 it became a superior prefecture, Chao-ch'ing.

The centre of a prosperous and fertile agricultural district, Chao-ch'ing has various small industries processing local products and is a river port with much trade with eastern Kwangsi province. It is also an area of great scenic beauty. Pop. (1990) 194,784.

Ch'ao-chou, formerly CH'AO-AN, Pinyin CHAOZHOU, or CHAO'AN, city in eastern Kwangtung *sheng* (province), China. It is at the head of the delta of the Han River, some 26 miles (42 km) north of Swatow.

Having good communications with northern Kwangtung, Fukien, and Kiangsi provinces, via the Han River system, the city has been an important regional centre from early times. Its county, under the name Hai-yang, was founded in AD 413; the city itself was the seat of various commanderies and prefectures. The name Ch'ao was first given to it as a prefecture in 591. This part of Kwangtung was a wild frontier and was a favourite place of banishment for disgraced officials during medieval times. In the 13th century the city began to play an important administrative role, and from 1368 until 1911 it was a superior prefecture. After it was opened to foreign trade in 1858, Ch'ao-chou was gradually overtaken in size and commercial importance by Swatow, and, under the communist government, Swatow replaced it as the major local seat of administration.

Ch'ao-chou is situated at the centre of a rich and extremely fertile agricultural district that has a high population density. The city is an important regional agricultural market and is also a well-known centre of various handicrafts. Pop. (1990) 313,469.

Chao Fa Rua: *see* Wareru.

Chao Heng (Chinese emperor): *see* Chen-tsung.

Chao Hsiu Sheng (Chinese official): *see* Zhao Ziyang.

Chao Hsü (Chinese emperor): *see* Shen-tsung (1048–1085).

Chao Huan (Chinese emperor): *see* Ch'in-tsung.

Chao Huang: *see* T'ai-tsung (AD 939–997).

Chao-hui, Pinyin ZHAOHUI (b. 1708, China—d. Dec. 10, 1764, Peking), famous Ch'ing dynasty general who played a prominent part in the conquest of Chinese Turkestan (now Uygur Autonomous Region of Sinkiang).

A member of the imperial family, Chao-hui volunteered to lead an expedition against the western Mongols, whose continued history of usurpations, tribal rebellions, wars, invasions, and migrations in Outer Mongolia and eastern Turkestan were a constant source of trouble on China's northwestern borders. During 1755–57 Chao-hui led several forays into the area, on the last of which his troops were cut off and surrounded. Relief finally came, and he succeeded in virtually exterminating the Dzungar tribes of the western Mongols. To consolidate his conquest, he put the region under a military governor and established Chinese garrisons and penal colonies.

Meanwhile, Muslims in the southern part of Chinese Turkestan revolted, and Chao-hui was sent to subdue them. Once more his troops were surrounded; the siege lasted so long that the soldiers are said to have been reduced to cannibalism. When finally relieved, he completed the conquest of the region. As a result Chinese control in the northwest was extended to the Pamir mountains, which divide eastern from western Asia. Although Chao-hui was much decorated, he is usually viewed as a *fu-chiang* ("lucky general") in view of his two "lucky" escapes from desperate sieges.

Chao Ju-kua, Pinyin ZHAO RUGUA (fl. 12th century, China), Chinese trade official whose two-volume work *Chu fan chih* ("Description of the Barbarians") is one of the best-known and most wide-ranging accounts of foreign places and goods at the time of the Sung dynasty (960–1279).

Chao was a member of the Sung imperial family and held the position of superintendent of customs at the great port of Ch'üan-chou in Fukien province in southern China. There he met Arab, Indian, and other foreign merchants, from whom he gathered his geographic information.

His descriptions are accurate for places close to China but not so reliable for more distant areas. In the first volume he writes of Japan, Korea, the Philippines, India, Africa, the Arab lands, and even Europe. Chao explains that if one travels north from Spain "for 200 days, the days are only 6 hours long." This reference to northwest Europe is the first of its kind in Chinese literature. Other European nations, such as Sicily, are minutely described. In his second volume Chao details the various articles imported into China from foreign lands. His work not only shows the tremendous volume of trade between China and foreign countries during the Sung dynasty but also demonstrates the knowledge the Chinese had of Europe before the Mongol invasion opened East Asia to European travelers.

Chao Kao, Pinyin ZHAO GAO (b. Chao [China]—d. 207 BC, China), Chinese eunuch who conspired to seize power on the death of Shih Huang-ti, first emperor of the Ch'in dynasty (221–206 BC). His action eventually led to the downfall of the dynasty.

As the chief eunuch to Shih Huang-ti, Chao Kao handled all the emperor's communications with the outside world, so that he had no difficulty in concealing Shih Huang-ti's death while on a trip in 209 BC. The emperor's eldest son was in exile on the northern frontier because he had opposed the measures of the minister Li Ssu to burn all books as a means of proscribing heterodox thought. The emperor's last orders were contained in a sealed letter to his eldest son, whom he named heir apparent. Fearing that the crown prince, if he succeeded to the throne, would have them dismissed and probably killed, Li and Chao forged a letter to the prince and his companion Meng T'ien, the commander of the army of the north, ordering them to commit suicide. The forgery was not immediately discovered, and the two men died. Li and Chao hastened to return to the capital with the dead emperor, concealing the malodorous corpse in a wagon load of salt fish attached to the rear of the imperial carriage. The conspirators then forged a decree that called for the emperor's infant son, Hu Hai, to ascend the throne.

Li and Chao soon turned on one another, and Chao had Li executed. Rebellions thereupon erupted throughout the country, and the rebels soon marched on the capital. Chao executed the puppet sovereign and set another man on the throne, whom he also attempted to execute. His plot discovered, Chao was assassinated as he entered the palace.

Chao Kou (Chinese emperor): *see* Kao-tsung (1107–1187).

Chao K'uang-i (Chinese emperor): *see* T'ai-tsung (AD 939–997).

Chao K'uang-yin (Chinese emperor): *see* T'ai-tsu (AD 927–976).

Chao Kuei (Chinese emperor): *see* T'ai-tsung (AD 939–997).

Chao K'uo (Chinese emperor): *see* Ning-tsung.

Chao-lieh ti (Chinese emperor): *see* Liu Pei.

Chao Meng-fu, Pinyin ZHAO MENGFU, pseudonym TZU-ANG (b. 1254, Wu-hsing, Chekiang province, China—d. 1322), Chinese painter and calligrapher who, though occasionally condemned for having served in the foreign Mongol court (Yüan dynasty, 1206–1368), has been honoured as an early master within the tradition of literati painters (*wen-jen-hua*) who sought personal expression rather than representation of nature.

Chao Meng-fu, though he was a descendant of the imperial family of the Sung dynasty (960–1279) and had been educated in the imperial university, in 1286 accepted service in the newly established Mongol court. His paintings were among the first after the collapse of the Sung dynasty and its academy of painting to show a new variety and interest derived from subjects and styles of ancient masters. Chao Meng-fu is popularly remembered as a painter of horses in the manner of the T'ang dynasty (618–907) master Han Kan (*q.v.*), but he also painted other animal groups, landscapes, and bamboos. Within his subject matter there was a general avoidance of superficial beauty with deliberately simpli-



"A Sheep and a Goat," painting in ink by Chao Meng-fu; in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

fied colour and compositions and a schematic, even childlike, rendering of forms and scale—all seen as referring to the antique and displaying a great variety of brushwork. Chao Meng-fu's wife, Kuan Tao-sheng, and his son, Chao Yung (born 1289), were both painters of note, though of rather more limited range.

Chao Phraya River, Thai MAE NAM CHAO PHRAYA, also called MAENAM, principal river of Thailand. It flows south through the nation's fertile central plain for more than 225 miles (365 km) to the Gulf of Thailand. Thailand's capitals, past and present (Bangkok), have all been situated on its banks or those of its tributaries and distributaries, as are many other cities.

The Chao Phraya constitutes a valuable waterway for the transport of the nation's traditional exports of teak and rice south to Bangkok, though less bulky commodities are now moved overland by road or rail. For centuries the Thai have made use of the Chao Phraya, and particularly its canal (*khlong*) system, for drainage, recreation, and fishing and as a source of water.

The river's headwaters—the Ping, Wang, Yom, and Nan rivers—rise in the mountains of northern Thailand. At Nakhon Sawan, 140 miles north of Bangkok, the main river begins with the Ping-Nan confluence. Its tortuous course flows past Chai Nat (site of a government dam and irrigation scheme), Sing Buri, Ang Thong, Nonthaburi, and Bangkok to its mouth at Samut Prakan. From its formation at Nakhon Sawan, the river falls less than 80 feet (24 m) in its journey to the sea.

The Chao Phraya system drains 61,807 square miles (160,079 square km) and is the basis of several major irrigation projects. The river's basin is a low, filled arm of the Gulf of Thailand that is seamed with numerous distributaries. Near Chai Nat a distributary—the Nakhon Chai Si River—branches to the west and parallels the mother stream to the gulf at Samut Sakhon, 25 miles (40 km) west of the main mouth. The main stream bifurcates and reunites several times. Below Chai Nat the Noi River branches westward and rejoins the Chao Phraya at Sam Khok. The Lop Buri River branches eastward and, before returning to the main stream, flows past the cities of Lop Buri and Phra Nakhon Si Ayutthaya; at the latter it receives a great eastern tributary—the Pa Sak River—from the Phetchabun Mountains of the northeast.

Tides run up the meandering Chao Phraya to Phra Nakhon Si Ayutthaya. The delta plain around Bangkok is seldom more than 7 feet (2 m) above sea level, and annual flooding brings rich alluvium to the rice fields. In the delta, the Chao Phraya, the Mae Klong on the west, and the Bang Pakong on the east are linked by a network of canals.

The 25-mile course below Bangkok is lined with wharves and other harbour installations. The mouth of the deepwater channel requires frequent dredging and cannot accommodate vessels larger than 10,000 tons.

Chao Tzu-yang (Chinese official): *see* Zhao Ziyang.

Chaos, in early Greek cosmology, either the primeval emptiness of the universe before things came into being or the abyss of Tartarus, the underworld. Both concepts occur in the *Theogony* of Hesiod. First there was Chaos in Hesiod's system, then Gaea and Eros (Earth and Desire). Chaos, however, did not generate Gaea; the offspring of Chaos were Erebus (Darkness) and Nyx. Nyx begat Aether, the bright upper air, and Day. Nyx later begat the dark and dreadful aspects of the universe (*e.g.,* Dreams, Death, War, and Famine). This concept tied in with the other early notion that saw in Chaos the darkness of the underworld.

In the later cosmologies Chaos generally designated the original state of things, however conceived. The modern meaning of the word is derived from Ovid, who saw Chaos as the original disordered and formless mass, from which the maker of the Cosmos produced the ordered universe. This concept of Chaos also was applied to the interpretation of the creation story in Genesis 1 (to which it is not native) by the early Church Fathers.

chaos, in mechanics and mathematics, apparently random or unpredictable behaviour in systems governed by deterministic laws. A more accurate term, "deterministic chaos," suggests a paradox because it connects two notions that are familiar and commonly regarded as incompatible. The first is that of randomness or unpredictability, as in the trajectory of a molecule in a gas or in the voting choice of a particular individual from out of a population. In conventional analyses, randomness was considered more apparent than real, arising from ignorance of the many causes at work. In other words, it was commonly believed that the world is unpredictable because it is complicated. The second notion is that of deterministic motion, as that of a pendulum or a planet, which has been accepted since the time of Isaac Newton as exemplifying the success of science in rendering predictable that which is initially complex.

In recent decades, however, a diversity of systems have been studied that behave unpredictably despite their seeming simplicity and the fact that the forces involved are governed by well-understood physical laws. The common element in these systems is a very high degree of sensitivity to initial conditions and to the way in which they are set in motion. For example, the meteorologist Edward Lorenz discovered that a simple model of heat convection possesses intrinsic unpredictability, a circumstance he called the "butterfly effect," suggesting that the mere flapping of a butterfly's wing can change the weather. A more homely example is the pinball machine: the ball's movements are precisely governed by laws of gravitational rolling and elastic collisions—both fully understood—yet the final outcome is unpredictable.

In classical mechanics the behaviour of a dynamical system can be described geometrically as motion on an "attractor." The mathematics of classical mechanics effectively recognized three types of attractor: single points (characterizing steady states), closed loops (periodic cycles), and tori (combinations of several cycles). In the 1960s a new class of "strange attractors" was discovered by the American mathematician Stephen Smale. On strange attractors the dynamics is chaotic. Later it was recognized that strange attractors have detailed structure on all scales of magnification; a direct result of this recognition was the development of the concept of the fractal (*q.v.*; a class of complex geometric shapes that commonly exhibit the property of self-similarity), which led in turn to remarkable developments in computer graphics.

Applications of the mathematics of chaos are highly diverse, including the study of turbulent flow of fluids, irregularities in heartbeat, population dynamics, chemical reactions, plasma physics, and the motion of groups and clusters of stars.

Chaouen (city, Morocco): *see* Chechaouene.

Chaozhou (China): *see* Ch'ao-chou.

Chapala, Lake, Spanish LAGO DE CHAPALA, lake, west-central Mexico. It lies on the central plateau at 6,000 feet (1,800 m) above sea level in Jalisco and Michoacán states. Chapala is Mexico's largest lake, measuring approximately 48 miles (77 km) east-west by 10 miles (16 km) north-south and covering an area of 417 square miles (1,080 square km). Despite its size, the lake is very shallow and is susceptible to infestations of water hyacinth. It is fed principally by the Lerma River, which enters



Resort on Lake Chapala in Jalisco state, Mexico

Charles Townsend—Shostal

at the eastern end and leaves at the northeastern corner as the Santiago River. The scenic setting, pleasant climate, picturesque villages dotting the shores, and good fishing make the lake a popular resort and, increasingly in the late 20th century, a retirement centre for American citizens. Lying 30 miles (48 km) south-southeast of Guadalajara, it is easily accessible by highway, railroad, or air.

chaparral, vegetation composed of broad-leaved evergreen shrubs, bushes, and small trees usually less than 2.5 m (about 8 feet) tall; together they often form dense thickets. Chaparral is found in regions with a climate similar to that of the Mediterranean area, characterized by hot, dry summers and mild, wet winters. The name chaparral is applied primarily to the coastal and inland mountain vegetation of southwestern North America; sometimes it takes the place of a more general term, Mediterranean vegetation, which denotes areas of similar vegetation around

the Mediterranean Sea, at the southern tip of Africa, in southwestern Australia, and in central South America.

Sages and evergreen oaks are the dominant plants in North American chaparral areas that have an average yearly rainfall of about 500 to 750 mm (20 to 30 inches). Areas with less rainfall or poorer soil have fewer, more drought-resistant shrubs such as chamise and manzanita. Chaparral vegetation becomes extremely dry by late summer. The fires that commonly occur during this period are necessary for the germination of many shrub seeds and also serve to clear away dense ground cover, thus maintaining the shrubby growth form of the vegetation by preventing the spread of trees. Chaparral returns to its prefire density within about 10 years but may become grassland by too frequent burning.

Deer and birds usually inhabit chaparral only during the wet season (the growth period for most chaparral plants), and move northward or to a higher altitude as food becomes scarce during the dry season. Small, dull-coloured animals such as lizards, rabbits, chipmunks, and quail are year-round residents. New chaparral growth provides good grazing for domestic livestock, and chaparral vegetation also is valuable for watershed protection in areas with steep, easily eroded slopes.

Chapayevsk, also spelled ČAPAJEVSK, or CHAPAEVSK, formerly (until 1929) IVASHCHENKOVO, city, Samara *oblast* (province), western Russia, on the Chapayevka River, a tributary of the Volga. Formerly a centre of the defense industry specializing in explosives, it now concentrates on nitrogen production and ammonia synthesis. A college of technology is located in the city. Pop. (1991 est.) 96,000.

chapbook, small, inexpensive stitched tract formerly sold by itinerant dealers, or chapmen, in western Europe and in North America. Most chapbooks were 5½ by 4¼ inches (14 by 11 cm) in size and were made up of four pages (or multiples of four), illustrated with woodcuts. They contained tales of popular heroes, legend and folklore, jests, reports of notorious crimes, ballads, almanacs, nursery rhymes, school lessons, farces, biblical tales, dream lore, and other popular matter. The texts were mostly crude and anonymous, but they formed the major part of secular reading and now serve as a guide to the manners and morals of their times.

Many of the earliest English and German chapbooks derived from French examples, which began to appear at the end of the 15th century. The *Volksbücher* (a type of chapbook) began to flourish in Germany in the mid-16th century. Some were prose versions of medieval German verse romances; others contained tales of foreign origin. Whatever their sources, they satisfied a need for light literature that persisted long after the 16th century. In colonial America they were imported from England and were produced locally. When religious and other more serious tracts appeared, and as publication of inexpensive magazines developed in the early 19th century, chapbooks lost popularity and were discontinued.

chapel, small, intimate place of worship. The name was originally applied to the shrine in which the kings of France preserved the cape (late Latin *cappella,* diminutive of *cappa*) of St. Martin. By tradition, this garment had been torn into two pieces by St. Martin of Tours (*c.* 316–397) that he might share it with a ragged beggar; later Martin had a vision of Christ wearing the half cape, and it was preserved as a relic and carried about by the Frankish kings on their military campaigns. By extension, any sanctuary housing relics was called a chapel and the priest *cappellanus,* or chaplain. By a further extension, all places of worship that were not mother churches, including a large number of miscellaneous foundations, came to be known as chapels. Oratories, places of private worship attached to royal residences, also were termed chapels. Thus the Sainte Chapelle (1248), the palace chapel at Paris, was built by St. Louis IX to enshrine the relic of what was thought to be the Crown of Thorns, which he had brought from Constantinople. In the next century, other *saintes chapelles* were founded by princes of the French royal house at Bourges, Riom, and elsewhere.

In the European Middle Ages the cult of the Virgin Mary was widespread, and by the close of the 14th century most major churches in western Europe had a Lady chapel (*q.v.*). Such extradevotional chapels were largely introduced by the religious orders, and secular clergy in parochial and cathedral churches quickly followed their example. In the 13th century many cathedrals and monastic churches were remodeled to embody a chevet, or semicircular range of radiating polygonal chapels, on the eastern wall. This plan was the standard for the great churches of the Île-de-France region, and it was reflected in England in the churches of Westminster and Canterbury.

St. Sernin, at Toulouse, has no fewer than 17 pentagonal chapels, linked by narrow passages. The multiplication of chapels in the later Middle Ages stemmed from two innovations: the inclusion of the chantry, a special place of worship established by a donor for the singing of masses after his death, and the formation of numerous guilds or confraternities that built their own chapels in the town churches for corporate worship. The chapels of these guilds were arranged along each side of the nave, either enclosed by party walls inside the church or built out between the buttresses.

A domestic chapel intended for private devotions may be attached to a house, college, or other building or institution and is sometimes called an oratory. Thus, the Sistine Chapel is the private chapel of the Vatican, and St. George's Chapel, Windsor, is the private chapel of Windsor Castle, Berkshire.

In modern times a chapel is generally speaking a subordinate house of worship auxiliary to or parallel with a church.

Chapel Hill, town, Orange county, central North Carolina, U.S., 12 miles (19 km) southwest of Durham. It was founded in 1792 and named for the Church of England New Hope Chapel that once stood at the crossroads on the hill at the settlement's centre. With the adjoining town of Carrboro (to the west), it forms a university community, being the seat of the University of North Carolina (chartered 1789; opened 1795). The Old Well, a campus landmark, has become the university's shrine and symbol. The Morehead Planetarium has an art collection as well as facilities for indoor stargazing. The Carolina Playmakers Community Theatre has a national reputation. Inc. 1851. Pop. (1990) 38,719.

Chapelain, Jean (b. Dec. 4, 1595, Paris, Fr.—d. Feb. 22, 1674, Paris), French literary critic and poet who attempted to apply empirical standards to literary criticism.

Chapelain's approach was a challenge to others of his day who appealed in doctrinaire fashion to classical Greek authorities. His critical views were advanced primarily in short articles and monographs and in his voluminous correspondence. Chapelain's own poetic works are considered mediocre. His epic *La Pucelle* ("The Maid"), which he began in 1630, was a failure when the first 12 cantos were published 26 years later. Chapelain first attracted attention in 1619–20 with a translation of Mateo Alemán's picaresque novel, *Guzmán de Alfarache.* He subsequently became a pupil of the aged poet and critic François de Malherbe and was later instrumental in founding the French Academy. His prestige in literary circles became such that in 1663, when Jean-Baptiste Colbert, minister of finance to King



Chapelain, engraving by Robert Nanteuil, 1655
By courtesy of the Bibliotheque Nationale, Paris

Louis XIV, decided to grant pensions to deserving writers, Chapelain was entrusted with the naming of candidates. A number of other writers opposed him, however, and readily expressed their views in pamphlets and epigrams and in a skit entitled *Chapelain décoiffé* (1663; "Chapelain Dewigged").

Chapelier, Jean Le: *see* Le Chapelier, Jean.

chaplain, originally a priest or minister who had charge of a chapel, now an ordained member of the clergy who is assigned to a special ministry. The title dates to the early centuries of the Christian church.

In the 4th century, chaplains (Latin *cappellani*) were so called because they kept St. Martin's famous half cape (*cappella,* diminutive of *cappa*). This sacred relic gave its name to the tent and later to the simple oratory or chapel where it was preserved. To it were added other relics that were guarded by chaplains appointed by the king during the Merovingian and Carolingian periods, and particularly during the reign of Charlemagne, who appointed clerical ministers (*capellani*) who lived within the royal palace. In addition to their primary duty of guarding the sacred relics, they also said mass for the king on feast days, worked in conjunction with the royal notaries, and wrote any documents the king required of them. In their duties chaplains thus gradually became more identified with direct service to the monarch as advisers in both ecclesiastical and secular matters.

The practice of kings appointing their own chaplains spread throughout western Christendom. Many of the royal chaplains were appointed to bishoprics and the highest offices in the church; and down to the present day the British monarchs have appointed their own royal chaplains. British monarchs still appoint the members of the Royal College of Chaplains, whose duties now involve little more than preaching occasionally in the chapel royal.

In modern usage the term *chaplain* is not confined to any particular church or denomination. Clergy and ministers appointed to a variety of institutions and corporate bodies—such as cemeteries, prisons, hospitals, schools, colleges, universities, embassies, legations, and armed forces—usually are called chaplains.

Chaplains serve in the armed forces of most countries, generally as commissioned officers who are not required to bear arms. Protestant, Roman Catholic, and Jewish chaplains serve in the armed forces of the United States.

A chaplain performs basically the same func-

tions in most armed forces. A chaplain in the U.S. military must furnish or arrange for religious services and ministrations, advise his commander and fellow staff officers on matters pertaining to religion and morality, administer a comprehensive program of religious education, serve as counselor and friend to the personnel of the command, and conduct instruction classes in the moral guidance program of his service.

Chaplin, Charlie, byname of SIR CHARLES SPENCER CHAPLIN (b. April 16, 1889, London, Eng.—d. Dec. 25, 1977, Corsier-sur-Vevey, Switz.), British-born American actor and director, who won international fame with his portrayal of a pathetic yet humorous little tramp in American-made silent films. Within two years of his first appearance in motion pictures, in 1914, he had become one of the best-known personalities in the nation. By the early 1920s, his box-office appeal was so great that no studio could afford his talents, and he



Charlie Chaplin as "the Tramp"
Brown Brothers

appeared only in films produced by himself. Though he appeared in few films after the advent of sound at the end of the 1920s, his fame scarcely diminished as his early works became recognized as motion-picture classics and found appreciative new audiences. Among Chaplin's great feature-length comedies were *The Kid* (1921), *The Gold Rush* (1925), *City Lights* (1931), *Modern Times* (1936), and *The Great Dictator* (1940). He was knighted by Queen Elizabeth II in 1975.

Chaplin was the son of Charles and Hannah Chaplin, music-hall performers, and he first appeared on stage at age eight in a clog-dancing act, "Eight Lancashire Lads." Because his father died soon after, and his mother was often in and out of mental institutions, Chaplin's early life was a dreary succession of boarding schools and orphanages, interspersed with occasional stage engagements and periods when he lived in the streets.

When Chaplin was 17 his older half brother, then working for the Fred Karno Company (an English vaudeville organization), found a place for him in the troupe. He remained with Karno, performing in numerous music-hall skits, until 1913, when he was signed for the movies by the Keystone Company: Mack Sennett, the producer of Keystone's slapstick one-reelers, had noticed Chaplin in New York City during a Karno tour. Chaplin's film career began in December 1913 at $150 a week. He never returned to the stage.

Chaplin hit upon his famous costume—derby hat, tight frock coat, baggy trousers, out-sized shoes, moustache, and cane—while making his second picture, *Kid Auto Races at Venice* (1914), though the full pathos and significance of the tramp character had not yet been realized. His comedies were, however, sensationally successful from the start, even though they were made at a rate of two a week. Soon he was allowed to direct all his films, and his salaries soared: $1,250 a week from Essanay (1915); $10,000 a week, plus a $150,000 bonus for signing, from Mutual (1916); $1,000,000 for eight pictures from First National (1917). Two years later Chaplin—together with two other of the foremost stars of the day, Mary Pickford and Douglas Fairbanks, and the director D.W. Griffith—formed United Artists so that each could produce and distribute his own films independently. After his First National contract ended with *The Pilgrim* (1923), Chaplin produced only for his own company until making *A Countess from Hong Kong* for Universal in 1966.

Chaplin's meteoric rise was due in part to the emergence of the star system—the selling of films on the basis of featured performers rather than titles or plots; indeed, the public's eager reception of the Chaplin screen personality, along with those of Pickford, Fairbanks, and others, did much to establish the system. In *The Tramp* (1915) Chaplin first inserted the note of pathos that was to make his little tramp not only amusing but endearing. As star, director, and writer of his own pictures, he was in a unique position to explore the implications of the character, described by one critic as "the destitute person shown in the perspective of the wealthy." This "little fellow," as Chaplin called him, was developed through such films as *Easy Street* (1917), *Shoulder Arms* (1918), *The Kid* (1921), *The Gold Rush* (1925), *City Lights* (1931), *Modern Times* (1936), and *The Great Dictator* (1940), the last being his first talking picture. The tramp figure reemerged, albeit briefly, in the autobiographical *Limelight* (1952).

Chaplin's personal life was often stormy. He was married four times—to three of his leading ladies, Mildred Harris (1918), Lita Grey (1924), and Paulette Goddard (1936), and, in 1943, to Oona O'Neill, daughter of the playwright Eugene O'Neill—and his first two divorces produced sensational headlines, as did a paternity suit in 1944. There were headlines also when, in 1942, Chaplin called for a second front in the war against Germany; his political stance was attacked, in part, on grounds that he had never become a U.S. citizen. His film *Monsieur Verdoux* (1947), a mordant version of the Bluebeard story, angered the American Legion, among others. Pressed by the United States government for back taxes and linked by politicians and newspaper columnists with allegedly subversive causes, Chaplin left the country in 1952. Informed that his reentry rights would be questioned by the U.S. Department of Justice, he surrendered his reentry permit at Geneva in 1953. Thereafter, Chaplin and his family lived at Corsier-sur-Vevey, near Vevey, Switz. In 1957 he produced in London *A King in New York,* a comedy laden with sermons against the House Committee on Un-American Activities, inane television commercials, and other aspects of American life. The film brought fresh accusations of pro-communism, which Chaplin specifically denied. In 1966 he wrote, directed, and appeared briefly in *A Countess from Hong Kong,* starring Marlon Brando and Sophia Loren. In 1972 he returned to the United States to receive a special award from the Academy of Motion Picture Arts and Sciences. His autobiography was published in 1964. (A.Kn.)

BIBLIOGRAPHY. Charles Chaplin, Jr., *My Father, Charlie Chaplin* (1960), offers a far more personal view than Chaplin was able to give of himself and admirably supplements the autobiography. Theodore Huff, *Charlie Chaplin* (1951, reprinted 1972), is a scrupulously researched, basic study of Chaplin, with emphasis on the films themselves. Robert Payne, *The Great God Pan: A Biography of the Tramp Played by Charles Chaplin* (1952), is an eminently readable, sympathetic critical study of Chaplin's films. David Robinson, *Chaplin, His Life and Art* (1985), is a major biographical and critical study of the filmmaker. Charles J. Maland, *Chaplin and American Culture: The Evolution of a Star Image* (1989), examines the social aspects of the actor's popularity.

Chaplin, Sid, byname of SIDNEY CHAPLIN (b. Sept. 20, 1916, Shildon, Durham, Eng.—d. Jan. 11, 1986), British novelist and short-story writer noted for his mastery of detail and local colour in his depictions of working-class life.

The son of a coal miner, Chaplin began working in the mines at age 15 and continued to do so while obtaining an education from the Worker's Educational Association of the University of Durham (1932–46) and the Fircroft College for Working Men, Birmingham (1939). He was a branch secretary of the Miners' Federation of Great Britain (1943–45) and finally was able to quit the mines in 1950 when he became a writer for a number of coal publications and a public relations officer for the National Coal Board.

The Leaping Lad (1946; rev. ed., 1970), a collection of short stories about the Durham mining community, established Chaplin as a talented regional writer. His next novel, *The Thin Seam* (1950), was another acutely observed portrait of coal-mining life, and *The Day of the Sardine* (1961) was a definitive portrait of a working-class youth's coming of age. Chaplin's subsequent works include the novels *The Watchers and the Watched* (1962) and *The Mines of Alabaster* (1971), and the short-story collections *On Christmas Day in the Morning* (1979) and *The Bachelor Uncle* (1980). Chaplin also adapted some of his works for the stage and for television.

Chapman, Frank M(ichler) (b. June 12, 1864, Englewood, N.J., U.S.—d. Nov. 15, 1945, New York, N.Y.), American ornithologist famous for his extensive and detailed studies of the life histories, geographic distribution, and systematic relationships of North and South American birds.

A self-taught ornithologist, Chapman was appointed assistant curator of ornithology and mammalogy (1888–1908) and curator of ornithology (1908–42) at the American Museum of Natural History, where he developed the habitat and seasonal bird exhibits. Beginning in 1887, he traveled widely, collecting and photographing birds. He was associate editor of *Auk* (1894), the leading U.S. ornithology journal of his day, and founded and edited the magazine *Bird-Lore* (1899). His most im-



Frank M. Chapman
By courtesy of the American Museum of Natural History, New York

portant works include *Handbook of Birds of Eastern North America* (1895), *The Distribution of Bird-Life in Colombia* (1917), *The Distribution of Birds of the Urubamba Valley, Peru* (1921), and *The Distribution of Bird-Life in Ecuador* (1926).

Chapman, George (b. 1559?, Hitchin, Hertfordshire, Eng.—d. May 12, 1634, London), English poet and dramatist, whose translation of Homer long remained the standard English version. He attended the University of Oxford but took no degree. By 1585 he was working in London for the wealthy commoner Sir Ralph Sadler and probably travelled to the Low Countries at this time.

His first work was *The Shadow of Night . . . Two Poeticall Hymnes* (1593), followed in 1595 by *Ovids Banquet of Sence.* Both philosophize on the value of an ordered life. His poem in praise of Sir Walter Raleigh, *De Guiana, Carmen Epicum* ("An Epic Poem about Guiana," 1596), is typical of his preoccupation with the virtues of the warrior-hero, the character that dominates most of his plays.

The first books of his translation of the *Iliad* appeared in 1598. It was completed in 1611, and his version of the *Odyssey* appeared in 1616. Chapman's Homer contains passages of great power and beauty and inspired the sonnet of John Keats "On First Looking into Chapman's Homer" (1815).



George Chapman, engraved portrait by W. Hole from the frontispiece to *The Whole Works of Homer*

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Chapman's conclusion to Christopher Marlowe's unfinished poem *Hero and Leander* (1598) emphasized the necessity for control and wisdom. *Euthymiae Raptus; or the Teares of Peace* (1609), Chapman's major poem, is a dialogue between the poet and the Lady Peace, who is mourning over the chaos caused by man's valuing worldly objects above integrity and wisdom.

Chapman was imprisoned with Ben Jonson in 1605 for writing *Eastward Hoe,* a play that James I, the king of Great Britain, found offensive to his fellow Scots. Of Chapman's dramatic works, about a dozen plays survive, chief of which are his tragedies: *Bussy d'Ambois* (1607), *The Consptracie, and Tragedie of Charles Duke of Byron . . .* (1608), and *The Widdowes Teares* (1612).

Chapman, John, byname JOHNNY APPLESEED (b. Sept. 26, 1774, Leominster, Mass.—d. March 18?, 1845, near Fort Wayne, Ind., U.S.), missionary nurseryman of the North American frontier who helped prepare the way for 19th-century pioneers by supplying apple-tree nursery stock throughout the Middle West.

Although the legendary character of "Johnny Appleseed" is known chiefly through fiction, John Chapman was a genuine and dedicated professional nurseryman who expected to make a profit from the sale of his seedlings. Around 1800 he started collecting apple seeds from cider presses in western Pennsylvania and soon began his long trek westward, planting a series of apple nurseries from the Alleghenies to central Ohio and beyond. He sold or gave away thousands of seedlings to pioneers, whose acres of productive apple orchards became a living memorial to Chapman's missionary zeal.

A variety of distinctive characteristics combined to create the "Johnny Appleseed" myth of the primitive natural man: his cheerful, generous nature, his affinity for the wilderness, his gentleness with animals, his devotion to the Bible, his knowledge of medicinal herbs, his harmony with the Indians, and above all his eccentric appearance—flowing hair under an inverted mush pan, bare feet, ragged trousers, and an old coffee sack over his shoulders with holes cut out for arms.

John Chapman, owner of 1,200 acres of planted land, died from exposure in 1845, but the legend of "Johnny Appleseed" lives on in numerous literary works. An authentic biography is Robert Price's *Johnny Appleseed: Man and Myth* (1954).

Chapman, John Jay (b. March 2, 1862, New York City—d. Nov. 4, 1933, Poughkeepsie, N.Y., U.S.), U.S. poet, dramatist, and critic who attacked the get-rich-quick morality of the post-Civil War "Gilded Age" in political action and in his writings. Ancestors on both sides of his family had distinguished themselves in antislavery and other causes, and he sought to continue that tradition among the upper middle classes, whose integrity he felt had been eroded by the upsurge of big business.

Chapman's father was a Wall Street executive who was for a time president of the New York Stock Exchange. At age 14 Chapman went to St. Paul's School, Concord, N.H., but he broke down physically and mentally and returned home to complete his preparatory education with tutors. After graduating from Harvard in 1885, he travelled in Europe and then returned to Harvard Law School. In 1887 he assaulted a man for his supposed insulting attentions to the woman who later became Chapman's wife. In remorse Chapman plunged his left hand into a fire and injured it so severely that it had to be amputated.

Admitted to the New York bar in 1888, Chapman practiced for 10 years, meanwhile becoming a leading reformer as president of the Good Government Club and editor and publisher of the periodical *The Political Nursery* (1897–1901), taking a leading part in the movement in New York City against the machine politics of Tammany Hall. Out of these activities came two books—*Causes and Consequences* (1898) and *Practical Agitation* (1900). Both stressed his belief that individuals should take a moral stand on issues troubling the nation.

Chapman had a nervous breakdown in 1901 and for several years wrote little other than plays for children. A play for adults, *The Treason and Death of Benedict Arnold* (published 1910), marked his return to vigorous intellectual activity. In 1912, on the first anniversary of the lynching of a Negro in Coatesville, Pa., Chapman hired a hall there and held a memorial service with only two others present. The speech he made, burning with indignation, which became a classic, appeared in *Harper's Weekly* (Sept. 21, 1912) and in his book of essays *Memories and Milestones* (1915).

In all, Chapman wrote some 25 books, including a biography of William Lloyd Garrison, the Abolitionist leader (1913); collected *Songs and Poems* (1919); and volumes of criticism such as *Emerson, and Other Essays* (1898), *Greek Genius, and Other Essays* (1915), and *A Glance Toward Shakespeare* (1922). His fear that the quality of United States education was being destroyed by its excessive scale and its servitude to the needs of business was expressed in his *New Horizons in American Life* (1932).

Chapman, Maria Weston, *née* WESTON (b. July 25, 1806, Weymouth, Mass., U.S.—d. July 12, 1885, Weymouth), U.S. Abolitionist who was the principal lieutenant to the radical anti-slavery leader William Lloyd Garrison.

Her marriage in 1830 to Henry Grafton Chapman, a Boston merchant, brought her into Abolitionist circles, and in 1832 with 12 other women she founded the Boston Female Anti-Slavery Society. In 1835, as a violent mob was about to disrupt the group's meeting, Maria Chapman uttered a statement long quoted by Abolitionists: "If this is the last bulwark of freedom, we may as well die here as anywhere."

Chapman became chief assistant to Garrison, helping him to run the Massachusetts Anti-Slavery Society and to edit *The Liberator,* a widely-circulated Abolitionist publication. In 1839 she published *Right and Wrong in Massachusetts,* a pamphlet that argued that the deep divisions among Abolitionists stemmed from their disagreements over women's rights. From 1839 to 1842 she also edited the *Non-Resistant,* the publication of Garrison's New England Non-Resistance Society. Chapman raised funds for the Abolitionist movement by organizing anti-slavery fairs throughout New England.

She edited *Songs of the Free and Hymns of Christian Freedom* in 1836 and wrote *Memorials of Harriet Martineau* (1877), a biography of the English writer.

Chapman, Sydney (b. Jan. 29, 1888, Eccles, Lancashire, Eng.—d. June 16, 1970, Boulder, Colo., U.S.), English mathematician and physicist noted for his research in geophysics.

One of Chapman's earliest contributions was to modify Maxwell's kinetic theory of gases, thereby predicting the phenomenon of thermal diffusion and later confirming it experimentally (1912–17). His interest in geophysics was aroused while he served as chief assistant (1910–14, 1916–18) to Sir Frank W. Dyson, the Astronomer Royal at Greenwich, where it was his responsibility to design a new magnetic observatory. This involvement led him to study magnetic storms and variations in the Earth's magnetic field, discovering that the geomagnetic field is at least partly generated in the atmosphere.

Chapman's later work included studies of auroras, magnetic disturbances of the ionosphere, and thermal diffusion in ionized gases. Chapman was elected to many learned societies, including the Royal Society in 1919, and for his contributions to understanding geomagnetism he received the Royal Society's Copley Medal in 1964.

Consult the INDEX *first*

Chappe, Claude (b. Dec. 25, 1763, Brûlon, Fr.—d. Jan. 23, 1805, Paris), French engineer and cleric who converted an old idea into a reality by inventing the semaphore visual telegraph.

His brother Ignace Chappe (1760–1829), a member of the Legislative Assembly during the French Revolution, strongly supported Claude's proposal for a visual signal line between Paris and Lille, near the war front. With the Assembly's backing, the Chappes built a series of towers on heights between the two cities. Each tower was equipped with a pair of telescopes, one pointing in either direction, and with a two-arm semaphore (a word derived by Chappe from the Greek for "bearing a sign"). Each arm of the semaphore could assume seven clearly visible angular positions, making possible 49 combinations that were assigned to the alphabet and a number

of other symbols. In August 1794 the Chappe semaphore brought to Paris in less than an hour the news of the capture of Condé-sur-l'Escaut from the Austrians. Other lines were built, notably between Paris and Toulon, and the system was soon widely copied elsewhere in Europe. Chappe was accorded the title telegraph engineer, but when rivals contested the priority of his invention, his natural tendency to melancholia was apparently deepened; in a fit of depression he committed suicide.

Chāpra, town, administrative headquarters of Saran district, Bihār state, northeastern India, near the junction of the Ghāghara and Ganges rivers. Chāpra grew in importance as a river mart in the 18th century when the Dutch, French, Portuguese, and English established saltpetre refineries there. It was constituted a municipality in 1864. The town has major rail and road connections and is an agricultural trade centre. Saltpetre and linseed-oil processing are the chief industries. There are several parks, four colleges affiliated with the University of Bihār, and a college affiliated with Kāmeshwara Singh Darbhanga Sanskrit University. Pop. (1981) 111,564.

chapter house, chamber or building, often reached through the cloister, in which the



Interior of the polygonal chapter house of Lincoln cathedral, Lincolnshire, England, mid-13th century
A.F. Kersting

chapter, or heads of monastic bodies, assemble to transact business. Chapter houses occur in various forms. In England the chapter houses of the medieval cathedrals were originally rectangular in plan (*e.g.,* Canterbury), but the most common design is a polygon with a central pillar to support a vaulted ceiling. Particularly fine octagonal examples can be seen at Salisbury or Westminster. There are oblong chapter houses at Canterbury and Exeter and a circular one at Worcester. English chapter houses are often provided with a vestibule (*e.g.,* Lincoln and Salisbury). On the continent of Europe, chapter houses are more rare than in England and are almost always rectangular.

In post-medieval times, occasions for building chapter houses in the proper sense were rare; but, because the form was so characteristic of medieval architecture, 19th-century Gothic revivalists made considerable use of it in secular adaptations—typical examples being the chapter house adjoining the Ashmolean Museum, Oxford, and the library of the House of Commons, Ottawa.

Chapu, Henri-Michel-Antoine (b. Sept. 29, 1833, Le Mée, Fr.—d. April 21, 1891, Paris), French sculptor and portrait medallist whose works were softened expressions of the Neoclassical tradition.

Early in his career Chapu spent five years in Italy after winning the Prix de Rome in 1855. Success came to him with his statue "Mercury" (1861) and his "Jeanne d'Arc" (1870), represented as a simple peasant. Numerous commissions followed, including a monument to the painter Henri Regnault in the courtyard of the École des Beaux-Arts (1872) and the tomb of the Comtesse Marie d'Agoult at Père-Lachaise Cemetery (1877). His last important work was a monument to Gustave Flaubert, with an allegorical figure of "Truth" (1890).

Chapultepec (Nauhuatl: Hill of the Grasshopper), rocky hill about 200 feet (60 metres) high on the western edge of Mexico City that has long played a prominent role in the history of Mexico. The Aztecs fortified the hill but were expelled by neighbouring peoples; after their consolidation of power in the valley of Mexico *c.* 1325, they built a religious centre and a residence for Aztec rulers on it. After the Spanish conquest (1521), a chapel was built there in 1554; in the 1780s the Spanish viceroys began the construction of a summer palace on the site, which became the home of the National Military Academy in 1841. In the 1860s Mexico's emperor Maximilian rebuilt the castle; it remained the official residence of the presidents of Mexico until 1940, when it was converted into a museum. Maximilian also beautified the surrounding park, today a principal cultural and recreational centre of the city. Among its features are four museums, including the world-famous Museo Nacional de Antropología, designed by Pedro Ramírez Vázquez and built in 1963–64.

Chapultepec was the scene of the last-ditch Mexican resistance in the war between Mexico and the United States (1846–48). U.S. forces under Gen. Winfield Scott, having seized Veracruz on the Gulf of Mexico, advanced on the capital. Scott defeated the Mexicans at the suburban bridgehead of Churubusco on Aug. 20, 1847, and continued toward Mexico City; athwart his path was the hill of Chapultepec, with approximately 5,000 defenders, including cadets from Mexico's military academy. After heavy artillery bombardment on September 12 failed to force their withdrawal, Scott's forces attacked the next morning. The defenders resisted in fierce hand-to-hand combat before capitulating. Several cadets, known in Mexican history as Los Niños Héroes, were killed, one of them, it is said, by leaping from the castle walls, holding the flag lest it be captured. During the following night, Mexican forces were withdrawn, and Scott entered the city on September 14, thus concluding the significant military operations of the war.

In March 1945 all the nations of the Western Hemisphere, except Argentina, sent representatives to the Chapultepec Conference to discuss hemispheric security. An economic charter for the Americas was adopted, as was the Act of Chapultepec, which pledged the signatory nations to take collective action in the event of aggression from within or outside of the Americas against one of their number.

Chapultepec Zoological Park, Spanish PARQUE ZOOLOGICO DE CHAPULTEPEC, zoo located in Mexico City on the original site of Montezuma's game reserve. Opened in 1926, the zoo is administered by the municipal government. Its grounds cover 13.5 hectares (33 acres) and house nearly 2,000 specimens of about 280 species, mostly in Victorian-style caging. The zoo specializes in hoofed stock and hippopotamuses. It also has a pair of giant pandas and is one of the few zoos outside of China to have successfully bred the animals.

Chaqueña (South America): *see* Gran Chaco.

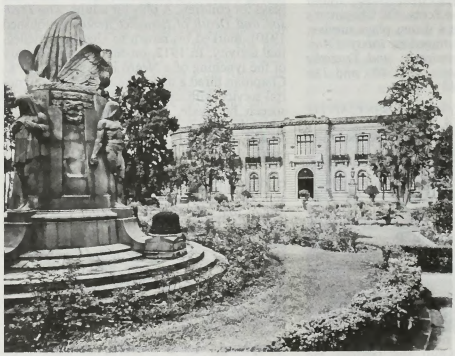
char (*Salvelinus*), any of several freshwater food and game fishes distinguished from the similar trout by light, rather than black, spots and by a boat-shaped bone (vomer) that is toothed only in front, on the roof of the mouth. Chars are of the trout and salmon



Arctic char (*Salvelinus alpinus*)
W.S. Pitt—Erick Hosking

family, Salmonidae, and often have smaller scales than their relatives.

The Arctic char (*S. alpinus*), of North America and Europe, inhabits the Arctic and adjacent oceans and enters rivers and lakes to breed. Some populations are restricted to freshwater lakes, which they colonized in glacial times. Like the other chars, the Arctic char is a good food and sport fish. It may



Chapultepec Castle, now a museum, Mexico City
By courtesy of the Mexican National Tourist Council

weigh 6.8 kg (15 pounds) or more. The brook trout, Dolly Varden trout, and lake trout (*qq.v.*) are native North American chars.

Char, René (b. June 14, 1907, L'Isle-sur-la-Sorgue, Fr.—d. Feb. 19, 1988, Paris), French poet who began as a Surrealist but who, after his experiences as a Resistance leader in World War II, wrote economical verse with moralistic overtones.

After completing his education in Provence, Char moved in the late 1920s to Paris, where he became friends with Surrealist writers and wrote poems about his native Provence. His most important early book of verse, *Le Marteau sans maître* (1934; "The Hammer Without a Master"), was Surrealistic in style, being marked by verbal luxuriance and a free play of imagery. During World War II Char led a Resistance unit in the French Alps. After the war's end he published some of his finest (and most politically committed) poems in the collections *Seuls demeurent* (1945) and *Feuillets d'Hypnos* (1946; "Leaves of Hypnos"). The latter work, his poetic journal of the war years, reflects his humanism, his belief in man's high calling, and his anger at the brutality of war. Char's subsequent volumes include *Les Matinaux* (1950; "The Early Risers"), *Recherche de la base et du sommet* (1955; "Search for the Base and the Summit"), and *Commune présence* (1964; "Common Presence"). His *Oeuvres complètes* ("Complete Works") was published in 1983.

Char was a master of poetic brevity, which he achieved by the use of the ellipse, the aphorism, the terse image, and the "heraclitic" phrase—*i.e.*, the merging of contradictory ideas. The result is a poetry (including prose poems) that is austere, dense, and somewhat difficult. The French composer Pierre Boulez set his *Le marteau sans maître* to music (1954).

charabanc (from French *char à bancs*: "wagon with benches"), long, four-wheeled carriage with several rows of forward-facing seats, originated in France in the early 19th century.



Charabanc, c. 1830; in the Maison Hutin, Compiègne, Fr.

Permission SPADEM 1971 by French Reproduction Rights, Inc., photograph Photo Hutin, Compiegne, Fr.

It was pulled by up to six horses and was used by private owners to convey guests on excursions. It was soon adopted in England, where two horses were used. As afterward modified in England for public transport, it was entered from the rear and had five or more rows of seats. Today sight-seeing motor coaches in Great Britain are sometimes called charabancs.

Characene (ancient state, Babylonia): *see* Mesene.

characin, any of the numerous freshwater fishes of the family Characidae. Hundreds of species of characins are found in Central and South America, a smaller number in tropical Africa. Characins are distinguished by toothed jaws and, usually, an adipose (second dorsal) fin on the back. They range in form from a small, blind cave fish (*Anoptichthys jordani*) of Mexico to the salmonlike tigerfishes (*Hydrocynus*) of Africa and the deep-bodied piranhas (*Serrasalmus*) of South America. They range from 2.5 to 152 cm (1 inch to 5 feet) in length and from herbivorous to carnivorous in diet. Many simply scatter their eggs among aquatic plants, but the spraying characin (*Copeina arnoldi*), placed in a separate family, Lebiasinidae, deposits its spawn out of water on an overhanging leaf or other suitable object, the male keeping the eggs moist by periodically splashing water on them with his tail.



Characin (*Exodon paradoxus*)

Jane Burton—Bruce Coleman Ltd.

Many characins are small, colourful, lively, and unaggressive and are often kept in aquariums. The tetras are popular pets, as are the bloodfin (*Aphyocharax rubripinnis*), a red-finned, silvery fish, and *Pristella riddlei*, a red-tailed characin with black and white in its dorsal and anal fins.

Characins form 1 of about 16 closely related groups of fishes. Some authorities consider each of these groups a distinct family, while others treat them as subfamilies of a single large family, Characidae. Thus, such fishes as the pencil fishes (Hemiodontidae, Anostomidae, and Lebiasinidae) and freshwater, or flying, hatchetfishes (Gasteropelecidae) are sometimes separated as distinct families and sometimes included among the characins.

For more information about characin species and groups, *see* dorado; hatchetfish; pencil fish; piranha; tetra; tigerfish.

character, in biology, any observable feature, or trait, of an organism, whether acquired or inherited. An acquired character is a response to the environment; an inherited character is produced by genes transmitted from parent to offspring (their expressions are often modified by environmental conditions). One gene may affect many characters; one character may be controlled by many genes. A character controlled by only a few genes is known as an oligogenic, discontinuous, or qualitative character; a character controlled by many genes is termed polygenic, continuous, or quantitative. A genetically controlled character may be termed dominant when its controlling genes are powerful enough to mask the effect of other genes (alleles) that control an alternative character, termed recessive.

A sexual character is one that distinguishes male from female. An organism's primary sexual characters are its reproductive organs and gametes (sex cells); an organism's secondary sexual characters include all other structural or visual differences, such as mammary glands, muscular development, plumages, and behavioral patterns, that do not figure directly in the reproductive act.

character disorder: *see* personality disorder.

character piece, relatively brief musical composition, usually for piano, expressive of a specific mood or nonmusical idea. Closely associated with the Romantic movement, especially in Germany, 19th-century character pieces often bore titles citing their inspiration from literature (*e.g.*, Robert Schumann's collection *Kreisleriana*) or from personal experience (*e.g.*, Schumann's *Scenes from Childhood*). Others refer to specific personages directly or in disguise (*e.g.*, Schumann's *Carnaval*) or evoke geographical and/or national images (*e.g.*, Frédéric Chopin's polonaises, mazurkas, and *Barcarolle*). Felix Mendelssohn's *Songs Without Words* covered a particularly wide range of subject matter, while Chopin tended to favour musico-literary genres (*e.g.*, the ballades) and more generalized idyllic or melancholy associations (*e.g.*, the nocturnes). Many, though by no means all, character pieces are relatively simple in design with a preference for ternary (*aba*) structures, emphasizing expressive melody and harmony, not unlike the contemporaneous German lied. Were it not for often elaborate idiomatic keyboard figurations derived more likely, especially in Chopin's case, from Italian opera, the 19th-century character piece might be identified as an instrumental song intended, like its German vocal counterpart, primarily for home rather than concert performance.

Antecedents of the 19th-century character piece abound especially in French keyboard music, in which the perennial tendency to link music with extramusical subject matter accounted for a host of titled harpsichord pieces as early as the 17th century. The clavecin works of François Couperin and Jean-Philippe Rameau represent the first culmination of a French tradition pursued by Emmanuel Chabrier, Claude Debussy, Erik Satie, and Maurice Ravel, among many others, well into the 20th century.

character writer, any writer who produced a type of character sketch that was popular in 17th-century England and France. Their writings stemmed from a series of character sketches that the Greek philosopher and teacher Theophrastus (fl. *c.* 372 BC) had written, possibly as part of a larger work and probably with the intention of instructing and amusing his students of rhetoric. Theophrastus' technique was to define an undesirable personal quality (such as vanity or stinginess) and then to describe the characteristic speech and behaviour of a man who exemplified it. His work was introduced to Europe during the Renaissance in an edition of 1529; admiring his wit and insight into human failings, a number of contemporary writers imitated his example. They included, in France, Jean de la Bruyère, and, in England, Joseph Hall, Sir Thomas Overbury, John Earle, and Samuel Butler.

charade, originally a kind of riddle, probably invented in France during the 18th century, in which a word or phrase is divined by guessing and combining its different syllables, each of which is described independently by the giver of the charade. Charades may be given in prose or verse. The following is an example of a poetic charade:

My first is a Tartar,
My second a letter;
My all is a country,
No Christmas dish better.

The solution is Turkey (Turk-e).

The most popular form of this amusement is the acted charade, in which the different syllables are acted out. A brilliant description of the acted charade is given in William Makepeace Thackeray's novel *Vanity Fair* (1848). In the United States the charade in somewhat different form was resurgent in the 1930s and 1940s and again after World War II. It was called "the Game" and was frequently played at parties. The group of players was divided into two teams. Each team designated one member of the opposing team to act out a quotation, the name of a person living or dead, a phrase, or an idea in such manner that his teammates might identify it. The des-

ignated actor was not permitted to use his voice or to indicate any inanimate object in the room. The actor tried to assist his teammates in guessing the subject in the shortest possible time. The team that arrived at the correct answer in the shorter time won.

charadriiform, large and diverse order of birds (*Charadriiformes*) that includes the shorebirds, gulls, auks, and their relatives.

A brief treatment of charadriiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

Their plumage usually is gray, white, brown, or black, and many have bright red or yellow feet, bills, wattles, eyes, or mouth linings. They can be found throughout the world, nesting on the ground and feeding in or near water. Most are strong flyers, and some species perform the most extensive migrations of any birds. One ruddy turnstone (*Arenaria interpes*) was recaptured four days after banding; it had travelled 2,325 miles (3,770 kilometres).

There are 16 families in the order. Basically, they fall into three main subgroups: the suborder Charadrii (200 species of shorebirds or waters, such as sandpipers, plovers, and lapwings); the suborder Lari (92 species of long-winged, web-footed birds, such as gulls, terns, skimmers, skuas, and jaegers); and the suborder Alcae (21 species of auks, murres, guillemots, and puffins).

Charadriiforms provide many benefits to humans. Shorebirds generally are good scavengers. Murres, puffins, gulls, terns, and lapwings lay eggs that have long been harvested for food by certain cultures. Feathers from some of these species have been used for decoration. Gulls consume many field pests and some shorebirds are hunted for sport. However, these birds have proved hazards at airports where they occasionally collide with airplanes.

Feeding behaviour. The feeding habits of these birds vary greatly. Jacanas eat the small invertebrates found underneath aquatic vegetation. Oystercatchers feed on oysters, mussels, and marine worms. Sandpipers, curlews, woodcock, plovers, and turnstones feed on crustaceans and other invertebrates found in mud, sand, or soil. Avocets and stilts feed on mollusks, insects, crustaceans, and worms in the water. Gulls eat mostly fish but have adapted themselves as scavengers and predators to feed on small birds, rodents, invertebrates, carrion, and garbage. Terns and skimmers forage for food on the wing, eating fish and crustaceans. Coursers and pratincoles are unusual in that they feed most actively at night on termites, black ants, and insects. The seedsnipe is unique in the order for its vegetarian diet of seeds, buds, shoots, and leaves.

Reproduction. The modes of reproduction among charadriiform species are only slightly less diverse than their food habits. Nearly all members are ground nesters. Some species nest in crevices or burrows, a few in trees. Many nest in colonies, with aggregations running to more than a million pairs. As a rule, charadriiform birds lay few eggs (two to four in most families or as many as six) that are often protectively coloured.

Traditional breeding patterns are altered in some species such as jacanas, painted snipe, and phalaropes. The female is more brightly coloured than the male and takes a dominant role in courtship, whereas the male incubates the eggs and rears the young.

In other species, courtship and breeding are quite different. Many species have courtship songs, some given while in flight. The gregarious male oystercatchers, as well as avocets and stilts, perform sexual displays within the flock, with incubation shared between both parents. The male plovers exhibit territorial and aggressive behaviour.

The largest family of shorebirds is the Scolopacidae. Most members construct nests on the ground, but several species use nests abandoned by other birds, in trees or on the ground. While some species are monogamous, others form no permanent pairing, with males mating with several females in the same season.

The breeding behaviour of the greenshank has common characteristics of many shorebirds. The species is usually monogamous and males display aggression. Flight songs are performed frequently during courtship and territorial adjustment. After copulation the male escorts the female to various parts of the territory where she chooses the nest site. A clutch of four speckled eggs is incubated for some 23 days. Both sexes share incubation. The chicks are covered with feathers and fly by about 26 days of age.

Members of the gull family (Lari) have a highly territorial courtship and nesting pattern. With gulls, both sexes share in the incubation, which lasts 30 days. Terns have reproductive behaviour similar to gulls, although tern displays are more aerial.

Alcids breed in island colonies. One distinctive feature of their mating behaviour is that a perch site, as well as a nest site, is defended. Alcids exhibit much courtship display. The pair builds the nest together and shares the 32-day incubation of the clutch containing two eggs. After 35 days the chicks are fledged.

Form and function. Most charadriiforms are clearly recognizable as belonging to a particular suborder. Major structural variations occur in the wings, beak, and legs.

Gulls, terns, and skimmers have long, narrow wings, low wing loadings (the ratio of weight to wing area), slow wing-beat rates and flight speeds, and moderately developed flight muscles. Alcids, on the other hand, have shorter wings, high wing loadings, rapid wing-beat rates, greater speed (45 to 55 mph), and large flight muscles. As the only charadriiforms adapted for swimming underwater, the alcids' wing bones are also flattened for underwater locomotion. The shorebirds lie between the other suborders in flight adaptations.

The shape of the bill varies greatly, in accordance with feeding methods. The hooked bill tip in gulls and jaegers facilitates grasping and tearing. Some species, *e.g.*, Atlantic puffin and fairy tern, have bills adapted to enable them to carry several fish crosswise in the bill while capturing still more.

An interesting feature of charadriiform birds is that many drink saltwater. The ionic balance of their blood is maintained by both the kidneys and special nasal or salt glands that lie in grooves in the skull over the eyes. These discharge their salty excretion through the nostrils.

Charadrius, bird genus of the family Charadriidae, including certain species known as killdeer and plover (*qq.v.*).

charas (drug): *see* hashish.

Charbonnages de France, state-owned French coal-mining and processing company. Headquarters are in Paris.

The company grew out of a general trend following World War II in which many postwar European governments became actively involved in economic planning and state investment in industry. Coal had long been a traditional energy source in France and the coalfields were major employers in many regions of the country, especially the Ruhr Valley. But in the postwar period the European coal industry was plagued with problems. Much mining equipment was obsolete, worn out, or had been damaged in the war. Coal demand, and therefore coal prices, were low because industrial production had not returned to prewar levels. Oil and gas were also beginning to replace coal as a heat source. Private industry was unable to make the investment necessary to modernize the industry but the government considered coal an essential resource and feared massive unemployment in the coal-producing regions, so it moved to take over the coalfields.

In 1944 France's postwar government nationalized the country's most productive coalfield, the Nord Pas de Calais, located in the Ruhr region. In 1946 Charbonnages de France was formed and all but a few of the coalfields which still remained in private hands were nationalized.

Nominally, the company is governed by a tripartite board made up of government, labour, and consumer representatives, though historically government representatives have dominated the board's decision-making process. The French government also coordinates coal production and marketing decisions with the European Economic Community (EEC), which closely monitors the coal market in Europe.

In the mid-1960s European demand for coal fell precipitously and the French government began phasing down coal production. Some of the Charbonnages resources were reinvested in chemical production and electric power generation. The company also is involved in providing building and construction materials.

Charbonneau, Jean (b. 1875, Montreal—d. Oct. 25, 1960, Saint-Eustache, Que., Can.), French-Canadian poet who was the primary force behind the founding of the Montreal Literary School (1895), a group of symbolists and aesthetes who reacted against the traditional Canadian themes of patriotism and local colour and, following the French Parnassians, espoused the principle of art for art's sake. Charbonneau later wrote the only history of the school, *L'École littéraire de Montréal* (1935; "The Literary School of Montreal"). A lawyer by profession, he also worked as a translator for the Quebec legislature (1935–47). In 1912 Charbonneau wrote *Les Blessures* ("The Wounds"), the first of several volumes of poetry that dealt primarily with philosophical speculation and myth. *Sur la borne pensive* (1952; "On the Bounds of Thought"), which invites his readers into a garden of delights where life is a spectacle of Persian lilacs, pergolas, fountains, and ruined temples, is characteristic of his mature style.

Charcas (Bolivia): *see* Sucre.

charcoal, impure form of graphitic carbon (*q.v.*), obtained as a residue when carbonaceous material is partially burned, or heated with limited access of air. Coke, carbon black (*qq.v.*), and soot may be regarded as forms of charcoal; other forms often are designated by the name of the materials, such as wood, blood, bone, and so on, from which they are derived. Charcoal has been replaced by coke for reducing metal ores in blast furnaces and by natural gas as a source of carbon in making certain chemicals, but it is still employed in making black gunpowder and in case-hardening metals. Formerly, charcoal production from wood was an important source of acetone, methyl alcohol, and acetic acid, all of which are now produced from other raw materials.

The use of special manufacturing techniques results in highly porous charcoals that have surface areas of 300–2,000 square metres per gram. These so-called active, or activated, charcoals are widely used to adsorb odorous or coloured substances from gases or liquids, as in the purification of drinking water, sugar, and many other products, in the recovery of solvents and other volatile materials, and in gas masks for the removal of toxic compounds from the air. They also are used as catalysts in making certain chemicals (*e.g.*, phosgene, sulfuryl chloride) or as supports for other catalytic agents.

charcoal drawing, use of charred sticks of wood to make finished drawings and preliminary studies. The main characteristic of charcoal as a medium is that, unless it is fixed by the application of some form of gum or resin, it is impermanent, easily erased or smudged. This characteristic determined its early use as a means of tracing the outline of a mural—either directly onto the wall or on a cartoon (full-sized drawing for transferring a design to a mural)—and its use as a means of roughing in the outline of a large painting on canvas to be completed in a more permanent medium such as oil. Artists also often produce small charcoal drawings as a means of working out preliminary ideas quickly.



"Portrait of the Artist's Mother," charcoal drawing by Albrecht Dürer, 1514; in the Staatliche Museen Preussischer Kulturbesitz, Kupferstichkabinett, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz, Berlin

Because of the softness of its drawing edge, charcoal tends to favour broad, vigorous draftsmanship, with an emphasis on mass and movement rather than on linear precision. A large number of such drawings have survived, including important work of Albrecht Dürer, Paulus Potter, and Italian artists of the 16th and 17th centuries. Later, far fewer independent charcoal drawings were executed, though there were some by such 19th- and 20th-century French artists as Édouard Manet, Edgar Degas, and Henri de Toulouse-Lautrec, as well as the Germans Ernst Barlach and Käthe Kollwitz.

Charcot, Jean-Baptiste-Étienne-Auguste (b. July 15, 1867, Neuilly-sur-Seine, Fr.—d. *c.* Sept. 16, 1936, at sea off Iceland), French explorer and oceanographer who carried out extensive charting in the region of the Antarctic Peninsula.

The son of the distinguished neurologist Jean-Martin Charcot, the young Charcot himself studied medicine and worked at the Hospital of Paris from 1890 to 1894, when he was also connected with the Pasteur Institute. He served as chief of the clinic of the faculty of medicine at the University of Paris from 1896 to 1898. Within a few years he turned to exploration.

On his first Antarctic expedition (1903–05) he charted parts of the Palmer Archipelago, explored the Gerlache Strait, and sailed as far as the northern end of Adelaide Island. On his second expedition (1908–10) he charted the coast to Alexander Island and discovered Fallières Coast and the island that bears his name. Deception Island and Adelaide Island were charted in detail. In 1912 he published a two-volume report of his findings, *Autour du pôle sud* ("Around the South Pole").

On subsequent ventures, between 1921 and 1936, with a corps of specialists, he studied plankton in the English Channel and in the North Atlantic and made oceanographic studies around the Hebrides, in Arctic waters, and off the east coast of Greenland. On Sept. 16, 1936, his ship was wrecked off Iceland. Only one man survived; Charcot and more than 30 others were drowned.

Charcot, Jean-Martin (b. Nov. 29, 1825, Paris, Fr.—d. Aug. 16, 1893, Morvan), founder (with Guillaume Duchenne) of modern neurology and one of France's greatest medical teachers and clinicians.

Charcot took his M.D. at the University of Paris in 1853 and three years later was appointed physician of the Central Hospital bureau. He then became a professor at the University of Paris (1860–93), where he began a lifelong association with the Salpêtrière Hospital, Paris (1862); there, in 1882, he opened what was to become the greatest neurological clinic of the time in Europe. A teacher of extraordinary competence, he attracted students from all parts of the world. In 1885 one of his students was Sigmund Freud, and it was Charcot's employment of hypnosis in an attempt to discover an organic basis for hysteria that stimulated Freud's interest in the psychological origins of neurosis.

In his study of muscular atrophy, Charcot described the symptoms of locomotor ataxia, a degeneration of the dorsal columns of the spinal cord and of the sensory nerve trunks. He was also first to describe the disintegration of ligaments and joint surfaces (Charcot's disease, or Charcot's joint) caused by locomotor ataxia and other related diseases or injuries. He conducted pioneering research in cerebral localization, the determination of specific sites in the brain responsible for specific nervous functions, and he discovered miliary aneurysms (dilation of the small arteries feeding the brain), demonstrating their importance in cerebral hemorrhage.

Charcot's writings include *Leçons sur les maladies du système nerveux,* 5 vol. (1872–83; *Lectures on the Diseases of the Nervous System*) and *Leçons du mardi à la Salpêtrière* (1888; "Tuesday Lessons at the Salpêtrière").

Charcot's joint (medicine): *see* neurogenic arthropathy.

Charcyzsk (Ukraine): *see* Khartsyzsk.

chard, also called SWISS CHARD (species *Beta vulgaris* variety *cicla*), an edible leaf beet, a variety of the beet of the goosefoot family (Chenopodiaceae), in which the leaves and leafstalks, instead of the roots, have become greatly developed. The plant has somewhat branched and thickened, but not fleshy, roots and large leaves borne on stalks. It is grown for the tender leaves and leafstalks; the former are boiled and served like spinach, the latter like asparagus. Swiss chard is popular as a home-garden potherb because of its ease of culture, productiveness, and tolerance to moderately hot weather.



Chard (*Beta vulgaris* variety *cicla*)

W.H. Hodge

Fresh chard should be crisp, with bright-green leaves. Because it is highly perishable, it is difficult to ship to distant markets. Both leaves and stalks are a good source of vitamins A, B, and C.

Chardin, Jean, also called (from 1681) SIR JOHN CHARDIN (b. Nov. 16, 1643, Paris, Fr.—d. Dec. 25, 1713, London, Eng.), French traveler to the Middle East and India.

A jeweler's son with an excellent education, Chardin traveled with a Lyon merchant to Persia and India in 1665. At Eṣfahān, Persia, he enjoyed the patronage of the shah, 'Abbās II. On returning to France (1670), he published an account of the coronation of Soleymān.

In August 1671 he again set out for Persia. Traveling through Turkey, the Crimea, and the Caucasus, he reached Eṣfahān nearly two years later. He remained in Persia for four years, revisited India, and returned to France (1677) via the Cape of Good Hope. Fleeing French persecution of the Huguenots (1681), he settled in London, where he became court jeweler and was knighted by King Charles II. In 1683 he represented the East India Company in Holland.

The complete account of his travels first appeared in *Journal du voyage du chevalier Chardin* (1711; "Journal of the Travel of the Cavalier Chardin").

Chardin, Jean-Baptiste-Siméon (b. Nov. 2, 1699, Paris, Fr.—d. Dec. 6, 1779, Paris), French painter of still lifes and domestic scenes remarkable for their intimate realism and tranquil atmosphere and the luminous quality of their paint. For his still lifes he chose humble objects ("Le Buffet," 1728), and for his genre paintings modest events ("Dame cachetant une lettre" [1733; "Lady Sealing a Letter"]). He also executed some fine portraits, especially the pastels of his last years. He was nominated to the Royal Academy of Painting in 1728.



Jean-Baptiste-Siméon Chardin, self-portrait, pastel, 1775; in the Louvre, Paris

Alinari—Art Resource

Born in Paris, Chardin never really left his native quarter of Saint-Germain-des-Prés. Little is known about his training, although he worked for a time with the artists Pierre-Jacques Cazes and Noël-Nicolas Coypel. In 1724 he was admitted to the Academy of Saint Luc. His true career, however, did not

begin until 1728 when, thanks to the portrait painter Nicolas de Largillière (1656–1746), he became a member of the Royal Academy of Painting, to which he offered "La Raie" ("The Skate") and "Le Buffet," both now at the Louvre Museum.

Although not yet established, he was beginning to gain a reputation. In 1731 he married Marguerite Saintard, and two years later the first of his figure paintings appeared, "Dame cachetant une lettre." From then on Chardin alternated between paintings of *la vie silencieuse* ("the silent life") or scenes of family life such as "Le Bénédicité" ("The Grace") and half-figure paintings of young men and women concentrating on their work or play, such as "Le Jeune dessinateur" ("Young Man Drawing") and "L'Enfant au toton" ("Child with Top," Louvre). The artist repeated his subject matter, and there are often several original versions of the same composition. Chardin's wife died in 1735, and the estate inventory drawn up after her death reveals a certain affluence, suggesting that by this time Chardin had become a successful painter.

In 1740 he was presented to Louis XV, to whom he offered "La Mère laborieuse" ("Mother Working") and "Le Bénédicité." Four years later, he married Marguerite Pouget, whom he was to immortalize 30 years later in a pastel. These were the years when Chardin was at the height of his fame. Louis XV, for example, paid 1,500 livres for "La Serinette" ("The Bird-Organ"). Chardin continued to rise steadily on the rungs of the traditional academic career. His colleagues at the academy entrusted him, first unofficially (1755), then officially (1761), with the hanging of the paintings in the Salon (official exhibition of the academy), which had been held regularly every two years since 1737 and in which Chardin had participated faithfully. It was in the exercise of his official duties that he met the encyclopaedist and philosopher Denis Diderot, who would devote some of his finest pages of art criticism to Chardin, the "grand magicien" that he admired so much.

An anecdote illustrating Chardin's genius and his unique position in 18th-century painting is told by one of his greatest friends, the engraver Charles-Nicolas Cochin, who wrote a letter shortly after Chardin's death to Haillet de Couronne, the man who was to deliver Chardin's eulogy to the Academy of Rouen, of which Chardin had been a member.

> One day, an artist was making a big show of the method he used to purify and perfect his colors. Monsieur Chardin, impatient with so much idle chatter, said to the artist, "But who told you that one paints with colors?" "With what then?" the astonished artist asked. "One uses colors," replied Chardin, "but one paints with feeling."

He was nearer to the feeling of meditative quiet that animates the rustic scenes of the 17th-century French master Louis Le Nain than to the spirit of light and superficial brilliance seen in the work of many of his contemporaries. His carefully constructed still lifes do not bulge with appetizing foods but are concerned with the objects themselves and with the treatment of light. In his genre scenes he does not seek his models among the peasantry as his predecessors did; he paints the petty bourgeoisie of Paris. But manners have been softened, and his models seem to be far removed from Le Nain's austere peasants. The housewives of Chardin are simply but neatly dressed and the same cleanliness is visible in the houses where they live. Everywhere a sort of intimacy and good fellowship constitute the charm of these modestly scaled pictures of domestic life that are akin in feeling and format to the works of Jan Vermeer.

Despite the triumphs of his early and middle life, Chardin's last years were clouded, both in his private life and in his career. His only son, Pierre-Jean, who had received the Grand Prix (prize to study art in Rome) of the academy in 1754, committed suicide in Venice in 1767. And then too, the public's taste had changed. The new director of the academy, the all-powerful Jean-Baptiste-Marie Pierre, in his desire to restore historical painting to the first rank, humiliated the old artist by reducing his pension and gradually divesting him of his duties at the academy. Furthermore, Chardin's sight was failing. He tried his hand at drawing with pastels. It was a new medium for him and less taxing on his eyes. Those pastels, most of which are in the Louvre Museum, are highly thought of in the 20th century, but that was not the case in Chardin's own time. In fact, he lived out the remainder of his life in almost total obscurity, his work meeting with indifference.

It was not until the middle of the 19th century that he was rediscovered by a handful of French critics, including the brothers Edmond and Jules de Goncourt, and collectors (the Lavalard brothers, for example, who donated their collection of Chardins to the Museum of Picardy in Amiens). Especially noteworthy is the LaCaze Collection donated to the Louvre in 1869. Today Chardin is considered the greatest still-life painter of the 18th century, and his canvases are coveted by the world's most distinguished museums and collections.

(P.M.R.)

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Chardin, Pierre Teilhard de: *see* Teilhard de Chardin, Pierre.

Chardonnet, (Louis-Marie-) Hilaire Bernigaud, comte de (count of) (b. May 1, 1839, Besançon, Fr.—d. March 12, 1924, Paris), French chemist and industrialist who first developed and manufactured rayon.

Trained as a civil engineer after completing scientific studies under Louis Pasteur, Chardonnet began to develop an artificial fibre in 1878. Obtaining a patent in 1884 on a fibre produced by extruding a solution of cellulose nitrate through fine glass capillaries, he worked for several years on the problem of reducing the flammability of the new substance. At the Paris Exposition of 1889 he showed rayon products to the public for the first time. Soon afterward he opened a factory, Société de la Soie de Chardonnet ("Society of the Silk of Chardonnet") in Besançon, which in 1891 began to produce the world's first commercially made synthetic fibre, sometimes called Chardonnet silk to distinguish it from other forms of rayon.

Chardzhou, also spelled ČARDŽOU, *oblast* (province), southeastern Turkmenistan, with an area of 36,200 square miles (93,800 square km). It lies along the middle reaches of the Amu Darya (river), with the Kara-Kum Desert on the left bank and the Kyzylkum and Sundukli deserts on the right. It is largely flat, but in the extreme southeast the spurs of the Gissar Mountains rise to 10,298 feet (3,139 m). Both the Amu Darya and the Kara-Kum Canal, which runs west from the Amu Darya just north of the Afghanistan frontier, are navigable. The climate is continental and very dry, with moderately cold winters and hot summers. Cotton cultivation and sericulture (raw-silk production) are practiced along the Amu Darya, and Karakul sheep are bred in the surrounding desert. The large Achak natural-gas field in the north is linked to the Central Asia Centre gas pipeline; sulfur is mined at Gaurdak and lead at Svintsovy Rudnik in the southeast. Industry is largely concentrated in the capital, Chardzhou; the other cities are Gaz Achak and Kerki. Pop. (1991 est.) 774,-700.

Chardzhou, also spelled ČARDŽOU, formerly (1886–1937) NOVY CHARDZHUY, city and administrative centre, Chardzhou *oblast* (province), Turkmenistan, on the Amu Darya (river). The second largest city in Turkmenistan, it was founded as a Russian military settlement when the Transcaspian Railway reached the Amu Darya in 1886. It is now a rail junction and the biggest port on the Amu Darya. The city has cotton-ginning and silk mills and manufactures superphosphates and Astrakhan furs. Turkmen Pedagogical Institute is located there. Pop. (1991 est.) 166,400.

Charente, inland *département,* Poitou-Charentes *région,* western France, separated from the Bay of Biscay by Charente-Maritime *département* and elsewhere surrounded by the *départements* of Deux-Sèvres, Vienne, Haute-Vienne, and Dordogne. Formed from the historic provinces of Angoumois and (in part) Saintonge, it encompasses an area of 2,300 square miles (5,956 square km).

Most of the *département* comprises fertile arable land where wheat, corn (maize), and fodder crops are grown. Charente is especially renowned for its vineyards, which provide the wine for distilling brandy, associated with Cognac, a town that lies in the Charente River valley. The river is navigable for small barges as far as Angoulême, which has paper works and food-canning industries. There are local limestone quarries and gypsum workings, and clay is dug for brick and tile works. Cattle are raised around Confolens and Barbezieux. Charente's butter, manufactured by a cooperative, is among France's best. Principal rivers, in addition to the Charente, which drains the central area, include the Vienne in the northeast and the Dronne in the south.

Charente is divided into the three *arrondissements* of Angoulême (the departmental cap-



"The Attributes of Music," oil on canvas by Jean-Baptiste-Siméon Chardin, 1765; in the Louvre, Paris

Giraudon/Art Resource, New York City

ital), Cognac, and Confolens. It forms the diocese of Angoulême and is associated with the *académie* (academic district) of Poitiers; its court of appeal is at Bordeaux. Pop. (1990 prelim.) 341,900.

Charente-Maritime, formerly (until 1941) CHARENTE-INFÉRIEURE, *département,* Poitou-Charentes *région,* western France, comprising the ancient provinces of Saintonge (in part) and Aunis and a small portion of Poitou. It extends along the Bay of Biscay from the Gironde Estuary to the Sèvre Nantaise River on the borders of Vendée and is bounded inland by Deux-Sèvres, Dordogne, and Charente *départements.* Charente-Maritime (which includes the offshore islands Oléron, Ré, Aix, and Madame) has an area of 2,650 square miles (6,864 square km) and is drained southeast-northwest by the Charente River to the Bay of Biscay. Oyster culture is carried on in some coastal areas (especially Marennes); but Charente-Maritime is chiefly agricultural, growing cereals, fodder crops, and grapes. Cattle raising and dairying are important, especially on the drained lands of the Poitevin swampland. The coast alternates between scarps and sandy beaches, but it is also muddy. There are sandy beaches along the estuary of the Gironde, where Royan is a tourist centre.

La Rochelle (capital of the *département*), Rochefort, Saintes, Saint-Jean-d'Angély, and Jonzac give their names to the five *arrondissements,* and the *département* forms the diocese of La Rochelle. Its court of appeal is at Poitiers. Pop. (1990 prelim.) 526,200.

Charente River, river in western France, about 225 miles (360 km) long, rising near Rochechouart in the Limousin uplands (Haute-Vienne *département*), on the margin of the Massif Central, and flowing generally westward to the Bay of Biscay. Taking a northwesterly course to Civray (Vienne *département*), it makes a wide loop and meanders south to Angoulême, capital of Charente *département,* and then flows gently westward through Cognac and Saintes (Charente-Maritime *département*). The river receives its chief tributary, the Boutonne, from the plain of Poitou to the north, before making a southern loop round Rochefort, 5 miles (8 km) from its mouth, east of the island of Oléron. It is navigable for small craft as far as Angoulême.

Chares (fl. 4th century BC), Athenian general and mercenary commander.

In 357 BC Chares regained for Athens the Thracian Chersonese from the Thracian king Cersobleptes. During the Social War (Athens against her allies, 357–355), he commanded the Athenian forces; in 356 he was joined by Iphicrates and Timotheus with reinforcements. Having blamed the subsequent defeat on his colleagues, Chares was left sole commander. After receiving no supplies from Athens, however, he joined the insurgent Persian satrap Artabazus.

In 349, 348, and 340 Chares accomplished little as commander of Athenian forces against Philip II of Macedonia. He was defeated by Philip in 338 at Amphissa in Locris and participated in the Battle of Chaeronea. After conquering Thebes (335), Alexander the Great (Philip II's son) is said to have demanded the surrender of Chares, among others, but Chares escaped to the Troad.

In 332 Chares commanded a Persian force in Mytilene, but he surrendered at the approach of a Macedonian fleet on condition that he be allowed to retire unmolested. Chares is last heard of at Taenarum (Cape Matapan) and is thought to have died at Sigeum.

Chares OF LYNDUS (fl. late 4th–early 3rd century BC, Lyndus, Rhodes), ancient Greek sculptor who created the Colossus of Rhodes, usually counted among the Seven Wonders of the World. A pupil of the sculptor Lysippus, he fashioned for the Rhodians a colossal bronze statue of the sun god, the cost of which was defrayed by selling engines of war left by Demetrius Poliorcetes after a siege in 305–304 BC. This Colossus was said to be 70 cubits (105 feet; 32 m) in height. The notion that it bestrode the harbour has been discredited. It was destroyed by an earthquake about 225 BC. (*See also* Rhodes, Colossus of.)

Charette de La Contrie, François-Athanase (b. April 21, 1763, Couffé, Fr.—d. March 29, 1796, Nantes), leader of the French royalist counterrevolutionary forces during the Wars of the Vendée (1793–96).



Charette de La Contrie, engraving by Bautran after a painting by Paulin-Guérin
By courtesy of the Bibliotheque Nationale, Paris

A naval officer and landowner near Nantes, he joined the revolt that began in that region in March 1793 against the government of the revolutionary National Convention. After fighting in the royalists' siege of Nantes (June–July) and the Battle of Torfu (September 19), he quarreled with other rebel leaders. In October 1793 he withdrew his peasant guerrillas to the Poitevin Marshes (Marais), where he directed Vendéan resistance until he surrendered and was pardoned by the government (Feb. 17, 1795). On June 26, 1795, however, he declared his allegiance to the exiled comte de Provence, who had recently assumed the title of King Louis XVIII. The next day he fought on the side of royalist émigrés who unsuccessfully invaded the country at Quiberon Bay (Morbihan). Eventually, he was captured and shot by the republican general Lazare Hoche.

charge, electric: *see* electric charge.

charge carrier, any entity having electric charge, the motion of which constitutes an electric current. In metals the charge (or current) carriers are free electrons, common negative subatomic particles. In gases and liquids the charge carriers may also be positive and negative ions, atoms or molecules of the material that have a deficiency or an excess of electrons. In semiconductors the charge carriers are free electrons and holes. A hole, an absence of an electron in a bond between atoms, acts as a positive charge carrier and migrates through a current-carrying semiconductor in a direction opposite to the free electron drift. Positive current carriers may be distinguished experimentally from negative ones by the Hall effect (*q.v.*).

charge conjugation, in particle physics, an operation that replaces particles with antiparticles (and vice versa) in equations describing subatomic particles. The name charge conjugation arises because a given particle and its antiparticle generally carry opposite electric charge. The positive electron, or positron, for example, is the antiparticle of the ordinary negative electron.

Until the mid-1950s, it was believed that nature would be unaffected if particles were replaced by their antiparticles. The operation of charge conjugation, in other words, would not change the mathematical descriptions of fundamental physical processes. Several experiments on weak nuclear interactions, undertaken after 1956, however, indicated that nature is not indifferent to the exchange of particles and antiparticles. Thus, antiparticle universes, popular in science fiction, would have physical laws slightly different from the laws for this universe. When charge conjugation C is combined with two other operations, parity reversal P and time reversal T, strong theoretical grounds (CPT theorem) indicate that the basic laws of physics do remain invariant. *See also* CP violation.

charge conservation, in physics, constancy of the total electric charge in the universe or in any specific chemical or nuclear reaction. The total charge in any closed system never changes, at least within the limits of the most precise observation. In classical terms, this law implies that the appearance of a given amount of positive charge in one part of a system is always accompanied by the appearance of an equal amount of negative charge somewhere else in the system; for example, when a plastic ruler is rubbed with a cloth, it becomes negatively charged and the cloth becomes positively charged by an equal amount.

Although fundamental particles of matter continually and spontaneously appear, disappear, and change into one another, they always obey the restriction that the net quantity of charge is preserved. When a charged particle changes into a new particle, the new particle inherits the exact charge of the original. When a charged particle appears where there was none before, it is invariably accompanied by another particle of equal and opposite charge, so that no net change in charge occurs. The annihilation of a charged particle requires the joint annihilation of a particle of equal and opposite charge.

These events could hardly take place if it were not for the fact that electric charge comes in tiny, basic amounts, known as quanta, that are all precisely equal to the charge of the electron. All observable charged particles carry at least one quantum but never any intermediate or fractional value of one quantum. However, the fundamental quarks that make up the particles of matter that are known as hadrons do appear to carry fractional values of charge equal to one-third or two-thirds of the electron's charge.

chargé d'affaires, the lowest rank of diplomatic representative recognized under the Vienna Convention on Diplomatic Relations (1961). A chargé d'affaires is usually accredited to the foreign minister of the country in which he operates, rather than to the head of state, and acts in the absence of the head of his mission—usually an ambassador. A chargé d'affaires may be appointed head of mission in cases in which only tenuous diplomatic relations exist between his country and the receiving state.

Chari-Nile languages, also called MACRO-SUDANIC LANGUAGES, branch of the Nilo-Saharan family of languages spoken in an area extending from southern Egypt to northern Tanzania and from Ethiopia and Kenya to Chad. The Chari-Nile branch is usually divided into four subbranches: Eastern Sudanic (including the Nilotic and Nubian subgroups), Central Sudanic, Kunama, and Berta. *See also* Eastern Sudanic languages; Central Sudanic languages.

Chari River, also called SHARI, principal tributary feeding Lake Chad in north-central Africa. It flows through Chad and the Cen-

tral African Republic and is formed by the Bamingui (its true headstream), the Gribingui, and the Ouham (*q.v.*), which brings to it the greatest volume of water. Near Sarh the Chari is joined on its right bank by the Bahr Aouk, the Bahr Kéita, and the Bahr Salamat, parallel



Villagers laundering clothes in the Chari River, Chad
Kay Honkanen—Ostman Agency

streams that mingle in an immense floodplain. Bahr Salamat, which rises in Darfur in The Sudan, in its middle course is fed by the waters of Lac (lake) Iro. The river then divides into numerous branches that spread into a delta and end in the Chari. Bahr Aouk, which forms the boundary between Chad and the Central African Republic, also rises in Darfur and sluggishly drains an immense marshy plain. In the dry season it is sometimes reduced to a succession of stagnant ponds; its floodwaters empty into the Chari in an extensive delta. Downstream from Sarh the Chari crosses the Gay Rapids near Niellim, broadening out to 3 or 4 mi (5 or 6.5 km) in width, its lower reaches dividing into many channels. At N'Djamena to the west it joins the Logone and flows into Lake Chad through several distributaries. The total length of the Chari is about 870 mi (1,400 km). The Chari basin covers 250,000 sq mi (650,000 sq km), and the river unites the drainage of the southern part of the Chad inland basin. Steamboats navigate the main river for more than 530 mi in the wet season. The existence of the Chari was made known to Europeans by the British explorers Dixon Denham, Hugh Clapperton, and Walter Oudney, who reached Lake Chad in 1823.

Charibert, also spelled CHEREBERT, French CARIBERT, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Charibert I** (d. 567 or 568, Paris), king of the Franks, the eldest son of Chlotar I and Ingund. He shared in the partition of the Frankish kingdom that followed his father's death in 561, receiving the old kingdom of Childebert I, with its capital at Paris. Eloquent and learned in the law, he was yet loose-living and died excommunicate. At his death his brothers Guntram, Sigebert I, and Chilperic I shared his realm between them; a tripartite division of the lands north of the Loire thenceforth remained normal, the areas concerned being the east (Austrasia), the west (the future Neustria), and Burgundy.

• **Charibert II** (d. 631, Blaye, Fr.), king of Aquitaine from 630. On the death of his father, Chlotar II, in 629, the entire Frankish realm went to his brother, Dagobert I, but in 630 Dagobert ceded to him several territories in Aquitaine and Gascony, with his capital at Toulouse. He and his infant son were assassinated the following year, and the territories reverted to Dagobert.

Charidemus (d. 333 BC), Greek mercenary leader from Euboea who fought sometimes on the side of the Athenians, at other times on the side of their enemies. He served under the Athenian general Iphicrates at Amphipolis about 367 BC but later joined Cotys, king of Thrace, against Athens. Captured by the Athenians, Charidemus was taken into their service and received their citizenship, but in 362 he was discharged. After participating in a revolt of satraps in Persia, he again joined Cotys. On Cotys' murder he became guardian to the dead king's young son, Cersobleptes.

Charidemus was credited with restoring the strategic Thracian Chersonese (modern Gallipoli Peninsula) to Athens in 357—a deed for which he received a golden crown. In 348 he led some Athenian forces to Olynthus against Philip II of Macedonia. After crushing the rebellion of Thebes (335), Alexander the Great of Macedonia demanded the surrender of Charidemus, who escaped with banishment. He fled to Persia, where Darius III, it is said, executed him for criticizing preparations taken for the Battle of Issus.

Chārikār, capital of Parvān *velāyat* (province), east central Afghanistan, at an altitude of 5,250 ft (1,600 m). The city lies on the road from Kābul (the national capital, 40 mi [65 km] south) to the northern provinces. A British garrison was massacred at Chārikār in 1841 during the First Anglo-Afghan War. Following the Soviet military intervention in 1979, Chārikār was the scene of heavy fighting between Afghan guerrillas (from their strongholds in nearby Panjshēr Valley) and Soviet and Afghan army units. The town's proximity to Afghanistan's modern textile factory, at Gōlbahār, led to a considerable population increase after 1962. Chārikār is known for pottery and fine grapes as well as cutlery and silverwork. It also has an iron foundry. Pop. (1982 est.) 25,117.

Charing Cross, locality, City of Westminster, Greater London, where the street called the Strand (once along the Thames bank) leads east toward the City of London from the north end of Whitehall, now the site of Trafalgar Square. The name derives from *cierran* (Old English: "to turn") and refers to the nearby great bend in the Thames, or possibly to a bend in the Roman road that ran west from London. Here Edward I erected the last of the series of 12 crosses in memory of Queen Eleanor (died 1290) that marked stages of the funeral procession to Westminster Abbey. The cross was destroyed in 1647, during the Civil War, and the modern cross of 1863 stands in the forecourt of Charing Cross Railway Station nearby. After the restoration of the English monarchy in 1666, several regicides were executed on the spot where the old cross stood, and the site is marked by an equestrian statue (1672) in memory of Charles I, who was executed in 1649.

chariot, open, two- or four-wheeled vehicle of antiquity, probably first used in royal funeral processions and later employed in warfare, racing, and hunting. The chariot apparently originated in Mesopotamia in about 3000 BC; monuments from Ur and Tutub depict battle parades that include heavy vehicles with solid wheels, their bodywork framed with wood and covered with skins. On the earliest chariots the wheels rotated on a fixed axle that was linked by a draft pole to the yoke of a pair of oxen. To the axle was attached a superstructure consisting of a platform protected by sidescreens and a high dashboard. These Mesopotamian chariots were mounted by both spearman and charioteer, although it is doubtful that fighting was conducted from the vehicle itself.

The two-wheeled version soon proved superior in battle because of its higher maneuverability. Greater speed was attained by the use of teams of two or four onagers and by the evolution of the light, spoked wheel. The introduction of the horse as a draft animal in about 2000 BC was the final step in the development of the chariot into a military arm that revolutionized warfare in the ancient world by providing armies with unprecedented mobility. Chariotry contributed to the victories, in the 2nd millennium BC, of the Hyksos in Egypt, the Hittites in Anatolia, the Aryans in northern India, and the Mycenaeans in Greece. By 1435 BC Egyptians were making chariots, and by the end of the century chariots with four-spoked wheels and light design were in use throughout the Levant and had been introduced to Minoan Crete and the southern European mainland.

Bronze chariot plaques and horse trappings from graves of the Shang dynasty (18th–12th century BC) indicate that chariotry was introduced to the Chinese steppes by the 14th century BC, but no reconstruction of the earliest types is possible. Chariots of *c.* 300 BC found in a burial at Liu-li-ho, in Peking municipality, have dished wheels but otherwise are similar in construction to Celtic chariots in western Europe.

In Europe the chariot was transmitted, perhaps by the Etruscans, to the Celts, who were using it in the British Isles about the 5th century BC. The bodywork of Celtic chariots was somewhat heavier than that of the Greek, and metal, sometimes inlaid with fine enamels, was extensively used for axle and draft pole, and occasionally for solid wheels. On the fringe of the Celtic world, where the chariot remained in use until the 4th century AD, small ponies, yoked four abreast, were used for draft.

By the time of Alexander the Great, the war chariot had been superseded by cavalry, but chariot racing had become popular in Greece and was a main feature of the Olympic Games and of the Pythian Games at Delphi. In



Model of a *biga*, Etruscan of the 6th century BC; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York, Rogers Fund, 1909

the Roman circus games, chariot racing took foremost place, and chariotry became socially important. Racing vehicles were drawn by two, three, or four horses, although as many as 10 horses were harnessed on spectacular occasions; chariots drawn by dogs and even ostriches are mentioned.

In England and America in the 18th and early 19th centuries, a popular four-wheeled vehicle was called a chariot. It was essentially the rear half of a coach, cut off just in front of the door.

chariot racing, in the ancient world, a popular form of contest between small, two-wheeled vehicles drawn by two-, four-, or six-horse teams. The earliest account of a chariot race occurs in Homer's description of the funeral of Patroclus (*Iliad,* book xxiii). Such races were a prominent feature of the ancient Olympic Games and other games associated with Greek religious festivals. They were the main events of the Roman public games (*ludi publici*) that took place at the Circus Maximus.

From four to six chariots competed in a single race, normally consisting of seven laps around the circus. The racing chariots were light, fragile affairs, easily smashed in a collision, in which case the driver was often entangled in the long reins and dragged to death or seriously injured.

Under the Roman Empire, the chariot teams

were organized into four principal factions, each managed by a different association of contractors and each distinguished by a different colour: red, white, blue, and green. Enthusiasm for the favourite colour often led to disorder; Juvenal, the Roman satirist of the 1st and 2nd centuries AD, said that, if the greens lost, the whole city would be downcast, as if some great national defeat had occurred. In the later Empire these factions played a part in political and (after Christianization) religious controversies. Under Justinian, the blues were identified with Orthodoxy and the greens with Monophysitism, a heretical doctrine.

Charis (goddess): *see* Grace.

charisma, attribute of awesome and almost magical power and capacity ascribed by followers to the person and personality of extraordinarily magnetic leaders. Such leaders may be political and secular as well as religious.

The term came into scholarly usage primarily through the works of the German sociologist Max Weber (1864–1920), especially his *Wirtschaft und Gesellschaft* (1921; *On Law in Economy and Society*, 1954), in which he postulated that charismatic authority was a form of authority distinct from those of tradition and law. The process whereby charismatic authority becomes transformed, or changed, to any of the other forms is referred to by Weber as the "routinization of charisma."

Although in current usage many popular and attractive leaders are called charismatic, in the original sense of the word only such phenomenal personages as Jesus or Napoleon merit the description charismatic.

Charites (goddesses): *see* Grace.

Chariton (fl. not later than 2nd century AD, Aphrodisias, Caria, Asia Minor), Greek novelist, author of *Chaereas and Callirhoë*, the earliest fully extant romantic novel in Western literature. The complex but clearly narrated plot concerns a husband and wife whose love is tested by a series of fast-moving, perilous adventures in Sicily, Persia, and Egypt, ending in eventual happiness. Historical persons are introduced as characters but are treated with free invention.

charity, in Christian thought, the highest form of love, signifying the reciprocal love between God and man that is made manifest in unselfish love of one's fellow men. St. Paul's classical description of charity is found in the New Testament (I Cor. 13). In Christian theology and ethics, charity (a translation of the Greek word *agapē*, also meaning "love") is most eloquently shown in the life, teachings, and death of Jesus Christ. St. Augustine summarized much of Christian thought about charity when he wrote: "Charity is a virtue which, when our affections are perfectly ordered, unites us to God, for by it we love him." Using this definition and others from the Christian tradition, the medieval theologians, especially St. Thomas Aquinas, placed charity in the context of the other Christian virtues and specified its role as "the foundation or root" of them all.

Although the controversies of the Reformation dealt more with the definition of faith than with either hope or charity, the Reformers identified the uniqueness of God's *agāpe* for man as unmerited love; therefore, they required that charity, as man's love for man, be based not upon the desirability of its object but upon the transformation of its subject through the power of divine *agāpe*.

Modern philosophical discussions of charity have compared it to other terms and concepts of love, notably to *erōs*, which is understood as desire or yearning.

Charity, Sisters of, any of numerous Roman Catholic congregations of noncloistered women who are engaged in a wide variety of active works, especially teaching and nursing. Many of these congregations follow a rule of life based upon that of St. Vincent de Paul for the Daughters of Charity (*q.v.*), but modified according to the specific constitutions of the institute. Several congregations of Sisters of Charity in the United States and Canada are branches of the community founded at Emmitsburg, Md., in 1809 by Mother Elizabeth Bayley Seton, the first native-born American canonized as a saint.

Charity of Saint Vincent de Paul, Daughters of (D.C.), a Roman Catholic religious congregation founded at Paris in 1633 by St. Vincent de Paul and St. Louise de Marillac. The congregation was a radical innovation by 17th-century standards; it was the first noncloistered religious institute of women devoted to active charitable works, especially in the service of the poor. Vincent originally established in Paris and in nearly every country place where he worked congregations of charity among the wealthy women who wished to help the poor. Eventually peasant girls were gathered to assist the Ladies of Charity, and they were entrusted to the care of Louise de Marillac. This group developed into the Daughters of Charity of St. Vincent de Paul. At first dedicated to nursing the poor in their homes, the sisters almost immediately undertook the teaching of poor children and the running of hospitals, and gradually they were involved in every form of charitable work. Their services during various wars in many countries earned them the title Angels of the Battlefield.

In the late 20th century the Daughters of Charity comprised the largest congregation of women religious. Their provinces all over the world are subject to the motherhouse in Paris, which is under the supervision of the superior general of the Congregation of the Mission, or Vincentians.

charity school, also called BLUE COAT SCHOOL, type of English elementary school that emerged in the early 18th century to educate the children of the poor. They became the foundation of 19th-century English elementary education. Supported by private contributions and usually operated by a religious body, these schools clothed and taught their students free of charge. They were instituted in an attempt to cope with poverty by means of education and were scattered throughout the country, particularly in urban areas. Charity schools as such also existed in colonial America and on the Continent during the same period, but the term was not so commonly used.

Char'kov (Ukraine): *see* Kharkov.

Charlemagne, also called CHARLES I, byname CHARLES THE GREAT, French CHARLES LE GRAND, Latin CAROLUS MAGNUS, German KARL DER GROSSE (b. April 2, *c.* 742—d. Jan. 28, 814, Aix-la-Chapelle, or Aachen, Austrasia), king of the Franks (768–814) and king of the Lombards (774–814), who united by conquest nearly all the Christian lands of western Europe and ruled as emperor (800–814). (He is reckoned as Charles I of both the Holy Roman Empire and France.) Besides expanding his political power, he also brought about a cultural revival in his empire, called the Carolingian Renaissance.

A brief account of the life and works of Charlemagne follows; for a full biography, *see* MACROPAEDIA: Charlemagne.

A member of the Carolingian dynasty and the son of Pepin III the Short, Charlemagne acceded to the Frankish throne in 768, gaining sole control upon the death of his brother in 771. He conquered the Lombards and the pagan Saxons, whom he Christianized. His continued expansion of the Frankish state, his close alliance with the papacy, and the papal desire for a western emperor to counter Byzantium resulted in the coronation of Charlemagne in 800. His court at Aix-la-Chapelle became an intellectual, political, and administrative centre after 794.

After death his body was borne in a sarcophagus to the church that he had had built. It remained there undisturbed until its formal translation in 1165 on the occasion of Charles's canonization at the request of the emperor Frederick I Barbarossa by the antipope Paschal III. The popular cult of Charlemagne was fairly widely observed in Germany and France during the Middle Ages, so that he is now regarded as having been informally beatified.

Legend fastened on Charles as soon as he was dead. It helped to create an image that neither he nor his successors could match. His reign overshadowed the future, and most of the problems that his successors had to face were implicit in the legacy that he left them.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Charleroi, municipality, Hainaut province, south central Belgium, on the north bank of the Sambre River, south of Brussels.

Following the Treaty of the Pyrenees (1659), France had to yield Landrecies, Avesnes, Philippeville, and Mariembourg to Spain. The frontier was dismantled, and with the return of peace and the marriage of Louis XIV to the Spanish Infanta, Spain determined to build a new fortress on the Sambre. This was to be Charleroi and the decree creating it was signed by the governor, Castel Rodrigo, in 1666. The site chosen for the new fortress was the medieval village of Charnoy and the name honoured Charles II, king of Spain. The very next year Louis XIV became master of Charleroi. It was returned to Spain in 1678, and once again fell to the French in 1693 after a siege directed by Sébastien de Vauban. Recovered by the Spanish in 1697, again French in 1701, the city was Austrian from 1713 to 1746. Napoleon headquartered in Charleroi in 1815 but was forced to retreat in a short time—regretting that he had not fortified the city. The Dutch (1816) did so as a barrier against France. Belgian after 1830, the fortress was dismantled between 1868 and 1871. Charleroi was the scene of the first battle of World War I (Aug. 22, 1914).

Canalization of the Sambre in the 19th century brought great expansion, and Charleroi became the hub of a heavily populated industrial region, *le pays noir* ("the black country," because of its smoke). It is now an important centre for coal mining and the iron, steel, and engineering industries. It manufactures machinery, electronic equipment, glass, chemicals, and cement. Jumet, a northern suburb of Charleroi, was world famous for its glassmakers in the 19th century and sent some to the United States, where a similar and now competing industry was founded. Jumet is also known for its "Marche de la Madeleine," in which citizens disguised in Napoleonic uniforms prevented the passage of Napoleon's troops toward Waterloo.

Notable landmarks include the town hall (1936) with its 230-ft (70-m) belfry, from which the annual procession of the Walloon Festival sets out, the Palais des Expositions (1954), where industrial exhibitions are held, and the Palais des Beaux-Arts (1957). Institutions include a Université du Travail (business college), a medical and surgical institute, and an archaeological museum. Charleroi is linked to Brussels by rail and canal; its airport is 4 mi (6 km) north. Pop. (1990 est.) mun., 206,779.

Charles, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Czech	Karel
Dutch	Karel
French	Charles
German	Karl
Hungarian	Károly
Italian	Carlo
Portuguese	Carlos
Romanian	Carol
Spanish	Carlos
Swedish	Karl, or Carl

Anjou/Maine

• **Charles I–II:** *see* Charles I–II (Naples).

• **Charles III,** also called CHARLES OF VALOIS (b. March 12, 1270—d. Dec. 16, 1325, Le Perray, near Rambouillet, Fr.), count of Valois from 1285 and of Anjou and Maine from 1290. He was son of a king, brother of a king, uncle of three kings, and a father of a king. Though he himself never gained a crown, he sought at various times those of Aragon, France, Constantinople, and the Holy Roman Empire.

In 1285 Charles received the Valois countship from his father, Philip III of France, and in 1290 the countships of Anjou and Maine by his marriage to Margaret, daughter of Charles II of Naples; to these were added in 1291 and 1293 the countships of Alençon and Chartres, granted by his brother, Philip IV, in compensation for their father's failure to win the crown of Aragon for Charles by a so-called crusade in 1285.

In 1301 Charles, regarding Italy as a stepping-stone toward his eastern ambitions, readily accepted Pope Boniface VIII's invitation to aid the papal cause. After subduing Florence for the pope, Charles led an unsuccessful military campaign into Sicily before he was recalled by his brother, Philip IV, to France. In 1308 he vainly sought the title of Holy Roman emperor to ensure additional French control over Italy and the papal possessions.

As chief councillor during the reign of his nephew Louis X, Charles brought about the fall of the famous financial adviser Enguerrand de Marigny. After Louis's death in June 1316, Charles desired the throne, but he gave way to another nephew, Philip V, who died in 1322. Charles had considerable influence with his nephew Charles IV, the new king, and was sent by him on a successful campaign into Guyenne in 1324. He had previously commanded French armies in Guyenne in 1295 and led them in Flanders in 1297, 1299, 1300, 1303, and 1314. His son, Philip VI (king from 1328 to 1350), was the first of the Valois line.

Austria

• **Charles III:** *see* Charles VI (Germany/Holy Roman Empire).

• **Charles (I)** (b. Aug. 17, 1887, Persenbeug Castle, Austria—d. April 1, 1922, Quinta do Monte, Madeira), emperor (*Kaiser*) of Austria and, as Charles IV, king of Hungary, the last ruler of the Austro-Hungarian monarchy (Nov. 21, 1916–Nov. 11, 1918).

A grandnephew of the emperor Francis Joseph I, Charles became heir presumptive to the Habsburg throne upon the assassination of his uncle Francis Ferdinand (June 28, 1914), whose children were barred from succession because of his morganatic marriage. After his accession, Charles, a peace-loving man, made attempts to take Austria-Hungary out of World War I through secret overtures to the Allied powers, the most promising being through his brother-in-law, Prince Sixtus von Bourbon-Parma. All failed, largely because the emperor refused to cede any territories to Italy. Because he had also supported French claims to Alsace-Lorraine, his reputation both in Germany and at home suffered when his efforts were made public.

World War I accelerated the centrifugal forces of nationalism in Charles's multinational empire. His solution, transformation of the western part of his empire into a federated state,



Charles, emperor of Austria

By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

announced in October 1918, proved insufficient and too late. On Nov. 11, 1918, after the collapse of the Austro-Hungarian armies on the Italian front, Charles renounced all participation in affairs of state but did not abdicate. Exiled to Switzerland in March 1919, he was deposed by the Austrian parliament that April. In 1921 he twice tried to regain his Hungarian throne but failed and was sent to exile in Madeira, living there in very poor conditions and dying of pneumonia.

Upon Charles's death in 1922, his widow, Zita von Bourbon-Parma (1892–1989), went into mourning and wore black for the rest of her life, dying at age 96 in Switzerland.

Bohemia

• **Charles:** *see* Charles IV (Germany/Holy Roman Empire).

Brittany

• **Charles,** byname CHARLES OF BLOIS (b. 1319—d. Sept. 29, 1364, Auray, Fr.), rival duke of Brittany, a son of the French king Philip VI's sister Margaret.

Charles's claim to Brittany through his marriage to Joan the Lame of Penthièvre, niece of Duke John III of Brittany, led to a conflict with the other claimants, John of Montfort and later his son Duke John IV of Brittany, in the 20-year War of the Breton Succession, which also involved the kings of England and France. When John of Montfort began to win most of Brittany, Charles appealed to Philip, who had the peers of France recognize Charles as sole heir to the duchy; meanwhile, John had sought the aid of Edward III of England.



Charles of Blois, engraving

By courtesy of the Bibliotheque Nationale, Paris

On Nov. 1, 1341, Charles seized the city of Nantes and imprisoned John for four years. When Edward attacked Nantes, Pope Clement VI intervened in 1343 to conclude a truce. The war was renewed, however, and Charles was captured at La Roche-Derrien in January 1347 and incarcerated in the Tower of London; he paid a ransom and promised to hold Brittany, under vassalage to Edward. On July 12, 1363, Charles finally agreed on a partition of Brittany with Duke John IV of Brittany but was persuaded by his wife to break the treaty. At the Battle of Auray (Sept. 29, 1364), Charles was killed and his army defeated.

Burgundy

• **Charles,** byname CHARLES THE BOLD, French CHARLES LE TÉMÉRAIRE (b. Nov. 10, 1433, Dijon, Burgundy [now in France]—d. Jan. 5, 1477, near Nancy, Lorraine), last of the great dukes of Burgundy (1467 to 1477).

Early years. The son of Duke Philip III the Good of Burgundy, Charles was brought up in the French manner as a friend of the French dauphin, afterward Louis XI of France, who spent five years in Burgundy before his accession. Although he had shown no hostility toward France before taking over the government of Burgundy during his father's last illness, he thereupon gave rein to an ambition to make Burgundy independent of France and to raise it, if possible, to a kingdom.

Charles was almost entirely successful until 1474. He extended Burgundy's possessions, organized them as a state, and freed them from French control. Much annoyed by Louis XI's acquisition of Burgundian territory on the Somme River, he entered upon a lifelong



Charles the Bold, detail of a portrait by Rogier van der Weyden, *c.* 1460; in the Gemäldegalerie, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz Gemaldegalerie Berlin

struggle against Louis and became one of the principal leaders of the League of the Public Weal, an alliance of the leading French magnates against Louis. Charles forced Louis to restore to him the territory on the Somme in the Treaty of Conflans (October 1465) and to promise him the hand of his daughter Anne of France, with Champagne as dowry. Louis continued to encourage the towns of Dinant and Liège to revolt against Burgundy. But Charles sacked Dinant (1466), and the Liégeois were defeated in battle and deprived of their liberties after the death of Philip the Good (1467).

Charles, now not merely regent but duke in his own right, outdid Louis by obtaining the alliance of Edward IV of England, whose sister Margaret of York he married as his third wife (July 1468). Louis now tried negotiations with Charles at Péronne (October 1468). There, in the course of the discussions, Charles was informed of a fresh revolt of the Liégeois, again aided by Louis. Looking on Louis as a traitor, Charles nevertheless negotiated with him but at the same time forced him to remove Flan-

ders, Ghent, and Bruges from the jurisdiction of the Paris *parlement* (superior court) and to assist in quelling the revolt; Liège was destroyed, and the inhabitants were massacred. The truce, however, was not lasting. Louis commanded Charles to appear before the *parlement* of Paris and seized some of the towns on the Somme (1470–71). The Duke retaliated by invading Normandy and the Île-de-France, ravaged the country as far as Rouen, but failed in an attack on Beauvais (1471–72). Another truce was made (November 1472), and Charles decided to wait, before renewing his attempt, for assurances of further help from Edward IV and for the solution of the problem of the eastern border of his states.

Charles wished to extend his territories as far as the Rhine and to make them into a single unit by acquiring the lands bordered by Burgundy, Luxembourg, and the Netherlands. Losing no opportunity, he purchased the county of Ferrette, the landgraviate of Alsace, and some other towns from the archduke Sigismund of Austria, in 1469; he secured for himself the inheritance of the old duke Arnold of Gelderland in 1473. To achieve his territorial aims, it remained for him only to subdue Cologne and the Swiss cantons and to get Lorraine from René II (René of Vaudémont).

Administrative reforms. In the meantime, Charles had been reorganizing his army and the administration of his territories. Statutes promulgated at Thionville (1473) instituted companies of four squadrons, at his expense, and made rules for discipline and tactics; Charles also had many excellent guns cast. He hired soldiers and took many Italian condottieri (mercenary captains) into his service. Intending to centralize the government, he created by statute a single *chambre des comptes* to control ducal finances for the Netherlands, a *chambre du trésor* to survey the administration of his own domain, and a *chambre des généraux* to control the collection of taxes. He exacted very heavy taxes indeed from the States General (parliament), which became a regular institution in his territories. To administer justice, he established a court called the *grand conseil* at Malines, with jurisdiction to supersede that of the *parlement* of Paris, and another that met alternately at Beaune and at Dole.

It remained for Charles to acquire a royal title. For a short time he entertained designs on the crown of the Holy Roman Empire, but this he renounced. On the other hand, he believed that he had persuaded the emperor Frederick III, in the course of conversations at Trier, to agree to crown him king of Burgundy. The royal insignia were ready and the ceremony arranged, when Frederick precipitately fled by night (September 1473). He probably was suspicious of the ambitious Charles.

In less than three years, Charles's dream vanished. The crown had slipped through his fingers. He was obliged to give up his plan of taking the little town of Neuss, which he had unsuccessfully besieged for 11 months (July 1474 to June 1475), from the citizens of Cologne. Moreover, the Treaty of Picquigny (Aug. 29, 1475), concluded by Edward IV and Louis XI, made certain the defection of his English ally. Attacked by René of Lorraine, who had signed an agreement with Louis XI (August 1474), and by a coalition of the Swiss, Sigismund of Austria and the towns on the upper Rhine, Charles took Nancy in November 1475; but, in March and June 1476, he was defeated by the Swiss, at Granson and at Morat. In October he lost Nancy. Then, on Jan. 5, 1477, a further battle was fought outside Nancy, and Charles himself was killed; his mutilated body was discovered some days later.

The fragility of his achievement is proved by its rapid disintegration during the minority of Marie, his daughter by Isabella of Bourbon. Yet Charles the Bold was not merely a belated representative of the chivalrous spirit; he was a man of wide knowledge and culture, already a prince of the Renaissance. His haste, his lack of adaptability, and his obstinacy lost him much more than did his visionary approach and his boldness. (M.J.Mo.)

BIBLIOGRAPHY. The excellent work by J. Bartier, *Charles le Téméraire*, rev. ed. (1970), with abundant illustrations, an appendix on the historical, literary, and mythical interpretations of the subject, and a critical bibliography, may be considered definitive.

Flanders

• **Charles,** byname CHARLES THE GOOD, French CHARLES LE BON, Dutch KAREL DE GOEDE (b. *c.* 1084—d. March 2, 1127, Bruges, Flanders), count of Flanders (1119–27), only son of St. Canute, or Canute IV of Denmark, by Adela, daughter of Robert I the Frisian, count of Flanders. After the assassination of Canute in 1086, his widow took refuge in Flanders, taking with her her son. Charles was brought up by his mother and grandfather, Robert the Frisian, on whose death he did great services to his uncle, Robert II, and his cousin, Baldwin VII, counts of Flanders. Baldwin died of a wound received in battle in 1119 and, having no issue, left by will the succession to his countship to Charles. Charles did not secure his heritage without a civil war, but he was speedily victorious and made his position secure by treating his opponents with great clemency. He now devoted himself to promoting the welfare of his subjects and did his utmost to support the cause of Christianity, both by his bounty and by his example. He refused the offer of the crown of Jerusalem on the death of Baldwin I and declined to be nominated as a candidate for the imperial crown in succession to the Holy Roman emperor Henry V. He was murdered on Ash Wednesday, 1127, in the church of St. Donat at Bruges.

France

• **Charles I:** *see* Charlemagne.

• **Charles II:** *see* Charles II (Germany/Holy Roman Empire).

• **Charles (III):** *see* Charles III (Germany/Holy Roman Empire).

• **Charles III,** byname CHARLES THE SIMPLE, French CHARLES LE SIMPLE (b. Sept. 17, 879—d. Oct. 7, 929, Péronne, Fr.), king of France (893–922), whose authority came to be accepted by Lorraine and who settled the Northmen in Normandy but who became the first Carolingian ruler of the western kingdom to lose his crown.

The posthumous son of Louis II the Stammerer, Charles was too young to assume the throne on the death of his half-brother, Carloman, in 884 or that of his cousin, Charles the Fat, in 888. On Jan. 28, 893, however, he was crowned king by Fulk, archbishop of Reims; and, although he renounced his rights after civil war in 897, the death of King Eudes in the following year brought him general recognition as king.

Charles was strongly under the influence of Robert, brother of the dead Eudes. It was Robert's victory against the Northmen at Chartres in 911 which paved the way for the Treaty of Saint-Clair-sur-Epte later that year, by which Charles ceded territory, in the area later known as Normandy, to the Viking leader Rollo and his men; in return, Rollo became a Christian and Charles's vassal. The Normans who had such an impact on Europe in the 11th and 12th centuries were the final product of this settlement.

In 911 also, the magnates of Lorraine (Lotharingia) accepted the authority of Charles on the death of the last Carolingian king of the East Franks, Louis the Child. Charles's preoccupation with Lotharingian affairs and councillors alienated the nobles of Neustria, however, and in 922 they elected Robert king. Charles killed Robert in battle in 923 but was soon taken prisoner by Herbert, count of Vermandois, who used him for his own gain against Rudolf, Robert's son-in-law and the new king.

• **Charles IV,** byname (in France) CHARLES THE FAIR, or (in Navarre) CHARLES THE BALD, French CHARLES LE BEL, or LE CHAUVE, Spanish CARLOS EL HERMOSO, or EL CALVO (b. 1294—d. Feb. 1, 1328, Vincennes, Fr.), king of France and of Navarre (as Charles I) from 1322, the last of the direct line of the Capetian dynasty; his inglorious reign was marked by his invasion of Aquitaine and by political intrigues with his sister Isabella, wife of King Edward II of England.



Charles IV receiving his sister Isabella and her son Edward from England, miniature from Jean Froissart's *Chronicles*, 14th century; in the Bibliothèque Municipale, Besançon, Fr. (MS. Fr. 864)
Giraudon—Art Resource/EB Inc.

After the death of his brother Philip V in 1322, Charles ignored Philip's daughter and successfully claimed the throne for himself. Among his first political intrigues as king were to bid for the German throne and to intervene in Flanders, hoping to bring that territory under the French crown; both ventures failed.

Charles also renewed war with England by invading Aquitaine; the peace of 1327 was the great triumph of his reign, giving him a generous land settlement and 50,000 marks.

• **Charles V,** byname CHARLES THE WISE, French CHARLES LE SAGE (b. Jan. 21, 1338, Vincennes, Fr.—d. Sept. 16, 1380, Nogent-sur-Marne), king of France from 1364 who led the country in a miraculous recovery from the devastation of the first phase of the Hundred Years' War (1337–1453), reversing the disastrous Anglo-French settlement of 1360.



Charles V the Wise, sculpture by an unknown artist; in the Louvre, Paris
Archives Photographiques, Paris

Having purchased the Dauphiné (on France's southeastern frontier) in 1349, Charles bore the title of dauphin until his coronation. After his father, King John II the Good, was captured by the English at Poitiers in 1356, Charles, in order to raise his father's ransom money, had to convene a hostile States General, which, led by Étienne Marcel, provost of the Paris merchants, forced him to issue an ordinance of reform on March 3, 1357. To frighten Charles further, Marcel had two of the king's councillors assassinated in the palace in Charles's presence in February 1358. Charles, in order to raise an army, left Paris to convoke an assembly of his supporters. On July 31, 1358, Marcel was assassinated.

When Charles reentered Paris on Aug. 2, 1358, his military situation remained precarious because he still had to fight both the English and his archenemy, the King of Navarre. The treaties of Brétigny and of Calais (May and October 1360) granted to Edward III of England most of southwestern France and 3,000,000 gold crowns for John's ransom.

Charles ascended the French throne on April 8, 1364, on John's death. He then challenged the King of Navarre over the succession of Burgundy. Bertrand du Guesclin, Charles's brilliant military leader, defeated the Navarrese at Cocherel in May 1364 but was defeated at Auray the following September by the English-backed side in a renewal of an old dispute over the Breton succession.

When war broke out again with England in 1369 over France's failure to abide by its treaty obligations, Charles followed du Guesclin's military advice, winning for the French so many victories that, by 1375, the settlement of 1360 was virtually nullified. In 1378, after learning of plots of the King of Navarre, Charles dispossessed him of all his French lands except Cherbourg. That December Charles made, unsuccessfully, his last attempt to deprive Duke John IV of Brittany. Charles's last political acts were primarily concerned with the rivalry between the two newly elected popes; his decision to support Clement VII made him chiefly responsible for the great schism of the papacy.

In his court Charles, an intellectual and religious man, surrounded himself with luxury and men of educated tastes. Besides reorganizing the army, creating a new navy, instituting tax changes, and bringing Flanders, Spain, and Portugal into French alliances, he was also concerned with redecorating the Louvre to house a magnificent library and with finishing the castle of Vincennes.

• Charles VI, byname CHARLES THE WELL-BELOVED, or THE MAD, French CHARLES LE BIEN-AIMÉ, or L'INSENSÉ (b. Dec. 3, 1368, Paris—d. Oct. 21, 1422, Paris), king of France who throughout his long reign (1380–1422) remained largely a figurehead, first because he was still a boy when he took the throne and later because of his periodic fits of madness.

Crowned on Oct. 25, 1380, at Reims at the age of 11, Charles remained under the tutelage of his uncles until his declaration to rule alone in 1388. During those early years France was ruled by his uncles and their creation, the administrative Council of 12. Philip the Bold of Burgundy conducted the council from 1382. The marriage of Isabella of Bavaria to Charles (July 17, 1385) was arranged by Philip, who had inherited the countship of Flanders and needed German allies to offset English intervention there. Philip also induced Charles to support Jeanne of Brabant, the aunt of Philip's wife, and to lead an expedition in August 1388 against Duke William of Gelderland; Charles, however, made a speedy peace with William and returned to France.



Charles VI the Well-Beloved, detail of a miniature from a contemporary manuscript; in the Bibliothèque Publique et Universitaire, Geneva (MS. Fr. 165)

By courtesy of the Bibliotheque Publique et Universitaire, Geneva

It was then (Nov. 2, 1388) that Charles made his decision to rule alone. His uncles withdrew, and the former officials of his father, Charles V, took over. Governmental reorganization and reforms were initiated, and a number of ordinances were promulgated in early 1389. The following winter Charles visited the antipope Clement VII in Avignon and discussed plans to install Clement as pope in Rome and thus enhance French power in Italy. Reports of those plans brought about the resumption of negotiations with England, which had been at war with France since 1337 (the Hundred Years' War). England's king Richard II favoured the Roman pope Boniface IX. While efforts were being made for peace in 1392, however, Charles became ill with a fever and convulsions, the first of his 44 attacks of madness. The attacks lasted from three to nine months and were interspersed with three- to five-month periods of sanity for the remainder of his life.

Royal authority waned, and the dukes of Burgundy and Orléans began to vie for power. The Burgundians, led by John the Fearless, successor of Philip the Bold, arranged the murder of Louis, duc d'Orléans, in 1407 and allied themselves with King Henry V of England, who won the Battle of Agincourt (1415) against the French. In December 1418 the 15-year-old dauphin proclaimed himself regent, but in May 1420, under Isabella's influence, Charles VI signed the Treaty of Troyes for the marriage of his daughter Catherine of Valois to Henry V of England, who was declared regent of France and heir to the French throne (as if the dauphin were not his son). After Charles VI's death in 1422, the country north of the Loire was under the control of England, while southern France, excluding English Aquitaine, was loyal to the dauphin as Charles VII.

• Charles VII, byname CHARLES THE WELL-SERVED, or THE VICTORIOUS, French CHARLES LE BIEN-SERVI, or LE VICTORIEUX (b. Feb. 22, 1403, Paris—d. July 22, 1461, Mehun-sur-Yèvre, Fr.), king of France from 1422 to 1461, who succeeded—partly with the aid of Joan of Arc—in driving the English from French soil and in solidifying the administration of the monarchy. Before ascending the throne he was known as the Dauphin and was regent for his father, Charles VI, from 1418.

Early life. Charles VII was the 11th child of King Charles VI and his wife, Isabella of Bavaria. Indulged by his mother, he was permanently marked by his childhood at the French court, where intrigue, luxury, a taste for the arts, extravagance, and profligacy all prevailed at the same time. Crises caused by his father's insanity were frequent. In May 1413 rioting Parisians invaded the Hôtel Saint-Paul, where he lived. Toward the end of that year, he was betrothed to Mary of Anjou, the nine-year-old daughter of Louis II of Anjou, king of Naples, and his wife, Yolande of Aragon. Charles went to live in Anjou, where Yolande, energetic and accustomed to rule, established her influence over him. In 1416, he became captain general of Paris and began to participate in the royal council, where Louis of Anjou played a prominent role.

Dauphin. On the death of his elder brother in April 1417, Charles became dauphin (heir to the throne) at the age of 14. He was named lieutenant general of the kingdom, but his mother left Paris and allied herself with John the Fearless, duke of Burgundy. On May 29, 1418, the Burgundians occupied the capital, and Charles had to flee to Bourges. There he put himself at the head of the Armagnac party (rivals of the Burgundians) and at the end of 1418 assumed the title of regent for the deranged Charles VI. Faced with the threat of the English, who had invaded France, and the demands of the English king, Henry V, who claimed the French crown, Charles attempted to reconcile his differences with the Duke of Burgundy. They concluded a pact of friendship at Pouilly on July 2, 1419, but, in the course of another meeting at Montereau on September 10, the Duke was killed by the Armagnacs in Charles's presence. On December 24 the Duke's successor, Philip the Good, utilizing powers conferred on him by Charles VI, concluded a general truce with the English, excluding the Armagnacs and sealing the Anglo–Burgundian alliance. In 1420 the Treaty of Troyes recognized Henry V as heir to the French throne, excluding Charles. Charles's supporters, however, included not only the Armagnacs but also the "party of the King," which backed his claim to the succession. These people set up an administration in



Charles VII, detail of a portrait by Jean Fouquet c. 1447; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

Poitiers and Bourges the jurisdiction of which extended over all of France south of the Loire River, except for the English part of Guyenne. In April of 1422 Charles celebrated his marriage at Bourges. He then resumed warfare, occupied La Charité, and threatened Burgundian territory, though still avoiding any major confrontation with the Anglo–Burgundian armies.

King. On the death of his father on Oct. 21, 1422, Charles assumed the title of king of France. His worst difficulties were of a financial nature: the taxes voted by the States General (representative assembly) were insufficient for his needs; he mortgaged his lands and lived by borrowing from financiers and nobles, such as Georges de La Trémoille. His army was repulsed at Verneuil in August 1424, and he tried once again to effect a reconciliation with the Duke of Burgundy; but his efforts were frustrated by the memory of John the Fearless' murder. In 1425, influenced by his mother-in-law, he dissociated himself from the Armagnacs. Arthur de Richemont, brother of John V, duke of Brittany, and brother-in-law of the Duke of Burgundy, became constable

of France; he endeavoured to bring about peace, but the negotiators were still unable to come to an agreement in 1427. The English and the Burgundians revived the war and gained ground. Richemont was disgraced and replaced by La Trémoille, who sought only his own fortune. On Oct. 12, 1428, the English laid siege to Orléans. Charles was 25 years old at this time. For 12 years he had known only war and the worst of intrigues. He could neither reconquer his kingdom nor conclude peace with the Burgundians. Discouraged, he thought of retiring to Spain or of ceding to English pressure. But the defense of Orléans became for the French a symbol of their struggle against the enemy. Joan of Arc, the visionary peasant girl from Lorraine, travelled across the country to fortify the King's intentions to fight for France. He received her at Chinon in February 1429. She restored the French army's confidence, and they liberated Orléans. On July 17, after a victorious journey with his army, Charles was crowned at Reims, in spite of his counsellors' misgivings. Through the efforts of Yolande, La Trémoille was then forced out of the council, and Richemont was restored to favour. In 1435, after protracted negotiations, Philip of Burgundy concluded a separate peace with France at Arras: the King condemned the murder of Philip's father, and the Duke recognized Charles as his sovereign. A new phase then opened up in Charles's life. At the age of 32 he seemed to have achieved maturity. He worked regularly with his counsellors. Between 1425 and 1439, he gradually acquired the permanent right to levy taxes that previously had to be approved by the States General, thus gaining financial independence. The merchant Jacques Coeur, court banker, master of the mint, and adviser to the king, did much to expand French commerce in the Mediterranean before he fell from favour in 1451.

The administration of the realm was reorganized, and in 1438 Charles promulgated the Pragmatic Sanction of Bourges, limiting papal authority over the church in France. The Sanction also increased the King's control over the granting of ecclesiastical revenues. The discipline of the army was improved and methods of recruitment made more efficient by the ordinances of 1439, 1445, and 1448. In 1437 the King took command of his armies again for the first time since his coronation and returned to Paris, which had been liberated from the English the previous year. The power of the nobility was lessened by his reforms; encouraged by the Duke of Burgundy—and especially by Charles's son, the dauphin Louis (later King Louis XI)—they formed a coalition against the King (the Praguerie). Charles reacted skillfully and energetically, and the rebellion was put down (1440). To counter such intrigues, to end the destruction caused by the Écorcheurs (bands of mercenary soldiers then ravaging the country), and also because of a stalemate in diplomatic negotiations with England, Charles renewed the war in 1441 both north of Paris and in Guyenne, in the southwest. In 1444, negotiations finally brought a general truce, but no permanent peace was concluded, and hostilities were resumed in 1449; the King's cousin, Jean d'Orléans, comte de Dunois, was placed in charge of operations. Charles campaigned successfully in Normandy and took possession of its capital, Rouen, on Nov. 20, 1450. In 1453, after the victory of Castillon and the surrender of Bordeaux, Guyenne returned to France after having been associated with England for three centuries.

The King's last years were troubled. The reconquered areas were restive under the yoke of royal administration, and the princes still posed a dangerous threat to the royal power: the revolt of Jean V, comte d'Armagnac, and the treason of Jean II, duc d'Alençon, were severely repressed. Philip of Burgundy dreamed of dominating France, and the Dauphin, who was approaching 40, had difficulty in concealing his impatience to reign. The King died at Mehun-sur-Yèvre at the age of 58; he had reigned for 38 years and eight months.

Assessment. Charles VII's reign was one of the most important in the history of the French monarchy. Although France had lost the economic prosperity and commercial importance it had enjoyed in the preceding centuries and the great nobles had become independent during the long partisan struggles of the Hundred Years' War period, Charles was able to begin the work of reunifying the kingdom by rallying the peoples' loyalty to himself as the legitimate king.

Later, when the national feeling, revived by foreign occupation, had crystallized around him, he introduced financial and military reforms that strengthened the revived power of the monarchy. His action in obtaining a posthumous reversal of Joan of Arc's condemnation (1456) was perhaps less inspired by a concern for justice than by a need to justify the circumstances surrounding his coronation. Charles has often been accused of apathy. He did require constant encouragement from courageous and intelligent counsellors, such as Yolande of Aragon, Richemont, Joan of Arc, and his mistress Agnès Sorel, and he certainly had no taste for dangerous adventures, prestigious operations, or sumptuous exhibitions. His innate indolence and his shyness—as well as his good sense and wisdom—induced him to prudence, notably in his foreign policies (as when he refused to participate in a crusade urged on him by the Pope). He was adept at minimizing papal influence over the internal affairs of his kingdom.

Like his cousin of Burgundy, he was pleasure loving, especially toward the end of his life, had influential mistresses (Agnès Sorel and, after her death in 1450, Antoinette de Maignelay), and had no fixed residence, travelling from one castle to another.

He also patronized the arts, surrounding himself with men of letters and intellectuals. He always preferred peace to war, and his conciliatory policy—he repeatedly pardoned towns that collaborated with the English—contributed much toward restoring unity to his country. (Y.L.)

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• Charles VIII (b. June 30, 1470, Amboise, Fr.—d. April 7, 1498, Amboise), king of France from 1483, known for beginning the French expeditions into Italy that lasted until the middle of the next century.



Charles VIII, portrait by an unknown artist; in the Uffizi, Florence

Alinari—Art Resource/EB Inc.

The only son of Louis XI and Charlotte of Savoy, Charles showed no aptitude for government at the time of his accession: he was in poor health and of poor intelligence. Though he was legally of age, the government in the first years of his reign was in the hands of a regency comprising his sister Anne and her husband Pierre de Bourbon, seigneur de Beaujeu. After his marriage to Anne of Brittany in 1491, however, Charles was persuaded by his favourite, Étienne de Vesc, to free himself from the Beaujeus. By his Breton marriage Charles forfeited rights to Artois and the Franche-Comté that he had acquired by his engagement to Margaret of Austria, and he also agreed in the Treaty of Étaples (1492) to pay heavy compensation to King Henry VII of England for the abandonment of English interests in Brittany. Furthermore, in 1493, by the Treaty of Barcelona, he ceded Roussillon and Cerdagne back to Aragon.

The motive for these cessions was to free his hands for his grand enterprise, an expedition to Italy to assert the right to the kingdom of Naples that he had inherited from the Angevins. This absurd ambition inaugurated a series of Italian wars lasting more than 50 years and gaining the French kings only momentary glory in return for a vast outlay of men and money. Having borrowed money left and right to raise a great army, Charles crossed Italy unopposed in 1494 without suspecting that he was leaving enemies behind him. Charles entered Naples in triumph on Feb. 22, 1495, and was crowned there on May 12, but already the opposition of Milan, Austria, Venice, and the Pope was rallying against him. He escaped with difficulty from the Battle of Fornovo and had lost his conquests by the time he returned to France. He died while preparing for another expedition.

• Charles IX, also called (until 1560) DUC (duke) D'ORLÉANS (b. June 27, 1550, Saint-Germain-en-Laye, near Paris—d. May 30, 1574, Vincennes, Fr.), king of France from 1560, remembered for authorizing the massacre of Protestants on St. Bartholomew's Day, Aug. 23–24, 1572, on the advice of his mother, Catherine de Médicis.

The second son of Henry II and Catherine, Charles became king on the death of his brother Francis II, but his mother was regent. Proclaimed of age on Aug. 17, 1563, after his 13th birthday (according to the custom of the kingdom), he remained under his mother's domination, being incapable of choosing and following a policy of his own. His health was poor and he was mentally unstable.

To strengthen the prestige of the crown, Catherine took Charles on a tour of France from 1564 to 1566. The kingdom, however, was torn by the hostility between the Catholics and the Huguenots. The victories of his brother, the Duc d'Anjou (later Henry III), over the Huguenots at Jarnac and Moncontour in 1569 made Charles jealous, so that in 1571, when the Huguenot Gaspard de Coligny came to court, Charles was persuaded to favour a Huguenot plan for intervention against the Spanish in the Netherlands; Charles sanctioned a defensive alliance with England and Huguenot aid to the Dutch. All this came to nothing, however, when Catherine, alarmed at the new policy and at Coligny's ascendancy, and dismayed at the reaction to an unsuccessful attempt on Coligny's life (Aug. 22, 1572), induced Charles to order the massacre of St. Bartholomew's Day.

The massacre apparently haunted Charles for the rest of his life. His health deteriorated, and he became increasingly melancholy. He died of tuberculosis, leaving no children by his consort, Elizabeth of Austria, whom he had married in 1570, but one son, Charles,

later duc d'Angoulême, by his mistress Marie Touchet.

Charles, although emotionally disturbed, was an intelligent man. His education had been entrusted to the Humanist Jacques Amyot,



Charles IX, portrait by an unknown artist, 16th century; in the Musée de Versailles, France

Giraudon—Art Resource/EB Inc

who helped him to develop a love of literature. He wrote poetry and a work on hunting and was a patron of the Pléiade, a literary group dedicated to the advancement of French literature.

• **Charles X,** also called (until 1824) CHARLES-PHILIPPE, COMTE (count) D'ARTOIS, byname (1795–1824) MONSIEUR (b. Oct. 9, 1757, Versailles, Fr.—d. Nov. 6, 1836, Gorizia, Friuli), king of France from 1824 to 1830. His reign dramatized the failure of the Bourbons, after their restoration, to reconcile the tradition of the monarchy by divine right with the democratic spirit produced in the wake of the Revolution.

The fifth son of the dauphin Louis and Maria Josepha of Saxony, Charles was given the title of comte d'Artois. He spent his early life in scandalous dissipation; his service with the French Army at the siege of Gibraltar in 1782 was undertaken rather for distraction than from serious concern with a military career. Eventually he abandoned his libertine lifestyle and directed his talents toward politics. In the events leading up to the Revolution he emerged as an opponent of concessions to the Third Estate.

Ordered by his brother Louis XVI to leave France soon after the fall of the Bastille (July 14, 1789), Charles went first to the Austrian Netherlands and then to Turin in Piedmont, thus becoming the first member of the royal family to go into exile, in which he was not joined by his brother the Comte de Provence (later Louis XVIII) until 1791.

When the Comte de Provence became titular king he made Charles lieutenant general of the kingdom. Until the Bourbon Restoration in 1814, Charles travelled to Austria, Prussia, Russia, and England. During this period he made an unsuccessful attempt to land in the Vendée to lead the royalist rising there. Returning to France in 1814, he became the leader of the Ultras, the party of extreme reaction during Louis XVIII's reign.



Charles X, detail of a portrait by François Gérard; in the Château de Versailles, France

Cliché Musees Nationaux, Paris

Upon Louis XVIII's death in 1824, Charles became king as Charles X. His popularity waned as his reign passed through three reactionary ministries. During the first, former émigrés were compensated for their nationalized lands, largely at the expense of bourgeois holders of government bonds; greater power was granted to the clergy, and the death penalty was imposed for certain "sacrileges."

The second government, though more moderate, lasted only from January 1828 to August 1829, when liberals joined with the extreme right to defeat it. Losing patience and ignoring public opinion, Charles called upon an extreme clericalist reactionary, the highly unpopular prince Jules de Polignac, to form a government. A formidable agitation sprang up which, making the King only more obstinate, culminated in the July Revolution of 1830.

In March 1830, when liberal members objected to the Polignac ministry, Charles dissolved the Chamber. The May elections returned a majority unfavourable to the King. On July 26 he issued four ordinances which, through their repressive measures, provoked revolution by the Paris radicals. Unprepared for such an outbreak, Charles fled first to Versailles and then to Rambouillet, where he learned to his surprise that the insurrection could not be resisted. On August 1 he appointed Louis-Philippe, duc d'Orléans, lieutenant general of the kingdom and on August 2 abdicated in favour of his grandson, the Duc de Bordeaux. On Louis-Philippe's acceptance of the crown, Charles withdrew to England. He eventually established himself at Prague, where he resided until shortly before his death.

Germany/Holy Roman Empire

• **Charles I:** *see* Charlemagne.

• **Charles II,** byname CHARLES THE BALD, French CHARLES LE CHAUVE, German KARL DER KAHLE (b. June 13, 823—d. Oct. 6, 877, Brides-les-Bain, Fr.), king of France (*i.e.,* Francis Occidentalis, the West Frankish kingdom) from 843 to 877 and Western emperor from 875 to 877. (He is reckoned as Charles II both of the Holy Roman Empire and of France.)

Son of the emperor Louis I the Pious and his second wife, Judith, Charles was the unwitting cause of violent discord when, in 829, he was granted lands by his father; Louis's action precipitated a series of civil wars, lasting until 838, in which the three sons of his first marriage, Lothair I, Louis (the German), and Pepin, strove to maintain or to increase the rights that they had been guaranteed by the succession settlement of 817, the *Ordinatio imperii.* Pepin died in 838, but after the death of Louis I in 840 the civil war resumed and continued until Louis the German joined with Charles to force Lothair to accept the Treaty of Verdun in 843, by which Charles received all the lands west of a line roughly following the Scheldt, the Meuse, the Saône, the eastern mountains of the Massif Central, and the lower reaches of the Rhône, and Louis the German and Lothair received respectively the lands of the East Franks (Germany) and the middle kingdom, lying between the other two.

Until 864 Charles's political situation was precarious because few vassals were loyal to him. His lands suffered from raids by Northmen, who left only after receiving bribes; he was defeated by the Bretons and, in 858, faced an invasion by Louis the German. Yet he succeeded in gaining control of Aquitaine after the capture of Pepin's son in 864; and, by the Treaty of Meersen (870) with Louis the German, he received western Lorraine.

When Lothair's son, the emperor Louis II, died in 875, Charles went to Italy and was crowned emperor on December 25 by Pope John VIII. In 876, after the death of Louis the German, Charles invaded Louis's possessions but was defeated at Andernach by Louis's son, Louis the Younger. Charles's death in the next year occurred when another son of Louis the German, Carloman, was marching against him and when his own major vassals were in revolt.



Charles II the Bald, detail of a miniature from his Bible, by the School of Tours, c.846; in the Bibliothèque Nationale, Paris (MS. latin 1)

By courtesy of the Bibliotheque Nationale, Paris

During Charles's reign some of the splendours of the Carolingian renaissance were revived, and his close collaboration with the church enhanced his prestige and authority.

• **Charles III,** byname CHARLES THE FAT, French CHARLES LE GROS, German KARL DER DICKE (b. 839, Bavaria?—d. Jan. 13, 888, Neidingen), Frankish king and emperor, whose fall in 887 marked the final disintegration of the empire of Charlemagne. (Although he controlled France briefly, he is usually not reckoned among the kings of France).

The youngest son of Louis the German and great-grandson of Charlemagne, Charles became king of Swabia on his father's death in 876; in 879, on the resignation of his sick brother Carloman (died 880), he took over the kingdom of Italy. He was crowned emperor by Pope John VIII in 881. Saxony fell to Charles on the death of his brother Louis the Younger (882), and Charles became king of all the East Franks. Then, on the deaths of the West Frankish kings Louis III (882) and Carloman (884), Charles reunited (885) under his rule the empire of Charlemagne with the exception of Provence, where the usurper Boso had set up a kingdom for himself. Charles, afflicted by illness, was listless in his duties; he failed to help the Pope against the Saracens and the expansionist dukes of Spoleto; and, although he led armies against the Vikings in



Charles III the Fat, seal, c. 9th century; in the Bayerisches Nationalmuseum, Munich

By courtesy of the Bayerisches National Museum, Munich; photograph Foto Marburg

the Netherlands (881) and at Paris (886), on both occasions he bought off the invaders. His incompetence and the ambition of his nephew Arnulf finally provoked a rising in East Francia, where Arnulf took over the government (Frankfurt, November 887).

•Charles IV, byname CHARLES OF LUXEMBOURG, original name WENCESLAS, Czech KAREL LUCEMBURSKY, or VÁCLAV, German KARL VON LUXEMBURG, or WENZEL (b. May 14, 1316, Prague—d. Nov. 29, 1378, Prague), German king and king of Bohemia (as Charles) from 1346 to 1378 and Holy Roman emperor



Charles IV, portrait bust by Petr Parléř, 14th century; in the triforium of St. Vitus' Cathedral, Prague
Foto Marburg

from 1355 to 1378, one of the most learned and diplomatically skillful sovereigns of his time. He gained more through diplomacy than others did by war, and through purchases, marriages, and inheritance he enlarged his dynastic power. Under Charles's rule Prague became the political, economic, and cultural centre—and eventually the capital—of the Holy Roman Empire. Indeed, from his reign until the 18th century it was understood that the German imperial crown was based on the crown of the king of Bohemia.

Early life. Charles was the eldest son of the Bohemian king John of Luxembourg and Elizabeth, the sister of the last native Bohemian king. In 1323 he joined the French court, where he married Blanche, the sister of Philip VI of France. One of his teachers in Paris was the future pope Clement VI. In 1330 Charles's father summoned him to Luxembourg, and in 1331 he headed the administration of his father's provisional acquisitions in northern Italy. Two years later his father appointed him margrave of Moravia and captain general of Bohemia. In his autobiography Charles told of the difficulties he had in redeeming the pawned royal castles, towns, and mansions, in building up an army, and in suppressing the influence of the nobility, which had grown during his father's absence. But Charles's administrative ability only aroused John's suspicion, and he was dismissed in 1335. After a reconciliation Charles was assigned to missions outside Bohemia, but his competence as a statesman and diplomat made him increasingly indispensable to his father. In 1341 John, now blind, introduced him, as his successor, to an assembly of prelates, nobility, and gentry, representatives of the royal towns, and ambassadors of Breslau; in 1343 John entrusted him with the administration of the country. One year later, due to Charles's efforts, Pope Clement VI raised the bishopric of Prague to an archbishopric, thus giving the Bohemian lands ecclesiastical autonomy. At the same time, the foundation stone of St. Vitus' Cathedral, built under the direction of Charles, was laid on the Hradčany Hill in the Bohemian capital. Meanwhile, negotiations were initiated to elect Charles German king in place of Louis IV, who had been excommunicated by the Pope in 1324. Charles did not gain the throne until 1346, when he was elected by five out of seven electors and had taken all the oaths the Pope had demanded. William of Ockham, one of the greatest medieval theologians and scholars, called Charles *rex clericorum* ("the priests' king"). Louis, however, refused to acknowledge Charles and maintained that he was the rightful king.

King of Bohemia. At first the coexistence of two German kings had no bad consequences. But after Charles took part in a war against England, in which his father died at the Battle of Crécy (1346), he became king of Bohemia and prepared to attack Louis. Although Louis IV died in the following year, his followers elected anti-kings until Charles won them over peaceably. By granting privileges to the towns in southern Germany, he gained their support; and by using diplomatic skill, he managed to make friends in the north as well. Soon he was generally recognized as the only German king. His main concern, however, lay in the Bohemian lands—his Luxembourgian dynastic power—which provided his greatest source of strength.

In 1347 Charles was crowned king of Bohemia by the new archbishop in Prague. Within a few months he issued a new law of coronation and defined the constitutional position of the king in the state: Bohemia became a hereditary monarchy in which the law of succession of the first-born son and his descendants was to be valid and binding; in case of the extinction of the male lineage, the law of succession devolved upon the daughters. Later, Charles's succession treaties (1364) with the Habsburg family in Austria and the Árpáds in Hungary were the bases on which the Austro-Hungarian monarchy was formed. In 1348 Charles founded the first university in central Europe to possess the same rights and liberties as did the universities of Paris and Bologna. At the same time the foundation stone was laid near Prague for another of Charles's projects—Karlštejn castle, where the imperial crown jewelry and the insignia of the crown of Bohemia were placed. In 1354 Charles led an army into Italy to secure recognition of the authority of the House of Luxembourg and of the patrimonial dominions of Bohemia. Early in 1355 he received the Iron Crown of Lombardy in Milan, and that Easter he received the imperial crown in Rome. At that time a Florentine contemporary described Charles as a medium-sized man, black-haired and broad-faced, with a habitual stoop. Having thus acquired the imperial crown, he is said to have fetched it and then returned to Prague, leaving the Italians embroiled in their own domestic problems. Petrarch was very much disillusioned by Charles.

Back in Prague, Charles issued the decree known as the Golden Bull, a kind of imperial constitution. It regulated the election of the German king by seven electors, who, privileged with special rights, became *domini terrae,* real sovereigns; and above all stood the king of Bohemia. Charles's last wish was to secure the succession to the throne for his eldest son, Wenceslas. After long and difficult negotiations, Wenceslas was elected the German king. Charles died in 1378 and was buried in St. Vitus' Cathedral.

Charles IV was a generous patron of arts and science, especially in Prague, and ardently supported church building and the establishment of charitable institutions. He was interested in the early Humanism, which especially came to influence his government, and was also influential in the development of the German written language. (H.Pr.)

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•Charles V (b. Feb. 24, 1500, Ghent—d. Sept. 21, 1558, San Jerónimo de Yuste, Spain), Holy Roman emperor (1519–56), king of Spain (as Charles I, 1516–56), and archduke of Austria (as Charles I, 1519–21), who inherited a Spanish and Habsburg empire extending across Europe from Spain and the Netherlands to Austria and the Kingdom of Naples and reaching overseas to Spanish America. He



Charles V, detail of an oil painting by Titian, 1548; in the Bayerische Staatsgemäldesammlungen, Munich
By courtesy of the Bayerische Staatsgemaldesammlungen, Munich

struggled to hold his empire together against the growing forces of Protestantism, increasing Turkish and French pressure, and even hostility from the Pope. At last he yielded, abdicating his claims to the Netherlands and Spain in favour of his son Philip II and the title of emperor to his brother Ferdinand I and retiring to a monastery.

Charles was the son of Philip I the Handsome, king of Castile, and Joan the Mad, and the grandson of Emperor Maximilian I and Mary of Burgundy, as well as of the "Catholic Kings" Isabella I the Catholic, of Castile, and Ferdinand II the Catholic, of Aragon. After his father's death in 1506, Charles was raised by his paternal aunt Margaret of Austria, regent of the Netherlands. His spiritual guide was the theologian Adrian of Utrecht (later Pope Adrian VI), a member of the *devotio moderna,* a religious and educational reform movement promoting literacy among the masses.

At the age of 15, he assumed the rule over the Netherlands. His scope of activities soon widened. After the death of his maternal grandfather, Ferdinand II, in 1516, Charles was proclaimed sovereign of Spain, together with his mother (who, however, suffered from a nervous illness and never reigned). In September 1517 he landed in Spain, a country with whose customs he was unfamiliar and whose language he was as yet barely able to speak. There he instituted, under Burgundian influence, a government that was little better than foreign rule. When his election as king of Germany in 1519 (his paternal grandfather, the Habsburg emperor Maximilian I, having died) recalled him to Germany, Charles left behind him, after some two and one-half years in Spain, a dissatisfied and restless people. Adrian, whom he had installed as regent, was not strong enough to suppress the revolt of the Castilian cities (*comuneros*) that broke out at this point.

Making the most of their candidate's German parentage and buying up German electoral votes (mostly with money supplied by the powerful Fugger banking family), Charles's adherents had meanwhile pushed through his election as emperor over his powerful rival, Francis I of France.

In October 1520 Charles was accordingly crowned king of Germany in Aachen, assuming at the same time the title of Roman emperor-elect. In the spring of 1521 the imperial Diet, before which Martin Luther had to defend his theses, assembled at Worms. The reformer's appearance represented a first challenge to Charles, who had his own confession of faith, beginning with a sweeping invocation of his Catholic ancestors, read out to the Diet. Rejecting Luther's doctrines in the Edict of Worms, Charles declared war on Protestantism.

Gradually, the other chief task of his reign also unfolded: the struggle for hegemony in western Europe, a legacy of his Burgundian forefathers. Long before, the grand design of his ancestor Charles the Bold had come to naught in the fight against the French Valois, Louis XI. Now the great-grandson was brought face-to-face with the main problem of his great-grandfather's existence. It was to become a fateful problem for Charles also.

After defeating Duca Massimiliano Sforza at Marignano in 1515, the reigning Valois, Francis I, compelled him, in the Treaty of Noyon, to renounce his claim to the Duchy of Milan. The vanquished Sforza turned for help to Pope Leo X and Charles V, with whom he concluded a treaty in 1521. Despite the outbreak of war with France, Charles hurried back to Spain, where his followers had meanwhile gained the upper hand over the *comuneros*. Even though he granted an amnesty, the young monarch proved to be an intransigent ruler, bloodily suppressing the revolt and signing 270 death warrants. These actions were nevertheless followed by a rapid and complete rapprochement between the pacified people and their sovereign; in fact, it was during this second and protracted sojourn in Spain (1522–29) that Charles became a Spaniard, with Castilian grandees replacing the Burgundians. There soon developed an emotionally tinged understanding between Charles and his Spanish subjects that was to be steadily deepened during his long rule. Henceforth, it was primarily the material resources of his Spanish domains that sustained his far-flung policies and his Spanish troops who acquitted themselves most bravely and successfully in his wars.

In 1522 his teacher Adrian of Utrecht became pope, as Adrian VI. His efforts to reconcile Francis I and the Emperor failed, and three years later Charles's army defeated Francis I at Pavia, taking prisoner the King himself. The victory assured Spanish supremacy in Italy. Held in the alcazar of Madrid, the royal captive feigned agreement with the conditions imposed by Charles, even taking the Emperor's oldest sister, Eleanor, the dowager queen of Portugal, for his wife and handing over his sons as hostages. But, as soon as he had regained his freedom, Francis rejected the terms of the Treaty of Madrid of January 1526.

With the accession of Süleyman the Magnificent to the sultanate in 1520, Turkish pressure on Europe increased once more. The Sultan threatened not only Hungary but also those hereditary provinces of the Habsburgs that, by Charles's agreement in 1522 with his brother Ferdinand, henceforth belonged to the younger branch of the Habsburgs. When Louis II of Hungary and Bohemia was defeated and killed by the Turks in the Battle of Mohács in August 1526, Ferdinand assumed this throne both as the childless former monarch's brother-in-law and by virtue of the treaty of succession concluded in 1491 between his own grandfather and Louis' father, Vladislov II. After this, the Turkish danger became the Habsburgs' foremost concern on land, as it had been on the seas ever since Charles's accession to the throne of Spain. Although Charles realized that his first duty as emperor of Christendom lay in warding off this peril, he found himself so enmeshed in the affairs of western Europe that he had little time, energy, and money left for this task. In 1526 Charles married Isabella, the daughter of King Manuel I of Portugal.

In early 1527, instead of fighting the infidel, Charles's Spanish troops and his German mercenaries marched against the Pope, his enemy since the establishment of the League of Cognac. Mutinous and with their pay in arrears, they entered the defenseless city of Rome and looted it during the infamous Sack of Rome (May 1527).

The Pope, having surrendered to the mutinous troops, was now ready for any compromise. The newly started war between the Emperor and France also came to a close when the mother of Francis I approached Margaret of Austria, the Emperor's aunt, through whose mediation the "ladies' peace" of Cambrai was concluded in August 1529. The status quo was preserved: Charles renounced his claim to Burgundy, Francis his claims to Milan and Naples. The Pope, having made peace with Charles, met him in Bologna; there he crowned him emperor in February 1530. It was to be the last time that a Holy Roman emperor was crowned by a pope.

In 1530, Charles, attempting to bring about a reformation within the Catholic Church through the convocation of a universal council, also tried to find a modus vivendi with the Protestants. The Catholics, however, replied to the Confession of Augsburg, the basic confessional statement of the Lutheran Church, with the Confutation, which met with Charles's approval. The final decree issued by the Diet accordingly confirmed, in somewhat expanded form, the resolutions embodied in the Edict of Worms of 1521. This, in turn, caused the Protestant princes to close ranks in the following year in the Schmalkaldic League. Faced with renewed Turkish onslaughts, the Emperor granted some concessions in return for armed support against the enemy. In 1532 a large army under Charles's personal command faced Süleyman's forces before the city of Vienna, but the order to give decisive battle was withheld. Instead, the Emperor returned to Spain in 1533, leaving his brother Ferdinand behind as his deputy.

By taking up his grandfather Ferdinand of Aragon's project of conquering North Africa, Charles endeavoured to undertake by sea what he had omitted to do on land. The attempt to repulse the corsair (and Turkish general) Barbarossa (Khayr ad-Dīn) was nonetheless no more than a marginal operation, since Charles's capture of Ḥalq al-Wādī and Tunis (1535) did nothing to diminish the strength of Süleyman's position.

From Africa, the Emperor sailed to Naples, entering Rome in 1536 to deliver his famous political address before Pope Paul III and the Sacred College of Cardinals, in which he challenged the King of France (who had meanwhile invaded Savoy and taken Turin) to personal combat. When Francis declined, Charles invaded Provence in an operation that soon faltered. Through the Pope's intercession, peace was concluded in May 1538.

Intent on suppressing the open revolt that had broken out in Ghent, his native city, the Emperor himself went to the Netherlands. The country's regent, Charles's sister, Mary of Hungary, had proved incapable of settling the conflict between herself and the city, which jealously guarded its prerogatives. On his arrival in February 1540, Charles revoked Ghent's privileges, had 13 leading rebels executed, and gave orders to build a fortified castle. Once again his actions, as severe as those he had taken against the *comuneros* in 1522, were crowned by success. Toward the German Protestants, on the other hand, he showed himself conciliatory; in 1541 the Diet of Regensburg granted them major concessions, even if these were later rejected by both the Pope and Luther. Although Ferdinand, having lost his Hungarian capital in August 1541, pleaded for a land campaign against Süleyman, Charles again decided on a naval venture, which failed dismally after an unsuccessful attack on Algiers.

When Charles enfeoffed his son Philip with Milan, the King of France, enraged because he had hoped to regain indirect control of Milan himself, rearmed and declared war in August 1542. Fighting broke out the following year, even though the Pope had finally convoked, in Trent, the council for which the Emperor had been pressing. Once again Charles's precarious financial situation partially accounted for the failure of his plans. His finances were in a perpetually unsettled state. The "Indian" possessions in America were, of course, in an uninterrupted state of expansion throughout his entire reign, marked by, among other ventures, the conquest of Mexico and the conquest of Peru. The gold from the Indies did not add up to any sizable sum at the time. Only in 1550 did 17 Spanish ships provide the Emperor with 3,000,000 ducats and others with a like sum in the earliest significant monetary transfusion from the New World. The silver mines of Potosí were not exploited systematically until the 1550s, so that their revenue arrived too late for Charles. In 1516 the floating debt amounted to 20,000 livres; by 1556 it had risen to 7,000,000. In 1556, the exchequer owed 6,761,272 ducats. Thus, the campaign of 1543–44, inadequately financed, bogged down. It was to no avail that the French and imperial armies faced one another in the field in November 1543 and again in August 1544. As in 1532, when Charles had faced the Turks before Vienna, neither side cared to open hostilities, with the result that the peace of Crepy (September 1544) again more or less confirmed the status quo.

The Council of Trent did not open until December 1545, but Paul III had earlier offered Charles men and money against the heretics. When the Protestant princes failed to put in an appearance at the imperial Diet of Regensburg in 1546, the religious and political situation turned critical once again. Charles prepared for war. In a battle that decided the whole campaign and placed his archenemies at his mercy, the Emperor (who had been attacked by the German princes the previous September) defeated the Protestants at Mühlberg in April 1547. Ill much of the time, he spent the following year at Augsburg, where he succeeded in detaching the Netherlands from the imperial Diet's jurisdiction while yet assuring their continued protection by the empire. Also in Augsburg, he drew up his "political testament" for Philip and reorganized the Spanish court. The Diet of Augsburg furthermore saw the publication of the "Interim," a formula conciliatory to the Protestants but retaining the Roman Catholic ritual in general. Although Charles believed that he had granted far-reaching concessions to the people and the Protestant authorities in this document, his main concern was to make the Protestants return to the Catholic Church.

North Germany was now on the brink of revolt. The new king of France, Henry II, was eagerly awaiting an opportunity to renew the old rivalry between the houses of Valois and Burgundy, while the German princes believed that the moment was at hand to repay Charles for Mühlberg. After a secret treaty was signed in October 1551 between Henry II, Albert II Alcibiades, margrave of Brandenburg, and

Maurice, elector of Saxony, Maurice in January 1552 ceded to France the cities of Metz, Toul, and Verdun, thus handing over imperial lands. When Maurice tried to capture the Emperor himself, the latter barely managed to escape. He soon gathered reinforcements, but the changed political situation compelled him to ratify an agreement made between his brother Ferdinand and the rebels, according to which the new Protestant religion was to be granted equal rights with Roman Catholicism. Charles's attempt to retake Metz that fall ended in a complete fiasco, with Burgundy capitulating to Valois and the Emperor defeated in his struggle for hegemony in western Europe.

In order to save what he could of this hegemony, Charles, already severely racked by gout, tried new paths by preparing the ground for his widowed son's marriage with Mary I of England. It looked for a while as if his great hopes were about to be fulfilled, the joining of north and south and the realization of the dream of a universal empire. But, even though Philip married Mary in July 1554, the English Parliament emphatically refused to crown him. Since Mary remained childless, Charles's hopes came to naught. After an abortive last campaign against France, he prepared for his abdication, renouncing, in 1555 and 1556, his claims to the Netherlands and Spain in favour of Philip and those to the imperial crown in Ferdinand's favour. Disembarking in Spain at the end of September 1556, he moved to the monastery of Yuste, which he had long ago selected as his final refuge, in early February 1557. There he laid the groundwork for the eventual bequest of Portugal to the Habsburgs after King Sebastian's death with the help of his sister Catherine, grandmother of Sebastian and regent of Portugal. He aided his son in procuring funds in Spain for the continuation of the war against France, and he helped his daughter Joan, regent of Spain during Philip's absence in the Netherlands, in persecuting Spanish heretics.

Not only the task but the man to whom it was given had a dual nature. By background and training, Charles was a medieval ruler whose outlook on life was stamped throughout by a deeply experienced Catholic faith and by the knightly ideals of the late chivalric age. Yet his sober, rational, and pragmatic thinking again mark him as a man of his age. Although Charles's moral uprightness and sense of personal honour make it impossible to regard him as a truly Machiavellian statesman, his unswerving resolve and his refusal to give up any part whatsoever of his patrimony are evidence of a strong and unconditional will to power. More than that, it is precisely this individual claim to power that forms the core of his personality and explains his aims and actions.

Charles's abdication has been variously interpreted. While many saw in it an unsuccessful man's escape from the world, his contemporaries thought differently. Charles himself had been considering the idea even in his prime. In 1532 his secretary, Alfonso de Valdés, suggested to him the thought that a ruler who was incapable of preserving the peace and, indeed, who had to consider himself an obstacle to its establishment was obliged to retire from affairs of state. Once the abdication had become a fact, St. Ignatius of Loyola had this to say:

> The emperor gave a rare example to his successors . . . in so doing, he proved himself to be a true Christian prince . . . may the Lord in all His goodness now grant the emperor freedom.

In this last, metaphysically tinged period of his life, Charles's freedom consisted in his conscious and conscientious preparation for the *buen morir*, for a lucid death.

(M.deF./Ed.)

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• **Charles VI** (b. Oct. 1, 1685, Vienna—d. Oct. 20, 1740, Vienna), Holy Roman emperor from 1711 and, as Charles III, archduke of Austria and king of Hungary. As pretender to the throne of Spain (as Charles III), he attempted unsuccessfully to reestablish the global empire of his 16th-century ancestor Charles V. He was the author of the Pragmatic Sanction, intended to enable his daughter Maria Theresa to succeed him after the extinction of the direct male line of the House of Habsburg.

The second son of the emperor Leopold I, Charles was a claimant to the Spanish throne when it became vacant on the death of Charles II in 1700. After the outbreak of the War of the Spanish Succession (1701), most of Germany, as well as England, the United Provinces of the Netherlands, and Portugal, recognized Charles. From 1704 to 1711 he attempted to impose his rule but succeeded only in Catalonia. On the death of his elder brother, the emperor Joseph I, in 1711, he inherited all the Austrian territories. Thereupon his allies, unwilling to tolerate a reestablishment of the empire of Charles V, abandoned



Charles VI, detail from an oil painting by Johann Gottfried Auerbach

By courtesy of the Bild-Archiv, Österreichische Nationalbibliothek, Vienna

him and recognized Philip V of Bourbon as king of Spain by the Treaty of Utrecht (1713). Charles, who had been elected Holy Roman emperor in 1711, was forced to leave Spain but continued the war against France until 1714, when, by the Treaty of Rastatt, he gained territories in Italy in partial compensation for the loss of Spain. His Spanish advisers, however, continued to exercise great influence for a number of years. After the return of peace in the West, he conducted a highly successful war against the Ottoman Empire (1716–18), which resulted in great gains in Hungary and Serbia. He further strengthened his empire by founding the lucrative Ostend Company (1722–31), which was finally abandoned under English and Dutch pressure, and he expanded the port of Trieste. Toward the end of his reign Austria's fortunes declined. Charles lost the War of the Polish Succession (1733–38), and a new conflict with Turkey (1736–39) resulted in the loss of most southeastern territories gained in 1718.

Charles's chief concern at this time was, however, the regulation of the Habsburg succession. As early as 1713 he had promulgated the Pragmatic Sanction, whereby Austria's lands were to pass undivided to his female heirs in the absence of male progeny. As his only son died early, he bequeathed his inheritance to his eldest daughter, Maria Theresa. Fighting strenuously to wrest agreement from the European powers, he seemed at the time of his death to have accomplished his purpose. But his expectation proved illusory: Maria Theresa was forced to fight several wars before she could establish herself securely as her father's heiress.

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• **Charles VII,** also called CHARLES ALBERT, German KARL ALBRECHT (b. Aug. 6, 1697—d. Jan. 20, 1745, Munich), elector of Bavaria (1726–45), who was elected Holy Roman emperor (1742–45) in opposition to the Habsburg Maria Theresa's husband, Francis, grand duke of Tuscany.



Charles VII, detail from a lithograph by Georg de Marres after a portrait by J.A. Pfeffel I

By courtesy of the Staatliche Graphische Sammlung, Munich

Succeeding to the Bavarian throne in 1726, Charles Albert renounced any claims to the Austrian succession when he recognized the emperor Charles VI's Pragmatic Sanction that established the Emperor's daughter Maria Theresa as heiress of the Habsburg dominions. Charles Albert, however, maintained mental reservations since his wife was the daughter of the emperor Joseph I, and the Bavarian Wittelsbach claim to the throne was a legitimate one.

On the death of Charles VI in 1740, Charles Albert immediately joined the alliance against Maria Theresa and, with the aid of Prussia and France, was crowned as Emperor Charles VII in February 1742. But even while he was being crowned, Bavaria was overrun by Austrian troops. A mere puppet in the hands of the anti-Austrian coalition, he was restored by

Prussia and France to his Bavarian lands in 1744 but died only three months later.

Great Britain

• **Charles I** (b. Nov. 19, 1600, Dunfermline Palace, Fifeshire, Scot.—d. Jan. 30, 1649, London), king of Great Britain and Ireland (1625–49), whose authoritarian rule and quarrels with Parliament provoked a civil war that led to his execution.



Charles I, triple portrait by Sir Anthony Van Dyck, 1635; in Windsor Castle

By gracious permission of H.M. Queen Elizabeth II

Charles was the second surviving son of James VI of Scotland and Anne of Denmark. He was a sickly child, and, when his father became king of England in March 1603, he was temporarily left behind in Scotland because of the risks of the journey. Devoted to his elder brother, Henry, and to his sister, Elizabeth, he became lonely when Henry died (1612) and his sister left England in 1613 to marry Frederick V, elector of the Rhine Palatinate (*see* James I).

All his life Charles had a Scots accent and a slight stammer. Small in stature, he was less dignified than his portraits by the Flemish painter Sir Anthony Van Dyck suggest. He was always shy and struck observers as being silent and reserved. His excellent temper, courteous manners, and lack of vices impressed all those who met him, but he lacked the common touch, travelled about little, and never mixed with ordinary people. A patron of the arts (notably of painting and tapestry; he brought both Van Dyck and another famous Flemish painter, Peter Paul Rubens, to England), he was, like all the Stuarts, also a lover of horses and hunting. He was sincerely religious, and the character of the court became less coarse as soon as he became king. From his father he acquired a stubborn belief that kings are intended by God to rule, and his earliest surviving letters reveal a distrust of the unruly House of Commons with which he proved incapable of coming to terms. Lacking flexibility or imagination, he was unable to understand that those political deceits that he always practiced in increasingly vain attempts to uphold his authority eventually impugned his honour and damaged his credit.

In 1623, before succeeding to the throne, Charles, accompanied by the Duke of Buckingham, King James I's favourite, made an incognito visit to Spain in order to conclude a marriage treaty with the daughter of King Philip III. When the mission failed, largely because of Buckingham's arrogance and the Spanish court's insistence that Charles become a Roman Catholic, he joined Buckingham in pressing his father for war against Spain. In the meantime a marriage treaty was arranged on his behalf with Henrietta Maria, sister of the French king, Louis XIII.

Conflict with Parliament. In March 1625, Charles I became king and married Henrietta Maria soon afterward. When his first Parliament met in June, trouble immediately arose because of the general distrust of Buckingham, who had retained his ascendancy over the new king. The Spanish war was proving a failure and Charles offered Parliament no explanations of his foreign policy or its costs. Moreover, the Puritans, who advocated extemporaneous prayer and preaching in the Church of England, predominated in the House of Commons, whereas the sympathies of the King were with what came to be known as the High Church Party, which stressed the value of the prayer book and the maintenance of ritual. Thus antagonism soon arose between the new king and the Commons, and Parliament refused to vote him the right to levy tonnage and poundage (customs duties) except on conditions that increased its powers, though this right had been granted to previous monarchs for life.

The second Parliament of the reign, meeting in February 1626, proved even more critical of the King's government, though some of the former leaders of the Commons were kept away because Charles had ingeniously appointed them sheriffs in their counties. The failure of a naval expedition against the Spanish port of Cádiz in the previous autumn was blamed on Buckingham and the Commons tried to impeach him for treason. To prevent this, Charles dissolved Parliament in June. Largely through the incompetence of Buckingham, the country now became involved in a war with France as well as with Spain and, in desperate need of funds, the King imposed a forced loan, which his judges declared illegal. He dismissed the chief justice and ordered the arrest of more than 70 knights and gentlemen who refused to contribute. His high-handed actions added to the sense of grievance that was widely discussed in the next Parliament.

By the time Charles's third Parliament met (March 1628), Buckingham's expedition to aid the French Protestants at La Rochelle had been decisively repelled and the King's government was throughly discredited. The House of Commons at once passed resolutions condemning arbitrary taxation and arbitrary imprisonment and then set out its complaints in the Petition of Right, which sought recognition of four principles—no taxes without consent of Parliament; no imprisonment without cause; no quartering of soldiers on subjects; no martial law in peacetime. The King, despite his efforts to avoid approving this petition, was compelled to give his formal consent. By the time the fourth Parliament met in January 1629, Buckingham had been assassinated. The House of Commons now objected both to what it called the revival of "popish practices" in the churches and to the levying of tonnage and poundage by the King's officers without its consent. The King ordered the adjournment of Parliament on March 2, 1629, but before that the speaker was held down in his chair and three resolutions were passed condemning the King's conduct. Charles realized that such behaviour was revolutionary. For the next 11 years he ruled his kingdom without calling a Parliament.

In order that he might no longer be dependent upon parliamentary grants, he now made peace with both France and Spain, for, although the royal debt amounted to more than £1,000,000, the proceeds of the customs duties at a time of expanding trade and the exaction of traditional crown dues combined to produce a revenue that was just adequate in time of peace. The King also tried to economize in the expenditure of his household. To pay for the Royal Navy, so-called ship money was levied, first in 1634 on ports and later on inland towns as well. The demands for ship money aroused obstinate and widespread resistance by 1638, even though a majority of the judges of the court of Exchequer found in a test case that the levy was legal.

These in fact were the happiest years of Charles's life. At first he and Henrietta Maria had not been happy, and in July 1626 he peremptorily ordered all of her French entourage to quit Whitehall. After the death of Buckingham, however, he fell in love with his wife and came to value her counsel. Though the King regarded himself as responsible for his actions—not to his people or Parliament but to God alone according to the doctrine of the divine right of kings—he recognized his duty to his subjects as "an indulgent nursing father." If he was often indolent, he exhibited spasmodic bursts of energy, principally in ordering administrative reforms, although little impression was made upon the elaborate network of private interests in the armed services and at court. On the whole, the kingdom seems to have enjoyed some degree of prosperity until 1639, when Charles became involved in a war against the Scots.

The early Stuarts neglected Scotland. At the beginning of his reign Charles alienated the Scottish nobility by an act of revocation whereby lands claimed by the crown or the church were subject to forfeiture. His decision in 1637 to impose upon his northern kingdom a new liturgy, based on the English Book of Common Prayer, although approved by the Scottish bishops, met with concerted resistance. When many Scots signed a national covenant to defend their Presbyterian religion, the King decided to enforce his ecclesiastical policy with the sword. He was outmanoeuvred by a well-organized Scottish covenanting army, and by the time he reached York in March 1639 the first of the so-called Bishops' Wars was already lost. A truce was signed at Berwick-upon-Tweed on June 18.

On the advice of the two men who had replaced Buckingham as the closest advisers of the King—William Laud, archbishop of Canterbury, and the Earl of Strafford, his able lord deputy in Ireland—Charles summoned a Parliament that met in April 1640—later known as the Short Parliament—in order to raise money for the war against Scotland. The House insisted first on discussing grievances against the government and showed itself opposed to a renewal of the war; so, on May 5, the King dissolved Parliament again. The collection of ship money was continued and so was the war. A Scottish army crossed the border in August and the King's troops panicked before a cannonade at Newburn. Charles, deeply perturbed at his second defeat, convened a council of peers on whose advice he summoned another Parliament, the Long Parliament, which met at Westminster in November 1640.

The new House of Commons, proving to be just as uncooperative as the last, condemned Charles's recent actions and made preparations to impeach Strafford and other ministers for treason. The King adopted a conciliatory attitude—he agreed to the Triennial Act that ensured the meeting of Parliament once every three years—but expressed his resolve to save Strafford, to whom he promised protection. He was unsuccessful even in this, however. Strafford was beheaded on May 12, 1641.

Charles was forced to agree to a measure whereby the existing Parliament could not be dissolved without its own consent. He also accepted bills declaring ship money and other arbitrary fiscal measures illegal, and in general condemning his methods of government during the previous 11 years. But while making these concessions, he visited Scotland in August to try to enlist anti-parliamentary support there. He agreed to the full establishment of Presbyterianism in his northern kingdom and allowed the Scottish estates to nominate royal officials.

Meanwhile, Parliament reassembled in London after a recess, and, on Nov. 22, 1641, the Commons passed by 159 to 148 votes the Grand Remonstrance to the King, setting

out all that had gone wrong since his accession. At the same time news of a rebellion in Ireland had reached Westminster. Leaders of the Commons, fearing that if any army were raised to repress the Irish rebellion it might be used against them, planned to gain control of the army by forcing the King to agree to a militia bill. When asked to surrender his command of the army, Charles exclaimed "By God, not for an hour." Now fearing an impeachment of his Catholic queen, he prepared to take desperate action. He ordered the arrest of one member of the House of Lords and five of the Commons for treason and went with about 400 men to enforce the order himself. The accused members escaped, however, and hid in the City. After this rebuff the King left London on January 10, this time for the north of England. The Queen went to Holland in February to raise funds for her husband by pawning the crown jewels.

A lull followed, during which both Royalists and Parliamentarians enlisted troops and collected arms, although Charles had not completely given up hopes of peace. After a vain attempt to secure the arsenal at Hull, in April the King settled in York, where he ordered the courts of justice to assemble and where royalist members of both houses gradually joined him. In June the majority of the members remaining in London sent the King the Nineteen Propositions, which included demands that no ministers should be appointed without parliamentary approval, that the army should be put under parliamentary control, and that Parliament should decide about the future of the church. Charles realized that these proposals were an ultimatum; yet he returned a careful answer in which he gave recognition to the idea that his was a "mixed government" and not an autocracy. But in July both sides were urgently making ready for war. The King formally raised the royal standard at Nottingham on August 22 and sporadic fighting soon broke out all over the kingdom.

Civil War. In September 1642 the Earl of Essex, in command of the Parliamentarian forces, left London for the midlands, while Charles moved his headquarters to Shrewsbury to recruit and train an army on the Welsh marches. During a drawn battle fought at Edgehill near Warwick on October 23, the King addressed his troops in these words: "Your king is both your cause, your quarrel, and your captain. The foe is in sight. The best encouragement I can give you is that, come life or death, your king will bear you company, and ever keep this field, this place, and this day's service in his grateful remembrance." Charles I was a brave man but no general, and he was deeply perturbed by the slaughter on the battlefield.

In 1643 the royal cause prospered, particularly in Yorkshire and the southwest. At Oxford, where Charles had moved his court and military headquarters, he dwelt pleasantly enough in Christ Church College. The Queen, having sold some of her jewels and bought a shipload of arms from Holland, landed in Yorkshire in February and joined her husband in Oxford in mid-July. Both by letters and by personal appeal she roused him to action and warned him against indecision; "delays have always ruined you," she observed. The King seems to have assented to a scheme for a three-pronged attack on London—from the west, from Oxford, and from Yorkshire—but neither the westerners nor the Yorkshiremen were anxious to leave their own districts.

In the course of 1643 a peace party of the Parliamentarian side made some approaches to Charles in Oxford, but these failed and the Parliamentarians concluded an alliance with the Scottish covenanters. The entry of a Scottish army into England in January 1644 thrust the King's armies upon the defensive and the plan for a converging movement on London was abandoned. Charles successfully held his inner lines at Oxford and throughout the west and southwest of England, while he dispatched his nephew, Prince Rupert, on cavalry raids elsewhere. For about a year the King's forces had the upper hand; yet eventually he put out a number of peace feelers. These came to nothing, but he was cheered by reports that his opponents were beginning to quarrel among themselves.

The year 1645 proved to be one of decision. Charles may have had some foreboding of what was to come, for in the spring he sent his eldest son, Charles, into the west, whence he escaped to France and rejoined his mother, who had arrived there the previous year. On June 14 the highly disciplined and professionally led New Model Army organized and commanded by Sir Thomas Fairfax with Oliver Cromwell (*q.v.*) as his second in command, defeated the King and Prince Rupert at the Battle of Naseby. This was the first of a long row of defeats the King's forces suffered through the summer and fall. Charles returned to Oxford on November 5, and by the spring of 1646 Oxford was surrounded. Charles left the city in disguise with two companions late in April and arrived at the camp of the Scottish covenanters at Newark on May 5. But when the covenanters came to terms with the victorious English Parliament in January 1647, they left for home, handing over Charles I to parliamentary commissioners. He was held in Northamptonshire, where he lived a placid, healthy existence and, learning of the quarrels between the New Model Army and Parliament, hoped to come to a treaty with one or the other and regain his power. In June, however, a junior officer with a force of some 500 men seized the King and carried him away to the army headquarters at Newmarket.

After the army marched on London in August, the King was moved to Hampton Court, where he was reunited with two of his children, Henry and Elizabeth. He escaped on November 11, but his friends' plans to take him to Jersey and thence to France went astray and instead Charles found himself in the Isle of Wight, where the governor was loyal to Parliament and kept him under surveillance at Carisbrooke Castle. There Charles conducted complicated negotiations with the army leaders, with the English Parliament, and with the Scots; he did not scruple to promise one thing to one side and the opposite to the other. He came to a secret understanding with the Scots on Dec. 26, 1647, whereby the Scots offered to support the King's restoration to power in return for his acceptance of Presbyterianism in Scotland and its establishment in England for three years. Charles then twice refused the terms offered by the English Parliament and was put under closer guard, from which he vainly tried again to escape.

In August 1648 the last of Charles's Scottish supporters were defeated at the Battle of Preston and the second Civil War ended. The army now began to demand that the King should be put on trial for treason as "the grand author of our troubles" and the cause of bloodshed. He was removed to Hurst Castle in Hampshire at the end of 1648 and thence taken to Windsor Castle for Christmas. On Jan. 20, 1649, he was brought before a specially constituted high court of justice in Westminster Hall.

Execution of the King. Charles I was charged with high treason and "other high crimes against the realm of England." He at once refused to recognize the legality of the court because "a king cannot be tried by any superior jurisdiction on earth." He therefore refused to plead but maintained that he stood for "the liberty of the people of England." The sentence of death was read on January 27; his execution was ordered as a tyrant, traitor, murderer, and public enemy. The sentence was carried out on a scaffold erected outside the banqueting hall of Whitehall on the morning of Tuesday, Jan. 30, 1649. The King went bravely to his death, still claiming that he was "a martyr for the people." A week later he was buried at Windsor. (M.As.)

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• **Charles II,** byname THE MERRY MONARCH (b. May 29, 1630, London—d. Feb. 6, 1685, London), king of Great Britain and Ireland (1660–85), who was restored to the throne after years of exile during the Puritan Commonwealth. The years of his reign are known



Charles II, detail of a painting by Sir Peter Lely, *c.* 1675, in the collection of the Duke of Grafton

By courtesy of the Duke of Grafton and the Royal Academy of Arts

in English history as the Restoration period. His political adaptability and his knowledge of men enabled him to steer his country through the convolutions of the struggle between Anglicans, Catholics, and dissenters that marked much of his reign.

Birth and early years. Charles II, the eldest surviving son of Charles I and Henrietta Maria of France, was born at St. James's Palace, London. His early years were unremarkable, but before he was 20 his conventional education had been completely overshadowed by the harsh lessons of defeat in the Civil War against the Puritans and subsequent isolation and poverty. Thus Charles emerged into precocious maturity, cynical, self-indulgent, skilled in the sort of moral evasions that make life comfortable even in adversity.

But though the early years of tawdry dissipation have tarnished the romance of his adventures, not all of his actions were discreditable. He tried to fight his father's battles in the west of England in 1645; he resisted the attempts of his mother and his sister Henrietta Anne to convert him to Catholicism and remained openly loyal to his Protestant faith. In 1648 he made strenuous efforts to save his father; and when, after Charles I's execution in 1649, he was proclaimed Charles II by the Scots in defiance of the English republic, he was prepared to go to Scotland and swallow the stringently anti-Catholic and anti-Anglican Presbyterian Covenant as the price for alliance. But the sacrifice of friends and principles was futile

and left him deeply embittered. The Scottish army was routed by the English under Oliver Cromwell at Dunbar in September 1650, and in 1651 Charles's invasion of England ended in defeat at Worcester. The young king became a fugitive, hunted through England for 40 days but protected by a handful of his loyal subjects until he escaped to France in October 1651.

His safety was comfortless, however. He was destitute and friendless, unable to bring pressure against an increasingly powerful England. France and the Dutch United Provinces were closed to him by Cromwell's diplomacy and he turned to Spain, with whom he concluded a treaty in April 1656. He persuaded his brother James to relinquish his command in the French army and gave him some regiments of Anglo-Irish troops in Spanish service, but poverty doomed this nucleus of a royalist army to impotence. European princes took little interest in Charles and his cause, and his proffers of marriage were declined. Even Cromwell's death did little to improve his prospects. But George Monck, one of Cromwell's leading generals, realized that under Cromwell's successors the country was in danger of being torn apart and with his formidable army created the situation favourable to Charles's restoration in 1660.

Most Englishmen now favoured a return to a stable and legitimate monarchy, and, although more was known of Charles II's vices than his virtues, he had, under the steadying influence of Edward Hyde, his chief adviser, avoided any damaging compromise of his religion or constitutional principles. With Hyde's help, Charles issued in April 1660 his Declaration of Breda, expressing his personal desire for a general amnesty, liberty of conscience, an equitable settlement of land disputes, and full payment of arrears to the army. The actual terms were to be left to a free parliament, and on this provisional basis Charles was proclaimed king in May 1660. Landing at Dover on May 25, he reached a rejoicing London on his 30th birthday.

Restoration settlement. The unconditional nature of the settlement that took shape between 1660 and 1662 owed little to Charles's intervention and must have exceeded his expectations. He was bound by the concessions made by his father in 1640 and 1641, but the Parliament elected in 1661 was determined on an uncompromising Anglican and royalist settlement. The Militia Act of 1661 gave Charles unprecedented authority to maintain a standing army, and the Corporation Act of 1661 allowed him to purge the boroughs of dissident officials. Other legislation placed strict limits on the press and on public assembly, and the 1662 Act of Uniformity created controls of education. An exclusive body of Anglican clergy and a well-armed landed gentry were the principal beneficiaries of Charles II's restoration.

But within this narrow structure of upper-class loyalism there were irksome limitations on Charles's independence. His efforts to extend religious toleration to his Nonconformist and Roman Catholic subjects were sharply rebuffed in 1663, and throughout his reign the House of Commons was to thwart the more generous impulses of his religious policy. A more pervasive and damaging limitation was on his financial independence. Although the Parliament voted the king an estimated annual income of £1,200,000, Charles had to wait many years before his revenues produced such a sum, and by then the damage of debt and discredit was irreparable. Charles was incapable of thrift; he found it painful to refuse petitioners. With the expensive disasters of the Anglo-Dutch War of 1665–67 the reputation of the restored king sank to its lowest level. His vigorous attempts to save London during the Great Fire of September 1666 could not make up for the negligence and maladministration that led to England's naval defeat in June 1667.

Foreign policy. Charles cleared himself by dismissing his old adviser, Edward Hyde, Earl of Clarendon, and tried to assert himself through a more adventurous foreign policy. So far, his reign had made only modest contributions to England's commercial advancement. The Navigation Acts of 1660 and 1663, which had been prompted by the threat to British shipping of the rise of the Dutch carrying trade, were valuable extensions of Cromwellian policies, and the capture of New York in 1664 was one of his few gains from the Dutch. But although marriage to Princess Catherine of Braganza of Portugal in 1661 brought him the possession of Tangier and Bombay, they were of less strategic value than Dunkirk, which he sold to Louis XIV in 1662. Charles was, however, prepared to sacrifice much for the alliance of his young cousin. Through his sister Henrietta Anne, Duchess of Orléans, he had direct contact with the French court, and it was through her that he negotiated the startling reversal of the Protestant Triple Alliance (England, the Dutch United Provinces, Sweden) of 1668. By the terms of the so-called Secret Treaty of Dover of May 1670, not only did England and France join in an offensive alliance against the Dutch but Charles promised to announce his conversion to Roman Catholicism. If this provoked trouble from his subjects he was assured of French military and financial support. Charles saw to it that the conversion clause of the treaty was not made public.

This clause, which was the most controversial act of Charles II's reign, can be explained as a shortsighted bid for Louis XIV's confidence. In this, however, it failed. Louis neither welcomed Charles's intentions nor believed in them and, in the event, it was only upon his deathbed that Charles was received into the Roman Catholic church. But Charles had now fatally compromised himself. Although he subsequently attempted to pursue policies independent of Louis, he remained bound to him by inclination as well as by the fear of blackmail. More seriously, he had lost the confidence of his subjects, who deplored the French alliance and distrusted the whole tendency of Charles's policies.

Other circumstances deepened Englishmen's discontent with their king. By the 1670s, the miscarriages of the queen had reduced hopes that Charles would have a legitimate heir, and in 1673 the second marriage of his brother James, Duke of York, to Mary of Modena, increased the possibility of the Catholic line of succession, for James's conversion to the Roman church was well known. But it was for his autocratic character as much as for his religion that James was feared as his brother was not, and it was on his brother's behalf that Charles eventually had to face the severest political storm of his reign.

The Popish Plot of 1678 was an elaborate tissue of fictions built around a skeleton of even stranger truths. The allegations of Titus Oates, a former Anglican cleric who had been expelled from a Jesuit seminary, that Roman Catholics planned to murder Charles to make James king, seemed to be confirmed by scraps of evidence of which Charles was justifiably skeptical. But Charles was obliged to bow before the gusts of national hysteria that sought to bar his brother from the line of succession. Between 1679 and 1681 Charles very nearly lost control of his government. Deprived of his chief minister, the Earl of Danby, who had been compromised by his negotiations with France, the king had to allow the Earl of Shaftesbury and his Whig supporters, who upheld the power of the Parliament—men whom he detested—to occupy positions of power in central and local government. Three general elections produced three equally unmanageable parliaments; and although Charles publicly denied the legitimacy of his first son, the Protestant Duke of Monmouth, he had to send his Catholic brother James out of the country and offer a plan of limitations that would bind James if he came to the throne. The plan proved to be unacceptable both to the Whigs and to James, and, when Charles fell seriously ill in the summer of 1679, there was real danger of civil conflict.

But Charles kept his nerve. He defended his queen against slanders, dismissed the intractable parliaments, and recovered control of his government. His subjects' dread of republican anarchy proved stronger than their suspicion of James, and from March 1681, when he dissolved his last Parliament, Charles enjoyed a nationwide surge of loyalty almost as fervent as that of 1660. He had made yet another secret treaty with France and in addition to a French subsidy could now count upon a healthy public revenue. Reforms at the Treasury, which he had inaugurated in 1667, provided the crown with a firm basis of administrative control that was among Charles II's most valuable legacies to English government.

As a result of these actions, Charles, who died in February 1685 at Whitehall in London, was able to end his reign in the kind of tranquil prosperity he had always sought.

Assessment. Believing that God would not "make a man miserable only for taking a little pleasure out of the way," he had made quite sure of his own share and left at least 14 illegitimate offspring, of whom only James, Duke of Monmouth, played any part in English politics. Mistresses like Barbara Villiers, Duchess of Cleveland, and Louise de Kéroualle, Duchess of Portsmouth, were always costly and often troublesome, but Charles probably paid a smaller price for his amours than for his laziness. He was tall and active and loved riding and sailing but, although robust enough to outsit his advisers at the Council board, he hated routine and prolonged application. This failing undermined the effectiveness of his government and led to his dependence on France. But the relaxed tolerance he brought to religious matters in the end may have contributed more to the stability of his reign than was lost by his shifty insincerity.

Charles fully shared the interests of the skeptical, materialist century that saw the foundation of the Royal Society under his charter, and he did something to foster technological improvements in navigation and ship design. The sincerity of his interest in England's naval advancement is held by some historians to be the most important of his redeeming features, although, like his reputation for wit and high intelligence, it may not stand up to close examination. Any verdict on Charles is therefore controversial. A contemporary wrote of him that "he had as good a claim to a kind interpretation as most men," and on this basis it may be agreed that his image as a man remains more attractive than his reputation as a king. (H.G.R.)

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Charles (III): *see* Charles Edward, the Young Pretender.

Hungary

• **Charles I** byname CHARLES ROBERT, or CAROBERT, OF ANJOU, Hungarian KÁROLY RÓBERT (b. 1288, Naples, Kingdom of Naples [Italy]—d. July 16, 1342, Visegrád, Hung.), courtly, pious king of Hungary who restored his kingdom to the status of a great power and enriched and civilized it.

Charles was the son of Charles Martel of Anjou-Naples and Clemencia of Habsburg, daughter of the Holy Roman emperor Rudolf I. As great-grandson of Stephen V and with papal approval, Charles claimed the Hungarian throne after the death of Andrew III, the last of the Arpád line, and was crowned in 1301. When his claim was disputed, however, he was forced to surrender the crown to Wenceslas of Bohemia, who in 1305 transferred his right to Otto, duke of Lower Bavaria. After Otto was taken prisoner by the Hungarians, Charles was recognized as king in 1308 and received the Crown of St. Stephen at Székesfehérvár on Aug. 27, 1310.

Foreign policy under Charles was aimed at family aggrandizement, but it also greatly benefited Hungary. In 1335 his alliance with Poland for mutual defense against the Bohemians and the Habsburgs bore fruit in victory over the Holy Roman emperor Louis IV, the Bavarian, and his ally Albert of Austria. Fearing that Hungary might achieve predominance in the Adriatic, Venice and the pope frustrated Charles I's plans to unite the kingdoms of Hungary and Naples under his eldest son, Louis (the future Louis I the Great). Charles then turned to a pact with his brother-in-law and ally, Casimir III the Great of Poland, whereby they agreed that Louis of Hungary should succeed the childless Casimir.

• **Charles II:** *see* Charles III (Naples).

• **Charles III:** *see* Charles VI (Germany/Holy Roman Empire).

• **Charles IV:** *see* Charles (I) (Austria).

Lorraine

• **Charles I** (b. 953—d. May 21, 992?, Orléans, Fr.), duke of Lower Lorraine, head of the only surviving legitimate line of the Carolingian dynasty by 987, and an unsuccessful claimant for the French throne.

Son of Louis IV of France, Charles was banished by his brother, King Lothair, in 977. Receiving the duchy of Lower Lorraine from Otto II of Germany in the same year, he conspired unsuccessfully with Otto to dethrone Lothair but then reversed his policy, made peace with Lothair, and plotted against the new German king, Otto III. After the deaths of Lothair (986) and Lothair's son and successor Louis V (987), Charles asserted his claim to the French throne. But Adalbero, archbishop of Reims, convinced the assembly of Frankish nobles that the Frankish crown was elective rather than hereditary and that Charles was unworthy of the kingship. The assembly then proclaimed Hugh Capet king of France.

Charles did not abandon his claim but, in 991, was seized and handed over to Hugh, who kept him in prison until his death. One son, Otto, succeeded him as duke of Lower Lorraine, dying about 1012; two other sons died obscurely. With them the legitimate male line of the Carolingians came to an end.

• **Charles I (or II),** byname CHARLES THE BOLD, French CHARLES LE HARDI (b. 1365—d. Jan. 25, 1431, Nancy, Lorraine [Germany; now in France]), duke of Lorraine and an ally of the Burgundian faction in the internal strife that divided France during the Hundred Years' War. He succeeded in uniting Lorraine with the duchy of Bar.

Becoming duke in 1391, he followed his father's example in allying Lorraine with the Burgundians. Thus he defeated Louis, Duke d'Orléans, at Champigneulles in 1407, acted as the duke of Burgundy's representative at the Council of Constance in 1414, and entered Paris with the duke on July 24, 1418, bearing the title of constable of France. Because of disputes with the French king, Charles, in one of his wills, had forbidden his daughters to marry French subjects. In 1420, however, he married his daughter Isabella to René d'Anjou, heir to the duchy of Bar; and in 1425 he ensured the union of Bar and Lorraine by disinheriting his nephew and proclaiming female succession of the duchy of Lorraine.

• **Charles II (or III),** byname CHARLES THE GREAT, French CHARLES LE GRAND (b. Feb. 18, 1543, Nancy, Lorraine [Germany; now in France]—d. May 14, 1608, Nancy), duke of Lorraine from 1545, whose reign is noted for its progress and prosperity.

Charles was the son of Francis I of Lorraine and Christina of Denmark. On his father's death in 1545, his mother became regent for



Charles II the Great, drawing by an unknown French artist, 16th century; in the Louvre, Paris

Giraudon—Art Resource/EB Inc

him, and in 1552 Charles was taken to Paris by Henry II of France after the French seizure of the bishoprics of Metz, Toul, and Verdun. In 1559 Charles married Henry's daughter, Claude de France.

After the death of Henry's successor, Francis II (1560), Charles returned to Nancy to rule his duchy. He maintained good relations with the Holy Roman Empire and extended his frontiers eastward by the acquisition of Bitche, Phalsbourg, and Marsal. In the French civil wars between Roman Catholics and Huguenots he long took no part, but in 1584 he adhered to the League (of French Catholics). He then tried to set up his eldest son Henry to dispute the right of the Protestant Henry of Navarre (the future Henry IV of France) to the French succession. Consequently, German Protestants ravaged Lorraine on their way into France (1587) to support Henry IV, and in 1592 Henry IV declared war. Henry's conversion to Roman Catholicism, however, made Charles more conciliatory, and hostilities between them ended in 1594.

The reign of Charles III was the most brilliant in the history of Lorraine. He reformed the duchy's judiciary and finances and encouraged economic development. He founded a university at Pont-à-Mousson in 1572, encouraged art, and enlarged Nancy as his capital.

• **Charles III (or IV)** (b. April 5, 1604, Nancy, Lorraine [Germany; now in France]—d. Sept. 18, 1675, Allenbach, near Trier [Germany]), duke of Lorraine whose resentment against encroaching French power led to a lifelong fight against France.

Charles was the son of Francis, brother of Duke Henry II of Lorraine. Charles married Henry's daughter Nicole and became duke consort in 1624 when Henry died. Francis abolished female succession in 1625 and was proclaimed duke, but he abdicated in Charles III's favour. By 1627 Charles had become involved in an English coalition against France, and in 1631 he was forced by the French to sign the Treaty of Vic. His intrigues with the Holy Roman emperor Ferdinand II led to the French seizure of Port-à-Mousson and Bar-le-Duc and to the Treaty of Liverdun (1632), by which Louis XIII occupied Stenay, Jometz, and Clermont. In 1633 Charles was forced to cede his capital, Nancy, to France for four years. He then abdicated in the name of his brother, Cardinal Francis (1634), and joined the Germans fighting at Nordlingen, but he revoked his abdication and tried to reconquer Lorraine.

In 1641 Charles signed the treaty of Saint-Germain with France, by which his duchies were returned but with the proviso that future infidelity to France would result in their annexation. He soon violated the treaty; his estates were declared neutral, and Lorraine was ravaged by war. After serving for Spain and with the Frondeurs, he sold his estates to Louis XIV (1662), but his heirs had the treaty annulled by the Treaty of Nomény (1663). Expelled from Lorraine, Charles took up arms again in Germany, fighting until his death.

• **Charles IV (or V) Leopold** (b. April 5, 1643, Vienna, Austria—d. April 18, 1690, Wels), duke of Lorraine and Bar, Austrian field marshal who commanded the forces defeating the Turks before the gates of Vienna in 1683 and subsequently expelled them from most of Hungary.

Charles, a nephew of Duke Charles III (or IV), entered the Austrian army in 1664 and fought primarily along the Rhine during the



Charles IV, duke of Lorraine and Bar; detail from an engraving by J. Peeters

By courtesy of the Heeresgeschichtliches Museum, Vienna

war against France from 1673 to 1679. He was twice an unsuccessful candidate for the Polish crown. Opposing the Turkish advance on Vienna, he defeated the Ottomans outside the imperial capital on Sept. 12, 1683, with the aid of the Polish king, John III Sobieski, and German contingents. During the next four years he drove the Turks from most of Hungary, gaining the decisive victory of Mohács on Aug. 12, 1687. With the outbreak of the War of the Grand Alliance against France (1689), Charles captured Mainz and Bonn. He died suddenly a few months later.

Naples

• **Charles I,** byname CHARLES OF ANJOU, Italian CARLO D'ANGIÒ (b. March 1226—d. Jan. 7, 1285, Foggia, Kingdom of Naples [Italy]), king of Naples and Sicily (1266–85), the first of the Angevin dynasty, and creator of a great but short-lived Mediterranean empire.

The younger brother of Louis IX of France, Charles acquired the county of Provence in 1246 and accompanied Louis on his Egyptian Crusade (1248–50). Allied with the papacy,

he conquered Naples and Sicily in the 1260s, defeating Manfred and Conradin, the last representatives of the Hohenstaufen dynasty, at Benevento (1266) and Tagliacozzo (1268). He



Charles I of Naples and Sicily, illumination from a medical treatise, 1278–79; in the Bibliothèque Nationale, Paris

By courtesy of the Bibliotheque Nationale, Paris

thereafter expanded his power into the Balkans and in 1277 became heir to the Kingdom of Jerusalem. Charles's transfer of his capital from Palermo to Naples and his introduction of French officials caused discontent in Sicily, where rebellion broke out in 1282 (*see* Sicilian Vespers). Aided by Peter III of Aragon, the Sicilians expelled the Angevins, defeating Charles's fleet in the Bay of Naples in June 1284. Charles was preparing a counteroffensive when he died.

• **Charles II,** byname CHARLES OF ANJOU, or CHARLES THE LAME, Italian CARLO D'ANGIÒ, or CARLO LO ZOPPO (b. *c.* 1254—d. May 5, 1309, Naples), king of Naples and ruler of numerous other territories, who concluded the war to regain Sicily started by his father, Charles I. By making astute alliances and treaties, he greatly enlarged his dominions.

Named prince of Salerno (1269) by his father and married by him to Maria, daughter of the king of Hungary (1270), Charles was engaged in acquiring more lands and titles when his father lost Sicily to the Aragonese (1282). When Charles I initiated his ill-fated campaign to regain Sicily, Charles of Salerno was in charge of Naples during his father's absence. In 1284, he was lured out of the port of Naples by the enemy's admiral, Ruggiero di Lauria, and was captured.

Charles I died (1285) during his son's imprisonment, and it was not until 1288 that Charles II was able to arrange his release, using Edward I of England and Pope Nicholas IV as intermediaries. Charles promised to give up his claim to Sicily, but, once released, the Pope absolved him from his promise and the war for Sicily continued. It was resolved by the Peace of Caltabellotta (1302), under which Charles agreed to give up his claim to Sicily during the lifetime of Frederick III of Aragon (ruled Sicily 1296–1337).

Thenceforth Charles carefully built up an extremely complex set of alliances, usually by arranging the marriages of his children. In that way he increased or extended his control over Piedmont, Provence, Hungary, Athens, and Albania, among other territories.

Charles was considered an extremely pious man, closely allied with the church. Ruling over an enlightened court, he eliminated many of his father's harsh measures. He is also noted for making Naples into something of a European capital by fostering trade and the arts, patronizing the university, and building monasteries and churches.

• **Charles III,** byname CHARLES OF DURAZZO, Italian CARLO DI DURAZZO, Hungarian KÁROLY DURRAZZÓI (b. 1345—d. Feb. 17, 1386, Buda), king of Naples (1381–86) and king (as Charles II) of Hungary (1385–86). A leading figure of the Hungarian branch of the Angevin dynasty, he was an astute politician who won both of his thrones by triumphing over rival claimants.

Charles was educated at the court of Louis I of Hungary. In 1369 he married his cous in Margaret, daughter of Charles of Durazzo and Mary of Naples, thus becoming an heir to the Neapolitan throne. Margaret's aunt, the childless queen Joan I of Naples, initially recognized Charles as heir to the throne but later adopted Louis, duc d'Anjou, as her heir. When Pope Urban VI named Charles king of Naples (1381), Charles and Margaret seized Naples and imprisoned Joan, whom Charles ordered killed a year later. Louis of Anjou then named himself king of Naples and invaded southern Italy, but his death in September 1384 left Charles master of Naples.

With the death of Louis I of Hungary in 1382, Charles claimed the throne of Hungary over Louis's 10-year-old daughter, Maria. He was crowned king of Hungary in 1385, aided by those at the Hungarian court hostile to Maria. He was later assassinated by order of Louis's widowed queen, Elizabeth.

• **Charles VII:** *see* Charles III (Spain).

Navarre

• **Charles I:** *see* Charles IV (France).

• **Charles II,** byname CHARLES THE BAD, Spanish CARLOS EL MALO, French CHARLES LE MAUVAIS (b. 1332—d. Jan. 1, 1387), king of Navarre from 1349, who made various short-lived attempts to expand Navarrese power in both France and Spain.

He was the son and successor of Joan of France, queen of Navarre, and Philip, count of Évreux. Married in 1352 to Joan, daughter of John II of France, he demanded Champagne, Brie, and Angoulême as fiefs once held by his mother. Because John had granted these to the constable of France, Charles of La Cerda, Charles II's supporters assassinated the constable (1354); but, since Charles II was meanwhile negotiating with the English, John had to make terms with him, ceding extensive lands in Normandy. When Charles continued plotting with the English, John had him arrested at Rouen (April 1356). Soon afterward the English captured John at Poitiers. Escaping from prison in November 1357, Charles began a series of treacherous dealings with every party in France and, in his dealings with the dauphin (later Charles V), recovered Normandy. He then went back to Navarre.

In Spain he first supported Peter the Cruel of Castile against Peter IV of Aragon (1362), then allied himself with Peter IV and Henry of Trastámara against Peter (1363). Then John of France died (1364) and Charles V by military action forced Charles to renounce almost all his major claims in France.

In 1378 Charles II's son and future successor Charles the Noble had to acknowledge evidence found in France, proving that his father had been planning not only a new alliance with England but also the poisoning of Charles V. This meant the final loss of all Navarre's Norman possessions except Cherbourg. An attempt to seize Logroño from Castile (1378) ended in defeat, and the treaty of Briones (1379) tied Navarre to Castilian policy.

• **Charles III,** byname CHARLES THE NOBLE, Spanish CARLOS EL NOBLE, French CHARLES LE NOBLE (b. 1361—d. Sept. 8, 1425, Olite, Navarre), king of Navarre (1387–1425), eldest son of Charles II the Bad. Unlike his father, he pursued a consistent policy of peace both with Castile (which in gratitude restored certain districts to Navarre) and with France. By the treaty of Paris (1404) Charles not only renounced the Navarrese claims to Champagne but also ceded Cherbourg (which he had recovered from the English in 1393) and the countship of Évreux to Charles VI of France in exchange for Nemours, which was raised from a countship to a peerage-duchy for him.

By his marriage (1375) with Leonor of Trastámara, Charles had nine children, all of whom died early except his daughter and successor Blanche of Navarre.

Portugal

• **Charles** (b. Sept. 28, 1863, Lisbon—d. Feb. 1, 1908, Lisbon), king of a troubled Portugal that was beset by colonial disputes, grave economic difficulties, and political unrest during his reign (1889–1908).

The son of King Louis and of Maria Pia of Savoy, daughter of Victor Emmanuel II of Italy, he married Marie Amélie of Orléans, a granddaughter of the French king Louis-Philippe, in 1886 and succeeded his father on Oct. 19, 1889. Forces generated by mistakes made before his time proved to be the undoing of this talented and intelligent man, who was also known for his paintings and oceanographical studies. At home, republicans, disaffected monarchists, and Freemasons kept up a running opposition. Popular indignation over the British ultimatum of 1890 demanding Portuguese withdrawal from certain African territories resulted in the republican revolt at Oporto (January 1891).

In an effort to surmount political difficulties and bring about economic and administrative reform after a series of strikes and revolts, Charles appointed João Franco as prime minister in May 1906 and allowed him to assume dictatorial powers soon thereafter. Although some useful reforms were effected, strong opposition was aroused by governmental coercion and controversies over extravagances and the private life of Charles. While driving through the streets of Lisbon, the King and his eldest son, Luis Felipe, were assassinated. Charles was succeeded by another son, Manuel II.

Provence

• **Charles,** byname CHARLES OF PROVENCE, French CHARLES DE PROVENCE (d. 863), third son of the Frankish emperor Lothair I. Upon his father's death (855) he inherited Provence. He was the first king of Provence, but he died without issue, and Provence was seized by his elder brother, the emperor Louis II.

Romania

• **Charles I–II:** *see* Carol I–II.

Scotland

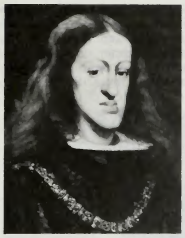
• **Charles I–II:** *see* Charles I–II (Great Britain).

Spain

• **Charles I:** *see* Charles V (Germany/Holy Roman Empire).

• **Charles II,** byname CHARLES THE MAD, Spanish CARLOS EL HECHIZADO (b. Nov. 6, 1661, Madrid—d. Nov. 1, 1700, Madrid), king of Spain from 1665 to 1700 and the last monarch of the Spanish Habsburg dynasty.

Charles's reign opened with a 10-year regency under the queen mother, during which the government was preoccupied with combatting the ambitions of the French king Louis XIV in the Low Countries and with intrigues at court involving the Queen, her Jesuit confessor Johann Eberhard Nithard, her subsequent favourite Fernando de Valenzuela, and the King's bastard brother Juan José (1629–79) de Austria. Of the two phases in the King's personal government, the first, concerned with resistance to the French im-



Charles II of Spain, detail of a portrait by Juan Carreno, *c.* 1685; in the Kunsthistorisches Museum, Vienna

By courtesy of the Kunsthistorisches Museum, Vienna

perialism of Louis XIV, ended with the peace of Rijswijk in 1697; the second, the last three years of the reign, was dominated by the succession problem, for by then it was clear that Charles would father no children.

At the peak of the succession problem, when the Austrian and French parties at the Spanish court were prepared to use any means to gain the support of the wretched king, Charles II obstinately defended the majesty of the crown and was determined to preserve its territorial integrity. In this latter aim he failed, for his death led to the War of the Spanish Succession and the dismembering of Spain's European possessions.

• **Charles (III):** *see* Charles VI (Germany/Holy Roman Empire).

• **Charles III** (b. Jan. 20, 1716, Madrid—d. Dec. 14, 1788, Madrid), king of Spain (1759–88) and king of Naples (as Charles VII, 1734–59), one of the "enlightened despots" of the 18th century, who helped lead Spain to a brief cultural and economic revival.

Early years. Charles was the first child of Philip V's marriage with Isabella of Parma. Charles ruled as duke of Parma, by right of his mother, from 1732 to 1734 and then became king of Naples. On the death of his half-brother Ferdinand VI in 1759—after a useful apprenticeship of 25 years as an absolute ruler—he became king of Spain and resigned the crown of Naples to his third son, Ferdinand I.



Charles III, detail of an oil painting by Anton Raphael Mengs; in the Prado, Madrid

By courtesy of the Museo del Prado, Madrid

Charles III was convinced of his mission to reform Spain and make it once more a first-rate power. He brought considerable qualities to the task. In spite of a fanatical addiction to hunting, his frugality and his application to the business of government impressed foreign observers as well as his own subjects. His religious devotion was accompanied by a blameless personal life and a chaste loyalty to the memory of his wife, Maria Amalia of Saxony, who died in 1760. On the other hand, he was so highly conscious of royal authority that he sometimes appeared more like a tyrant than an absolute monarch. His greatest quality, however, was his ability to select effective ministers and continually to improve his government by bringing in men of outstanding quality, notably the Conde de Aranda and the Conde de Floridablanca. While conferring with them regularly, Charles was wise enough to give them sufficien. freedom of action.

The survival of Spain as a colonial power and, therefore, as a power to be reckoned with in Europe was one of the main objects of Charles's policy. His foreign policy, however, was not successful. Fearing that a British victory over France in the Seven Years' War would upset the balance of colonial power, he signed the Family Compact with France—both countries were ruled by branches of the Bourbon family—in August 1761. This brought war with Great Britain in January 1762. Charles overrated his own strength and prospects and those of his ally. Sharing in the defeat, he lost Florida to England and revealed Spanish naval and military weakness. In the American Revolution, Charles III was caught between a desire to embarrass his colonial rival, which accounts for his undercover aid to the American revolutionaries from 1776, and fear for his own American possessions, which led him to offer his mediation in 1779. When Great Britain refused his conditions, he declared war, but, at the same time, he refused to recognize United States independence. Charles was more successful in strengthening his own empire. Commercial reforms, designed to open new routes and new ports for trade between Spain and the colonies, were undertaken from 1765. Territorial readjustments were carried out in the interest of defense, and a modern administrative organization—the intendant system, of French origin and already operating in Spain itself—was introduced. The intendants, who had executive, judicial, and military power, improved local administration and linked it directly with the crown rather than with the viceroy. Released from the former commercial restrictions, secured against attack, and with the prospect of better administration, the Spanish Empire under Charles III assumed a new look.

Domestic reforms. In Spain Charles was concerned to make himself more absolute and therefore better able to undertake reform. His ecclesiastical policy was conditioned by his determination to complete the subordination of the church to the crown. He allowed no papal bulls or briefs in Spain without royal permission. He particularly resented the Jesuits, whose international organization and attachment to the papacy he regarded as an affront to his absolutism. Suspecting their loyalty and obedience to the crown in the American colonies, he also chose to believe that they were the instigators of the violent riots in Madrid and elsewhere in 1766. After a commission of investigation, he ordered their expulsion from Spain and the colonies (1767). In 1773, cooperating with the court of France, Charles succeeded in procuring from the papacy the complete suppression of the society. But Charles's opposition to papal jurisdiction in Spain also led him to curb the arbitrary powers of the Inquisition, while his desire for reform within the church caused him to appoint inquisitors general who preferred persuasion to force in ensuring religious conformity.

Charles III improved the agencies of government through which the will of the crown could be imposed. He completed the process whereby individual ministers replaced the royal councils in the direction of affairs. In 1787, with the assistance of Floridablanca, he coordinated the various ministries by establishing a council of state whose regular meetings could produce a concerted policy. He tightened crown control of local government by stimulating his intendants and giving the Council of Castile supervision of municipal finances. The objective of his government was to create the conditions in which industry and trade could improve. By the end of his reign, Spain had abandoned its old commercial restrictions and, while still excluding foreigners, had opened up the entire empire to a commerce in which all its subjects and all its main ports could partake. Protected against foreign competition, the native cotton industry grew rapidly, and the state itself intervened in the production of luxury goods. Charles III's agrarian policy, however, timid in face of landed interests, failed to deal with the greatest obstacles to agricultural progress and to the welfare of the rural masses in Spain—large untilled estates and legally unalterable succession in the inheritance of landed property. In fact, strength, rather than welfare, was the aim of Charles III. Within these limits he led his country in a cultural and economic revival, and, when he died, he left Spain more prosperous than he had found it.

(Jo.Ly.)

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• **Charles IV** (b. Nov. 11, 1748, Portici, Kingdom of Naples—d. Jan. 20, 1819, Rome), king of Spain (1788–1808) during the turbulent period of the French Revolution, who succeeded his father Charles III in 1788.

Lacking qualities of leadership himself, Charles entrusted the government (1792) to Manuel de Godoy, a protégé of the queen, Maria Luisa of Parma. Their adherence to the First Coalition against Revolutionary France led to a French invasion (1794) and the subsequent reduction of Spain to the status of a French satellite. When Napoleon again occupied northern Spain in 1807, Charles, threatened by a coup, tried to flee to America, but was stopped and forced to abdicate by supporters of his son Ferdinand (March 1808). The following May Napoleon deposed both



Charles IV of Spain, detail of an oil painting by Francisco de Goya, 1798–1808; in the Prado, Madrid

By courtesy of the Museo del Prado, Madrid

Charles and Ferdinand, placing his brother Joseph Bonaparte on the Spanish throne. Charles spent the rest of his life in exile.

• **Charles (V):** *see* Carlos María Isidro de Borbón.

• **Charles (VI):** *see* Carlos Luis de Borbón.

• **Charles (VII):** *see* Carlos María de los Dolores de Borbón y Austria-Este.

Sweden

• **Charles VIII** Knutsson, also called (until 1448) karl knutsson bonde (b. *c.* 1408, Sweden—d. May 15, 1470, Stockholm), king of Sweden (1448–57, 1464–65, 1467–70), who represented the interests of the commercially oriented, anti-Danish Swedish nobility against the older landowning class of nobles who favoured a union with Denmark. Although he was twice removed from office by his opponents, his nationalist policies were adopted by succeeding rulers.



Charles VIII of Sweden, detail from a wood sculpture by Bernt Notke, *c.* 1480; in Gripsholm Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

A scion of a leading Swedish noble family, Charles joined the noble faction supporting the peasant revolt of 1436 against the rule of Erik of Pomerania, king of the united realms of Denmark, Norway, and Sweden. Playing off the peasant, noble, and royal factions against one another, he was elected regent in 1438 and led in forcing Erik to relinquish his throne in 1439. When Christopher of Bavaria was elected king in 1441, Charles was compensated with several fiefs, including Finland, and after Christopher's death, in 1448, he became king.

Opposed to a return to the Danish-led northern union, Charles aimed at Swedish dominance in Scandinavia and defended his policies with ardent nationalist propaganda. From 1451 to 1457 he fought against the forces of the Danish king Christian I, who sought control over Sweden. Charles's domestic program, including reduction of the church's economic powers and the reclaiming of royal fiefs, antagonized an important faction of the nobles led by the Oxenstierna and Vasa families, who overthrew him in 1457 and elected Christian I king.

Charles was recalled in 1464 for a brief term and again in 1467, when the nationalist noble faction led by the Tott and Sture families gained the advantage in their civil war against the Oxenstiernas and their allies. He had become a mere figurehead by that time; the real power was exercised by the nobles' state council.

• **Charles IX** (b. Oct. 4, 1550, Stockholm—d. Oct. 30, 1611, Nyköping, Swed.), virtual ruler of Sweden (1599–1604) and king (1604–11) who reaffirmed Lutheranism as the national religion and pursued an aggressive foreign policy leading to war with Poland (1605) and Denmark (1611).

The third son of the Swedish king Gustav I Vasa, Charles in 1568 was one of the leaders of a rebellion against the rule of his half brother Erik XIV that placed his other brother on the throne as John III. Charles subsequently clashed with his brother in asserting his authority in his duchy and in leading the opposition to the king's efforts to reconcile Lutheranism and Roman Catholicism in Sweden. He rejected the king's new liturgy, the "Red Book," and granted asylum to persecuted Lutherans in his duchy. The brothers were reunited in 1587, however, when both opposed the nobles' state council, which promoted the candidacy of John's son Sigismund (king of Poland as Sigismund III Vasa) for the Polish throne.

After the devoutly Catholic Sigismund also succeeded to the Swedish throne in 1592, Charles called the Convention of Uppsala (1593), which demanded that Lutheranism be retained as the national religion. By playing on the nobles' fear of absolutist rule by an absentee monarch, Charles won their support in forcing Sigismund to accept the decisions of the Convention of Uppsala and to recognize Charles as regent in conjunction with the nobles' state council. The king's renunciation of this agreement provoked a civil war in which Charles had the support of the lower estates against the royal armies and the nobility. Defeated at Stångebro (1598), Sigismund was deposed the following year and replaced by Charles as virtual ruler of Sweden. Charles then ruthlessly suppressed the state council and his other aristocratic opponents, and thereafter his relations with the nobility remained tense. He was declared king in 1604, though he was not crowned until 1607.



Charles IX of Sweden, portrait by an unknown artist, 1630; in Gripsholm Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

Charles's overthrow of Sigismund led to hostilities with Poland, but full-scale war did not break out until 1605; almost immediately the Swedes suffered a disastrous defeat at Kirkholm. Charles's forces then intervened in Russia, attempting to prevent a Polish conquest of the country and to install his son Gustavus (later king of Sweden as Gustav II Adolf) as ruler. Gaining no real advantage in Russia, Charles then provoked a war with Denmark (the Kalmar War, 1611–13) that was subsequently concluded by Gustavus, disadvantageously for Sweden.

After he had suppressed his aristocratic opposition, Charles relied on the political support of the lower estates. An excellent administrator, he contributed to the nation's economic growth by sponsoring the development of metallurgical industries and by introducing foreign technicians and entrepreneurs. But he was an unattractive character, unscrupulous and choleric, brutal and coarse in speech and action, who tried to rule by a diet subordinated to his will and a system of terror.

• **Charles X Gustav** (b. Nov. 8, 1622, Nyköping Castle, Sweden—d. Feb. 13, 1660, Göteborg), king of Sweden who conducted the First Northern War (1655–60) against a coalition



Charles X Gustav, detail from a portrait by Sebastian Bourdon; in the Nationalmuseum, Stockholm

By courtesy of the Svenska Portrattarkivet, Stockholm

eventually embracing Poland, Russia, Brandenburg, the Netherlands, and Denmark. His aim was to establish a unified northern state.

In 1642 Charles, the son of John Casimir, count palatine of Zweibrücken, and Charles IX's eldest daughter, Catharine, joined the Swedish armies in Germany under Lennart Torstenson and returned to Sweden in 1645, a few years before the end of the Thirty Years' War. Although he failed in his efforts to marry the Swedish queen Christina, then still a minor, she secured his appointment as commander of the Swedish forces in Germany (1648), over the opposition of the leading nobles, and the following year named him to succeed her; he was crowned in 1654.

Charles X's first task was to restore the public finances, greatly weakened during Christina's reign. In the Riksdag (Parliament) of 1655 he imposed the Reduction, by which the nobles were obliged to return to the crown certain endowed lands and either to pay an annual fee or to surrender one-quarter of the crown lands they had acquired since 1633. These financial measures were not seriously enforced, however, as Charles turned his attention to war against Poland (1655).

Although he was ostensibly defending himself against a Polish claim to the Swedish throne, Charles X's real motivations for war were to check a potential Russian threat in Poland and to strengthen Sweden's control of the Baltic region. His initial decisive victories in Poland (1655–56) forced the Polish king John Casimir to flee, but they drew Russia and the Holy Roman Empire into the war; they were soon joined by Charles X's former ally the elector of Brandenburg, as well as by Denmark and the Netherlands. With his Polish campaign stalled, Charles boldly attacked Denmark (1657), quickly conquering the province of Jutland and threatening Sjælland. By the Peace of Roskilde (1658), Denmark ceded all its holdings in southern Sweden and central Norway and the island of Bornholm.

After failing to obtain English or French aid for an invasion of Brandenburg, Charles again attacked Denmark (1658), hoping to counter the growing Danish-Dutch alliance by conquering Denmark and forming a unified Scandinavian state. When the Danes resisted, repelling an attack on Copenhagen in February 1659, a Riksdag was called in Göteborg (1660) to deal with the military situation. Charles died while the Riksdag was in session.

• **Charles XI** (b. Nov. 24, 1655, Stockholm—d. April 5, 1697, Stockholm), king of Sweden who expanded royal power at the expense of the higher nobility and the lower estates, establishing an absolutist monarchy that ended only with the death of Charles XII in 1718.



Charles XI of Sweden, portrait by D.K. Ehrenstrahl, 1685; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

Charles, the only son of Charles X Gustav and Hedvig Eleonora of Holstein-Gottorp, was only five years old when he succeeded his father in 1660. A regency was established under which the higher nobility gained control of the government and blocked the repossession of alienated crown lands. Although Charles came of age in 1672, the regents continued to control foreign policy; they drew Sweden into the Dutch War of 1672–78 at the behest of King Louis XIV of France, with whom they had signed a treaty of alliance. Charles assumed control of the armies and the administration after the Swedish defeat at Fehrbellin by the forces of the electorate of Brandenburg in 1675, which encouraged Denmark to invade its former province of Skåne in Sweden.

Charles XI's defeat of the Danes in 1678 led to the Treaty of Lund (1679), by which Denmark gave up its claim to Skåne. The alliance of the two nations in opposition to Dutch commercial influence in the Baltic was sealed by Charles XI's marriage to Ulrika Eleonora (1680), sister of King Christian V of Denmark. By the treaties of Nijmegen (1678–79), which marked the end of the Dutch War, Sweden was able to keep nearly all of its German possessions.

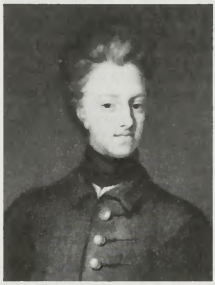
Charles and his new advisers then determined to keep Sweden free from foreign subsidy treaties. The Riksdag (parliament) of 1680 renewed in full force the repossession of alienated crown lands, and by the end of Charles XI's reign the crown had increased its holdings in Sweden–Finland from less than 1 percent to more than 30 percent of all lands. The repossession of royal lands in the trans-Baltic provinces accounted for more than half of the increase in the King's income. The enlarged state income allowed the establishment of a fixed budget that paid for 25,000 hired troops, as well as of a civil administration that also had control over churches and schools, a national army of 40,000 men, and a new navy to compete with Denmark's. In 1693 Charles was granted unrestricted power by the estates to implement and safeguard his reforms.

In foreign affairs Charles and his principal advisers saw a balance of power among France, the Holy Roman Empire, the Netherlands, and England as the best protection for Swedish interests. Sweden concluded a treaty with the Dutch (1681) against Louis XIV. Charles also felt threatened by the personal union of England and the United Provinces begun under William III in 1688, and he maintained Sweden's virtual neutrality during the War of the Grand Alliance (1689–97).

Although Denmark and Sweden cooperated during the war to protect their merchant shipping, Charles nearly provoked war with Denmark in 1689 when he supported the claims of the duke of Holstein-Gottorp in Schleswig-Holstein. Shortly before his death Charles arranged for the continuation of his dynastic ties with the House of Holstein-Gottorp and served, though he had little effective power, in his cherished role of mediator at the Treaty of Rijswijk (1697), which concluded the War of the Grand Alliance.

• **Charles XII** (b. June 17, 1682, Stockholm—d. Nov. 30, 1718, Fredrikshald, Nor.), king of Sweden (1697–1718), an absolute monarch who defended his country for 18 years during the Great Northern War and promoted significant domestic reforms. He launched a disastrous invasion of Russia (1707–09), resulting in the complete collapse of the Swedish armies and the loss of Sweden's status as a great power. He was, however, also a ruler of the early Enlightenment era, promoting domestic reforms of significance.

Early life. Prince Charles was the second child and eldest (and only surviving) son of Charles XI of Sweden and Ulrika Eleonora of Denmark. His early childhood was happy and secure, but the close family circle was broken by his mother's death in 1693. Charles XI's chief consolation was a close companionship with his heir, and from this time onward Prince Charles accompanied his father on travels of inspection and on all kinds of official occasions. After his father's death in April



Charles XII, detail of an oil painting by David von Krafft after J.D. Swartz, 1706; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

1697, Charles XII had to take on the burden of absolute kingship—he was the first and only Swedish king born to absolutism—when he was barely 15 years old. Charles XI had stipulated a regency, but the regents proved anxious to obtain the new king's concurrence in all decisions, and the Riksdag called in November 1697 declared him of age.

Charles XII had been carefully prepared for his task by excellent tutors and governors. He was, however, exceptionally strong willed and gave repeated proof of his obstinate adherence to those standards he accepted from the religious and moral teaching of his family and his governors. In adolescence a personal program for toughening physique—in particular, his intrepid horsemanship and his predilection for risks—worried the old and staid among the courtiers. He had been open and confiding; but on succeeding to the crown he assumed a noncommittal behaviour in public, though in private he was much influenced by the instructions that his father had left for his political guidance and by the counsel of his father's advisers.

After negotiations for Charles's marriage to a Danish cousin, the daughter of Christian V, were begun on Denmark's initiative, Charles's advisers held back until the outcome of Danish negotiations with other powers was known. These negotiations led in fact to a coalition between Denmark, Saxony, and Russia that, by attacking Sweden in the spring of 1700, began the Great Northern War. The speedy success hoped for by the three allied powers did not materialize, and rumours of rebellion by the Swedish nobility against the absolutist monarchy, in case of war, proved false.

Military leadership, 1700–09. The early campaigns—the descent on Zealand (August 1700), which forced Denmark out of the war; the Battle of Narva (November 1700), which drove the Russians away from the Swedish trans-Baltic provinces; and the crossing of the Western Dvina River (1701), which scattered the troops of Augustus II (elector of Saxony and king of Poland)—were all planned and directed by the officers whom Charles had inherited from his father; but the King, while developing his military skill, gave valuable help in fostering morale by his courage, his religiously coloured optimism, and his faith in the cause of Sweden as the victim of a concerted attack.

Charles's responsibility in planning and executing armed operations constantly increased, so that from 1702 he became the superior of most of his officers. Also from 1702 he began to take a greater part in political decisions, his senior advisers having died or retired through ill health. Most significant of these personal decisions was that to fight Augustus II in Poland and to transform Poland from a divided country, where Augustus had both partisans and opponents, into an ally and a base for the final campaign against Russia. This transformation was to be accomplished by dethroning Augustus and substituting a Polish-born king willing to cooperate with the Swedes. By the time this program had been brought to success and Stanisław Leszczyński elected king of Poland—Augustus being forced to accept the settlement by a Swedish invasion of Saxony in September 1706—Charles XII had matured both as a general and as a statesman.

Charles was not unmindful of Sweden's role in central and western Europe; his support of the Silesian Protestants against the Catholic Habsburg emperor was firmly based on the Swedish guarantee of the Peace of Westphalia, and he continued that policy of the "balancing role" between the great coalitions of the west to which Swedish rulers and statesmen since 1660 had aspired in the hope of achieving prestige and territory by armed mediation in suitable circumstances. His first necessity in 1706, however, was to secure Sweden's position in relation to Russia, which, under Peter I the Great, had from 1703 onward made good use of Charles XII's campaigns in Poland to train its army and undertake a piecemeal conquest of the Swedish east Baltic provinces. Charles's troops left Saxony to invade Russia in the late autumn of 1707. They won the Battle of Hołowczyn in July 1708, but Russian scorched-earth tactics forced Charles to abandon his route to Moscow and turn instead into the Ukraine. Thereafter, the Russians interfered successfully with the Swedes' communications, and by the summer of 1709 Charles XII had no choice between accepting battle with the Russians or withdrawing once more into Poland. Though wounded in the foot and unable to lead the army in person, Charles chose battle and attacked the Russian fortified camp at Poltava on July 8 (June 27, old style; June 28, Swedish style). The attack

failed, and three days later the bulk of the Swedish Army surrendered to the Russians at Perevolochna. Charles was by then already on his way to Turkish-held territory, where he hoped to find allies.

Years in Turkey, 1709–14. Turkey's desire to reconquer Azov from Peter the Great augured well for its cooperation with Charles XII, but—in spite of four Turkish declarations of war against Russia—as the army expected from Sweden never arrived, the Swedish king was unable to pursue his plans vigorously.

He became the object of Turkish intrigues and in February 1713 had to fight a regular battle, the *kalabalik* of Bender (modern Bendery, Moldova), to avoid a plot to deliver him into the hands of Augustus of Saxony, now restored in Poland. The closing of the Turko-Habsburg frontier due to the plague, and the determination of the anti-French alliance in the War of the Spanish Succession to prevent Sweden from using its bases in Germany to attack its enemies further circumscribed Charles XII's freedom of action in these years. The Swedish council, virtually in charge of affairs at home during his absence, was preoccupied with threats to Sweden from Denmark.

The administrative and financial reforms that Charles promulgated from Turkey in order to distribute the burden of the war effort fairly and to increase both resources and efficiency were largely sabotaged and were put into effect only after his return to Swedish Pomerania in November 1714 (having ridden incognito through Habsburg and German lands in 14 days and nights).

Decline of Swedish power. For more than a year, Charles fought a delaying action in Pomerania to keep Swedish troops on German soil as long as possible, attempting to restore the prestige of Swedish arms, to keep the war away from Sweden itself, and to prepare his diplomatic offensive for splitting the coalition, augmented after 1714 by Hanover and Prussia. A subsidy treaty with France, intrigues with the Jacobites (the adherents of the exiled branch of the Stuart monarchs) to threaten the Elector of Hanover in his position as king of England, and separate negotiations with the enemies averted the danger to Sweden once Charles, in December 1715, had been forced to leave Stralsund and Wismar.

From 1713 onward Charles had realized that sacrifice of territory would be necessary but was set on retaining Sweden's great power status either by ceding land for money for a given number of years only, not in perpetuity, or by allowing outright cession only as the price for guaranteed and considerable military help. He argued that any satisfactory peace on these lines could only be gained if military action backed up the diplomatic effort; to some extent, therefore, all negotiations, and especially those with the Russians at Aland throughout the year 1718, were designed to gain time. By the autumn of 1718, Charles XII had collected an army of 60,000 men, but his strategic plan was never fully unfolded, for at the siege of Fredrikshald (Halden), at an early stage in the invasion of Norway, he exposed himself to fire from the fortress and was fatally shot through the head. Rumours that he had been killed by someone from his own side began to circulate shortly after his death. The debate on this question continues, but the weight of available evidence favours the view that Charles XII was killed by an enemy bullet.

Assessment. Charles XII was not the simple and uneducated soldier-king he has often been made out to be. His intellectual pursuits were many and varied. He was always interested in architecture and in painting; he could quote contemporary Swedish poetry and liked to argue theology and philosophy. His real bent was mathematical and scientific. He became increasingly occupied with new ideas in administration, and many of his administrative reforms were far ahead of their time.

Charles's character was complex. Kind-hearted, he had to steel himself to say no; yet by virtue of his own sacrifices and devotion to duty, he demanded considerable sacrifices of those classes in Sweden who were lukewarm about the war effort once the years of bad fortune set in after 1709. A youthful longing for romantic love had to be buried in the harsh life of the soldier and produced the ascetic leader whose habits of bachelorhood grew upon him to the extent that those around him hardly credited his reiterated "I'll marry after the war is over." Affectionate to his family, he was torn in two by the factions within it that his own childlessness tended to produce.

In military matters Charles learned from experience to insist on utter secrecy and kept even his own officers guessing until the last moment. He had a good eye for the strategic battleground and insisted on personal leadership in battle, believing that the phlegmatic and cautious Swedish peasant would only fight well when seeing his king sharing the dangers of the battle.

Firmly believing in his responsibility to God, Charles held that the fortunes of war had taught him that one could not always be lucky, but one could always be honourable. He was against double-dealing and against the easy pledging of one's word only to break it at the first suitable opportunity. A self-righteous contempt for the behaviour of rulers that did not fit into his own moral code is evident. He lacked insight into men's motives, probably because of his early assumption of the crown; and having been born to absolutism, he did not realize the strength of the anti-absolutist forces in Sweden. He had, however, no illusions about his real power. "They will not obey me now when I am alive," he said once in answer to an appeal to settle the succession: "how can I expect them to obey me when I am dead?" (R.M.H.)

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• Charles XIII (b. Oct. 7, 1748, Stockholm—d. Feb. 5, 1818, Stockholm), king of Sweden from 1809 and, from 1814 to 1818, first king of the union of Sweden and Norway. The second son of King Adolf Frederick of Sweden, he was created duke of Södermanland by his elder brother, King Gustav III, and later served as admiral of the fleet during the Russo-Swedish War (1788–90). In 1792, on the death of his brother, he became regent for his nephew, the 13-year-old Gustav IV. Charles was little gifted and lacked strength of character, so that real power passed to advisers until Gustav himself began to exert influence. The latter's unsuccessful policy during the Napoleonic Wars resulted in his deposition (March 1809), and Charles, prematurely aged and childless, was elected king in his place. The Riksdag (Parliament) provided for the succession by naming Duke Christian August (later Charles August) heir apparent, and, on his early death in 1810, one of Napoleon's marshals, Jean-Baptiste Bernadotte, whom Charles adopted as his son. From then until his death, Charles was eclipsed by the Crown Prince, even in his symbolic role.



Charles XIII of Sweden and Norway, detail from an oil painting by Per Krafft the Younger, 1812; in Rosersbergs Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

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• Charles XIV John, Swedish KARL JOHAN, or CARL JOHAN, original name JEAN-BAPTISTE BERNADOTTE, also called (1806–10) PRINCE DE PONTE-CORVO (b. Jan. 26, 1763, Pau, Fr.—d. March 8, 1844, Stockholm), French Revolutionary general and marshal of France (1804), who was elected crown prince of Sweden (1810), becoming regent and then king of Sweden and Norway (1818–44). Active in several Napoleonic campaigns between 1805 and 1809, he subsequently shifted allegiances and formed Swedish alliances with Russia, Great Britain, and Prussia, which defeated Napoleon at the Battle of Leipzig (1813).



Charles XIV John, detail of an oil painting by Fredrik Westin, 1824; in Gripsholm Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

Bernadotte was the son of a lawyer. At the age of 17 he enlisted in the French army. By 1790 he had become an ardent supporter of the Revolution and rose rapidly from sublieutenant in 1792 to brigadier general in 1794. During the campaigns in Germany, the Low Countries, and Italy he restrained his troops from plundering and gained a reputation as a disciplinarian. Bernadotte first met Napoleon Bonaparte in 1797 in Italy. Their relationship, at first friendly, was soon embittered by rivalries and misunderstandings.

In January 1798 Bernadotte was expected to succeed Bonaparte in command of the army of Italy but instead was appointed ambassador to Vienna until April, when his mission ended. On Aug. 17, 1798, having returned to Paris, he married Désirée Clary, Napoleon's former fiancée and the sister-in-law of Joseph Bonaparte, Napoleon's older brother.

Bernadotte campaigned in Germany during the winter following his marriage, and from July to September 1799 he was minister of war. His growing fame, however, and his contacts with the radical Jacobins irritated

Emmanuel Joseph Sieyès—one of the five members of the government of the Directory that ruled France from 1795 to 1799—who engineered his removal. In November 1799 Bernadotte refused to assist Bonaparte's coup d'etat that ended the Directory but neither did he defend it. He was a councillor of state from 1800 to 1802 and became commander of the army of the west. In 1802 he fell under suspicion of complicity with a group of army officers of republican sympathies who disseminated anti-Bonapartist pamphlets and propaganda from the city of Rennes (the "Rennes plot"). Although no evidence has been found that he was involved, it is clear that he would have favoured constitutional limitation of the powers of Napoleon, who had in 1799 become the first consul—to all intents and purposes, dictator of France—or even his overthrow. In January 1803 Bonaparte appointed Bernadotte minister to the United States, but Bernadotte delayed his departure because of rumours of approaching war between France and England and remained inactive in Paris for a year. When, on May 18, 1804, Napoleon proclaimed the empire, Bernadotte declared full loyalty to him and, in May, was named marshal of the empire. In June he became the military and civil governor of the electorate of Hanover, and while in office he attempted to set up an equitable system of taxation. This did not prevent him from beginning to accumulate a sizable fortune with the "tributes" he received from Hanover and the Hanseatic city of Bremen.

In 1805 Bernadotte was given command of the I Army Corps during the Austrian campaign. Difficulties delayed his march toward Vienna, and in the battle at Austerlitz, in which Napoleon defeated the combined Russo-Austrian forces, the corps played a dramatic but somewhat minor role. Napoleon gave Bernadotte command of the occupation of Ansbach (1806) and in the same year made him prince of Ponte-Corvo. Bernadotte and his corps did not participate actively in the battles of Jena and Auerstädt (October 1806), in which the French routed the Prussian army, but nevertheless he was given enlarged responsibility in the Polish campaign, and in January 1807 he defeated the Russians at Mohrungen. In July 1807 Bernadotte was named governor of the occupied Hanseatic cities of northern Germany. He was scheduled to lead a campaign against Sweden, but this was abandoned, and in 1809 he took part in the Austrian campaign as commander of the IX Army Corps. In the Battle of Wagram, in which the French defeated the Austrians, he lost more than one-third of his soldiers and then returned to Paris "for reasons of health" but obviously in deep disfavour. Napoleon, however, put him in command of the defense of the Netherlands against the threatened British invasion; Bernadotte ably organized the defense. The British expedition to the Dutch island of Walcheren, however, was fatally weakened by disease and had to withdraw. When Bernadotte returned to Paris, political suspicions still surrounded him, and his position remained uncertain.

Despite the distrust of French politicians, however, dramatic new possibilities now opened up to him: he was invited to become crown prince of Sweden. In 1809 a palace revolution had overthrown King Gustav IV of Sweden and had put the aged, childless Charles XIII on the throne. The Danish prince Christian August had been elected crown prince but died suddenly in 1810, and the Swedes turned to Napoleon for advice. The Emperor, however, was reluctant to exert a decisive influence, and the initiative fell to the young Swedish baron Carl Otto Mörner. Mörner approached Bernadotte since he respected his military ability, his skillful and humane administration of Hanover and the Hanseatic towns, and his charitable treatment of Swedish prisoners in Germany. The Riksdag (diet), influenced by similar considerations, by their regard for French military power, and by financial promises from Bernadotte, abandoned other candidates, and on Aug. 21, 1810, Bernadotte was elected Swedish crown prince. On October 20 he accepted Lutheranism and landed in Sweden; he was adopted as son by Charles XIII and took the name of Charles John (Karl Johan). The Crown Prince at once assumed control of the government and acted officially as regent during the illnesses of Charles XIII. Napoleon now tried to prevent any reorientation of Swedish foreign policy and moreover sent an immediate demand that Sweden declare war on Great Britain; the Swedes had no choice, but, though technically in a state of war between 1810 and 1812, Sweden and Great Britain did not engage in active hostilities. Then, in January 1812, Napoleon suddenly occupied Swedish Pomerania.

Charles John was anxious to achieve something for Sweden that would prove his worth to the Swedes and establish his dynasty in power. He could, as many Swedes wished, have regained Finland from Russia, either by conquest or by negotiation. Political developments, however, prompted another solution, namely the conquest of Norway from Denmark, based on a Swedish alliance with Napoleon's enemies. An alliance was signed with Russia in April 1812, with Great Britain in March 1813—with the British granting a subsidy for the proposed conquest of Norway—and with Prussia in April 1813. Urged by the allies, however, Charles John agreed to take part in the great campaign against Napoleon and to postpone his war with Denmark. The Crown Prince landed his troops at Stralsund, Ger., in May 1813 and soon took command of the allied army of the north. Although the Swedish troops contributed to the allied successes, Charles John intended to conserve his forces for the war with Denmark, and the Prussians bore the brunt of the fighting.

After the decisive Battle of Leipzig (October 1813), Napoleon's first great defeat, Charles John succeeded in defeating the Danes in a swift campaign and forced King Frederick VI of Denmark to sign the Treaty of Kiel (January 1814), which transferred Norway to the Swedish crown. Charles John now had dreams of becoming king or "protector" of France, but he had become alienated from the French people, and the victorious allies would not tolerate another soldier in charge of French affairs. Bernadotte's dream dissolved, and his brief visit to Paris after the armistice was not glorious.

New difficulties recalled him to Scandinavia. The Norwegians refused to recognize the Treaty of Kiel, and in May 1814 a Norwegian assembly adopted a liberal constitution. Charles John conducted an efficient and almost bloodless campaign, and in August the Norwegians signed the Convention of Moss, whereby they accepted Charles XIII as king but retained the May constitution. Thus, when force might have imposed any system on the Norwegians (for a time at least), the Crown Prince insisted on a constitutional settlement.

At the Congress of Vienna (1814–15), Austria and the French Bourbons were hostile to the upstart prince, and the son of the deposed Gustav was a potential pretender to the throne. But, thanks to Russian and British support, the status of the new dynasty was undisturbed, and in Sweden its opponents were very few. Upon the death of Charles XIII on Feb. 5, 1818, Charles John became king of Sweden and Norway, and the former republican and revolutionary general became a conservative ruler. His failure to learn Swedish increased his difficulties, yet his experience, his knowledge, and his magnetic personal charm gave him preponderant political influence. Though blunt in speech, he was cautious and farsighted in action. His foreign policy inaugurated a long and favourable period of peace, based on good relations with Russia and Great Britain. In domestic affairs, farsighted legislation helped the rapid expansion of Swedish agriculture and the Norwegian shipping trade; in Sweden, the famous Göta Canal was completed, postwar financial problems were solved, and during the reign both countries enjoyed a rapid increase in population. On the other hand, the King's autocratic tendencies, restrictions on the liberty of the press, and his reluctance to introduce liberal reforms in commercial and industrial policy and in the organization of the Swedish Riksdag led to a growing opposition that culminated during the late 1830s and led to some demands for his abdication. In Norway there was opposition to the Swedish predominance within the union and to the royal influence over the legislature. But the King rode out the storms, and the 25th anniversary of his succession to the throne in 1843 was an occasion for successful royalist propaganda and popular acclaim. (S.C.O.C.)

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• **Charles XV,** Swedish in full CARL LUDVIG EUGEN (b. May 3, 1826, Stockholm—d. Sept. 18, 1872, Malmö, Swed.), king of Sweden and Norway from 1859 to 1872. Succeeding his father, Oscar I, on July 8, 1859, Charles was an intelligent and artistically inclined ruler much



Charles XV of Sweden and Norway, detail from an oil painting by G. von Rosen; in the Royal Castle, Stockholm
By courtesy of the Svenska Portrattarkivet, Stockholm

liked in both kingdoms. The royal power, however, was considerably reduced during his reign as the Riksdag (parliament) and executive assumed increasing power. Among important new liberal measures that enjoyed his support was the introduction of a bicameral legislature. A champion of Pan-Scandinavianism and political solidarity among the three northern kingdoms, Charles unwisely gave a half promise of help—which his ministers were unable to back—to Denmark during the Schleswig-Holstein crisis of 1864. He left one child, Louisa Josephina Eugenia, by his marriage to Louisa, daughter of Prince Frederick of Denmark, and was succeeded by his brother, Oscar II.

• **Charles XVI Gustav:** *see* Carl XVI Gustaf.

Charles, ARCHDUKE, German ERZHERZOG KARL (b. Sept. 5, 1771, Florence [Italy]—d. April 30, 1847, Vienna, Austria), Austrian archduke, field marshal, army reformer, and military theoretician who was one of the few Allied commanders capable of defeating the French generals of the Napoleonic period. He



Archduke Charles of Austria, detail of a portrait by an unknown artist
By courtesy of the Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

modernized the Austrian army during the first decade of the 19th century, making it into a formidable fighting force that contributed materially to Napoleon's defeat in 1813–15.

The third son of the future Holy Roman emperor Leopold II, Charles grew up in Italy. Taking part in the war against Revolutionary France beginning in 1792, he was victorious at Aldenhoven and Neerwinden in 1793 and became governor-general of the Austrian Netherlands the same year. He was appointed commander in chief of the Austrian Rhine army in 1796 and was also named field marshal general of the Holy Roman Empire. His campaign of 1796, in which he repeatedly defeated the French commanders Jean-Baptiste Jourdan and Jean-Victor-Marie Moreau and drove them back across the Rhine, distinguished him as one of Europe's best commanders.

Again commanding the Rhine front in the War of the Second Coalition against France (1798–1802), Charles defeated Jourdan and André Masséna but could not stop Moreau's advance on Vienna after the Austrian defeat at Hohenlinden (1800). During the war of 1805 Charles commanded the main Austrian army in Italy and again crushed Masséna at Caldiero, but Austrian defeats in Germany decided the struggle in Napoleon's favour.

After the Treaty of Lunéville (1801), Charles became president of the Austrian Hofkriegsrat ("Supreme War Council") and generalissimo with wide powers. The only general who had vanquished the French, he discarded Austria's old military system and initiated a far-reaching program of reforms that included the adoption of the "nation-in-arms" principle, the utilization of French military organization and tactics, and the founding of military academies. Not yet ready but nevertheless a formidable force, the Austrian army under Charles crushed Napoleon at Aspern-Essling but was again defeated in the desperately fought battle of Wagram in 1809.

Retiring during that year, Charles took no further part in the Napoleonic struggles. His military writings, especially his *Grundsätze der Strategie erläutert durch die Darstellung des Feldzuges von 1796 in Deutschland,* 3 vol. (1814; "Principles of Strategy, Explained Through the Description of the Campaign of 1796 in Germany"), exercised considerable influence on his contemporaries. In contrast to his aggressive and daring conduct of actual operations, Charles's writings emphasized caution and the importance of strategic points and were somewhat antiquated even in his own time.

Charles, PRINCE OF WALES, in full CHARLES PHILIP ARTHUR GEORGE, PRINCE OF WALES AND EARL OF CHESTER, DUKE OF CORNWALL, DUKE OF ROTHESAY, EARL OF CARRICK AND BARON OF RENFREW, LORD OF THE ISLES AND GREAT STEWARD OF SCOTLAND (b. Nov. 14, 1948, Buckingham Palace, London, Eng.), heir apparent to the British throne, eldest child of Queen Elizabeth II and Prince Philip, Duke of Edinburgh.

Beginning his primary education with tutors at Buckingham Palace, Charles enrolled in 1956 in day classes at Hill House, a private school in London. From 1957 to 1962 he attended Cheam School in Headley, Hampshire, and from 1962 to 1967 took preparatory schooling at the austere Gordonstoun School on the Moray coast of Scotland (which his father, Prince Philip, had also attended); from January to September 1966 he was also an exchange student at Timbertop, a bush outpost of Geelong Grammar School in Victoria, Australia. In 1967 he entered Trinity College, Cambridge, and in 1971 took a bachelor's degree, the first ever by an heir to the British crown. He also spent a term at the University College of Wales at Aberystwyth, learning Welsh in preparation for his investiture as prince of Wales on July 1, 1969, at Caernarvon Castle. He then attended the Royal Air Force College (becoming an excellent flyer) and the Royal Naval College, Dartmouth, and, from 1971 to 1976, took a tour of duty with the Royal Navy.

On July 29, 1981, Charles married Lady Diana Frances Spencer (*see* Diana, Princess of Wales), daughter of the 8th Earl Spencer. Their first child, Prince William of Wales (b. June 21, 1982), became at his birth second in line of succession to the throne. Their second child, Prince Henry Charles Albert David, was born on Sept. 15, 1984. On Dec. 9, 1992, it was announced that Charles and Diana had decided to separate but would continue to fulfill their public duties and to share the responsibility of rearing their sons.

Unwilling to act as a mere "ribbon cutter" until his accession to the throne, Charles became involved in a number of social issues, one of which was architectural style. He much preferred traditional architectural styles to modern, stating that "if we help to re-create places where people can walk in comfort and security and can look about and be entertained by buildings that are tuned to the eye; if we encourage a renaissance of craftsmanship and the art of embellishing buildings for man's pleasure and for the sheer joy in beauty itself, as opposed to mere functionalism, then we shall have made our cities centres of civilization once again." His book on British architecture, *A Vision of Britain,* was published in 1989.

Charles MARTEL, Latin CAROLUS MARTELLUS, German KARL MARTELL (b. *c.* 688—d. Oct. 22, 741, Quierzy-sur-Oise, France), mayor of the palace of Austrasia (the eastern part of the Frankish kingdom) from 715 to 741, who reunited and ruled the entire Frankish realm and stemmed the Saracen invasion at Poitiers in 732. His byname, Martel, means "the hammer." A man of valiant determination, ambition, and ability, he strove incessantly to consolidate his power.

Background. After the death of Dagobert I in 639, there had been no king of any worth in the Frankish kingdom. All of them were of the Merovingian line—idle, slothful, and bent on ease and luxury. The burden of rule lay upon the mayors of the palace, who in reality governed Austrasia, the eastern part of the Frankish kingdom, and Neustria, its western portion. These mayors not only controlled routine in the royal palace but also directed the political, social, and commercial life of the Franks. Neustria bitterly resented its conquest and annexation in 687 by Pepin of Herstal, mayor of Austrasia and father of Charles Martel, at the Battle of Tertry (Testry), near Péronne.

When in 714 Pepin of Herstal died, he left as heirs three grandsons, his legitimate children all being dead. Until his grandchildren came of age, Plectrude, Pepin's widow, was to hold power. As an illegitimate son, Charles Martel was entirely neglected in the will. But he was young, strong, and determined, and a struggle for control at once began between him and Plectrude.

Both Charles and Plectrude faced rebellion throughout the Frankish kingdom when Pepin's will was made known. The king, Chilperic II, was in the power of Ragenfrid, mayor of the palace of Neustria, who joined forces with an enemy of the Franks, Radbod, king of the Frisians in Holland, in order to eliminate Charles. Plectrude managed to imprison Charles, but he escaped, gathered an army, defeated King Chilperic and Mayor Ragenfrid, and conquered the hostile Neustrians. His success made resistance by Plectrude and the Austrasians useless; realizing the spirit and power of young Charles, they submitted, and by 719 Charles alone governed the Franks as mayor. Peace and order reigned in Austrasia and Neustria, so that by 724 Charles was free to deal with hostile elements elsewhere. This involved expeditions against the Saxons and the peoples of the lands near the Rhine and the Danube.

Battle of Poitiers. Charles next crossed the Loire into Aquitaine, where one Eudes (Odo) was duke. Eudes, once an ally of Charles, had become disloyal and promptly called to his aid the Saracens, Moors from Africa, who, entering Spain in 711, had soon conquered it and were now (732) threatening Gaul. Led by their king, 'Abd ar-Rahmān, they marched for Bordeaux, there to burn churches and to plunder. From Bordeaux they went across Aquitaine to Poitiers. It was outside this city that Charles Martel came upon them and put them to flight.

In 733 Charles forced Burgundy to yield to his rule, and in 734 he subdued the Frisians. During 735 word arrived that Eudes was dead, and Charles marched rapidly across the Loire River in order to make his power felt around Bordeaux. In 736 he fought to secure his conquest of Burgundy, and there were further engagements against the Saracens during the 730s.

Charles Martel's health began to fail in the late 730s, and in 741 he retired to his palace at Quierzy-sur-Oise, where he died soon after. Before his death he divided the Merovingian kingdom between his two legitimate sons, Pepin and Carloman. He had maintained the fiction of Merovingian rule all of his life, refraining from transferring the royal title to his own dynasty. (E.S.D./Ed.)

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Charles OF ANJOU: *see* Charles I *under* Charles (Naples); Charles II *under* Charles (Naples).

Charles OF ARAGON: *see* Viana, Carlos de Aragon, príncipe de.

Charles OF BLOIS: *see* Charles *under* Charles (Brittany).

Charles OF FRANCE (b. Dec. 28, 1446—d. May 28, 1472), duke of Berry, of Normandy,

and of Guyenne, who fought in the coalitions against his brother King Louis XI of France.

The last son of King Charles VII, Charles of France was given the duchy of Berry on his father's death in 1461. Pressed by councillors, however, the young prince allied himself with Charles the Bold of Burgundy, the dukes of Brittany and Bourbon, and other nobles in the League of the Public Weal (1465), all of whom sought to resist King Louis's severe and arbitrary attempts to reduce their power. After chasing Charles of France from Normandy (1466), the King gave him the duchy of Guyenne (1469). Charles died as another coalition was being formed (1472); Louis XI was accused of having had him poisoned, but no proof ever developed.

Charles OF LUXEMBOURG: *see* Charles IV *under* Charles (Germany/Holy Roman Empire).

Charles OF PROVENCE: *see* Charles *under* Charles (Provence).

Charles OF VALOIS: *see* Charles *under* Charles (Anjou/Maine).

Charles THE BAD: *see* Charles II *under* Charles (Navarre).

Charles THE BALD: *see* Charles II *under* Charles (Germany/Holy Roman Empire); Charles IV *under* Charles (France).

Charles THE BOLD: *see* Charles *under* Charles (Burgundy); Charles I (or II) *under* Charles (Lorraine).

Charles THE FAIR: *see* Charles IV *under* Charles (France).

Charles THE FAT: *see* Charles III *under* Charles (Germany/Holy Roman Empire).

Charles THE GOOD: *see* Charles *under* Charles (Flanders).

Charles THE GREAT: *see* Charlemagne; Charles II *under* Charles (Lorraine).

Charles THE LAME: *see* Charles II *under* Charles (Naples).

Charles THE MAD: *see* Charles VI *under* Charles (France).

Charles THE SIMPLE: *see* Charles III *under* Charles (France).

Charles THE VICTORIOUS: *see* Charles VII *under* Charles (France).

Charles THE WELL-BELOVED: *see* Charles VI *under* Charles (France).

Charles THE WELL-SERVED: *see* Charles VII *under* Charles (France).

Charles THE WISE: *see* Charles V *under* Charles (France).

Charles, THE YOUNG PRETENDER: *see* Charles Edward, the Young Pretender.

Charles, Ezzard (Mack) (b. July 7, 1921, Lawrenceville, Ga., U.S.—d. May 28, 1975, Chicago), American world heavyweight boxing champion from Sept. 27, 1950, when he outpointed Joe Louis in 15 rounds in New York City, to July 18, 1951, when he was knocked out by Jersey Joe Walcott in seven rounds in Pittsburgh.

He won several amateur championships, including two Golden Gloves crowns—welterweight, 1938, and middleweight, 1939—before turning professional in 1940. Before winning the heavyweight championship, he had won the National Boxing Association title by defeating Walcott on June 22, 1949. In attempts to regain the world championship, he lost to Walcott in 1952 and twice to Rocky Marciano in 1954. From 1940 to 1959, Charles fought 122 bouts, winning 96, 58 by knockouts.

Charles, Jacques-Alexandre-César (b. Nov. 12, 1746, Beaugency, Fr.—d. April 7, 1823, Paris), French mathematician, physicist, and inventor who, with Nicolas Robert, was the first to ascend in a hydrogen balloon (1783). About 1787 he developed Charles's law (*q.v.*) concerning the thermal expansion of gases.

From clerking in the finance ministry Charles turned to science and experimented with electricity. He developed several inventions, including a hydrometer and reflecting goniometer, and improved the Gravesand heliostat and Fahrenheit's aerometer. With the Robert



Jacques Charles, engraving, 18th century
Giraudon—Art Resource/EB Inc

brothers, Nicolas and Anne-Jean, he built one of the first hydrogen balloons (1783). In several flights he rose more than a mile in altitude. He was elected (1795) to the Académie des Sciences and subsequently became a professor of physics. His published papers deal mainly with mathematics.

Charles, Ray, original name RAY CHARLES ROBINSON (b. Sept. 23, 1930, Albany, Ga., U.S.), American pianist, singer, composer, and bandleader, a leading black entertainer billed as "the Genius." Charles was credited with the early development of soul, a style based on a melding of gospel, rhythm and blues, and jazz music.

When Charles was an infant his family moved to Greenville, Fla., and he began his musical career at age five on a piano in a neighbourhood café. He began to go blind at six, possibly from glaucoma, completely losing his sight by age seven. He attended the State School for the Blind in St. Augustine, where he concentrated on musical studies, but left school at age 15 to play professionally after his mother died from cancer (his father had died when the boy was 10).

Charles built a remarkable career based on the immediacy of emotion in his performances. After emerging as a blues and jazz pianist indebted to Nat King Cole's style in the late 1940s, Charles recorded the boogie-woogie classic "Mess Around" and the novelty song "It Should've Been Me" in 1952–53. His arrangement for Guitar Slim's "The Things That I Used to Do" became a blues million-seller in 1953. By 1954 Charles had created a successful combination of blues and gospel influences and signed on with Atlantic Records. He made such hit records as "I've Got a Woman," "Hallelujah I Love You So," and "What'd I Say," which led the rhythm and blues sales charts in 1959 and was Charles's own first million-seller.

Charles's rhythmic piano playing and band arranging revived the "funky" quality of jazz, but he also recorded in many other musical genres. He entered the pop market with the best-sellers "Georgia on My Mind" (1960) and "Hit the Road, Jack" (1961). His album *Modern Sounds in Country and Western Music* (1962) sold more than 1,000,000 copies, as did its single, "I Can't Stop Loving You." Thereafter his music emphasized jazz standards and renditions of pop and show tunes.

From 1955 Charles toured extensively in the U.S. and elsewhere with his own big band and a gospel-style female back-up quartet called The Raeletts. He also appeared on television and worked in such films as *Ballad in Blue* (1964) and *The Blues Brothers* (1980) as featured act and sound track composer. He formed his own custom recording labels, Tangerine in 1962 and Crossover Records in 1973. Among many national and international awards, he received 10 Grammy Awards for recording excellence. He published an autobiography, *Brother Ray, Ray Charles' Own Story* (1978), written with David Ritz.

Charles, Thomas (b. Oct. 14, 1755, Pantdwin, near St. Clears, Carmarthenshire, Wales—d. Oct. 5, 1814, Bala, Merionethshire), Welsh religious leader, a founder of Calvinistic Methodism in Wales and an inspirer of missionary activities.

Educated at the dissenting academy in Carmarthen and at Jesus College, Oxford, after holding curacies in Somerset, he settled in 1783 in the neighbourhood of Bala, his wife's home. He failed to find a living in the established Anglican church, but his wife's shop provided some economic security. In 1784 he joined the Methodist society at Bala and became, in effect, a free-lance minister.

From his student days he had been under the influence of the Methodist revival, and he was deeply committed to evangelism and education. Training teachers himself, he set up numbers of schools, which at first circulated but soon settled into Sunday schools. He compiled a dictionary of the Bible and edited a quarterly magazine, both in Welsh; he composed a catechism in Welsh and English and set up a printing press at Bala. He helped to found both the British and Foreign Bible Society (1804), which printed a Welsh Bible in 1806, and the London Missionary Society. In Wales, Methodism was still nominally within the Church of England, but few clergy besides Charles were sympathetic. The rapid growth of Methodist societies and associations as a result of his labours led, insensibly yet inevitably, to the demand for a separate organization with its own ministers. Charles, who like Wesley never repudiated his own episcopal orders, long opposed this, but in 1811 he drew up a form of ordination and himself ordained eight lay preachers.

Charles Albert (elector of Bavaria): *see* Charles VII *under* Charles (Germany/Holy Roman Empire).

Charles Albert, Italian CARLO ALBERTO (b. Oct. 2, 1798, Turin, Piedmont, French Republic—d. July 28, 1849, Oporto, Port.), king of Sardinia–Piedmont (1831–49) during the



Charles Albert of Sardinia–Piedmont, detail of a portrait by Horace Vernet; in the Pinacoteca, Turin, Italy
Alinari—Art Resource/EB Inc

turbulent period of the Risorgimento, the movement for the unification of Italy. His political vacillations make him an enigmatic personality.

Exiled from Italy, Charles Albert, who belonged to a collateral branch of the House of

Savoy, was brought up in Paris and Geneva, where he was exposed to the ideas of the French Revolution. Succeeding his father as prince of Carignano in 1800, he was named count by Napoleon in 1810. When his cousin Victor Emmanuel I was restored to the throne of Piedmont, Charles Albert returned to Milan, where the young liberals sought his aid in persuading the King to grant a popular constitution. After the revolution in Naples (1820), a plot against the King materialized. After consenting on March 6, 1821, to lead it, Charles Albert the next day refused to participate directly in the conspiracy. The coup erupted on March 10, Victor Emmanuel abdicated on the 13th, and Charles Albert was appointed regent until the arrival of the new king, Charles Felix. Charles Albert promptly promulgated a liberal constitution, which was, however, annulled by Charles Felix, who arrested the Regent and quelled the rebellion. Charles Albert then fought with the French to reinforce the monarchy in Spain (1823).

After Charles Felix' death in 1831, Charles Albert ascended the throne, giving new hope to the liberals. Yet he failed to pardon his accomplices in the plot of 1821 and harshly repressed a conspiracy in 1833. He was fiercely anti-Austrian, shunning the Austrophile reactionary party, however, and, though a believer in the divine right of kings, still considered himself the popular liberator of Italy. He mitigated the harsh administration of his country and accelerated its economic and social development.

After the election of the liberal Pius IX as pope and the Austrian occupation of Ferrara, Charles Albert sought to lead the liberation of Italy. He replaced his reactionary Cabinet with a reformist one (1847) and was soon forced by the spread of revolutionary ideas to grant a statute for representative government (March 5, 1848).

When the Milanese revolution against the Austrians (March 18–22) raised the question of war with Austria, Charles Albert at first hesitated, but then declared war. After enjoying great successes through the beginning of June, he remained inactive for more than a month, confused by political conflicts between the various Italian states and shifting foreign alliances. This respite allowed the Austrians to reorganize and mount a vigorous counteroffensive. Defeated decisively at Custoza, and then at Milan, the King was forced to sign the armistice of Salasco on August 9.

Republican and nationalist forces, however, agitated ever more strongly for a new war with Austria. Seeking to vindicate his past failures, Charles Albert broke the armistice with Austria on March 12, 1849. Promptly defeated at Novara on March 23, he abdicated in favour of his son Victor Emmanuel II. He exiled himself to Portugal.

Charles Augustus, German KARL AUGUST (b. Sept. 3, 1757, Weimar, Eisenach—d. June 14, 1828, Schloss Graditz, near Torgau, Weimar), grand duke (Grossherzog) of Saxe-Weimar-Eisenach, a liberal, enlightened ruler and patron of Johann Wolfgang von Goethe. He made his court and the University of Jena leading intellectual centres of Germany during the late 18th and early 19th centuries.

Introduced to Goethe in 1774, Charles Augustus formed a lifelong friendship with the poet, who shared the Grand Duke's patronage at Weimar with such other intellectuals as the philosophers Johann Gottfried von Herder, Friedrich Schelling, and G.W.F. Hegel, and the poet Friedrich Schiller.

A supporter of Prussia, Charles Augustus took part in the wars against Revolutionary



Charles Augustus, detail from an engraving by Heinrich Josef Mansfeld, early 19th century
By courtesy of Bild-Archiv, Osterreichische Nationalbibliothek, Vienna

France. After the battles of Jena and Auerstädt (1806), he was forced to join the Napoleonic Confederation of the Rhine. In 1813, however, he sided once again with a resurgent Germany, commanding a corps against Napoleon in the Netherlands. Weimar's territories were increased at the Congress of Vienna (1815), and he became a grand duke; but he protested the congress' reactionary spirit. The following year he granted his state a liberal constitution, becoming the first German ruler to do so.

Guaranteeing complete freedom of the press, the document made Weimar a focus for journalistic agitation against the prevailing conservatism of the system established at Vienna until Russian, Prussian, and Austrian pressure and the repressive Carlsbad Decrees (1819), passed by a conference of ministers of the more important German states, forced Charles Augustus to curtail his subjects' liberties once again. Nevertheless, his patronage of the Allgemeine Deutsche Burschenschaft (Young Germany Movement), a liberal, idealistic student association, from 1818 helped launch that organization into national prominence.

Charles City, county, eastern Virginia, U.S., occupying an area of 204 sq mi (528 sq km) in the Tidewater region, southeast of Richmond, between the Chickahominy and James rivers which unite at its southeastern border. One of Virginia's eight original shires, it was formed in 1634 and named for Charles City at Bermuda Hundred (Chesterfield County). It has some of Virginia's oldest and most historic plantations, notably Berkeley, Westover, Greenway, and Shirley. At Berkeley or Harrison's Landing, where some claim the first Thanksgiving was observed on Dec. 4, 1619, is the ancestral home of Benjamin Harrison, signer of the Declaration of Independence, and of two U.S. presidents—William Henry Harrison (9th) and Benjamin Harrison (23rd). During the Civil War, Berkeley was headquarters (1862) of Union General McClelland, and while quartered there Maj. Gen. Daniel Butterfield composed the bugle call "Taps." The county courthouse (1730) is in the hamlet of Charles City (the county seat), and Greenway, immediately to the west, is the birthplace (1790) of John Tyler, 10th president of the U.S. At Shirley, Ann Hill Carter, mother of Confederate general Robert E. Lee, was born and there she married "Light-Horse Harry" Lee.

The county is tied to Richmond economically, and truck, dairy, and poultry farming are the main pursuits. Pop. (1990) 6,282.

Charles City, city, seat (1854) of Floyd county, northern Iowa, U.S., on the Cedar River, 29 mi (47 km) east-southeast of Mason City. Settled in 1850 by Joseph Kelly, from Monroe, Wis., who named it for his son, it was called Charlestown and St. Charles before receiving its present name. The McGregor and Western Railroad arrived in 1869. In 1901 Charles Hart and Charles Parr produced there one of the first gasoline traction engines for agricultural and industrial use. The city is a railroad junction and a trade centre with manufacturing and agricultural-based industries.

Near Nashua, 10 mi southeast, is the Little Brown Church in the Vale where many couples come each year to wed; it was made famous (1857) by William Savage Pitts in his song "The Church in the Wildwood." Inc. 1869. Pop. (1990) 7,878.

Charles Edward, THE YOUNG PRETENDER, in full CHARLES EDWARD LOUIS PHILIP CASIMIR STUART, byname YOUNG CHEVALIER, or BONNIE PRINCE CHARLIE (b. Dec. 31, 1720, Rome—d. Jan. 31, 1788, Rome), last serious Stuart claimant to the British throne and leader of the unsuccessful Jacobite rebellion of 1745–46.

Charles's grandfather was the exiled Roman Catholic king James II (ruled 1685–88), and his father, James Edward, the Old Pretender, affected in exile the title King James III. Charles was reared a Catholic and trained in the arts of war. In 1744, during the War of



Charles Edward, detail from an oil painting after M.Q. de La Tour, c. 1745; in the Scottish National Portrait Gallery, Edinburgh
By courtesy of the Scottish National Portrait Gallery, Edinburgh

the Austrian Succession (1740–48), he joined a vast French fleet that was torn apart by a storm before it could invade England.

Unable to obtain more French aid, Charles decided to set off on his own to regain the crown. He landed with a tiny force of about a dozen men on the west coast of Scotland in July 1745 and raised the Highlands in revolt. On September 17, with about 2,400 men, he entered Edinburgh. Four days later he routed Sir John Cope's army at Prestonpans, near Edinburgh; early in November, with 5,500 men, he crossed the English border and headed toward London. Charles advanced as far as Derby before his officers, discouraged by lack of French and English support and frightened by the prospect of facing 30,000 government troops, forced him to retreat into Scotland. His troops melted away, and on April 16, 1746, William Augustus, duke of Cumberland, decisively defeated him at Culloden Moor, Inverness-shire. For the next five months Charles was relentlessly pursued by British soldiers. Finally, helped by loyal supporters (in particular, Flora Macdonald [*q.v.*], he escaped by ship to France (September 1746).

Charles wandered around Europe trying to revive his cause, but his drunken, debauched behaviour alienated his friends. After he settled in Italy in 1766, the major Roman Catholic powers repudiated his title to the British throne. Romanticized through ballads and legends, "Bonnie Prince Charlie" became a national hero of Scotland. See David Daiches, *Charles Edward Stuart* (1973).

Charles Emmanuel, Italian CARLO EMANUELE, French CHARLES-EMMANUEL, name of dukes of Savoy and kings of Sardinia grouped below chronologically and indicated by the symbol •.

• Charles Emmanuel I, byname CHARLES EMMANUEL THE GREAT, Italian CARLO EMANUELE IL GRANDE (b. Jan. 12, 1562, Rivoli, Savoy—d. July 26, 1630, Savigliano), duke of Savoy who alternated alliances with France and Spain, taking advantage of the



Charles Emmanuel I, detail of a lithograph

By courtesy of the Museo Centrale del Risorgimento, Rome

European power struggle in order to further his expansionist policy. A skilled soldier and shrewd politician, he was a capable ruler of Savoy, governing with moderation, promoting commercial development, and making his court a centre of culture.

Although his pretensions to the throne of France were rejected, Charles Emmanuel benefitted from unrest in that country to seize the marquisate of Saluzzo (1588) and to invade Provence. The new French king Henry IV, however, waged a successful war against him, forcing him to cede three of his dynasty's possessions to the French, though he was allowed to retain Saluzzo. The defeated duke turned his attentions on Geneva but failed in his surprise attack in December 1602.

By the Treaty of Bruzolo (April 1610), Charles Emmanuel aligned himself with the French against the Spanish and Austrian Habsburgs in exchange for a free hand in Lombardy. Although Henry IV's assassination aborted this alliance, Charles Emmanuel seized Monferrato from the Spanish in 1613, provoking a war that lasted until 1617, when he was forced to relinquish the duchy. In the Thirty Years' War, Charles Emmanuel, on the promise of the imperial crown, allied himself with the enemies of the Habsburgs. Yet in December 1627, when he was promised Monferrato, he went over to the Spanish side. After suffering a serious defeat at the hands of the French in March 1629, he died, leaving his state prey to the warring armies.

• Charles Emmanuel II (b. June 20, 1634, Turin, Savoy—d. June 12, 1675, Turin), duke of Savoy from 1638 to 1675, during a period of restoration and consolidation in the whole of Piedmont.

A younger son of Victor Amadeus I of Savoy, Charles Emmanuel acceded at the age of four on the death of his brother, Francis Hyacinth, who had reigned as duke for a year. Charles Emmanuel's minority ended in 1648, but he did not truly rule until the death of his regent mother in 1653. In 1655 and again in 1663–64, shocking Protestant Europe, he waged a campaign of persecution against the Waldenses, conducting massacres against the mountaineers. He tried to improve the army and made war upon Genoa in 1671–73, but without result, peace being concluded through the mediation of King Louis XIV of France. He also sought internal improvements, enlarging and embellishing the capital of Turin.

• Charles Emmanuel III (b. April 27, 1701, Turin, Savoy—d. Feb. 20, 1773, Turin, Kingdom of Sardinia), king of Sardinia–Piedmont and an extremely skilled soldier whose aid other European countries often solicited for the many wars of his time.

Having received a military and political education, Charles Emmanuel succeeded his father, Victor Amadeus II, in 1730. During the War of the Polish Succession (1733–38) he joined the side of France and Spain, occupied Milan, and scored a brilliant success at Guastalla (Sept. 19, 1734). By the ensuing Treaty of Vienna he obtained Novara and Tortona (1738).

During the War of the Austrian Succession (1740–48), which engaged the whole European continent, Charles Emmanuel fought against the Spanish, seeing that they, as did he, had designs on Milan. An astute negotiator, he was able to obtain Vigevano in the Treaty of Aix-la-Chapelle (1748).

He declined to participate in the Seven Years' War (1756–63), concentrating instead on instituting various administrative reforms and maintaining a well-disciplined army.

• Charles Emmanuel IV (b. May 24, 1751, Turin, Kingdom of Sardinia—d. Oct. 6, 1819, Rome), weak but religious king of Sardinia–Piedmont who was forced to abdicate to the French after ruling for only six years.

Charles Emmanuel succeeded to the throne vacated by his father, Victor Amadeus III, on Oct. 14, 1796. When his kingdom was disturbed by several republican uprisings in 1797, he became unpopular for executing revolutionaries, including many Jacobins, who introduced radical French ideals.

An opponent of the French Revolution, Charles Emmanuel was forced to cede all his mainland possessions to France by the French general B. C. Joubert (Dec. 9, 1798). Charles Emmanuel then retired to Sardinia with his wife. When Naples was overrun by the French (1799), he gave up hope of being restored and went to Rome, where he finally abdicated his throne (June 4, 1802) to his brother Victor Emmanuel I and joined a religious society.

Charles Felix, Italian CARLO FELICE (b. April 6, 1765, Turin, Kingdom of Sardinia—d. April 27, 1831, Turin), duke of Savoy and king of Sardinia–Piedmont (1821–31).

The 11th child of Victor Amadeus III, he succeeded to his position when his brother Victor Emmanuel I abdicated in the face of an uprising of revolutionaries who demanded a new constitution. The revolution collapsed upon the intervention of Austrian troops, however, and Charles Felix ruled as an absolute sovereign for 10 years. He was the last ruler of the main Savoy line, being succeeded by Charles Albert.

Charles Frederick, German KARL FRIEDRICH (b. Nov. 22, 1728, Karlsruhe, Baden—d. June 11, 1811, Karlsruhe), grand duke of Baden, a conscientious and liberal ruler who made his territories into a model of prosperity and effective government through his reforms based on the ideas of the Enlightenment.

Charles Frederick succeeded to the margravate of Baden-Durlach in 1746, and his reforms soon attracted attention throughout Germany and Europe. He emancipated the peasantry, eliminated torture, and separated insane asylums from prisons. He also established schools and encouraged agriculture, industry, and handicrafts. A truly enlightened ruler, he met and corresponded with such men as Goethe, Voltaire, and the botanist Carolus Linnaeus.

Charles Frederick opposed Revolutionary France but was forced to sign a truce with it. As a result, he saw his territories enlarged and became grand duke in 1806. His last great legal reform was the introduction of the Code Napoléon into his lands.

Charles Island (Galápagos Islands): *see* Santa María Island.

Charles River, river, eastern Massachusetts, U.S., the longest river wholly within the state; it meanders slightly more than 80 mi (130 km) from its source near Hopkinton in southwestern Norfolk County to its mouth on Boston Harbor. The river follows a winding course (north, east, northwest and east) past Cambridge and Boston to the west side of the harbour. The river is navigable for about 10 mi from there to Watertown; the dam near its mouth has locks. The Charles River Embankment section, also known as Storrow Drive, provides footpaths, fishing sites, playgrounds, a music shell for summer concerts, and ample greensward for sunbathing. Swimming and canoeing are popular sports, and college crews sail and row along the river. The Charles's riverfront was the scene of renovation and development in the late 1970s.

Charles Robert OF ANJOU (king of Hungary): *see* Charles I *under* Charles (Hungary).

Charles Theodore, German KARL THEODOR (b. Dec. 1, 1724, Droogenbosch, near Brussels—d. Feb. 16, 1799, Munich), elector (1742–77) of the Palatinate branch of the House of Wittelsbach and thereafter (1777–99) of the united Palatinate lands after inheriting Bavaria. The latter inheritance touched off the battleless War of the Bavarian Succession.

The son of Count Palatinate John Christian Joseph, Charles Theodore ruled Sulzbach after his father's death in 1733 and then succeeded to the electorship of the Palatinate after his kinsman Elector Charles Philip died without male issue on Dec. 31, 1742. With the exception of two small pieces, the whole of the Palatinate was united under one ruler, a prince of refined and educated tastes, a patron of the arts, and a beautifier of the new capital of Mannheim.

On Dec. 30, 1777, the Bavarian line of the Wittelsbachs became extinct, and the succession passed to Charles Theodore. After a separation of four and a half centuries, the Palatinate (to which the duchies of Jülich and Berg had been added) was thus reunited with Bavaria.

Bavaria's new strength, however, was intolerable to neighbouring Austria, which immediately laid claim to a number of lordships, alleging them to be lapsed fiefs of the Bohemian, Austrian, and imperial crowns. These were at once occupied by Austrian troops, with the secret consent of Charles Theodore himself, who was without legitimate heirs, and wished to obtain from the emperor Joseph II the elevation of his natural children to the status of princes of the empire. The protests of the next heir, Charles, duke of Zweibrücken, supported by the King of Prussia, led to the War of the Bavarian Succession. By the Peace of Teschen (May 13, 1779) a parcel of land was ceded to Austria, and the succession secured to Charles of Zweibrücken.

For Bavaria itself Charles Theodore did little. He felt himself a foreigner among foreigners, and his favourite scheme, the subject of endless intrigues with the Austrian Cabinet and the immediate cause of Frederick II's League of Princes (*Fürstenbund*) of 1785, was to try to exchange Bavaria for the Austrian Netherlands and the title of king of Burgundy; the plan never succeeded. For the rest, the enlightened internal policy of his predecessor was abandoned. The government was inspired by the narrowest clericalism, which culminated in the attempt to withdraw the Bavarian bishops from the jurisdiction of the great German metropolitans and place them directly under that of the pope.

In 1792 the French revolutionary armies overran the Palatinate; in 1795 the French, under Jean-Victor Moreau, invaded Bavaria itself, advanced to Munich, and laid siege to Ingolstadt. Charles Theodore, who had done

nothing to resist the invasion, fled to Saxony, leaving a regency, the members of which signed a convention with Moreau, by which he granted an armistice in return for a heavy contribution (Sept. 7, 1796). Immediately afterward Charles Theodore was forced to retire, though he remained titular elector until his death.

Charles Town, city, seat (1801) of Jefferson county, eastern panhandle of West Virginia, U.S. The city lies 16 miles (26 km) southeast of Martinsburg. Laid out (1786) by George Washington's brother Charles, it early became the residence of some of Virginia's most aristocratic families. Many of their homes have been restored. The Abolitionist John Brown was tried and hanged there in 1859 following his raid on nearby Harpers Ferry. Charles Town was badly damaged during the American Civil War, but in 1871 it again became the county seat (which had been removed to Shepherdstown). Mainly residential, the city is now the trade centre for an agricultural and horse-breeding area. Just northwest is the industrial town of Ranson. Thoroughbred racing meets take place in the spring and fall. The city's historic landmarks include the Jefferson County Courthouse (1836), scene of John Brown's trial, and various homes of members of the Washington family, including Harewood, home of Samuel Washington, where Dolley Payne Todd was married to James (later President) Madison. Inc. 1872. Pop. (1990) 3,122.

Charles University, Czech UNIVERSITA KARLOVA, also called UNIVERSITY OF PRAGUE, state-controlled institution of higher learning in Prague, Czech Republic. The school was founded in 1348 by the Holy Roman emperor Charles IV, from whom it takes its name. It was the first university in central Europe. Among its buildings, scattered throughout Prague, is the Carolinum, one of the oldest existing university buildings in the world.

An early rector of the university, elected in 1409, was the Bohemian religious reformer Jan Hus. During the 17th century, the Jesuits renamed the institution Charles-Ferdinand University after the Holy Roman emperor Ferdinand II, who placed the university under their control, but in the late 18th century, a period of Jesuit suppression, it became a state institution. In 1882 it was divided into separate Czech and German institutions, each called Charles-Ferdinand. When the university was reopened after World War II (1945), the German university was abolished.

Charles University comprises faculties of mathematics and physics, natural science, general medicine, pediatrics, humanities, law, journalism, and education. Also attached are the Astronomical Institute and the Institute of Teacher Education.

Charles William Ferdinand, German KARL WILHELM FERDINAND (b. Oct. 9, 1735, Wolfenbüttel, Lower Saxony [Germany]—d. Nov. 10, 1806, Ottensen, near Hamburg), duke of Brunswick-Lüneburg-Wolfenbüttel, Prussian field marshal, and an enlightened ruler. Though he was Frederick II the Great's favourite disciple, Charles proved to be less than successful in his military career, being defeated by Revolutionary France at Valmy (1792) and at Auerstädt (1806), at which time the whole Frederician military-political system collapsed and Prussia became a French dependency.

The son of Charles I of Brunswick-Lüneburg and Philippina Charlotte, a sister of Frederick II of Prussia, Charles was educated in the classical, rationalist tradition. Distinguishing himself in the Seven Years' War, which involved the struggle for supremacy in Germany between Austria and Prussia, he became Frederick the Great's favourite. After inheriting the small, debt-ridden duchy in 1780, Charles set out to reform his territories. He reorganized the tax structure, set his finances in order, and reformed the educational system. Most of these efforts were thwarted, however, by the determined resistance of the clergy and nobility.

Made a Prussian field marshal in 1787, Charles defeated the Dutch democratic Patriots in a campaign that returned the stadtholder William V of Orange to power. His reputation as a field commander established, Charles in 1792 reluctantly accepted command of the Prussian army against Revolutionary France. His cultural tastes being decidedly French, Charles was not unsympathetic to the Revolution and had in fact been approached by France to reorganize that country's army. Only reluctantly did he sign the punitive "manifesto" drafted by an émigré, which tried to intimidate Revolutionary France into submission. Charles's cautious advance was stopped at Valmy. The next year he defeated the French several times in Germany, but he retired after incessant quarrels with King Frederick William III. Recalled to the Prussian high command in 1806, he was decisively defeated at the Battle of Auerstädt, which sealed the triumph of Napoleonic France over Prussia. Charles himself was mortally wounded and died shortly afterward.

Charlesbourg, city, Québec region, southern Quebec province, Canada. It lies just northwest of the city of Quebec. First known as Bourg Royal and later renamed in honour of its patron saint, Charles Borromée, it is one of the oldest settlements in the province (founded 1659). Though once a dairying, fruit-growing, and poultry-raising centre, Charlesbourg is now primarily a residential suburb of Quebec. Quebec Zoological Garden is nearby. The new city of Charlesbourg, created in 1976, has absorbed Charlesbourg-Est, Notre-Dames-des-Laurentides, and Orsainville. Inc. village, 1914; town, 1949; city, 1960; reincorporated, 1976. Pop. (1991) 70,788.

Charles's law, a statement that the volume occupied by a fixed amount of gas is directly proportional to its absolute temperature, if the pressure remains constant. This empirical relation was formulated by the French physicist J.-A.-C. Charles about 1787 and later by Joseph Gay-Lussac. It is a special case of the general gas law and can be derived from the kinetic theory of gases under the assumption of a perfect (ideal) gas. Measurements show that at constant pressure the thermal expansion of real gases, at sufficiently low pressure and high temperature, conforms closely to Charles's law. *See also* perfect gas.

Charles's Wain, group of stars within the constellation Ursa Major (*q.v.*).

Charleston, city, seat (1830) of Coles county, east-central Illinois, U.S. It lies near the Embarrass River in an agricultural region. First settled by Benjamin Parker (1826), it was named for Charles Morton, its first postmaster. Charleston was the scene of the fourth Lincoln-Douglas debate in September 1858. Charleston is primarily residential with some light manufactures (chiefly shoes). It is the seat of Eastern Illinois University (founded in 1895 as a state normal school). Lake Charleston and Fox Ridge State Park are situated a few miles southeast. Inc. village, 1835; city, 1865. Pop. (1991 est.) 20,598.

Charleston, city, seat of Charleston county, South Carolina, U.S. It is a major port on the Atlantic coast, a historic centre of Southern culture, and the hub of a large urbanized area that includes Mount Pleasant, St. Andrews, North Charleston, Hanahan, and Goose Creek. The city is situated on a peninsula between the estuaries of the Ashley and Cooper rivers, facing a fine deepwater harbour.

The settlement was originally called Charles Towne (for Charles II) and was established by English colonists in 1670 on the west bank of the Ashley, thus beginning the colonization of South Carolina. Moved to its present site in 1680, it became the commercial centre of trade in rice and indigo. In 1722 the settlement was briefly incorporated as Charles



The old homes of the Battery, Charleston, S.C.
Frank J. Miller

City and Port, and it was reincorporated as Charleston in 1783.

Charleston was the seat of the provincial congress in 1775 that created the state of South Carolina, and it was named the state capital the following year. In the American Revolution the city was held by the British from 1780 to 1782. It ceased to be the state capital in 1790, when the legislature moved to Columbia. Freed from British trade restrictions, Charleston throve as the chief winter port of the United States until the War of 1812. It had a large trade in the Caribbean and exported cotton and rice.

As the South's senior city, Charleston led the fight for states' rights from the beginning up to the formation of the Confederacy. South Carolina's ordinance of secession was passed in Charleston on Dec. 20, 1860, and the capture of Fort Sumter, in Charleston Harbor, by Confederates (April 12–14, 1861) precipitated the American Civil War. The city was blockaded by Union land and sea forces from July 10, 1863, to Feb. 18, 1865, the siege ending only when General William Tecumseh Sherman's advance forced the city's evacuation.

The completion of jetties through the harbour bar in 1896 provided Charleston with a deepwater entrance, and in 1901 a U.S. naval base was established on the Cooper River. The base was expanded in both World Wars I and II, and during the Cold War Charleston became heavily dependent on the national defense as it played host to a naval shipyard, naval supply and distribution centres, a Polaris missile base, and other facilities. The port's trade also expanded rapidly after World War II, and the nearby Santee-Cooper hydroelectric project (1942) aided the city's industrial development, which is now well diversified and includes paper and pulp mills, oil refineries, metalworking, and the manufacture of molded rubber products, cigars, and clothing. Charleston remains the financial and commercial centre of coastal South Carolina. The city was devastated by a powerful hurricane in September 1989, and its economy received a serious blow in 1993, when the naval shipyard and several other bases were slated for closure in the wake of the Cold War's end.

The city is the seat of the College of Charleston (1770), the Medical University of South Carolina (1824), The Citadel (a military college; 1842), Trident Technical College (1964), and Charleston Southern University (formerly the Baptist College at Charleston; 1964). Charleston's many old Colonial homes and churches, picturesque streets and courtyards, and notable parks and gardens recall its days as the chief city of the royal province of Carolina, and the city and its surroundings attract large numbers of tourists. Historic

buildings include Heyward-Washington House (1770), the Joseph Manigault House (1803), and the Dock Street Theatre (1736; reconstructed 1937). The city's cultural institutions include the Charleston Library Society (1748), the Carolina Art Association (1858), and the South Carolina Historical Society (1855). The College of Charleston was the nation's first municipal college, and the Charleston Museum (founded 1773) is the oldest museum in the United States.

The Battery (White Point Gardens), conspicuous for monuments and military relics, stands at the city's southern extremity, overlooking the rivers and the harbour. Fort Sumter National Monument, commemorating the first shot fired in the Civil War, is located 3 miles (5 km) southeast of Charleston, in the bay. Nearby are Middleton Place, a formal garden of the mid-18th century; Magnolia Gardens, noted for azaleas and camellias; and Cypress Gardens. Pop. (1991 est.) city, 82,104; Charleston MSA, 517,519.

Charleston, city, capital of West Virginia, U.S., and seat of Kanawha county. It is situated in the Allegheny Mountains, at the confluence of the Elk and Kanawha rivers (there bridged to South Charleston), in the central part of the state.

George Clendenin purchased the land in 1788 for less than $5, named the site Charles Town (renamed Charleston, 1818) for his father, and built Fort Lee. Because it lay on the migration route to the Ohio River valley, the settlement soon became a transshipment point



State Capitol, Charleston, W.Va., facing the Kanawha River
Charles May—Shostal

and attracted frontiersmen such as Daniel Boone and Simon Kenton. Charleston utilized local brine wells as early as 1795 and was an important salt centre in 1823, when the first steamboat arrived. Divided during the American Civil War, the city was occupied by Union troops after the Battle of Charleston (Sept. 13, 1862). Nominated as the state capital (1870), Charleston lost out to rival Wheeling for two years but won the honour in 1877.

Charleston lies in an area that is rich in bituminous coal, oil, and natural gas, as well as salt, and its chief economic support comes from the large chemical-manufacturing industry in the Kanawha River valley. Nylon, Lucite, and other base chemicals, from which consumer plastics have been developed, originated in the area.

The traditional Neoclassical-style State Capitol (completed 1932), designed by Cass Gilbert, houses a natural-history and art museum. The city is the seat of the University of Charleston (formerly Morris Harvey College; 1888). West Virginia State College (1891) is at Institute, 8 miles (13 km) west. The National Track and Field Hall of Fame was established (1974) in Charleston. Inc. 1794; city, 1870. Pop. (1991 est.) city, 57,646; Charleston MSA, 250,912.

Charleston, social jazz dance highly popular in the 1920s and frequently revived. Characterized by its toes-in, heels-out twisting steps, it was performed as a solo, with a partner, or in a group. Mentioned as early as 1903, it was originally a black folk dance known throughout the American South and especially associated with Charleston, S.C. Analysis of its movements shows it to have strong parallels in certain dances of Trinidad, Nigeria, and Ghana. In its early form the dance was highly abandoned and was performed to complex rhythms beaten out by foot stamps and handclaps. About 1920 professional dancers adopted the dance, and, after its appearance in the black musical *Runnin' Wild* (1923), it became a national craze. As a fashionable ballroom dance it lost some of the exuberance of the earlier version.

Charleston music is in quick $\frac{4}{4}$ time with syncopated rhythms. In the basic step the knees are bent, then straightened, as the feet pivot in and out. Weight is shifted from one leg to another, the free leg being kicked out from the body at an oblique angle. The basic step is often interspersed with strenuous movements, such as forward and backward kicks while traveling forward.

Charlestown, chief town and port on Nevis, an eastern Caribbean island in St. Kitts and Nevis, on a bay on the western coast. It became the chief town after Jamestown, Nevis' first settlement, was inundated by a tidal wave in 1680. In the late 18th century, Charlestown was both a naval base and a resort known for mineral waters. The town was almost destroyed by fire in 1873. The main industry is sugar milling. Notable buildings include Hamilton House, where Alexander Hamilton, a framer of the U.S. Constitution, was born, and the nearby ruins of Montpelier Estate, where the British naval hero Horatio Nelson was married. Pop. (1985 est.) 1,700.

Charlestown, section of Boston, Massachusetts, U.S. It is situated on a small peninsula between the estuaries of the Charles and Mystic rivers. The locality is dominated by several low hills, including the famous Bunker and Breed's hills. First settled in 1628, it originally comprised a large area, which was whittled away by the formation of new towns and cities until the remainder was finally annexed by Boston in 1874. Paul Revere crossed to the Charlestown shore on the evening of April 18, 1775, to begin his famous ride to Lexington. The British forces in Boston landed on that same shore on the morning of June 17, 1775, to be repulsed by the motley patriotic force that had dug in on Breed's Hill. The American forces finally withdrew, leaving most of Charlestown a smoldering ruin. The nearby Bunker Hill Monument, a 200-foot (60-metre) granite obelisk, commemorates the battle.

The U.S. Navy established one of its more important naval yards in Charlestown in 1800. Charlestown was the birthplace of Samuel F.B. Morse, inventor of the telegraph, and contains the grave of John Harvard, for whom Harvard University is named.

Charleville, town, south-central Queensland, Australia. It lies along the Warrego River at an elevation of 974 feet (297 m). The town was settled in 1842 and named for Charleville (Ráth Luirc), Ire. It developed as a service centre for the sheep belt. The first regular Qantas air route in Australia—between Charleville and Cloncurry—was inaugurated in 1922, and the town remains a major outback air base for the Royal Flying Doctor Service. Pop. (1991) 3,513.

Charleville-Mézières, twin towns, jointly capital of Ardennes *département*, Champagne-Ardenne *région*, northeastern France. They lie along the Meuse River, 52 miles (84 km) northeast of Reims and 9 miles (14 km) southwest of the Belgian frontier. The twin towns of Charleville and Mézières (formerly Maceriae, meaning "ramparts") were united into a single administrative unit in 1966, together with the *communes* of Mohan, Étion, and Montcy-Saint-Pierre. Mézières first belonged to the archbishops of Reims and then passed to the



The Rimbaud Museum, Charleville-Mézières, France
© H. Veiller/Explorer

counts of Rethel in the 10th century. Fortified in the 16th century, the town was successfully defended by the French hero Pierre du Terrail, Chevalier de Bayard, against the Holy Roman Empire, but it was severely damaged during the French Wars of Religion in the 16th century and later in World Wars I and II. Traces of the 16th-century ramparts can still be seen on the right bank of the Meuse. The Basilica of Notre-Dame de l'Espérance has a Gothic choir and nave, but the bell tower dates from the Renaissance.

Charleville, named after the 17th-century Charles de Gonzague, Duke de Nevers, obtained economic privileges that contributed to its prosperity but were rescinded at the time of the French Revolution. The town, begun in 1606, was built according to a plan. The Place Ducale, in the centre, is a fine example of early 17th-century classical French architecture, despite the presence of the 19th-century Hôtel de Ville, which replaced the unfinished Ducal Palace. The poet Arthur Rimbaud was born in the vicinity and composed his poem "Le Bateau ivre" ("The Drunken Boat") near the 17th-century mill, which is now a museum devoted to him. Charleville-Mézières is an important railway junction. The chief industries are the manufacture of both heavy and light metal equipment (cranes; agricultural, heating, and kitchen apparatus; and nails). Pop. (1990) 59,439.

Charlevoix, Pierre-François-Xavier de (b. Oct. 29, 1682, Saint-Quentin, France—d. Feb. 1, 1761, La Flèche), French Jesuit who wrote one of the earliest descriptive accounts of North America.

Sent from France on a scientific and exploratory mission to Canada, where he had previously stayed, he traveled up the St. Lawrence River in 1720, passed through the Great Lakes, made the portage to the Mississippi River, survived shipwreck in the Gulf of Mexico, and visited the island of Santo Domingo. Returning home, he wrote *Histoire de Saint-Domingue* and *Histoire et description générale de la Nouvelle-France,* the latter especially of permanent value.

charlock (*Brassica kaber,* or *Sinapis arvensis*), early-flowering weed of the mustard family (Brassicaceae), widespread in grainfields in Europe and North America. Charlock reaches 1 m (3 feet) and has stiff bristles on the stems and leaves. The long pod fruits that

form below the yellow flowers each enclose 10 to 12 black seeds. The closely related white mustard (*B. hirta*) has vanilla-fragrant, yellow flowers from which develop three to six large, yellow-seeded, bristly pods, swollen around the seeds. The seeds of both species contain a clear oil that is poisonous to livestock. White mustard seeds are a source of the condiment known as mustard (*q.v.*).

Charlot, Jean (b. Feb. 7, 1898, Paris—d. March 20, 1979, Honolulu), French-born muralist, painter, and book illustrator, known for monumental frescoes that show the influence of Mayan art.

Charlot, whose mother was of Mexican descent, moved to Mexico City in 1920. There he painted frescoes for the Mexican government with such artists as Diego Rivera and José Orozco. From 1926 to 1929 he was staff artist for a Carnegie Institute archaeological expedition in Yucatán. Moving to the United States in 1929, he taught at many schools, including the universities of Georgia and Hawaii. He retired in 1966.

Of more than 40 murals by Charlot, most notable are his frescoes. In Mexico City he painted "Fall of Tenochtitlán" (1922), at the National Preparatory School, and two panels, "The Washerwomen" and "The Pack Carriers" (1923), at the Ministry of Education Building. Frescoes at the University of Georgia are a three-panel work on the arts (1941–42) and two panels at the Commerce-Journalism Building, "Anno DMI 1519 Emperor Montezuma's Scouts Cover America's First Scoop" and "Anno DMI 1944 Press and Cameramen Flash on the Spot News, World War II" (1943–44). Charlot's fascination with Mayan art is evident in his bold colouring and in his reduction of living figures into such elemental geometric shapes as circles, cubes, and cylinders. His works often deal with mythical and religious themes.

Charlot also painted on canvas and illustrated many books for adults and children. Of his own books, *The Temple of the Warriors at Chichen Itzá, Yucatan* (1931; with E.H. and A.A. Morris) and *Mexican Mural Renaissance, 1920–1925* (1963) cover the influences on his art.

Charlotte, in full CHARLOTTE ALDEGONDE ÉLISE MARIE WILHELMINE (b. Jan. 23, 1896, Château de Berg, Lux.—d. July 9, 1985, Château de Fischbach), grand duchess of Luxembourg from 1919 to 1964. Her constitutional reign saw the evolution of Luxembourg into a modern social-democratic state.

The second daughter of Grand Duke William IV, Charlotte succeeded her sister Marie-Adélaïde, who abdicated in January 1919 after acquiring a pro-German reputation during World War I. Charlotte immediately called for a referendum, and in September three-quarters of the voters preferred her continued reign to a republic. Six weeks later she married Prince Félix of Bourbon-Parma (d. 1970). They had six children: Jean, Élisabeth, Marie-Adélaïde, Marie-Gabrielle, Charles, and Alix. When Nazi Germany overran Luxembourg in May 1940, Charlotte fled with the government, settling in Montreal for the duration of the war. Her frequent radio messages of encouragement were never forgotten by a grateful people. In April 1961 she granted Prince Jean all of her ducal responsibilities in preparation for abdicating in November 1964.

Charlotte's popular reign provided stability during a time of sweeping change. Luxembourg's constitution was twice rewritten (1919 and 1948), providing universal suffrage and abolishing the country's much-violated disarmed neutrality. Labour laws and social-security schemes were passed, and through the Benelux Economic Union, NATO, and the EEC, Luxembourg was integrated into post-World War II western Europe. During this time Charlotte's steadfast patriotism and democratic sympathies made her a symbol of Luxembourg's sovereignty and prosperity.

Charlotte, city, seat (1774) of Mecklenburg county, in the Piedmont region, near the Catawba River, south central North Carolina, U.S. Settled *c.* 1750, it was incorporated in 1768 and named for Princess Charlotte Sophia of Mecklenburg-Strelitz, later George III's queen. The Mecklenburg Declaration of Independence (May 20, 1775) was signed there, and is celebrated annually. Lord Cornwallis, occupying the town in 1780, received such hostile treatment he dubbed it "the hornet's nest," now the city's official emblem. Until the California Gold Rush (1849), Charlotte was the centre of gold production in the U.S., and a mint was located there (1837–61 and 1867–1913). During the Civil War it was the site of a Confederate naval yard.

A major wholesale distribution point for the Southeast and the Carolinas' biggest metropolis, Charlotte has diversified manufactures (textiles, machinery, metal, and food products). The first college in North Carolina, Queens College in Charlotte, was chartered in 1771 but was disallowed by English authorities. The present Queens College was chartered in 1857. Other educational institutions in the area include a branch of the University of North Carolina (1946), Johnson C. Smith University (1867), King's College (1901), and Central Piedmont Community College (1963).

Presidents Andrew Jackson and James K. Polk, born nearby, received their early schooling in Charlotte. The area's history during the American Revolution has inspired several novels, including Inglis Fletcher's *Raleigh's Eden* (1940) and Burke Davis' *Ragged Ones* (1951). Pop. (1990) city, 395,934; Charlotte–Gastonia–Rock Hill MSA, 1,162,093.

charlotte, either of two traditional French desserts, both formed in a deep, cylindrical mold. For a fruit charlotte the mold is lined with well-buttered bread, filled with a thick puree of apples, apricots, or other fruit, topped with additional slices of bread, and baked. It is served warm, often with a sauce. For cold charlotte, the mold is lined with ladyfingers (sticks of spongecake) and filled with ice cream, whipped cream, or most commonly, Bavarian cream (*q.v.*). If the latter is used the dessert is called a charlotte russe, a recipe believed to have been originated by the great chef Antonin Carême.

Charlotte Amalie, formerly SAINT THOMAS, capital of the U.S. Virgin Islands and of St. Thomas Island, at the head of St. Thomas Harbour, on the island's southern shore. The largest city in the Virgin Islands, it is built on three low volcanic spurs called Frenchman Hill (Foretop Hill), Berg Hill (Maintop), and Government Hill (Mizzentop). There are several examples of Danish colonial architecture. Two castles, attributed to the 18th-century pirates Blackbeard (Edward Teach) and the half-legendary Bluebeard, overlook the harbour. Established as a Danish colony in 1672, it was called Charlotte Amalie, or Amalienborg, for the Danish queen. The name was changed to St. Thomas in 1921, but its former name was restored in 1936.



Charlotte Amalie harbour on St. Thomas Island, U.S. Virgin Islands
Arthur Griffin—EB Inc

The harbour, protected by Hassel Island, has docking and fueling facilities, machine shops, and shipyards and is also a U.S. submarine base. The economy is based on tourism, handicrafts, and the production of rum, bay rum, and jams. The population is predominantly black, but there is a considerable minority group of French Huguenot origin who have lived there for many generations. Pop. (1980) 11,842.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Charlotte Harbor, shallow inlet of the Gulf of Mexico, indenting southwestern Florida, U.S. It is about 25 mi (40 km) long and 5 mi wide. The Peace and Myakka rivers enter the harbour's north end, and a dredged channel serves the chief port, Punta Gorda. In 1521 Juan Ponce de León, a Spanish explorer, tried to establish a colony in the area, but he was driven away by hostile Indians.

Charlotte Island: *see* Abaiang Atoll.

Charlottenburg, district of Berlin, Germany, on the Spree River. Originally called Lietzenburg, the district was renamed for Sophie



Charlottenburg Palace, Berlin
Farrell Grehan—Photo Researchers/EB Inc

Charlotte, wife of Frederick I, king of Prussia, and was chartered in 1705. It was incorporated into Berlin in 1920. The palace, built in 1695–99 for the Queen, contains collections of antiquities, paintings, and musical instruments. In the palace park is the Mausoleum (heavily damaged in World War II) with the graves of Frederick William III and Louise of Prussia. Virtually destroyed during World War II, the Baroque Eosander Chapel in Charlottenburg Palace has been restored. The former Technische Hochschule of Charlottenburg was reopened in 1946 as a university. The stadium in Charlottenburg was the scene of the 1936 Olympic Games. The Opera House, several museums, and colleges of art and music are in the locality. Industries within the district include the famous royal porcelain factory and ironworks along the Spree. Pop. (1986 est.) 145,564.

Charlottesville, city, in, but administratively independent of, Albemarle county, central

Virginia, U.S., on the Rivanna River, in the foothills of the Blue Ridge Mountains. Located 66 mi (106 km) northwest of Richmond, on the main route west from the Tidewater region, it was settled in the 1730s and chosen as the courthouse seat of Albemarle County in 1761. Named for Charlotte Sophia, consort of King George III, it grew as a tobacco-trading point and later became famous as the home of presidents Thomas Jefferson and James Monroe and explorers Meriwether Lewis and George R. Clark. Overlooking the city is Monticello (*q.v.*), the home designed (1770–1809) in Palladian Neoclassical style by Jefferson; it contains the Jefferson family graves and has been restored and maintained as a national shrine. Ash Lawn (5 mi [8 km] southeast), planned by Jefferson for James Monroe, served as Monroe's home from 1798 to 1820.

During the U.S. War of Independence, British troops captured at Saratoga were quartered at Charlottesville, which was raided in 1781 by British colonel Banastre Tarleton in hopes of capturing Jefferson and other Revolutionary leaders. Jefferson founded the University of Virginia at Charlottesville in 1819 and designed its original buildings (used as hospitals during the American Civil War). The Institute of Textile Technology was founded there in 1944 and Piedmont Virginia Community College in 1972.

Although there is some light industry and agriculture (livestock, racehorses, apples), the economy is based on educational services. Inc. town, 1851; city, 1888. Pop. (1990) city, 40,341; Charlottesville MSA, 131,107.

Charlottetown, city, seat of Queens County and capital (1765) of Prince Edward Island, Canada, on Hillsborough Bay, an arm of Northumberland Strait, at the mouths of the Elliot (west), North, and Hillsborough rivers. Originating in the 1720s as a French settlement called Port la Joie (the site of which is now within Fort Amherst National Historic Park), it was renamed in honour of Queen Charlotte, wife of George III, after the island passed to Britain in 1763. Charlottetown, with its excellent deepwater harbour and airport, is the commercial centre of the province. Economic activities centre mainly around tourism, government business, fisheries, and agriculture (chiefly dairying, meat packing, and potato growing).

Historic buildings include Government House (1844; the official residence of the province's lieutenant governor) and Province House, home of the island's legislative body and the site of the 1864 conference at which the first plans for Canada's unification were discussed. There are several noteworthy churches including St. Paul's Anglican (1747; the island's first Protestant church), St. Peter's (Anglican) Cathedral (1879), and St. Duncan's Basilica (seat of a Roman Catholic diocese). Charlottetown is the seat of Holland College and of the University of Prince Edward Island, formed in 1969 through the amalgamation of Prince of Wales College and St. Dunstan's University.

Charlottetown is the site of the Confederation Centre of the Arts, which was opened in 1964 as Canada's national memorial to the Fathers of the Confederation. The Centre houses an art gallery, theatre, and library-museum and is the focus of the city's Summer Festival. Inc. town, 1855; city, 1875. Pop. (1991) 15,396.

Charlottetown Conference (1864), first of a series of meetings that ultimately led to the formation of the Dominion of Canada. In 1864 a conference was planned to discuss the possibility of a union of the Maritime Provinces. The Province of Canada (consisting of present-day Ontario and Quebec) requested and received permission to send a delegation. Consequently the conference, which convened at Charlottetown, P.E.I., on Sept. 1, 1864, consisted of five delegates from each of the three Maritime Provinces and eight delegates from the Province of Canada.

The proposed union of the three Maritime Provinces was unpopular, particularly in Prince Edward Island. The original purpose of the conference was greatly altered by the arrival of the Canadian delegates, who, on September 2, were invited to present their case and who argued in favour of a union of Canada and the Maritime Provinces.

On September 7 the Maritime delegates met by themselves to discuss the original proposal, but they failed to reach agreement. With the idea of a federation of the Maritime Provinces and Canada now having gained greater appeal, the Charlottetown Conference adjourned. But the delegates reconvened in Halifax, Nova Scotia, on Sept. 10 and 12, 1864, and in Quebec city, Can., on Oct. 10–27, 1864. The Quebec Conference resulted in a draft constitution for the proposed federal union.

Charly, Louise: *see* Labé, Louise.

Charnay, Claude-Joseph-Désiré (b. May 2, 1828, Fleure, Fr.—d. Oct. 24, 1915, Paris), French explorer and archaeologist, noted for his pioneering investigations of prehistoric Mexico and Central America.

He was commissioned by the French government in 1857 and spent four years collecting relics in Mexico and compiling a photographic archive of the ruins he saw there. Later expeditions took him to Madagascar (1863), through North America (1867–70), South America (1875), and Australia and Oceania (1878).

Charnay's explorations of the ancient cities of Central America (1880–83) were partly financed by the New York philanthropist Pierre Lorillard. Charnay developed a theory of Toltec migrations in which he argued that certain prehistoric peoples of Central America were of Asian origin. His major work on the subject was *Les Anciennes Villes du Nouveau Monde* (1885; *The Ancient Cities of the New World*).

Charnay Fibula, curved silver ornament, dating from the mid-6th century, that bears a runic inscription. The Fibula, a type of clasp, was discovered around 1857 in Burgundy, Fr. Its inscription consists of a horizontal line using the first 20 characters of the runic alphabet and two vertical lines that have not been fully interpreted. The Charnay Fibula and an inscribed golden ring unearthed in 1837 in Buzău district, Romania, may be the only known runic texts found in Romance-language regions.

Charney, Jule Gregory (b. Jan. 1, 1917, San Francisco—d. June 16, 1981, Boston), American meteorologist who contributed to the development of numerical weather prediction and to increased understanding of the general circulation of the atmosphere by devising a series of increasingly sophisticated mathematical models of the atmosphere.

Shortly after receiving his Ph.D. from the University of California, Los Angeles, Charney joined the Institute for Advanced Study in Princeton, N.J., and participated in the first efforts to apply digital computers to the problem of weather prediction. The recipient of numerous awards, he became professor of meteorology at Massachusetts Institute of Technology, Cambridge, in 1956.

Charney was a leader among those who worked to formulate the equations governing atmospheric motions, excluding from his formulations possible solutions (*e.g.,* sound waves) that do not affect large-scale weather patterns while retaining the complex phenomenon of cyclone formation. This work provided the theoretical basis for the routine use of computers in forecasting.

Charnock, Job (d. Jan. 10, 1693, Calcutta), English founder of Calcutta and controversial administrator in the East India Company.

Arriving in India in 1655/56, Charnock was stationed first at Cossimbāzār, north of present-day Calcutta, and then at Patna, in Bihār, eventually becoming chief agent of the East India Company at Hooghly (Hūgli), on the Hooghly River, in 1686. Threatened there by the Mughal (Mogul) viceroy in Bengal, in 1690 he moved his operations 27 miles south to Sutanati, the site of what is now Calcutta. The later selection of Calcutta as the capital of British India was largely the result of his persistence. Frequently at odds with Indian leaders and his superiors, Charnock was at times accused of mismanagement, theft, brutality to Indian prisoners, and having questionable morals; he was once recommended for dismissal. He lived with an Indian widow, whom he had rescued from her husband's funeral pyre, and fathered several of her children.

charnockite, any member of a series of metamorphic rocks with variable chemical composition, first described from the state of Tamil Nadu in southern India and named for Job Charnock. The term is often limited to the characteristic hypersthene granite of the series. Charnockite occurs all over the world, most often in deeply eroded Precambrian basement rock complexes.

Members of the series contain characteristic minerals that distinguish them from other rocks of comparable bulk chemical composition. Hypersthene is typical for all members of the series. The alkali feldspar may be intermediate between ordinary microcline and orthoclase, a fine microperthitic texture being common; the plagioclase feldspar is usually antiperthitic. Dark colour and clouding of the



Charlottetown, P.E.I., with the harbour area at right
George Hunter

feldspars are typical features of these rocks, as is a bluish tint in quartz. Some charnockites contain a brownish-green hornblende, often rather rich in titanium. The garnet characteristic of these rocks is rich in pyrope.

The charnockite series originally was assumed to have developed by the fractional crystallization of a silicate magma (molten material). Subsequent studies have shown, however, that many, if not all, of the rocks are metamorphic, formed by recrystallization at high pressures and moderately high temperatures.

Charnwood, district and borough, county of Leicestershire, England. The name comes from Charnwood Forest, one of the ancient forests of the Midlands. Charnwood district partially includes a group of hills northwest of the city of Leicester that rise to 912 feet (278 m) in Bardon Hill and that represent the emergence at the surface of some of the oldest basement rocks of Britain. These are a series of Precambrian gritstones that outcrop extensively in the hills, forming rocky eminences. Charnwood stone is quarried for building material and for road metal. The forest cover, though much-reduced in extent, is still considerable, and the area serves as a recreational and residential outlet for the population of Leicester.

The town of Loughborough is situated on the northeastern fringe of the Charnwood hills and serves as district headquarters. It is an industrial town with a modern university and a well-known college of physical education. Area 108 square miles (279 square km). Pop. (1991 prelim.) 140,500.

Charolais, also spelled CHAROLLAIS, region and former county of France in southern Burgundy, consisting of the country around Charolles (in the modern *département* of Saône-et-Loire). Formed from the southern part of the countship of Autun, Charolais was held successively by the houses of Burgundy, Bourbon, and Armagnac until 1390, when it was reacquired for Burgundy by Philip the Bold. From the dukes of Burgundy, Charolais passed to the Spanish Habsburgs, who held it from 1500 until 1684, when it was ceded to the French Condé family. It was definitely united with France in 1761. Charolais long enjoyed administrative autonomy, having its own estates (assembly), which met every third year until 1751, when they were incorporated into the estates of Burgundy.

Charolais, breed of large, light-coloured cattle developed in France for draft purposes but now kept for beef production and used for crossbreeding. White cattle had long been characteristic of the Charolais region; recognition of the Charolais breed began about 1775. A typical Charolais is massive and horned and cream-coloured or slightly darker.

The breed was first imported into the United States from a herd in Mexico in 1936, but few were later imported because of disease problems of the breed in France. The Charolais is crossbred with beef breeds and dairy cows; the Charbray, a mixture of Charolais and Brahman, is a notable example.

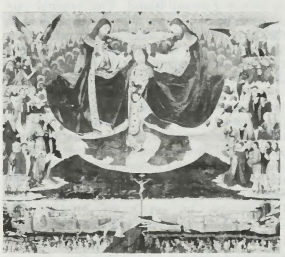
Charon, in Greek mythology, the son of Erebus and Nyx (Night), whose duty it was to ferry over the Rivers Styx and Acheron those souls of the deceased who had received the rites of burial. In payment he received the coin that was placed in the mouth of the corpse. In art Charon was represented as a morose and grisly old man. In Etruscan he was known as Charun and appeared as a death demon, armed with a hammer. Eventually he came to be regarded as the image of death and of the world below. As such he survives in Charos, or Charontas, the angel of death in modern Greek folklore.

Charon, only known natural satellite of Pluto. It was discovered in 1978 by James W. Christy and Robert S. Harrington at the United States Naval Observatory in Washington, D.C. Earlier attempts to detect a moon of Pluto had proved unsuccessful because Pluto is so remote. Moreover, Charon is unusually close to the planet and so had been obscured by the glare of its light.

Charon orbits Pluto in 6.3871 days on a circular orbit with a radius of approximately 19,700 km (12,210 miles). Its diameter is thought to be roughly half that of Pluto, or as little as 1,284 km. Charon, unlike Pluto, seems to have little methane. Its surface is believed to be composed of water-ice and a residual of carbonaceous or silaceous impurities (or both), which together would give it a morainic appearance.

Charonton, Enguerrand, Charonton also spelled CHARRENTON, or QUARTON (b. *c.* 1410, Laon, France; fl. 1444–66, Provence), French religious painter of the late Gothic period, famous for his "Coronation of the Virgin."

Charonton is one of the best-documented French medieval artists, and details exist of six commissions for important paintings, two



"Coronation of the Virgin," tempera painting by Enguerrand Charonton, 1453–54; in the Hospice de Villeneuve-lès-Avignon, France

Giraudon—Art Resource

of which have survived: the "Virgin of Mercy" (1452; Musée Condé, Chantilly), an altarpiece, the predella of which, painted in collaboration with Pierre Villate, is missing; and the hierarchic "Coronation of the Virgin" (1453–54; Hospice de Villeneuve-lès-Avignon). The contract for the latter is one of the most complete and interesting documents on medieval art, showing that the composition was minutely prescribed. Both paintings reveal an original style, mingling an affinity for such northern works as the tapestries of Arras, Picard sculpture, and Flemish painting with the sharp, sculptural stylization of figures, folds, and rocks typical of the art of Provence. The famous "Avignon Pietà" (shortly before 1457?; now in the Louvre, Paris) exhibits a similar style and has been attributed to him.

Charonton is full of imagination, creating original types of Virgin and saints; his drawing is precise and graceful, his composition majestic and rich. Like his contemporary Jean Fouquet, he combines the grandeur of monumental decoration with the subtlety of book illumination.

Charophyceae, class of algae, certain members of which are commonly known as stoneworts. *See* stonewort.

Charpak, Georges (b. Aug. 1, 1924, Poland), Polish-born French physicist, winner of the Nobel Prize for Physics in 1992 for his invention of subatomic particle detectors, in particular the multiwire proportional chamber.

Charpak's family moved from Poland to Paris when he was seven years old. During World War II Charpak served in the resistance and was imprisoned by Vichy authorities in 1943. In 1944 he was deported to the Nazi concentration camp at Dachau, where he remained until the camp was liberated in 1945. Charpak became a French citizen in 1946. He received his doctorate in 1955 from the Collège de France, Paris, where he worked in the laboratory of Frédéric Joliot-Curie. In 1959 he joined the staff of CERN (European Organization for Nuclear Research) in Geneva and in 1984 also became Joliot-Curie professor at the School of Advanced Studies in Physics and Chemistry, Paris. He was made a member of the French Academy of Science in 1985.

Charpak built the first multiwire proportional chamber in 1968. Unlike earlier detectors, such as the bubble chamber, which can record the tracks left by particles at the rate of only one or two per second, the multiwire chamber records up to one million tracks per second and sends the data directly to a computer for analysis. The speed and precision of the multiwire chamber and its descendants, the drift chamber and the time projection chamber, revolutionized high-energy physics. Samuel Ting's discovery of the J/psi meson and Carlo Rubbia's discovery of the W and Z particles, which won Nobel Prizes in 1976 and 1984, respectively, involved the use of multiwire chambers; and by the 1990s such detectors were at the heart of almost every experiment in particle physics. Charpak's chamber also has applications in medicine, biology, and industry.

Charpentier, Johann von (b. Dec. 8, 1786, Freiberg, Saxony [Germany]—d. Dec. 12, 1855, Bex, Switz.), pioneer glaciologist, one of the first to propose the idea of the extensive movement of glaciers as geologic agencies.

Charpentier was a mining engineer and an amateur naturalist and was the director of salt mines for the Canton of Vaud. He assessed the available information concerning Swiss glaciers and studied the locations of large, immovable boulders in the Rhône River valley. Rejecting the prevailing hypotheses that these boulders had been transported by such phenomena as floods and icebergs, Charpentier concluded in 1834 that only immense glaciers in the past could have moved them to their present locations. (This idea had also been suggested earlier in the century.) His interpretation attracted the attention of the Swiss naturalist Louis Agassiz, who in 1840 published *Studies on Glaciers,* a few months before Charpentier published his own *Essai sur les glaciers* (1841; "Essay on Glaciers").

Charpentier, Marc-Antoine (b. 1634, Paris, France—d. Feb. 24, 1704, Paris), most important French composer of his generation and the outstanding French composer of oratorios.

Charpentier studied painting in Italy and then studied composition under Giacomo Carissimi. On his return to France he became chapelmaster to the dauphin but lost that position through Jean-Baptiste Lully's influence. He composed the music for a new version of Molière's *The Forced Marriage* (first performed 1672) and collaborated with him again in *The Imaginary Invalid* (1673). After Molière's death Charpentier continued to work for the Théâtre Français until 1685. He produced his greatest stage work, *Médée,* to Thomas Corneille's text, in 1693. From 1680 to 1688 he was music director to the Princess de Guise, and from 1679 he composed music for the dauphin's chapel (Lully died in 1687). In 1692 he became composition teacher to the Duke d'Orleans and in 1698 was made music master at the Sainte-Chapelle in Paris.

In his sacred tragedies written for the Jesuit community in Paris, Charpentier established the oratorio in France. In such oratorios as the *Filius prodigus* (*Prodigal Son*), *Sacrificium Abrami,* and his masterpiece, *Le Reniement de saint Pierre* (*The Denial of St. Peter*), he successfully integrates the Italian style of Carissimi with his native French style. His work is

marked by its lyricism, skilled polyphony, and sensitive use of harmonic resources. In addition to his oratorios and stage works (16 operas, many pastorals), Charpentier composed 12 masses; elaborate motets with chorus, solos, and orchestra for the dauphin's chapel; a *Te Deum;* a *Magnificat;* and other works.

Charrenton, Enguerrand: *see* Charonton, Enguerrand.

Carrière, Henri, byname PAPILLON (b. 1906, Ardèche, France—d. July 29, 1973, Madrid, Spain), French criminal and prisoner in French Guiana who described a lively career of imprisonments, adventures, and escapes in an autobiography, *Papillon* (1969).

Charrière's nickname derived from the design of a butterfly (French: "papillon") tattooed on his chest. As a young man he was a safecracker, a thief, and, by some accounts, a pimp in Paris when he was arrested and convicted in 1931 of murdering a Montmartre gangster-pimp, Roland Legrand. Charrière always denied his guilt for the murder and attacked the inequities of French justice.

Nevertheless, he was sentenced to life imprisonment and sent to Cayenne, the notorious penal colony in French Guiana. His first escape, three years later, was made in an open boat about 1,800 miles (2,900 km) to Maracaibo; he lived with some jungle Indians, moved on, and was caught and shipped to Devil's Island. He tried eight more escapes, succeeded on the last, floating away on a coconut raft (1944), and settled in Venezuela, working at various jobs over the years, remarrying, and establishing a profitable restaurant in Caracas. At the age of 62 in 1968 he wrote *Papillon,* which was published the following year in France (and which, by the time of his death in 1973, had sold about 5,000,000 copies in 16 languages). It was made into a film in 1973. In 1970 the French minister of justice issued a decree of grace, removing legal restrictions on Charrière's return to France. In 1972 he published an autobiographical sequel, *Banco* (*Banco: The Further Adventures of Papillon*). Charrière was accused of inventing many of the adventures in *Papillon* and appropriating to himself the adventures of others. Two debunking books in this vein were Georges Ménager's *Les Quatre Vérités de Papillon* (1970; "The Four Truths of Papillon") and Gérard de Villiers' *Papillon épinglé* (1970; "Butterfly Pinned").

Charrière, Isabelle-Agnès-Élizabeth de, original name ISABELLA AGNETA ELISABETH VAN TUYLL VAN SEROOSKERKEN, bynames BELLE VAN ZUYLEN, ZÉLIDE, and ABBÉ DE LA TOUR (b. Oct. 20, 1740, Zuilen, near Utrecht, Neth.—d. Dec. 27, 1805, Colombier, Switz.), Swiss novelist whose work anticipated early 19th-century emancipated ideas.

She married her brother's Swiss tutor and settled at Colombier near Neuchâtel. Influenced by Denis Diderot and Jean-Jacques Rousseau, she expressed views critical of aristocratic privilege, moral conventions (*Trois Femmes,* 1797; "Three Women"), religious orthodoxy, and poverty, though she was opposed to revolutionary radicalism (*Lettres trouvées sous la neige,* 1794; "Letters Found on the Snow"). Her novels, of which the most important are *Caliste, ou lettres écrites de Lausanne* (1786; "Caliste, or Letters Written from Lausanne") and *Lettres neuchâteloises* (1784; "Letters of Neuchâtel"), abound in philosophical reflection, refined psychological observation, and local colour but lack coherent plots.



Isabelle de Charrière, detail of an oil painting by Jens Juel; in Kasteel Zuylen, The Netherlands

By courtesy of the Iconographisch Bureau, The Hague

Charron, Pierre (b. 1541, Paris, Fr.—d. Nov. 16, 1603, Paris), French Roman Catholic theologian and major contributor to the new thought of the 17th century. He is remembered for his controversial form of skepticism and his separation of ethics from religion as an independent philosophical discipline.

After studies in law Charron turned to theology and became a renowned preacher to Margaret of France, the queen of Navarre. Despite his success as a theological adviser in several dioceses and as canon at Bordeaux, in 1589 he sought to retire to a cloister but was refused because of his age. The same year, he met the French essayist Michel de Montaigne, whose close friend and disciple he became.

From Montaigne, Charron acquired his skeptical tendency, coupled with traditional Roman Catholicism, noted in his two major works, *Les Trois Vérités* (1593; "The Three Truths") and *De la sagesse* (1601; *On Wisdom*). In the first of these, which was intended as a Counter-Reformation tract against the reformed theology of John Calvin, Charron claimed that the nature and existence of God are unknowable because of God's infinitude and man's weakness. Faith, not reason, he claimed, is necessary for acceptance of Christianity, and only the authority of the traditional Roman Catholic church could make up for the human weaknesses inherent in the reformer's attempts to know God.

In *De la sagesse* Charron examined further the possibility of knowledge outside of revealed truths, concluding again that the wise man doubts completely because his mental capacities are unreliable. Such skepticism has two benefits, according to Charron: it frees men from prejudices, and it frees men to receive revealed truths. Consequently, the skeptic cannot be a heretic; having no opinions, he cannot have incorrect ones. In his moral theory Charron presented the skeptic as a man who, if he has not received divine commands, lives according to nature. By this affirmation of the "noble savage" who draws his moral guidelines from the natural world, Charron became one of the first modern ethical theorists to establish a basis for morality outside religion. *De la sagesse* was especially popular and influential in France and England throughout the 17th century but was immediately attacked as irreligious. Contemporary Roman Catholics were divided in their reaction; the Jesuit François Garasse called the book a breviary for freethinkers and its author a secret atheist, whereas the bishop of Boulogne, Claude Dormy, and other prominent churchmen defended Charron. He, like Montaigne, has been the subject of continuing debate over his intentions. Difficulty also remains in determining Charron's actual views, for, although his *Discours chrestiens* (1600; "Christian Discourses"), a collection of 16 discourses on various aspects of Christian life, and his own religious life indicate that his Christianity was sincere, portions of *De la sagesse* suggest that it was not.

charter, a document granting certain specified rights, powers, privileges, or functions from the sovereign power of a state to an individual, corporation, city, or other unit of local organization. The most famous charter, Magna Carta ("Great Charter"), was a compact between the English king John and his barons specifying the king's grant of certain liberties to the English people. Elsewhere in medieval Europe, monarchs typically issued charters to towns, cities, guilds, merchant associations, universities, and religious institutions; such charters guaranteed certain privileges and immunities for those organizations while also sometimes specifying arrangements for the conduct of their internal affairs.

By the end of the European Middle Ages, monarchs granted charters that guaranteed overseas trading companies monopolies of trade (and in some cases government) within a specified foreign geographic area. A corporation that was so endowed was called a chartered company (*q.v.*). Virtually all the British colonies in North America were established by charters; these charters granted land and certain governing rights to the colonists while retaining certain powers for the British crown.

Modern charters are of two kinds, corporate and municipal. A corporate charter is a grant made by a governmental body giving a group of individuals the power to form a corporation, or limited-liability company. A municipal charter is a law passed by a government allowing the people of a specific locality to organize themselves into a municipal corporation—*i.e.,* a city. Such a charter in effect delegates powers to the people for the purpose of local self-government.

Charter Oath, also called IMPERIAL OATH OF FIVE ARTICLES, Japanese GOKAJŌ NO GOSEIMON, in Japanese history, statement of principle promulgated on April 6, 1868, by the emperor Meiji after the overthrow of the Tokugawa shogunate and the restoration of direct participation in government by the imperial family. The Charter Oath opened the way for the modernization of the country and the introduction of a Western parliamentary constitution. The five articles of the Charter Oath were the following: (1) "Deliberative assemblies shall be established on an extensive scale, and all governmental matters shall be determined by public discussion." (2) "All classes, high and low, shall unite to carry out vigorously the plan of government." (3) "All classes shall be permitted to fulfill their just aspirations so that there will be no discontent." (4) "Evil customs of the past shall be discontinued, and new customs shall be based on the just laws of nature." (5) "Knowledge shall be sought throughout the world in order to promote the welfare of the empire."

charter party, contract by which the owner of a ship lets it to others for use in transporting a cargo. The shipowner continues to control the navigation and management of the vessel, but its carrying capacity is engaged by the charterer.

There are four principal methods of chartering a tramp ship—voyage charter, time charter, bareboat charter, and "lump-sum" contract. The voyage charter is the most common. Under this method a ship is chartered for a one-way voyage between specific ports with a specified cargo at a negotiated rate of freight. On time charter, the charterer hires the ship for a stated period of time, for a specified round-trip voyage, or, occasionally, for a stated one-way voyage, the rate of hire being expressed in terms of so much per ton deadweight per month. Whereas on a voyage charter the owner bears all the expenses of the voyage (subject to agreement about costs of loading and discharging), on time charter the charterer bears the cost of bunkers and stores consumed.

On bareboat charter, which is less frequently used in ordinary commercial practice, the owner of the ship delivers it up to the charterer for the agreed period without crew, stores, insurance, or any other provision. Contracts can also be arranged on a lump-sum basis, when an owner agrees to ship a given quantity of a

stated cargo from one port to another for a stated sum of money.

The charter party is the document that is subject to scrutiny and interpretation by a court of law in the event of dispute, but, in practice, most disputes are submitted to arbitration. Among the most important clauses in any charter party are those that lay down the number of days allowed for loading or unloading and those that determine who is to bear the expenses involved. *See also* lading, bill of.

chartered company, type of corporation that evolved in the early modern era in Europe. It enjoyed certain rights and privileges and was bound by certain obligations, under a special charter granted to it by the sovereign authority of the state, such charter defining and limiting those rights, privileges, and obligations and the localities in which they were to be exercised. The charter usually conferred a trading monopoly upon the company in a specific geographic area or for a specific type of trade item.

The earliest English chartered companies were the Merchant Adventurers (*q.v.*) and the Merchant Staplers. Such early companies were regulated companies, deriving the principles of their organization from the medieval merchant guilds. The regulated company was a corporation of merchants, each of whom traded on his own account but was subjected to a rigid set of common rules that regulated his operations within narrow limits.

A great increase in the number and activities of the chartered companies took place during the second half of the 16th century, when the English, French, and Dutch governments were ready to assist trade and encourage overseas exploration. Changes also occurred in the organization of chartered companies. The regulated company, which had been very convenient for trading with countries where conditions were stable, was not so suitable for ventures to remoter lands, where the risks, commercial and political, were greater. To meet the requirements of the new trading conditions, the joint-stock organization, in which the capital was provided by shareholders who then participated in the profits from the joint enterprise, was evolved. In some cases, the companies alternated between one form and the other. In all charters, provisions were inserted to secure the "good government" of the company.

In England two of the earliest and most important of overseas trading companies were the Muscovy Company (*q.v.;* 1555) and the Turkey Company (1583). They had important effects on international relations, for they maintained English influence and paid the expenses of ambassadors sent to those countries. Other English companies were established in this period for similar trading ventures: the Spanish Company (1577, regulated); the Eastland Company, for trade with the Baltic (1579, regulated); and the French Company (1611, regulated). The first company for African trade was founded in 1585, and others were granted charters in 1588, 1618, and 1631. But it was the chartered companies that were formed during this period for trade with the Indies and the New World which had the most wide-reaching influence. The East India Company (*q.v.*) was established in 1600 as a joint-stock company with a monopoly of the trade to and from the East Indies. Its political achievements form a large part of the history of the British Empire, and its economic power was enormous, contributing substantially to the national wealth and causing the company to be the centre of most of the economic controversies of the 17th century.

In North America the English chartered companies had a colonizing as well as a trading purpose. Although the Hudson's Bay Company (*q.v.*) was almost wholly devoted to trade, most companies—such as the London Company, the Plymouth Company, and the Massachusetts Bay Company—were directly involved in the settlement of colonists. Elsewhere, chartered English companies continued to be formed for the development of new trade—for instance, the short-lived Canary Company in 1665, the Royal African Company in 1672, and the South Sea Company in 1711. There was frantic speculation in the shares of the South Sea Company, resulting in a severe setback to joint-stock enterprise. The Bubble Act of 1720 was designed to make it much more difficult to obtain a charter.

In France and the Netherlands, chartered companies had also been used for similar purposes by the governments. In France, from 1599 to 1789, more than 70 such companies came into existence. Under J.B. Colbert the French East India Company was founded (1664), and the colonial and Indian trade was placed in the hands of chartered companies in which the king himself had large financial interests. The French companies, however, were largely destroyed by the "Mississippi scheme" of John Law, in which trading companies like the Senegal and French East India companies were incorporated in a plan to take over the public debt. The financial crash in 1720 destroyed public confidence, and although a new Company of the Indies existed until 1769, the chartered company was virtually dead. In the Netherlands the Dutch East India and West India companies were the basis of the commercial and maritime supremacy of the Dutch in the 17th century. The success of the East India companies caused the foundation of the Ostend Company, whereby the Holy Roman emperor Charles VI sought unsuccessfully to acquire the trade of England and the Netherlands.

The development of the modern limited-liability company or corporation under successive companies acts led to a decline in the importance of chartered companies. Some of the older ones still exist, however, including the Hudson's Bay Company.

Charterhouse, a well-known school and charitable foundation that is now in Godalming, Surrey, Eng. The name Charterhouse is a corruption of the French Chartreuse (the location of the first Carthusian monastery). The name is found in various places in England—*e.g.,* Charterhouse in the Mendip Hills, near Cheddar, and, notably the London Charterhouse in the City of London, near Aldersgate—where religious houses of the Carthusian Order had been established in the Middle Ages. After the London Charterhouse was dissolved in 1535, the property changed hands several times until, in 1671, the owner endowed a hospital on the site and bequeathed money for a chapel, hospital (almshouse), and school. Charterhouse school provided an education for poor but scholarly youths. The school was removed in 1872 to Godalming in Surrey. Famous pupils of Charterhouse school include Roger Williams, founder of Rhode Island (U.S.); the literary critic Joseph Addison; Sir Richard Steele; John Wesley; Sir William Blackstone; William Makepeace Thackeray; and Robert Baden-Powell, founder of the Boy Scout movement.

Charteris, Leslie, original name (until 1928) LESLIE CHARLES BOWYER YIN (b. May 12, 1907, Singapore—d. April 15, 1993, Windsor, Berkshire, Eng.), author of highly popular mystery-adventure novels and creator of Simon Templar, better known as "the Saint" and sometimes called the "Robin Hood of modern crime." From 1928 some 50 novels and collections of stories about "the Saint" were published; translations existed in at least 15 languages.

The son of a Chinese surgeon and his English wife, Charteris (who changed his name in 1928) briefly attended King's College, Cambridge (1926), and then worked as a merchant seaman; a gold prospector, tin miner, and pearl fisherman, all in Malaya; a bartender; and a professional bridge player in a London club. A U.S. resident from 1932, he was employed from 1933 as a Hollywood screenwriter, preparing scripts for eight "Saint" movies and several other films. Although he was naturalized as a U.S. citizen in 1946, he later returned to England.

Charters Towers, city, northeastern Queensland, Australia, in the upper Burdekin River basin. A gold boom, which began in the early 1870s, led to the founding of the town; its population reached a peak of 30,000 during the period. It was proclaimed a municipality in 1877 and a city in 1909. Worked continuously until World War I, the gold reefs were among the state's most productive. Silver, lead, and zinc were also mined in the vicinity. Situated along rail lines leading west-east from Mount Isa to Townsville and southeast to Brisbane (635 miles [1,020 km]), Charters Towers serves a district of fruit, grape, and vegetable cultivation and cattle grazing. Much of the old mining town has been preserved. Pop. (1991 prelim.) 9,017.

Chartier, Alain (b. *c.* 1385, Bayeux, Normandy, France—d. *c.* 1433, Avignon, Provence?), French poet and political writer whose didactic, elegant, and Latinate style was regarded as a model by succeeding generations of poets and prose writers.

Educated at the University of Paris, Chartier entered the royal service, acting as secretary and notary to both Charles VI and the dauphin, later Charles VII. He carried out various diplomatic missions for Charles VII, and in 1428 he was sent to Scotland to negotiate the marriage of Margaret of Scotland with the future Louis XI.

His work, written mainly from 1415 to 1430, is distinguished by its variety of subject matter and form. Chartier was a poet, orator, historian, moralist, and pamphleteer who wrote in Latin and French. His earliest-known poem, the *Livre des quatre dames* (1415 or 1416; "Book of the Four Ladies"), is a discussion between four ladies who have lost their lovers at the Battle of Agincourt. The same technique is used in the prose *Quadrilogue invectif,* written in 1422, the dialogue being between France and the three estates of the realm (clergy, nobility, and commoners). This work exposes the sufferings of the peasantry, the misdeeds of the church, and the abuses of the feudal army but maintains that France could yet be saved if the kingdom's contending factions would lay aside their differences in the face of the common enemy.

Chartier's poems are mostly allegories in the courtly tradition but show the influence of his classical learning in their frequent Latinisms. They include *La Belle Dame sans merci, Le Lay de paix* ("The Lay of Peace"), and *Le Bréviaire des nobles,* the first of which, a tale of unrequited love, is the best known and was translated into English in the 15th century.

Chartier, Émile-Auguste: *see* Alain.

Chartism, a British working-class movement for parliamentary reform named after the People's Charter, a bill drafted by the London radical William Lovett in May 1838. It contained six demands: universal manhood suffrage, equal electoral districts, vote by ballot, annually elected Parliaments, payment of members of Parliament, and abolition of the property qualifications for membership. Chartism was the first movement both working-class in character and national in scope that grew out of the protest against the social injustices of the new industrial order in Britain.

The movement was born amid the economic

depression of 1837–38, when high unemployment and the effects of the Poor Law Amendment Act of 1834 were felt in all parts of Britain. Lovett's charter provided a program acceptable to a heterogeneous working class population. The movement swelled to national importance under the vigorous leadership of the Irishman Feargus Edward O'Connor, who stumped the nation in 1838 in support of the six points.

A Chartist convention met in London in February 1839 to prepare a petition to present to Parliament. "Ulterior measures" were threatened should Parliament ignore the demands, but the delegates differed in their degrees of militancy and over what form "ulterior measures" should take. In May the convention moved to Birmingham, where riots led to the arrests of its moderate leaders Lovett and John Collins.

The rump of the convention returned to London and presented its petition in July. Parliament rejected it summarily. There followed in November an armed rising of the "physical force" Chartists at Newport, which was quickly suppressed. Its principal leaders were banished to Australia, and nearly every other Chartist leader was arrested and sentenced to a short prison term. The Chartists then started to emphasize efficient organization and moderate tactics. Three years later a second national petition was presented containing more than 3,000,000 signatures, but again Parliament refused to consider it. The movement lost some of its mass support later in the 1840s when the economy revived. Also, the movement to repeal the Corn Laws divided radical energies, and several discouraged Chartist leaders turned to other projects.

The last great burst of Chartism occurred in 1848, a year of bad harvests at home and revolution on the Continent. Another convention was summoned, and another petition was prepared. Again Parliament did nothing. Thereafter, Chartism lingered another decade in the provinces, but its appeal as a national mass movement was ended. With the onset of the relative prosperity of mid-Victorian Britain, working class militancy lost its edge. Many Chartist leaders, however, schooled in the ideological debates of the 1840s, continued to serve working class causes, and the Chartist spirit outlasted the organization. All of the six points with the exception of annual Parliaments have since been secured.

Chartres, town, capital of Eure-et-Loir *département*, Centre region, northwestern France, southwest of Paris. The town is built on the left bank of the Eure River, and the spires of its famous cathedral are a landmark



The cathedral at Chartres, Fr.
Everett C. Johnson—DeWys Inc.

on the plain of Beauce. Wide boulevards, bordered by elms, encircle the old town with its steep, narrow streets that lead down to picturesque houses by the river. The modern city has seen much recent growth in the neighbouring plain, which is an important route between Paris and the Loire Valley; and toward Brittany.

The main part of the great cathedral of Notre-Dame at Chartres was built in less than 30 years in the mid-13th century, when high Gothic architecture was at its purest. This gives it a unity that is almost unique. The cathedral was built to replace a 12th-century church of which only the crypt, the base of the towers, and the west facade remain. Remarkable 13th-century stained-glass windows and a Renaissance choir screen add to the beauty of the edifice. Another notable church is Saint-Pierre, built mainly in the 13th century. A museum is housed in the former Episcopal Palace, dating from the 17th and 18th centuries.

Chartres, named after a Celtic tribe, the Carnutes, who made it their principal Druidic centre, was attacked several times by the Normans and was burned by them in 858. In the Middle Ages it became a countship and was held by the families of Blois and Champagne. The city was sold to the king of France in 1286, but during the Hundred Years' War (1337–1453), the English occupied it for 15 years. Francis I raised it to the rank of a duchy in 1528. During the Wars of Religion, the Protestants attacked it unsuccessfully. Henry IV was crowned there in 1594. During World War II, the town was severely damaged. Chartres is a market town for the region of Beauce (the granary of France) and has agricultural industries (fertilizers and farm equipment). Other industries include brewing, perfumes, the manufacture of car accessories, and electronic equipment. The proximity of Paris has stimulated its economic development. Pop. (1990) 39,595.

Chartres, Louis-Philippe, duc de (duke of): *see* Louis-Philippe; Orléans, Louis-Philippe, duc d'.

Chartres, Louis-Philippe-Joseph, duc de (duke of): *see* Orléans, Louis-Philippe-Joseph, duc d'.

Chartres, Philippe II, duc de (duke of): *see* Orléans, Philippe II, duc d'.

Charybdis (in Greek mythology): *see* Scylla and Charybdis.

Chasavjurt (Russia): *see* Khasavyurt.

Chase, Mary Ellen (b. Feb. 24, 1887, Blue Hill, Maine, U.S.—d. July 28, 1973, Northampton, Mass.), U.S. scholar, teacher, and writer whose novels are largely concerned with the Maine seacoast and its inhabitants.

Chase grew up in Maine, graduating from the University of Maine in 1909. Three autobiographical works describe her background and early experiences: *A Goodly Heritage* (1932), *A Goodly Fellowship* (1939), and *The White Gate: Adventures in the Imagination of a Child* (1954). After teaching school, she went on to the University of Minnesota, where she obtained a Ph.D. in English in 1922. She was an assistant professor there from 1922 to 1926, devoting part of this period to postdoctoral study in England. She maintained her interest in England, where she frequently summered, and wrote of it in a book of light essays, *This England* (1936). From 1926 until her retirement in 1955, she taught at Smith College, Northampton, Mass.

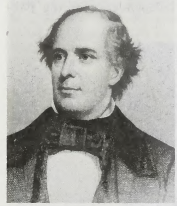
She began her writing career with books for children such as *The Girl from the Big Horn Country* (1916) and *Mary Christmas* (1926). Her first novel, *Uplands* (1927), was followed by two of her most powerful novels: *Mary Peters* (1934) and *Silas Crockett* (1935), both about Maine seafaring families. *Dawn in Lyonesse* (1938) is an interesting retelling of the Tristan and Isolde story in a modern New England setting. She also wrote literary criticism, biblical studies, essays, and instruction in the craft of writing.

Chase, Philander (b. Dec. 14, 1775, Cornish, N.H.—d. Sept. 20, 1852, near Peoria, Ill., U.S.), U.S. clergyman and bishop in the Protestant Episcopal Church, educator, and founder of Kenyon College, Gambier, Ohio.

Ordained a priest in 1799, Chase served several parishes in New York State, New Orleans, and Hartford, Conn., prior to his consecration as bishop for the new Ohio diocese in 1819. Because he felt the needs of the frontier West could best be served by clergy trained in the region, he sought and obtained funds in England and at Gambier in 1824 and founded Kenyon College and its affiliated seminary, Bexley Hall. Criticism by those who considered him to be too arbitrary as an administrator resulted in a dispute over control of the college and caused him to resign his bishopric in 1831. In 1835 he was elected bishop of the new diocese of Illinois, where, near Peoria, he founded Jubilee College and became its first president. He served until his death in both these capacities and also from 1843 as presiding bishop of his denomination.

Chase, Salmon P(ortland) (b. Jan. 13, 1808, Cornish Township, N.H., U.S.—d. May 7, 1873, New York City), lawyer and politician, antislavery leader before the U.S. Civil War, secretary of the treasury (1861–64) in Pres. Abraham Lincoln's wartime Cabinet, sixth chief justice of the United States (1864–73), and repeatedly a seeker of the presidency.

Chase received part of his education from his uncle Philander Chase, the first Episcopal bishop of Ohio and later of Illinois, and his legal training (1827–30) from William Wirt, U.S. attorney general. From 1830 he practiced law in Cincinnati, Ohio, where he became widely known for his courtroom work on



Salmon P. Chase, engraving by J.C. Buttre after a painting by F.B. Carpenter
By courtesy of the Ohio Historical Society Library

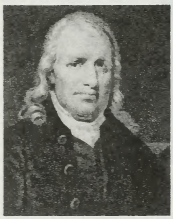
behalf of runaway slaves and white persons who had aided them. Originally a Whig, he changed his politics according to fluctuations in the antislavery movement. After leading the Liberty Party in Ohio (from 1841), he helped to found the Free-Soil Party (1848) and the Republican Party (1854). Between terms in the U.S. Senate (1849–55, 1860–61), he was the first Republican governor of Ohio (1855–59). He sought the Republican presidential nomination openly in 1856 and 1860, and surreptitiously in 1864 while serving in Lincoln's Cabinet; in 1868, during his chief justiceship, he sought the Democratic nomination as an opponent of the Radical Republicans' program of reconstructing the defeated Southern states, and in 1872 he was once more an unsuccessful candidate.

At the 1860 Republican convention in Chicago, Chase permitted the delegates pledged to him to cast decisive votes for Lincoln on the third ballot. As a reward Lincoln appointed him secretary of the Treasury, in which position for the next three years he was responsible for financing the Union war efforts. He held the Treasury post until June 1864, and in December of that year he was appointed chief justice to succeed Roger Brooke Taney, who had died in October.

Temperamentally unsuited to judicial office, Chase nonetheless enhanced the prestige of the Supreme Court by his caution in dealing with Reconstruction measures and by his fairness in presiding over the Senate's impeachment trial (ending in acquittal) of President Andrew Johnson in 1868. In *Mississippi* v. *Johnson* (1867) and *Georgia* v. *Stanton* (1867), Chase spoke for the court in refusing to prohibit Johnson and Secretary of War Edwin M. Stanton from enforcing the Reconstruction Acts. By disavowing the court's jurisdiction in *Ex parte McCardle* (1868), Chase sidestepped the question of whether a U.S. military commission in a former Confederate state could try a civilian for opposing those statutes. He dissented when the court invalidated, in *Cummings* v. *Missouri* and *Ex parte Garland* (both 1867), state and federal loyalty oaths prerequisite to the practice of learned professions. In various cases in 1872–73 (near the end of his life), in a court whose majority narrowly construed the postwar Thirteenth and Fourteenth Amendments to the Constitution, he tried to protect the rights of blacks from infringement by state action.

BIBLIOGRAPHY. The standard biography is Albert Bushnell Hart, *Salmon Portland Chase* (1899, reissued as *Salmon P. Chase*, 1980). Frederick J. Blue, *Salmon P. Chase* (1987), is also of interest.

Chase, Samuel (b. April 17, 1741, Princess Anne, Md. [U.S.]—d. June 19, 1811, Washington, D.C.), associate justice of the U.S. Supreme Court, whose acquittal in an impeachment trial (1805) inspired by President Thomas Jefferson for political reasons strengthened the independence of the judiciary.



Samuel Chase, portrait by an unknown artist

By courtesy of the Library of Congress, Washington, D.C.

A member of the Maryland assembly (1764–84) and the Continental Congress (1774–78, 1784–85), and a signer of the Declaration of Independence, Chase served as chief judge of the Maryland General Court from 1791 to 1796, when President George Washington appointed him to the U.S. Supreme Court. In *Ware* v. *Hylton* (1796), an important early test of nationalism, he upheld the primacy of U.S. treaties over state statutes. In *Calder* v. *Bull* (1798), he asserted that legislative power over liberty and property is limited by "certain vital principles in our free Republican governments"; later courts read these principles into the "due process of law" clauses of the Fifth and Fourteenth Amendments to the Constitution.

During the struggle between the Federalist and Jeffersonian Republican parties, Chase, a Federalist, conducted his circuit court in a partisan manner. The House of Representatives, encouraged by Jefferson, charged Chase with improper actions in treason and sedition trials and with a political address to a grand jury. In March 1805 the Senate, acting as trial court, found him not guilty. His acquittal, by establishing the principle that federal judges could be removed only for indictable criminal acts, clarified the constitutional provision (Article III, section 1) that judges shall hold office during good behaviour. Some scholars believe that if Chase had been found guilty, the Jefferson administration would have proceeded against other Federalist justices, particularly Chief Justice John Marshall, a leading opponent of Jefferson.

Chase, William Merritt (b. Nov. 1, 1849, Williamsburg [now Nineveh], Ind., U.S.—d. Oct. 25, 1916, New York, N.Y.), painter and teacher, who helped establish the fresh colour and bravura technique of much early 20th-century American painting.



"In the Studio," oil on canvas by William Merritt Chase, 1880–83; in The Brooklyn Museum, New York

By courtesy of The Brooklyn Museum, New York, gift of Mrs. Carll H. DeSilver in memory of her husband

Chase studied at the National Academy of Design in New York City and under Karl von Piloty for six years in Munich. He worked for a time in the grays and browns of the Munich school, but in the 1880s he took up a lighter palette, which was then popular in Paris.

An extremely effective teacher, Chase taught many pupils, first at the Art Students League of New York and then at his own school in New York City. He is best known for his portraits and figure studies, his still lifes of dead fish, and his studio interiors—*e.g.*, "In the Studio" (1880–83). His mature style is notable for its bold and spontaneous brushwork and other marks of virtuoso execution.

Chase Manhattan Corporation, The, American holding company incorporated Jan. 22, 1969, to acquire, as its main subsidiary, The Chase Manhattan Bank, NA, and to develop other related financial services and operations. The Chase Manhattan Bank itself had resulted from the merger in 1955 of the Bank of the Manhattan Company (founded 1799) and The Chase National Bank (founded 1877). Its headquarters are in New York City.

On April 2, 1799, at the urging of such civic leaders as Aaron Burr and Alexander Hamilton (later noted rivals), the New York state legislature chartered the Manhattan Company to build a water supply system for New York City. The original capital ($2,000,000) was so large that the directors quickly voted to use surplus funds to open an "office of discount and deposit," and on Sept. 1, 1799, the Bank of the Manhattan Company was opened at 40 Wall Street. In 1808 the company sold its waterworks to the city and turned completely to banking. Although growth was steady, the bank's real expansion began after the onset of the 20th century. In 1918 it merged with the Bank of the Metropolis and thus acquired the first of many branch offices. In 1920 it merged with the Merchants' National Bank of the City of New York (founded 1803, with Alexander Hamilton's promotion), and in 1929 it acquired the International Acceptance Bank, Inc. (founded 1921), thus venturing into various kinds of foreign-trade financing.

The Chase National Bank was organized Sept. 12, 1877, by John Thompson (1802–91), who named the bank in honour of the late U.S. Treasury secretary Salmon P. Chase. (Thompson had earlier helped found the First National Bank, a predecessor of Citibank and Citicorp.) Chase National's growth was phenomenal, and by 1921 it had become the second largest national bank in the United States, without benefit of mergers. Then there followed a long series of mergers: Metropolitan National Bank (1921), Mechanics and Metals National Bank (1926), Mutual Bank (1927), Garfield National Bank (1929), National Park Bank (1929), Equitable Trust Company, including Seaboard National Bank (1929), and Interstate Trust Company (1930). Such mergers resulted in a proliferation of branches and extensive foreign affiliations.

On March 31, 1955, Chase National Bank (then the nation's third largest bank) and the Bank of the Manhattan Company (the 15th largest) merged to form The Chase Manhattan Bank. The creation of The Chase Manhattan Corporation in 1969 was part of a general movement in American banking to establish holding companies to head banking operations and other operations such as finance companies, ordinarily legally excluded from the purview of banking.

In 1996 The Chase Manhattan Corporation merged with the nation's second largest bank, the New York-based Chemical Banking Corporation (*q.v.*), to form the largest bank in the United States. The merged bank kept the name Chase Manhattan Corporation.

Chasid (Judaism): *see* Hasidean.

Chasidism (Judaism): *see* Ḥasidism.

chasing, metalwork technique used to define or refine the forms of a surface design and to bring them to the height of relief required. The metal is worked from the front by ham-



Chased silver Torah case, 1764; in the Jewish Museum, New York City

By courtesy of the Jewish Museum, New York City; photograph, Art Resource

mering with various tools that raise, depress, or push aside the metal without removing any from the surface (except when the term chasing, instead of the more appropriate term chiselling, is used to describe the removal of surplus metal from objects after casting).

Chasing is the opposite of embossing, or repoussé, in which the metal is worked from the back to give a higher relief. A particular form of chasing, called flat chasing, which involves hammering with small, blunt tools to give a low-relief ornamentation, was popular for silver decoration in Europe in the early 18th century and was widely used in the United States during the second half of the same century.

Chasles, Michel (b. Nov. 15, 1793, Épernon, Fr.—d. Dec. 18, 1880, Paris), French mathematician who, independently of the Swiss-German mathematician Jakob Steiner, elaborated the theory of modern projective geometry, the study of the properties of a geometric line or plane figure that remain unchanged when the figure is projected onto a plane from a point not on either the plane or the figure. Chasles was made professor of geodesy and mechanics at the École Polytechnique, Paris, in 1841. His *Aperçu historique sur l'origine et le développement des méthodes en géométrie* (1837; "Historical Survey of the Origin and Development of Geometric Methods") is still a standard historical reference.

In 1846 he became professor of higher geometry at the Sorbonne. In that year he solved the problem of determining the gravitational attraction of an ellipsoidal mass to an external point. In 1864 he began publishing in *Comptes Rendus* the solutions to an enormous number of problems based on his "method of characteristics" and his "principle of correspondence." The basis of enumerative geometry is contained in the method of characteristics.

Chasles was a prolific writer and published many of his original memoirs in the *Journal de l'École Polytechnique*. He wrote two textbooks, *Traité de géométrie supérieure* (1852; "Treatise on Higher Geometry") and *Traité des sections coniques* (1865; "Treatise on Conic Sections"). His *Rapport sur le progrès de la géométrie* (1870; "Report on the Progress of Geometry") continues the study in his *Aperçu historique*.

Chasles is also remembered as the victim of a celebrated fraud. He is known to have paid nearly 200,000 francs (approximately $36,000) for various forged letters, some purported to be from famous men of science and one allegedly from Mary Magdalene to Lazarus.

Chasseboeuf, Constantin-François de: *see* Volney, Constantin-François de Chasseboeuf, comte de.

Chassériau, Théodore (b. Sept. 20, 1819, Samana, Dominican Republic—d. Oct. 8, 1856, Paris), French painter who attained some measure of success in his attempt to fuse the Neoclassicism of Jean-Auguste-Dominique Ingres and the Romanticism of Eugène Delacroix.

As a boy, Chassériau entered the studio of Ingres, following his master to Rome in 1834. Chassériau's immediate success at the Paris Salon of 1836 was confirmed three years later by a Venus and his "Suzanne," both in the Louvre. About 1840, however, he began to grow dissatisfied with the art of Ingres.

Around 1843, Chassériau's style and subject matter began to show the influence of Ingres's rival, Delacroix, and he began deliberately attempting to combine the rhythmical linear qualities of Ingres with the colouristic methods of the Romantic master. His 15 Othello etchings (1844) and his paintings of Moorish and Jewish life following his trip to North Africa (1846) suggest Delacroix, though Chassériau added an exotic quality of his own. He was also important in the revival of monumental allegorical and religious painting in France, though few of those works survive intact.



"The Two Sisters," oil painting by Théodore Chassériau, 1843; in the Louvre, Paris

CFL—Giraudon from Art Resource/EB Inc.

chasseur (French: "hunter"), member of an armoured unit of the French army. Originally (1743) chasseurs, or *chasseurs à pied* ("on foot"), were light-infantry regiments. By the outbreak of World War I there were 30 battalions of chasseurs of which 12 were known as *chasseurs alpins*—units specially trained for mountain warfare. After World War II, chasseurs were formed as independent battalions for administrative purposes but were grouped into demibrigades of three battalions for war. Just prior to World War II a few battalions were integrated into armoured divisions as motorized infantry called *chasseurs portés*.

The light-cavalry (*chasseurs à cheval*) regiments were first instituted in 1779. They performed notable service in the European campaigns of the Second Empire. At the close of World War I they were represented by five regiments of *chasseurs d'Afrique*, originally recruited in 1831 for service in Algeria. The number of such cavalry units was increased after World War I, and they were progressively reorganized into light-armoured battalions. In the process, the term *chasseurs de chars* was added to distinguish units specifically designed as tank-destroyer units.

chaste tree, also called MONK'S PEPPER TREE, or WILD LAVENDER (*Vitex agnus-castus*), aromatic shrub growing to 5 metres (about 16 feet) tall, bearing spikes of rose-lavender flowers. It belongs in the verbena family (Verbenaceae), order Lamiales.



Chaste tree (*Vitex agnus-castus*)

A.J. Huxley—EB Inc.

Its pliable twigs are used in basketry, and its red fruits are used for flavouring. The undersides of its five- to seven-lobed leaves and its branches are white felted. It is native to Eurasia and is naturalized in North America.

Chastelard, Pierre de Bocosel de (b. 1540, Dauphiné, Fr.—d. 1563, St. Andrews, Fife, Scot.), French courtier whose passion for Mary Stuart, Queen of Scots, eventually led to his execution.

Grandson of Pierre Terrail, chevalier de Bayard, Chastelard became page to the constable Montmorency and frequented the court of Francis II of France, where he fell in love with the queen consort, Mary, who is said to have encouraged his passion. He wrote poems to her and, after the death of Francis, was in the party escorting Mary back to Scotland in 1561. After returning to France, he revisited Edinburgh the next year and spent the winter at court at Holyroodhouse. There he hid himself under her bed, where he was discovered by her maids of honour. Mary pardoned the offense, but Chastelard was so rash as to repeat the same violation of her privacy. He was discovered again, seized, sentenced, and hanged the next morning. His story is the subject of Algernon Charles Swinburne's verse drama *Chastelard* (1865).

Chastellain, Georges, Chastellain also spelled CHASTELAIN (b. *c.* 1405 or *c.* 1415, Aalst, Brabant—d. 1475, Valenciennes, Burgundian Hainaut), Burgundian chronicler and one of the leading court poets who had many literary admirers and followers, among them Jean Molinet and Pierre Michault.

Chastellain served Philip the Good, duke of Burgundy, until in 1435, after the Peace of Arras, he abandoned soldiering. He spent the next years in France, mainly as secretary to Pierre de Brézé, seneschal of Poitou, and trying to improve relations between Philip the Good and Charles VII of France. His affection for France remained constant even when, in 1446, he entered Philip's household. There, too, he was used on secret and diplomatic missions, and in 1455 he was also appointed Burgundian historiographer. In about 1463 his disciple and successor, Jean Molinet, became his secretary.

Only about one-third of his *Chronique des ducs de Bourgogne* has survived. The chronicle extends, with gaps, from 1419 to 1474. Its interest lies in its description and factual information and in its shrewd assessment of contemporary figures and motives. Chastellain does not hesitate at times to lay blame upon his aristocratic patrons, but the growth of middle-class political self-consciousness meets with scant sympathy.

Chastellain's other work consists of political pieces, formal poems of little interest, ballades, works addressed to fellow writers, and didactic works and plays, often allegorical in form, and, like all Chastellain's writing, somewhat Latinized in style.

chasuble, liturgical vestment, the outermost garment worn by Roman Catholic priests and bishops at mass and by some Anglicans and Lutherans when they celebrate the Eucharist. The chasuble developed from an outer garment worn by Greeks and Romans called the *paenula* or *casula* ("little house"), a conical or bell-shaped cloak made from a semicircular piece of cloth sewn partially up the front with an opening left for the head.

Worn by both laity and clergy until the 6th century, the chasuble gradually developed into a specifically ecclesiastical vestment. It was draped in different ways but not structurally altered until the 15th century, when the use of



Italian chasuble with orphrey, mid-15th century; in the Art Institute of Chicago
By courtesy of the Art Institute of Chicago, gift of Honore Palmer

heavy brocades and other stiff materials led to the reduction of material over the arms until it resembled a highly decorated tabard. In the 19th and 20th centuries attempts have been made to restore the draped effect of the early chasuble, but various styles are still used.

In the Eastern churches, the equivalent vestment is the phelonion (phenolion), worn exclusively by priests.

chat, any of several songbirds (suborder Passeres, order Passeriformes) named for their harsh, chattering notes.

True chats make up a major division of the thrush family Turdidae (or subfamily Turdi-



Yellow-breasted chat (*Icteria virens*)
Ron Austing—Bruce Coleman Inc.

nae of the Muscicapidae); they are collectively grouped under chat-thrushes (*q.v.*).

Australian chats are chiefly *Epthianura* species, usually placed in the family Maluridae but sometimes separated as the subfamily Epthianurinae (both groups are sometimes considered families). Nomadic inhabitants of scrubby open lands of the south, they feed on terrestrial insects. All are about 13 centimetres (5 inches) long. The white-faced chat (*E. albifrons*) is white and gray, with a black band from nape to breast (male); it is also called tang, from its metallic note.

The yellow-breasted chat (*Icteria virens*) of North America is, at 19 cm (7½ in.), the largest member of the wood-warbler family Parulidae—if in fact it belongs there. Greenish-gray above and bright yellow below, with white "spectacles" (sexes alike), it skulks in thickets but may perch in the open to utter its mewing, churring, and whistling sounds.

To make the best use of the Britannica, consult the INDEX *first*

chat-thrush, any of the 190 species belonging to the songbird family Turdidae (order Passeriformes) that are generally smaller and have slenderer legs and more colourful plumage than true, or typical, thrushes. Chat-thrushes are sometimes treated as a distinct subfamily, Saxicolinae. They are found almost worldwide but are most common in the tropics, especially in Africa. Wing- and tail-flicking is common in this group, and a number of species behave like flycatchers (Muscicapidae)



Chat-thrush (*Cossypha cyanocampter*)
Drawing by John P. O'Neill

or warblers (Sylviidae). Many skulk in undergrowth, but some like open country or gardens. Chat-thrushes are named for the harsh, chattering notes characteristic of many of the species, and they sing less impressively than true thrushes. Their nesting habits are fairly diverse: most build open nests, but a few occupy cavities. Most have comparatively large clutches of five or six eggs.

Among the chat-thrush group are the bluebird; bluethroat; forktail; magpie-robin; nightingale; redstart; robin; thrush; warbler; and wheatear (*qq.v.*).

château, in France, during the 13th and 14th centuries, a castle, or structure arranged for defense rather than for residence. Later the term came to designate any seignorial residence and so, generally, a country house of any pretensions.

Originally, châteaus functioned as feudal communities; but with the rise of secular prosperity in the 14th century, the restrictive manorial system relaxed, giving rise to the spacious yet still-fortified private residence of



Château du Moulin near Lassay-sur-Croisne, Fr., 1480–1502
Colour Library International

the nobility. These compounds, or châteaufort, were usually placed on hills in a commanding position above river valleys. Walls were thick, windows were small, and parapets were often crenellated to resist attack. Architectural forms were freely borrowed from medieval bastions. A representative example of this type of fortified château is the Château de Pierrefonds (1390–1400). Eight monumental towers, machicolations (*i.e.*, openings from which missiles could be hurled or shot at attackers below), and battlemented walls surround a courtyard the walls of which are 20 feet (7 metres) thick. The château sits on a rocky cliff overlooking the village and can be approached only by a drawbridge that spans a moat.

The 15th century brought the beginning of a change in the methods of warfare, a decline in the feudal system, and the consequent rise of a social order in which luxuriant country houses rather than fortified castles filled the residence requirements of the nobility. The Château d'Amboise (15th century), Château de Blois (begun in the 13th century), Château de Chambord (1519–47), Château d'Azay-le-Rideau (1518–27), and Château de Chenonceaux (1515–23) may be taken as typical examples of the *châteaux de plaisance* (country houses) of the transition period, all retaining some of the characteristics of the medieval castle.

At Chambord, for example, the semifortified plan places the main house within a rectangular enclosure protected by a moat. The main inner building, the donjon, is the equivalent of the keep in a medieval English castle. Angle towers with conical roofs, pilasters, supporting classical parapets, and steeply pitched roofs with dormers combine to create a potpourri of architectural motifs. These distinctive and fantastic elements produce, at Chambord, the most famous château in the Loire River district and one that can be placed somewhere between fortified Gothic castle, Renaissance palace, and fairyland.

By the 17th century the need for semifortified châteaus had virtually vanished. In their place were built elegant, refined country villas such as the Château of Maisons (now Maisons-Laffitte) by François Mansart, which was designed, for the most part, by 1642. *See also* castle.

Château-Renault, François-Louis Rousselet, marquis de (b. Sept. 22, 1637, Château-Renault, Fr.—d. Nov. 15, 1716, Paris), French admiral, afterward a marshal of France, who served with distinction in the wars of King Louis XIV against the British and the Dutch.

In 1689 he transported French troops to Ireland to aid the deposed Catholic King James II of Great Britain, and he obtained a short-lived advantage by defeating a British fleet off the south coast of Ireland. As vanguard commander in the Battle of Beachy Head (1690), he was chiefly responsible for the French victory over the Dutch. He was absolved of blame for the loss to the British, in Vigo Bay, Spain, of part of a Spanish treasure fleet that he had convoyed from the Western Hemisphere in 1702.

Château-Thierry, town, northeast France, Aisne *département*, Picardie region, east-northeast of Paris. It is situated on the Marne River on the slopes of a hill, at the top of which are the ruins of an old castle, said to have been built in about 720 by the Frankish ruler Charles Martel for his puppet Thierry IV (the Merovingian king Theodoric). Close to the castle walls stands the 16th-century mansion in which Jean de La Fontaine (1621–95), writer of fables, was born. It has been turned into a La Fontaine museum.

Château-Thierry, which manufactures agricultural machinery, baked goods, and musical instruments, is on the main railway line from Paris to Nancy and Strasbourg. Formerly

the capital of the district of Brie Pouilleuse, Château-Thierry was captured by the English in 1421; by Charles V, Holy Roman emperor, in 1544; and by the Duke of Mayenne in 1591. During the French Revolution, it was called Egalité-sur-Marne. It was sacked by the Prussians in 1814. In World War I it was the farthest point reached by the German offensive of 1918, which was halted by French forces aided by the American Expeditionary Force. The town was badly damaged in both world wars. Pop. (1990) 15,830.

Chateaubriand, François-Auguste-René, Viscount (vicomte) **de** (b. Sept. 4, 1768, Saint-Malo, France—d. July 4, 1848, Paris), French author and diplomat, one of his country's first Romantic writers. He was the preeminent literary figure in France in the early 19th century and had a profound influence on the youth of his day.

The youngest child of an eccentric and impecunious noble, Chateaubriand spent his school holidays largely with his sister in the romantic solitudes of the family estate at Combourg, with its half-derelict medieval castle set in ancient oak woods and wild heaths. After leaving school, he eventually became a cavalry officer.

At the beginning of the French Revolution, he refused to join the Royalists and sailed in April 1791 for the United States, a stay memorable chiefly for his travels with fur traders and for his firsthand acquaintance with Indians in the region around Niagara Falls. After learning of Louis XVI's flight in June 1791, Chateaubriand felt that he owed obligations to the monarchy and returned to France. Penniless, he married an insipid heiress of 17 and took her to Paris, which he found too expensive; he then left her and joined the Royalist Army. Wounded at the siege of Thionville, he was discharged.

He went to England in May 1793. Often destitute, he supported himself by translating and teaching. In London he began his *Essai sur les révolutions* (1797; "Essay on Revolutions"), an emotional survey of world history in which he drew parallels between ancient and modern revolutions in the context of France's own recent upheavals.

In 1800 Chateaubriand returned to Paris, where he worked as a freelance journalist and continued to write his books. A fragment of an unfinished Indian epic appeared as *Atala* (1801); immediately successful, it combined the simplicity of a classical idyll with the more troubled beauties of Romanticism. The novel tells the story of a Christian girl who has taken a vow to remain a virgin but who falls in love with a Natchez Indian. Torn between love and religion, she poisons herself to keep from breaking her vow. The lush Louisiana setting and the playing-out of romantic passion in primitive American surroundings are captured in a rich, harmonious prose style that yields many beautiful descriptive passages.



Viscount de Chateaubriand, detail of an oil painting by Girodet-Trioson; in the National Museum of Versailles and the Trianons, France

Cliché Musees Nationaux

Shortly after the death of his mother in 1798, Chateaubriand reconciled his conflict between religion and rationalism and returned to traditional Christianity. His apologetic treatise extolling Christianity, *Le Génie du christianisme* (1802; "The Genius of Christianity"), won favour both with the Royalists and with Napoleon Bonaparte, who was just then concluding a concordat with the papacy and restoring Roman Catholicism as the state religion in France. In this work, Chateaubriand tried to rehabilitate Christianity from the attacks made on it during the Enlightenment by stressing its capacity to nurture and stimulate European culture, architecture, art, and literature over the centuries. Chateaubriand's theology was weak and his apologetics illogical, but his assertion of Christianity's moral superiority on the basis of its poetic and artistic appeal proved an inexhaustible sourcebook for Romantic writers; the renewed appreciation of Gothic architecture sparked by the book is the most prominent example of this.

Napoleon rewarded Chateaubriand for his treatise by appointing him first secretary to the embassy at Rome in 1803. But in 1804, when Napoleon stunned France with the unfair trial and hasty execution of the Duke d'Enghien on a flimsy pretext of conspiracy, Chateaubriand resigned his post in protest. He spent the next years in literary work and in many love affairs. The most important of the books he published during these years is the novel *René* (first published separately in 1805), which tells the story of a sister who enters a convent rather than surrender to her passion for her brother. In this thinly veiled autobiographical work Chateaubriand began the Romantic vogue for world-weary, melancholy heroes suffering from vague, unsatisfied yearnings in what has since been called the *mal du siècle* ("the malady of the age"). On the basis of *Les Martyrs* (1809), a prose epic about early Christian martyrs in Rome, and *Itinéraire de Paris à Jérusalem* (1811), an account of his recent travels throughout the Mediterranean, Chateaubriand was elected to the French Academy in 1811.

With the restoration of the Bourbon monarchy in 1814, Chateaubriand's hopes of a political career revived. In 1815 he was created a viscount and a member of the House of Peers. His extravagant lifestyle eventually caused him financial difficulties, however, and he found his only pleasure in his liaison with Mme Récamier, who illumined the rest of his life. He began *Mémoires d'outre-tombe* (1849–50), his memoir from "beyond the tomb," written for posthumous publication and perhaps his most lasting monument. This memoir, which Chateaubriand began writing as early as 1810, is as much a history of his thoughts and sensations as it is a conventional narrative of his life from childhood into old age. The vivid picture it draws of contemporary French history, of the spirit of the Romantic epoch, and of Chateaubriand's own travels is complemented by many self-revealing passages in which the author recounts his unstinting appreciation of women, his sensitivity to nature, and his lifelong tendency toward melancholy. Chateaubriand's most enduring preoccupation was himself, and his memoirs have proved to be his most enduring work.

After six months as ambassador to Berlin in 1821, Chateaubriand became ambassador to London in 1822. He represented France at the Congress of Verona in 1822 and served as minister of foreign affairs under the ultra-Royalist premier Joseph, Count de Villèle, until 1824. In this capacity he brought France into the war with Spain in 1823 to restore that country's Bourbon king Ferdinand VII. The campaign was a success, but its high cost diminished the prestige Chateaubriand won by it. He passed the rest of his life privately, except for a year as ambassador to Rome (1828–29).

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Châteauguay, town, Montérégie region, southern Quebec province, Canada. It lies at the mouth of the Châteauguay River, just south of its confluence with the St. Lawrence. The site of a Jesuit mission established in 1736, it served as a trading centre during the settlement of the surrounding region. On Oct. 26, 1813, the Battle of Châteauguay, a decisive engagement of the War of 1812, took place there; a small party of British troops under Colonel Charles de Salaberry repelled an attacking U.S. force, preventing their attempted capture of Montreal. Now a dairying and fruit-growing centre, Châteauguay has developed into a residential suburb 12 miles (19 km) southwest of Montreal city. The town's manufactures include road conduits and doors. Pop. (1991) 39,833.

Châteauguay, Battle of (Oct. 26, 1813), in the War of 1812, engagement in which the British compelled U.S. forces to abandon a projected attack on Montreal and thus exerted a decisive influence on U.S. strategy during the 1813 campaign.

In the autumn of 1813, a U.S. invading force of about 4,000 troops under General Wade Hampton marched toward Montreal through the Châteauguay River valley. A U.S. advance party of 1,500 under Colonel Robert Purdy and some 460 British troops under Colonel Charles de Salaberry met at Châteauguay on October 26. The British had taken up a good defensive position in the woods along the riverbank and, despite their inferior numbers, managed to stop Purdy's advance. After this setback, Hampton withdrew back across the border. At least 90 percent of the British troops at Châteauguay were French Canadians.

Châteauroux, city, capital of Indre *département,* Centre *région,* central France. It lies along the Indre River, south of Orléans, on the main road and railway from Paris to Toulouse. It derives its name from a castle built toward the end of the 10th century by Raoul le Large, prince of Déols. The present Château Raoul, occupied by the prefecture, dates from the 15th century. An 18th-century mansion, in which died Count Henri-Gratien Bertrand, a friend of Napoleon I who accompanied him into exile, houses Napoleonic collections. Châteauroux's industries produce metal equipment, chemicals, paper, textiles, pharmaceutical products, and cigarettes, and the city is the industrial centre of an extensive agricultural region. Pop. (1990) 52,949.

Châteauroux, Marie-Anne de Mailly-Nesle, Duchess (duchesse) **de** (b. Oct. 5, 1717, Paris, France—d. Dec. 8, 1744, Paris), mistress of Louis XV of France who used her influence with the king to promote French involvement in the War of the Austrian Succession (1740–48).

The fifth daughter of Louis de Mailly, Marquis de Nesle, Marie-Anne was married in 1734 to the Marquis de La Tournelle, who died in 1740. Her eldest sister, Louise-Julie, Countess de Mailly, had been Louis XV's mistress from 1737 to 1739, when she was replaced in the king's affections by the second sister, Pauline-Félicité, Marquise de Vin-

timille. Mme de Vintimille died in 1741, and in December 1742 Louis took Mme de La Tournelle as his official mistress (*maîtresse en titre*). As her price for accepting the arrangement, she made Louis grant her the title



Mme de Châteauroux, detail of a portrait by Jean-Marc Nattier; in the Longchamp Museum, Marseille
Giraudon—Art Resource

Duchess de Châteauroux (1743) and dismiss her eldest sister from court. Mme de Châteauroux helped lead the court faction that brought France into the War of the Austrian Succession against Austria, and she persuaded Louis to take the field in pursuit of military glory. Louis allowed her to join him with the army in the Austrian Netherlands in June 1744, but, when he fell critically ill at Metz in August, he was persuaded by priests to send her away. After his unexpected recovery, however, Louis renewed their liaison. Mme de Châteauroux died suddenly of peritonitis several months later. Louis then evidently had brief affairs with the remaining two Nesle sisters.

chatelaine, ornament, used by both men and women and usually fastened to belt or pocket,



Gold repoussé chatelaine, French, 18th century; in the Poldi Pezzoli Museum, Milan
By courtesy of the Museo Poldi Pezzoli, Milan

with chains bearing hooks on which to hang small articles such as watches, keys, seals, writing tablets, scissors, and purses. The word chatelaine is derived from a word meaning the keeper of a castle, thus the person entrusted with the keys. During the 18th century, chatelaines were particularly popular. The finest were made of gold; cheaper ones of a yellow alloy were named pinchbeck, after the inventor of the material. Some chatelaines were decorated with repoussé or enamel and depicted biblical, mythological, or genre scenes. Others were inlaid with agate, and, toward the end of the 18th century, some were adorned with cameos in a pseudoclassical style. The most luxurious were decorated with precious gems, especially diamonds.

Châtelet, in Paris, the principal seat of common-law jurisdiction under the French monarchy from the Middle Ages to the Revolution. The building itself (demolished between 1802 and 1810) was originally a little fort on the right bank of the Seine, guarding the northern approach to the Île de la Cité. Frequently rebuilt, it was known as the Grand Châtelet to distinguish it from the Petit Châtelet on the left bank of the Seine. In the 12th century the Grand Châtelet became the seat of the royal *prévôt* ("provost") of Paris. He had jurisdiction over matters of common law, both civil and criminal; judged appeals from all royal and seignorial courts in Paris; heard uncontested cases; and dealt through notaries with proceedings anywhere in the kingdom.

In 1667 Louis XIV created a lieutenant general of police, "monsieur de Paris," who took over many of the powers of the *prévôt* and who was granted authority over the *commissaires-examinateurs* of the Châtelet. The latter, a permanent staff in existence since 1327, were responsible for security and public order, for the supervision of prisons, including the Bastille, and for the regulation of the food supply of Paris. With the Revolution the jurisdiction of the Châtelet was abolished (Aug. 24, 1790).

Châtelet, Gabrielle-Émilie Le Tonnelier de Breteuil, Marquise du (b. Dec. 17, 1706, Paris, France—d. Sept. 10, 1749, Lunéville), French mathematician and physicist who was the mistress of Voltaire.

She was married at 19 to the Marquis Florent du Châtelet, governor of Semur-en-Auxois, with whom she had three children. The marquis then took up a military career and thereafter saw his wife only infrequently. Mme du Châtelet returned to Paris and its dazzling social life in 1730 and had several lovers before entering into an affair and intellectual alliance with Voltaire in 1733. She was able to extricate the intemperate Voltaire from many personal and political difficulties, such as those that followed the publication of his *Lettres philosophiques* in 1734. To avoid an arrest warrant, Voltaire left Paris in June of that year, taking refuge in Mme du Châtelet's château at Cirey in Champagne. In this haven they pursued their writing and philosophical and scientific discussions. In 1738 Mme du Châtelet and Voltaire competed independently for a prize offered by the Academy of Sciences for an essay on the nature of fire. Although the prize was won by the German mathematician Leonhard Euler, Mme du Châtelet's *Dissertation sur la nature et la propagation du feu* was published in 1744 at the Academy's expense. She wrote several other scientific treatises and many posthumously published works on philosophy and religion.

Voltaire and Mme du Châtelet continued to live together even after she began an affair with the poet Jean-François de Saint-Lambert; and when she died in childbirth at the court of Stanislas Leszczyński, Duke of Lorraine, these men and her husband were with her. From 1745 until her death she had worked unceasingly on the translation of Sir Isaac Newton's



Mme du Châtelet, detail of a portrait by an unknown French artist; in a private collection
J.E. Bulloz

Principia Mathematica. It was published in part, with a preface by Voltaire and under the direction of the French mathematician Alexis-Claude Clairaut, in 1756. The entire work appeared in 1759 and was for many years the only French translation of the *Principia*.

The many hundreds of letters that passed between Mme du Châtelet and Voltaire are assumed to have been destroyed, but some were included in Voltaire's *Correspondance*, 24 vol. (1953–57).

BIBLIOGRAPHY. Works on Châtelet's life and intellectual collaboration with Voltaire include Ira D. Wade, *Voltaire and Madame du Châtelet* (1941, reissued 1967); Nancy Mitford, *Voltaire in Love* (1957, reissued 1985); and Samuel Edwards, *The Divine Mistress* (1970).

Châtellerault, town, Vienne *département*, Poitou-Charentes *région*, west-central France. It lies north-northeast of Poitiers, on the main road from Paris to Bordeaux. Situated on the Vienne River, it derives its name from a 10th-century castle built by the 2nd Viscount Airaud of the district. The Henri IV bridge over the Vienne River was built between 1575 and 1611. The 16th-century Maison des Sybilles, where the French philosopher René Descartes spent his childhood, houses a museum devoted to him. There is also a museum of the automobile. Cutlery has been manufactured at Châtellerault since the 14th century. Its main industry is the manufacture of armaments. Pop. (1990) 35,691.

Chatham, town, Northumberland county, eastern New Brunswick, Canada. It lies near the mouth of the Miramichi River opposite Newcastle, 84 miles (135 km) north-northwest of Moncton. Founded about 1800 by Francis Peabody, it was probably named in honour of William Pitt, Earl of Chatham. It has pulp and paper mills, foundries, and shipyards and is a lumber-shipping and salmon-fishing port. In the 1830s Joseph Cunard built in Chatham's shipyards many of the large ships that carried lumber across the Atlantic to Europe. Chatham is the site of a Royal Canadian Air Force station. The town's institutions include St. Michael's convent and school. The Town Hall and Civic Centre were gifts of Lord Beaverbrook (William Maxwell Aitken), publisher and financier, who spent his boyhood in Newcastle. Inc. 1896. Pop. (1991) 6,544.

Chatham, city, seat of Kent county, southeastern Ontario, Canada. It lies at the head of navigation on the Thames River. The town originated in 1793 as a naval dockyard and was named after Chatham, Eng. During the War of 1812 a retreating British army under General Henry A. Procter escaped (Oct. 4, 1813) at Chatham from General William Henry Harrison's pursuing American army due to a rearguard action by Chief Tecumseh's forces (allied with the British). Located about 40 miles (65 km) east of Detroit, the town was a northern terminus of the Underground Railroad for fugitive slaves before the American Civil War. Chatham is now the centre

of a natural-gas, fruit-growing, and dairying district. Its varied industries include the manufacture of auto parts, plastics, and fabricated metals. Inc. village, 1841; town, 1855; city, 1895. Pop. (1991) 43,557.

Chatham, port, Rochester upon Medway district, county of Kent, England. The port lies along the River Medway just above its confluence with the River Thames, on the southeastern periphery of Greater London. Chatham is continuous with the communities of Rochester (west) and Gillingham and New Brompton (east), known as the Medway towns, for which Chatham functions as the main shopping centre.

Chatham (recorded in 1086 as Ceteham) grew around the Royal Navy dockyard established by Henry VIII and later improved by Charles I. The dockyard, closed as a naval base in the early 1980s, is now an historic trust. It lies partly on reclaimed land where the Medway broadens into a tidal estuary. During the Napoleonic Wars a number of forts known as "Chatham Lines" were built on a hill east of the town. The novelist Charles Dickens lived at Chatham from 1817 to 1821 while his father worked in the naval pay office. The district is featured in many of his novels. The hospital for former seamen, founded (1592) by Sir John Hawkins, was rebuilt in the mid-18th century. Chatham is the home of the Royal School of Military Engineering, founded there in 1812. Pop. (1981) 66,063.

Chatham, William Pitt, 1st Earl of: *see* Pitt, William, the Elder.

Chatham Island (Galápagos Islands): *see* San Cristóbal Island.

Chatham Islands, island group in the South Pacific Ocean, about 500 miles (800 km) east of New Zealand. Composed of 10 islands, with a total land area of 372 square miles (963 square km), they are primarily of volcanic formation, but areas of limestone indicate that they may once have been part of New Zealand. Chatham Island, the largest (347 square miles [900 square km]), rises to 942 feet (287 m); more than 20 percent of its poorly drained surface is covered by shallow lagoons. Pitt Island (about 24 square miles [62 square km]) lies 13 miles (21 km) from Chatham. Tarakoikoia is a rock pinnacle to the southeast rising abruptly to 566 feet (172 m).

There are no indigenous mammals, and the reptiles are of New Zealand species. The original forest vegetation has been seriously modified by fires and grazing since the arrival of Europeans; large areas are now under English grasses, while much of the rest is swamp, heath, and dune. The climate is cool and humid.

William R. Broughton discovered the group in 1791 while en route to Tahiti in the British ship *Chatham.* Sealing and whaling stations were soon established, the latter surviving until 1861. In 1865 sheep were introduced, and, although the industry has been limited by isolation, the export of wool and breeding stock is now the basis of the islands' economy. Other sources of income are blue cod and crayfish in the local waters. There are an estimated 10,000 acres (4,000 hectares) of moorland peat, which were being studied for possible commercial application.

Annexed by New Zealand in 1842, the group is administered by a resident commissioner appointed by the Department of Maori and Island Affairs. The populace, dominantly European with some Maori (who replaced the indigenous Moriori in 1835), is served by several schools and a hospital in the chief settlement, Waitangi, on Chatham Island. Pop. (1991) 760.

Chatham Strait, narrow passage of the eastern North Pacific through the northern Alexander Archipelago, southeastern Alaska, U.S. It extends for 150 miles (240 km) from the junction of Icy Strait and Lynn Canal, past Chichagof and Baranof islands (west) and Admiralty and Kuiu islands (east), to Coronation Island and the open sea. The deep, fault-formed strait, 3–10 miles (5–16 km) wide, is navigable and forms part of the Inside Passage between Alaska and Washington state. It was named in 1794 by the British navigator George Vancouver after Sir John Pitt, the 2nd Earl of Chatham.

Chatino, Middle American Indians of southwestern Oaxaca state in southern Mexico. The Chatino language is closely related to the neighbouring Zapotec language, and there are many cultural similarities between the two groups. The Chatino, who numbered about 37,000 in the late 20th century, live in a mountainous region. They are agricultural, raising a staple crop of corn (maize), as well as beans, squash, tomatoes, and chilies. Eggs and chickens are the major source of protein in the diet. Families usually prefer to live in villages, and outlying farm families may settle together in small hamlets rather than live alone on their land. The growth of cash crops such as coffee has resulted in abandonment of most native skills. Pottery and major weaving are rare, although weaving of belts and basket-making are still done to some extent. Houses are made of the traditional twigs and thatch or more modern adobe and tile. Clothing is Mexican-peasant style: white cotton for men, long skirts and blouses of machine-woven cloth for women.

The *compadrazgo,* or godparent (ritual kin), relationship occurs but has little associated ritual. Roman Catholicism with the usual Middle American blend of native elements and saint worship is practiced. Native animistic beliefs are also held.

chatoyance, the property of some minerals to exhibit a wavy, luminous band with a silky lustre, reminiscent of the eye of a cat, in the centre of a cabochon-cut (polished, with a rounded, unfaceted convex surface) stone. The effect, caused by parallel fibres or by oriented imperfections or inclusions within the stone, is typical of cat's-eye, tigereye, satin spar, and bronzite. The fibres, imperfections, or inclusions are oriented along a crystallographic axis; it is this same kind of orientation, but along three axes, that accounts for the asterism of star sapphire and ruby.

Chatrian, Louis-Alexandre: *see* Erckmann-Chatrian.

Chatsworth, estate near Rowsley parish, Derbyshire Dales district, county of Derbyshire, Eng., containing the principal seat of the English dukes of Devonshire. Chatsworth House itself stands near the left bank of the River Derwent. Construction of the original building began in 1553, but, after suffering occupation by both parties to the English Civil Wars of the mid-17th century, this house was subsequently demolished. The present mansion, often called "Palace of the Peak," was designed by William Talman for William Cavendish, the 4th Earl (created 1st Duke of Devonshire, 1694), and was begun in 1687. The 6th Duke made various additions, including the long north wing, 1820–27. The house has a library and an art collection with many masterpieces in it. The formal gardens that surround the house were designed by Sir Joseph Paxton, and the estate's park is more than 11 miles (18 km) in circumference.

Chattahoochee River, river having its source in several headstreams in the Blue Ridge Mountains in northeastern Georgia, U.S. It flows southwestward across northern Georgia to West Point, south of which its course marks the Georgia-Alabama and Georgia-Florida boundaries until it joins the Flint River at Chattahoochee, Fla., after a course of about 436 miles (702 km), where it forms the Apalachicola River. Northeast of Atlanta, Buford Dam forms Lake Sidney Lanier; north of Columbus, Ga., are two hydroelectric dams: Bartlett's Ferry Dam and Goat Rock Dam. The Chattahoochee is navigable from Columbus, Ga., to its mouth. South of Columbus lies the Providence Canyon area, created by severe erosion, in unconsolidated sandy soils, that has cut gullies as deep as 300 feet (90 m) and as wide as 200 feet (60 km). South of Fort Gaines, Ga., is Kolomoki Mounds State Park, developed around prehistoric Indian burial grounds. The Jim Woodruff Dam at the river's confluence with the Flint forms Lake Seminole. The name Chattahoochee is believed to be that of an early Indian village and probably means "cornmeal," or "pounded rock." The stream inspired Sidney Lanier's poem "The Song of the Chattahoochee."

Chattanooga, city, seat (1819) of Hamilton county, southeastern Tennessee, U.S. The city lies along the Moccasin Bend of the Tennessee River, near the Georgia border. Chattanooga is a headquarters for the Tennessee Valley Authority (TVA) power system, which since the 1930s has been an important element in its economic growth. The site was settled about 1815 when John Ross, who was later made a Cherokee Indian chief, established a trading post (Ross' Landing) on the river. In 1838 it was renamed Chattanooga, probably an Indian expression for the nearby Lookout Mountain (2,392 feet [729 m]), meaning "rock rising to a point." The settlement developed initially as a river port, and its growth was stimulated by the arrival of the railroads in the 1840s and '50s.

During the American Civil War, as a strategic Confederate communications point, it was a major objective of the Union armies, culminating in the decisive battles of Chickamauga and Chattanooga (September–November 1863), which resulted in Union occupation of the city and its use as a base by General William Tecumseh Sherman for his Atlanta campaign. The city's historic environs have been preserved in the Chickamauga and Chattanooga National Military Park (extending into Georgia), which includes the major battlefields, with sections on Orchard Knob, Lookout and Signal mountains, and Missionary Ridge. In Chattanooga National Cemetery are the graves of Captain James J. Andrews' Union raiders, who became famous for stealing the Confederates' wood-burning locomotive *The General* (preserved in Union Station Concourse).

Chattanooga's economy is well diversified and depends chiefly on tourism, insurance, warehousing and distribution, and a wide variety of manufactures, including textiles, steam boilers, nuclear reactors, stoves, plumbing supplies, farm implements, machinery, castings, soil pipe, structural steel, furniture, chemicals, explosives, and industrial ceramics.

The University of Tennessee at Chattanooga dates from 1886; other educational institutions include the Southern College of Seventh-day Adventists (1892) at nearby Collegedale, Chattanooga State Technical Community College (1965), and Tennessee Temple University (1946), supported by the local Highland Park Baptist Church. The city's cultural assets include an opera association, symphony orchestra, little theatre, and the Hunter Gallery of Art.

A steep-incline railway ascends Lookout Mountain, inside of which is a cave with a 145-foot (44-metre) waterfall; at the top of the mountain are gardens and odd stone formations known as Rock City. Nearby Chickamauga Lake, a reservoir 59 miles (95 km)

long, impounded by a TVA dam on the Tennessee River for power and flood control, also provides recreation and is the site of Booker T. Washington and Harrison Bay state parks. Inc. town, 1839; city, 1851. Pop. (1990) city, 152,466; Chattanooga MSA, 433,210.



Chattanooga and the Tennessee River from Lookout Mountain

By courtesy of the Tennessee Conservation Department

Chattanooga, Battle of (Nov. 23–25, 1863), in the U.S. Civil War, a decisive engagement fought at Chattanooga on the Tennessee River in late November 1863, which contributed significantly to victory for the North. Chattanooga had strategic importance as a vital railroad junction for the Confederacy. In September 1863 a Federal army led by Gen. William S. Rosecrans was besieged there by a Southern army commanded by Gen. Braxton Bragg. The following month Gen. Ulysses S. Grant took over the campaign to relieve the Union troops and seize the offensive. With the help of reinforcements from Gen. Joseph Hooker and Gen. William T. Sherman, the Federal forces defeated the Confederates in the battles of Lookout Mountain and Missionary Ridge and lifted the siege; by the end of the month the Confederate Army was in retreat into Georgia. Losses of men were less than at Chickamauga (about 6,000 Union and 7,000 Confederate), but the result was completely decisive, ranking in importance with Vicksburg and Gettysburg the same year. The way had been opened for Sherman's march to Atlanta and Savannah the following year.

chatter mark, small, curved fracture found on glaciated rock surfaces. Chatter marks are commonly 1–5 centimetres (½–2 inches) but may be submicroscopic or as much as 50 cm in length. They occur mainly on hard, brittle rocks such as granite and are formed under a glacier by the pressure and impact of boulders moved along by irregular rolling or sliding. Chatter marks are commonly arranged in nested series, with the orientation of the fractures at right angles to the direction of glacial movement. Three main types are recognized: the crescentic gouge, which is concave upstream and is made by the removal of a chip of rock; the crescentic fracture, which is concave downstream and also made by the removal of rock; and the lunate fracture, which is also concave downstream but without the removal of rock. Chatter marks in a series commonly decrease in size downstream.

chatterer (bird): *see* babbler.

Chatterjee, Bankim Chandra, Chatterjee also spelled CATTERJI, Bengali BAṄKIM CANDRA CAṬṬOPĀDHYĀY (b. June 26/27, 1838, near Naihati, Bengal, India—d. April 8, 1894, Calcutta), Indian author, whose novels firmly established prose as a literary vehicle for the Bengali language and helped create in India a school of fiction on the European model.

Bankim Chandra was a member of an orthodox Brahman family and was educated at Hooghly College, at Presidency College, Calcutta, and at the University of Calcutta, of which he was one of the first graduates. From 1858, until his retirement in 1891, he served as a deputy magistrate in the Indian civil service.

Some of Bankim Chandra's youthful compositions appeared in the newspaper *Sambad Prabhakar,* and in 1858 he published a volume of poems entitled *Lalita O Manas.* For a while he wrote in English, and his novel *Rajmohan's Wife* appeared serially in *Indian Field* in 1864. His first notable Bengali work was the novel *Durgeśnandinī,* which features a Rajput hero and a Bengali heroine. In itself it is of indifferent quality, but in the philosopher Devendranath Tagore's words, it took "the Bengali heart by storm," and with it the Bengali novel was full born. *Kapālkuṇḍalā,* a love story against a gruesome background of Tantric rites, was published in 1866; and *Mṛṇālinī,* which was set at the time of the first Muslim invasion of Bengal, in 1869.

Baṅgadarśan, Bankim Chandra's epoch-making newspaper, commenced publication in 1872, and in it some of his later novels were serialized. *Biṣabṛkṣa,* which poses the problem of widow remarriage, and *Indira* were published in 1873; *Yugalanguriya* in 1874; *Radharani* and *Candraśekhar* in 1875; *Rajanī* in 1877; *Kṛṣṇakānter Uil,* which the author considered his greatest novel, in 1878; *Rājsiṃha,* a story of Rajput heroism and Muslim oppression, in 1881; *Ānandamaṭh,* a patriotic tale of the revolt of the sannyasis against the Muslim forces of the East India company, in 1882; *Debī Caudhurānī,* a domestic novel with a background of dacoity, in 1884; and finally, in 1886, *Sītārām,* a marital tangle and a struggle of Hindus against Muslim tyranny.

Bankim Chandra's novels are considered exciting to read but structurally faulty. Serial publication was partly responsible for imperfect integration of the various episodes. Evolution of plot depends too frequently on chance or supernatural intervention, and characterization is often subordinated to an overriding didactic purpose. His achievements, however, outweigh these technical imperfections. To his contemporaries his voice was that of a prophet; his valiant Hindu heroes aroused their patriotism and pride of race. In him nationalism and Hinduism merged as one; and his creed was epitomized in the song "Bande Mātaraṃ" ("Hail to thee, Mother")—from his novel *Ānandamaṭh*—which later became the *mantra* ("hymn") and slogan of Hindu India in its struggle for independence.

Chatterton, Thomas (b. Nov. 20, 1752, Bristol, Gloucestershire, Eng.—d. Aug. 24, 1770, London), chief poet of the 18th-century "Gothic" literary revival, England's youngest writer of mature verse, and precursor of the Romantic movement.

At first considered slow in learning, Chatterton had a tearful childhood, choosing the solitude of an attic and making no progress with his alphabet. One day, seeing his mother tear up as waste paper one of his father's old French musical folios, the boy was entranced by its illuminated capital letters, and his intellect began to be engaged.

He learned to read far in advance of his age but only from old materials, music folios, a black-letter Bible, and muniments taken by his father from a chest in the Church of St. Mary Redcliffe. At seven Chatterton entered Colston's Hospital, but his learning was acquired independently. His first known poem was a scholarly Miltonic piece, "On the Last Epiphany," written when he was 10. About a year later an old parchment he had inscribed with a pastoral eclogue, "Elinoure and Juga," supposedly of the 15th century, deceived its readers, and thereafter what had begun merely as a childish deception became a poetic activity quite separate from Chatterton's acknowledged writings. These poems were supposedly written by a 15th-century monk of Bristol, Thomas Rowley, a fictitious character created by Chatterton. The name was taken from a civilian's monument brass at St. John's Church, Bristol.

The poems had many shortcomings both as medieval writings and as poetry. Yet Chatterton threw all his powers into the poems, supposedly written by Rowley, in such a manner as to mark him a poet of genius and an early Romantic pioneer, both in metrics and in feeling.

In 1767 Chatterton was apprenticed to a Bristol attorney but spent most of his time on his own writing, which for a while he turned to slight profit in *Felix Farley's Bristol Journal* and *Town and Country Magazine.* The life was irksome to him, however, and pressures began to build up, compounded of a fight for a free press, contempt for Bristol and his dowdy family, a philandering attitude to local girls, and the "death" of Rowley.

Chatterton sent James Dodsley, the publisher, letters offering some of Rowley's manuscripts, but Dodsley ignored him. Horace Walpole received similar offers and at first was enchanted with the "old" poems; but, when advised by friends that the manuscripts were modern, he treated Chatterton with chilly contempt, advising him in a letter to stick to his calling. Chatterton rewarded him with bitter but noble lines. By a mock suicide threat ("The Last Will and Testament of me, Thomas Chatterton of Bristol"), he forced his employer, John Lambert, to release him from his contract and set out for London to storm the city with satires and pamphlets. A lively burletta (comic opera), *The Revenge,* brought some money, but the death of a prospective patron quenched Chatterton's hopes. At this time he wrote the most pathetic of his Rowley poems, "An Excelente Balade of Charitie." Though literally starving, Chatterton refused the food of friends and, on the night of Aug. 24, 1770, took arsenic in his Holborn garret and died.

The aftermath was fame. The just tributes of many poets came after controversy between the "Rowleians" and those who rightly saw Chatterton as the sole author. Coleridge wrote a "Monody" to him; Wordsworth saw him as "the marvelous boy"; Shelley gave him a stanza in "Adonais"; Keats dedicated *Endymion: A Poetic Romance* to him and was heavily influenced by him; and Crabbe, Byron, Scott, and Rossetti added their praise. In France the Romantics hailed his example, and Alfred de Vigny's historically inaccurate

play *Chatterton* was the model for an opera by Ruggero Leoncavallo.

BIBLIOGRAPHY. E.H.W. Meyerstein, *A Life of Thomas Chatterton* (1930), an account of the poet and his works, superseded all previous studies. *The Complete Works*, 2 vol. (1971), edited by Donald S. Taylor and Benjamin Hoover, is the standard edition.

Chatti, Germanic tribe that became one of the most powerful opponents of the Romans during the 1st century AD. At that time the Chatti expanded from their homeland near the upper Visurgis (Weser) River, across the Taunus highlands to the Moenus (Main) River valley, defeating the Cherusci and other neighbouring tribes. In AD 83 the emperor Domitian drove them back from the Taunus. They continued to trouble the Romans, allying in 89 with the rebel governor of Upper Germany, Lucius Antonius Saturninus, and raiding Roman territory in 162, 170, and 213. They may have been incorporated in the coalition of the Franks in the 3rd century AD.

Articles are alphabetized word by word, not letter by letter

Chaucer, Geoffrey (b. *c.* 1342/43, London?, Eng.—d. Oct. 25, 1400, London), the outstanding English poet before Shakespeare and "the first finder of our language." His *The Canterbury Tales* ranks as one of the greatest poetic works in English.

A brief account of the life and works of Geoffrey Chaucer follows; for a full biography, *see* MACROPAEDIA: Chaucer.

The prosperity of Chaucer's middle-class family came from wine and leather, his father, John Chaucer, being a vintner. In 1357 Chaucer was in the service of the Countess of Ulster and by 1359 in the army in France with Edward III, who ransomed him after capture at the siege of Reims. Chaucer married Philippa Pan by 1366 and the following year was appointed a court official.

Chaucer's first important poem, *Book of the Duchesse* (1369 or 1370) was an elegy for the Duchess of Lancaster. In the next decade Chaucer traveled in Flanders, France, and Italy on diplomatic missions, was appointed comptroller of the customs, and wrote the love-vision narrative poem *Hous of Fame.* During the period 1380–90 he suffered personal and political anxieties but wrote works of a high order, including the love-vision poem *Parlement of Foules;* a prose translation of Boethius' *Consolation of Philosophy;* and his first great mature work, the romance *Troilus and Criseyde.* Chaucer's wife probably died in 1387. During the 1390s he retained his favour at court, forming a close relationship with John of Gaunt's son the Earl of Derby, later Henry IV, and wrote his best-known work, the unfinished *The Canterbury Tales.* In December 1399 Chaucer leased a house in the garden of Westminster Abbey. He died within a year and was buried in the abbey.

By 1387 Chaucer had planned *The Canterbury Tales,* a uniquely complex and vivid collection of tales. There were to be about 30 pilgrims (including the poet himself) described on a pilgrimage from the Tabard Inn in Southwark, then a suburb of London, to the famous shrine of Thomas à Becket in Canterbury Cathedral, and back again. Each pilgrim was to tell two stories going and two returning. (The collection is incomplete.) After opening lines describing the spring, in which the conventional theme is treated with great freshness, he describes the pilgrims in a series of brilliant brief portraits. In addition to representatives of the knighthood, the clergy, and the farmer, there are a great variety of miscellaneous pilgrims, both ecclesiastical and secular. The characters include a charming prioress, too keen to be thought a lady, a gross and oppressive summoner, and a contemptible, fraudulent pardoner. The great variety of social stations represented allows Chaucer to tell his tales in a variety of narrative styles appropriate to the storytellers, including courtly romance, racy fabliau, beast fable, medieval sermon, alchemical account, allegorical tale, and saint's life. Bound together by the clever framing device, *The Canterbury Tales* is a complex work, combining humour, tragedy, and acute observation in its rich image of medieval life.

Chauk, town and port, north-central Myanmar (Burma). Situated in the Irrawaddy River basin, it is a petroleum port for the Singu-Chauk oil fields. Traditionally, people of the Mon group gathered asphalt in the area to weatherproof houses. In 1902 the British discovered the Chauk-Lonywa oil field. Later, crude oil from Chauk was sent by a 350-mile (563-kilometre) pipeline to Syriam for refining. Insurgent sabotage of the pipeline after World War II confined marketing of Chauk's oil to northern Myanmar. Oil tankers began operation on the Irrawaddy River as an alternative means of transport to the damaged pipeline. The Chauk refinery was renovated in 1954, and the pipeline was repaired between Chauk, Tagaing, and Yenenma and between Prome and Syriam. A pipeline connecting Man and Syriam was completed in 1979. Abundant natural-gas reserves are found in the Chauk oil fields. Paved roads extend from Chauk in several directions, and air connections are accessible through Meiktila town. Pop. (latest est.) 13,615.

Chauliac, Guy de, Italian GUIDO DE CAULIACO (b. *c.* 1300, Chauliac, Auvergne, Fr.—d. July 25, 1368, Avignon), the most eminent surgeon of the European Middle Ages, whose *Chirurgia magna* (1363) was a standard work on surgery until at least the 17th century. In this work he describes a narcotic inhalation used as a soporific for surgical patients, as well as numerous surgical procedures, including those for hernia and cataract, which had previously been treated mainly by charlatans. On the other hand, the work tended to retard progress in surgery by advocating meddlesome treatment of wounds.

He took holy orders and studied at Toulouse, Montpellier, Paris, and Bologna. The greater part of his life was spent at Avignon, where he was physician to Pope Clement VI and two of his successors.

Chaumette, Pierre-Gaspard (b. May 24, 1763, Nevers, Fr.—d. April 13, 1794, Paris), French Revolutionary leader, social reformer, and promoter of the anti-Christian cult of the goddess Reason, who was put to death by the Revolutionary tribunal because of his democratic extremism.

Chaumette went to sea as a cabin boy, studied botany, traveled widely in France, and then (1789/90) settled in Paris as a medical student. As an active Revolutionary he signed the petition (July 17, 1791) that demanded the abdication of Louis XVI. From December 1792 he was procurator-general of the Paris commune, in which capacity he improved conditions in the hospitals; organized decent burial for the poor; and forbade whipping in the schools, prostitution, obscene publications, and lotteries. Strenuously anti-Catholic, he organized the first ceremony of the worship of Reason (personified by an actress) in Notre-Dame Cathedral (Nov. 10, 1793). His order to close the Paris churches (Nov. 23, 1793) remained effective despite the attempted intervention of Robespierre. His antipathy to the bourgeois-republican Girondins may have caused the leaders of the Reign of Terror to fear him as a potential leader of the sansculottes (lowest classes). Although he had not aided the advocate of sansculotte insurrection, Jacques-René Hébert, Chaumette was arrested and executed after the Hébertists were suppressed (March 1794).



Chaumette, engraving by F.-B. Lorieux after a portrait by F. Bonneville, 18th century
By courtesy of the Bibliotheque Nationale, Paris

Chaumont, also called CHAUMONT-EN-BASSIGNY, town, capital of Haute-Marne *département,* Champagne-Ardenne *région,* eastern France, southeast of Paris. Situated on the edge of a plateau at the confluence of the Marne and the Suize rivers in the upper Marne valley, it was originally called Calvus Mons (Bald Mountain) and was built around a 10th-century castle. At first a stronghold of the counts of Bassigny, it was the residence of the counts of Champagne for a century until 1329, when it became attached to the crown. Great Britain, Austria, Russia, and Prussia concluded a treaty at Chaumont in 1814, binding themselves to prosecute the Napoleonic War until final victory. The Church of Saint-Jean-Baptiste was built between the 13th and the 16th century. Chaumont is on the main road and railway from Paris to Basel (Switzerland). Its chief industries are glove making and the manufacture of footwear. Pop. (1982) 26,203.



The Church of Saint-Jean-Baptiste at Chaumont, Fr.
H. Roger-Viollet

Chauncy, Charles (baptized Nov. 5, 1592, Yardley-Bury, Hertfordshire, Eng.—d. Feb. 19, 1672, Cambridge, Mass. [U.S.]), American clergyman and second president of Harvard College, described by Cotton Mather as "a most incomparable scholar."

Chauncy attended Trinity College, Cambridge, and was in turn vicar at Ware and at Marston St. Lawrence, but he twice incurred censure from the authorities for nonconformity. His formal recantation in February 1637 caused him lasting self-reproach. In the same year, he emigrated to America, where he was an associate pastor at Plymouth, then pastor at Scituate, Mass., and, from 1654 until his death, president of Harvard College.

His writings include *The Plain Doctrine of the Justification of a Sinner in the Sight of God* (1659) and *Antisynodalia scripta Americana* (1664).

Chauncy, Charles (b. Jan. 1, 1705, Boston—d. Feb. 10, 1787, Boston), great-grandson of the elder Charles Chauncy, Congregationalist minister and one of the leading critics of the Great Awakening (*q.v.*) revivalist movement in the British American colonies in the mid-18th century.

A graduate of Harvard in 1721, Chauncy served the First Church of Boston from 1727 until his death. His *Seasonable Thoughts on the State of Religion in New England* (1743) was the nascent Unitarian reply to Jonathan Edwards' *Some Thoughts Concerning the Present Revival of Religion in New England* (1742), which represented the neo-Calvinist wing of Congregationalism.

Chaussée, Pierre-Claude Nivelle de La (French playwright): *see* La Chaussée, Pierre-Claude Nivelle de.

Chausson, Ernest (Amédée) (b. Jan. 21, 1855, Paris—d. June 10, 1899, Limay, Fr.), French composer, whose small body of compositions has given him high rank among French composers of the late 19th century.

He studied law but in 1880 entered the Paris Conservatoire for a course with Massenet. From 1880 to 1883 he was a private pupil of César Franck. Well-to-do and generous, he was for ten years secretary of the Société Nationale de Musique and did much to encourage contemporary French music. His own music, harmonically indebted primarily to Franck and occasionally to Richard Wagner, is particularly French in its clarity, balance, and formal poise.

His early works include songs on poems by Leconte de Lisle, notably "Le Colibri" ("The Hummingbird"). Later he set poems by Paul Verlaine, Maurice Maeterlinck (*Serres chaudes;* "Hothouse Blooms"), Jean Cros ("Chanson perpétuelle"; "Perpetual Song"), and Maurice Bouchor ("Poème de l'amour et de la mer"; "Poem of Love and of the Sea"). His *Concert for Violin, Piano, and String Quartet* (1890–91) represents a highly successful, almost unique application of two equal solo parts in combination with a string quartet. Notable among his orchestral works are the richly textured *Poème for Violin and Orchestra* (1896) and his *Symphony in B Flat Major* (*c.* 1890). He also composed several operas, among them *Le Roi Arthus* (posthumously produced in 1903), and choral and piano works.

Chautauqua, resort-colony and town (township) in Chautauqua town (township), Chautauqua county, western New York, U.S., on Chautauqua Lake (18 mi [29 km] long, 1–3 mi wide), near Lake Erie, 16 mi northwest of Jamestown. It originated in 1874 with the establishment of the Chautauqua Institution, a lyceum and amusement series popular in the late 19th and early 20th centuries, which was started by John Heyl Vincent as an attempt to educate Methodist Sunday school teachers. Though the popularity of the series has greatly diminished, the institute remains the centre of a resort area with a summer program of cultural pursuits (art, drama, music, religion) and youth activities. Pop. (1990) town, 4,554.

chautauqua movement, popular U.S. movement in adult education that flourished during the late 19th and early 20th centuries. The original Chautauqua began after the Civil War as an assembly for the training of Sunday school teachers and church workers at Chautauqua Lake in New York state. At first entirely religious in nature, the program was gradually broadened to include general education and popular entertainments. In later years the summer lectures and classes were supplemented by a program of directed home reading and correspondence study. William Rainey Harper, later president of the University of Chicago, became educational director in 1883 and attracted outstanding speakers. By 1900 the Chautauqua assembly included a school of theology, a correspondence school, and a publishing house.

The success of the Chautauqua, N.Y., assembly led to the founding of many "chautauquas" throughout the United States patterned after the original institution. By 1900 there were more than 400 such local assemblies and numerous booking agents had entered the field, supplying the lecturers and musicians who travelled from one community to another. After their peak year (1924), however, the circuit chautauquas began to decline, but the original institution at Chautauqua remained in existence, offering a diversified program that included symphony concerts, operas, plays, university summer school courses, and lectures. *See also* lyceum movement.

Chautemps, Camille (b. Feb. 1, 1885, Paris—d. July 1, 1963, Washington, D.C.), French politician who served three times as premier of France and played a controversial role in the surrender of France to Nazi Germany during World War II.

Born into a politically prominent family, Chautemps developed a highly successful law practice and became an influential member of the Radical Socialist Party. He was elected mayor of Tours and was then elected to the Chamber of Deputies in 1919. Rising rapidly, he served as minister of justice and minister of the interior several times between 1924 and 1926, becoming premier for a few days in February 1930 and from November 1933 to January 1934. In between, he was a minister in various cabinets. In 1934 Chautemps resigned the premiership after accusations of complicity in the Stavisky affair, a financial scandal that precipitated a political crisis.

Chautemps was again premier from June 1937 to March 1938. He tended to follow Popular Front policies, but his domestic efforts represented a dilution of the reforms of his predecessor in office, Léon Blum. As a Cabinet member in 1940, Chautemps was one of the first to suggest negotiating an armistice with Germany, and he was also one of the first Cabinet members to shift his loyalty to Pétain. In the new Vichy government Chautemps held a ministry, but he broke with Pétain's government after arriving in the United States on an official mission. He resided in the United States for much of the rest of his life. After the war a French court tried and convicted him, in absentia, for collaborating with the enemy.

chauth, in 17th- and 18th-century India, a levy of one-fourth of the revenue demand (or actual collection) of a district from which the Marāthās claimed rights of passage or overlordship. The name was derived from the Sanskrit word meaning "a fourth."

In practice chauth was often the fee paid by Hindu or Muslim rulers to induce the Marāthās either to refrain from molesting their territories or to retire from a district that they had invaded. The Marāthās claimed that it was a payment that involved, in return, protection from other attacks; but few princes, Hindu or Muslim, saw its incidence in this light. Since rulers always tried to collect their revenue in full, this impost, in addition to the regular revenue demand, was regarded as oppressive. It did much to make the Marāthās unpopular throughout India, among Hindus and Muslims alike.

Chauvelin FAMILY, prominent French family that had great influence in affairs of state from the 16th to 19th centuries and produced many notable diplomats and clergymen and several peers.

The first family member of note was Toussaint Chauvelin (d. *c.* 1552), who was a public prosecutor for parliament and then attorney general under Catherine de Médicis. His oldest son, François, became attorney general under Marie de Médicis. Bernard Chauvelin (1662–1755), great-grandson of Toussaint, was successively counsellor to parliament, steward of Tours, Bordeaux, and Amiens, and counsellor of state.

Louis de Chauvelin (b. 1640—d. July 31, 1719), the son of Louis Chauvelin (d. 1645), who was steward of the army of Italy, became counsellor to parliament and then steward of Picardie and Franche-Comté. At the time of his death he was counsellor of state. Germain-Louis Chauvelin (b. 1685—d. April 1, 1762) was general counsellor to parliament when he was appointed keeper of the seals (minister of justice) in 1727 and then secretary of state (1727–37) under the foreign minister Cardinal Fleury. Chauvelin's policy was basically anti-Austrian, and the War of Polish Succession is considered largely his work. He proved himself quite capable but attracted the jealousy of Fleury, who exiled him. Henri-Philippe Chauvelin (b. April 18, 1714—d. Jan. 14, 1770), the son of Bernard, was the abbot of Montieramey and counsellor to the parliament. Along with his widespread political influence, he was known for his anti-Jesuitical writings.

Bernard-Louis, marquis de Chauvelin (b. March 1, 1716—d. Nov. 24, 1773), was the brother of Henri-Philippe and achieved great distinction as a soldier and diplomat. In 1732 he became a lieutenant in the king's infantry and distinguished himself in the Italian campaign. Rising rapidly through the ranks, he became a commander of the army in Germany in 1735 and major general of infantry of the army in Italy in 1744 and fought valiantly in several campaigns until wounded. Created field marshal in 1745, he led several more diplomatic and military missions until sent as ambassador to Turin (1753–64). He took part in the Corsican campaign, which assured the annexation of that island to France.

His son, Bernard-François, marquis de Chauvelin (b. Nov. 29, 1766—d. April 9, 1832), succeeded his father as an attendant to Louis XVI. Raised with strong liberal ideals, Chauvelin welcomed the Revolution and fought with Rochambeau's army. In 1792 he was made ambassador to London, where he succeeded in obtaining British neutrality. In spite of his efforts in its behalf, when he returned to Paris in the midst of the Terror the government imprisoned him, although he was later released. He was elected to the Tribunal in 1800 and the legislature in 1804, when Napoleon, recognizing his talents, appointed him prefect of Lys. Chauvelin carried out his duties well, instituting a great number of public works. With the Bourbon restoration, he sought to retire to private life; under the second restoration, however, he was again active in liberal politics, and in 1816 he was elected to the Chamber of Deputies. He was an outstanding orator, known for his originality and eloquence, and proved to be one of the great defenders of liberalism and freedom of the press. Although reelected in 1827, he resigned in 1829.

chauvinism, excessive and unreasonable patriotism, similar to jingoism (*q.v.*). The word is derived from the name of Nicolas Chauvin, a French soldier who, satisfied with the reward of military honours and a small pension, retained a simpleminded devotion to Napoleon. He came to typify the cult of the glorification of all things military that was popular after 1815 among the veterans of Napoleon's armies. Later, chauvinism came to mean any kind of ultranationalism and was used generally to connote an undue partiality or attachment to a group or place to which one belongs. The term chauvinism may also describe an attitude of superiority toward members of the opposite sex.

Chaux-de-Fonds, La, town, Neuchâtel canton, western Switzerland. It is situated in the Jura Mountains, near the French border, northwest of Neuchâtel city. First mentioned in the 14th century, it was chartered in 1656 and was almost completely rebuilt after a fire in 1794. The watchmaking industry was established there in the early 18th century, and the town is now the headquarters of the Swiss Watch Chamber of Commerce and a centre of Swiss watch manufacturing. It has schools of watchmaking, music, art, and commerce and several museums. Machinery and printing are also significant. The population is chiefly Protestant and French-speaking. Pop. (1991 est.) 36,131.

Chaves, city, Vila Real *distrito* ("district"), northern Portugal. It lies along the Tâmega River, north-northeast of Vila Real town. The city, 5 miles (8 km) south of the Spanish frontier, is the site of a spa, the Chaves Hot Springs, known as Aquae Flavius to the Romans, who fortified it. Chaves was later dominated successively by the Suebi, Visigoths, Arabs, and Spanish. It is now a railway terminus. Roman remains include an 18-arch bridge and two inscribed columns. There are several notable medieval churches and a castle of the dukes of Bragança. Chaves is an agricultural and textile centre known for its ham. An anthropological institute is located in the city. There are tungsten mines nearby. Pop. (1982 est.) 12,000.

Chávez, Carlos, in full CARLOS ANTONIO DE PADUA CHÁVEZ Y RAMÍREZ (b. June 13, 1899, Mexico City, Mex.—d. Aug. 2, 1978, Mexico City), Mexican conductor and composer whose music skillfully combines elements of traditional folk songs and modern techniques.

At the age of 19 Chávez completed his first symphony. In 1921 he wrote his first significant work in a Mexican style, the ballet *El fuego nuevo* ("The New Fire"). After traveling in Europe and in the United States, he founded and became conductor of the Symphony Orchestra of Mexico (1928) and director of the national conservatory in Mexico (1928–34). Chávez published numerous essays on Mexican music and a book, *Toward a New Music* (1937); his Charles Eliot Norton lectures (1958–59) at Harvard University were collected in *Musical Thought* (1960).

The music of Chávez is unmistakably Mexican in its melodic patterns and rhythmic inflections. From Indian music he took ideas of percussion, primitive rhythms, and old forms of harmony and melody. He was also influenced by modern European and American music, especially that of Igor Stravinsky and Arnold Schoenberg.

Among his best-known compositions are two early symphonies, *Sinfonía de Antígona* (1933) and *Sinfonía India* (1935), both one-movement works using Mexican Indian themes. The *Concerto No. 1 for Piano and Orchestra* (1940) is highly percussive. The *Toccata for Percussion Instruments* (1942) is scored for 11 types of percussion instruments, some of them native, played by six performers. Other works include the ballet *Los cuatro soles* (1925; "The Four Suns"), *Xochipilli Macuilxochitl* (1940) for orchestra with Indian instruments, the *Concerto for Violin* (1950), and *Discovery* for orchestra (1969).

Chavez, Cesar (Estrada) (b. March 31, 1927, Yuma, Ariz., U.S.—d. April 23, 1993, San Luis, Ariz.), organizer and leader of migrant American farm workers, largely Hispanic.

Chavez, who was a farm labourer himself, began organizing farm workers in 1962, when he created the National Farm Workers Association (NFWA). In 1966, the NFWA merged with an AFL-CIO group to form UFWOC, the United Farm Workers Organizing Committee, AFL-CIO. In 1971 the latter organization became the United Farm Workers of America (UFW).

Chavez' childhood was that of a typical migrant farm-labour family of Mexican-American descent; he lived in a succession of migrant camps and attended school sporadically. After two years in the U.S. Navy during World War II, Chavez returned to migrant farm work in Arizona and California. His initial training as an organizer was provided by the Community Services Organization (CSO) in California, a creation of Saul Alinsky's Industrial Areas Foundation. In 1958 he became general director of CSO but resigned four years later to found the NFWA. In September 1965 Chavez led California grape pickers out on a five-year-long strike and nationwide boycott of California grapes that attracted liberal support from throughout the country. Subsequent battles with lettuce growers, table-grape growers, and other agribusinesses were generally ended with the signing of bargaining agreements. In the late 1960s, however, the Teamsters entered the fields as a rival organizer, signing up farm workers for its own union, one more favourable to the growers. After much conflict, in the fields and in the courts, the UFW signed a peace pact with the Teamsters in 1977, giving the UFW the sole right to organize field hands.

Meanwhile, trouble brewed within the UFW, which Chavez ran with an iron hand. Most of Chavez' top aides eventually resigned, and some of them formally charged him with staffing the organization with members of his own family. Chavez also developed interests in holistic medicine, encounter programs, vegetarianism, meditation, faith healing, and other rituals that he tried to press upon his official members. Union membership declined until union workers represented only about 10 percent of the pickers of California's table grapes.

Chávez, Federico, Chávez also spelled CHÁVES (b. 1881?, Asunción, Paraguay—d. April 24, 1978, Asunción), Paraguayan politician and soldier who served as president of his country (1949–54).

Chávez, who received his law degree in 1905, was a longtime leader of the right-of-centre Colorado (National Republican) Party. When his party served in a coalition government in 1946, Chávez was appointed to the Supreme Court. He served as Paraguay's foreign minister (1947, 1949) and as ambassador to France and Spain. The Democratic wing of the Colorado Party secured his assumption of the presidency (Sept. 11, 1949) following a period of great political instability. He was officially elected on July 15, 1950, for a three-year term and was reelected in 1953.

During Chávez' tenure in office he tried to build a managed economy by increasing nationalization of industry and placing controls on production, trade, prices, and wages. For this he faced growing opposition from the conservative wing of the Colorado Party, who denounced not only his economic policies but his close association with Argentina. In 1954, when Chávez tried to strengthen his regime by arming the national police, General Alfredo Stroessner, commander in chief of the armed forces, led the coup (May 5) that deposed Chávez. When Chávez died, he was buried with full state honours; Stroessner attended the services.

Chavigny et de Buzançais, Léon Bouthillier, Count (comte) **de** (b. March 28, 1608, Paris, France—d. Oct. 11, 1652, Paris), prominent figure during the French civil wars of the Fronde.

The son of one of Cardinal de Richelieu's principal adjutants, he was created Count de Chavigny and secretary of state in 1632; in 1635 he was also made chancellor in the household of Gaston, Duke d'Orléans, to watch over the latter's conduct. Nominated, with his father, to the regency council in Louis XIII's will, he bitterly resented Jules Mazarin's monopoly of Anne of Austria's favour when she became sole regent, and he was deprived of his secretaryship of state.

While governor of the château of Vincennes, he was arrested there in September 1648 as dangerous to the government; but the Parlement of Paris took up his case as an example of arbitrary arrest, and he was released in October. In the Fronde he was one of the Prince de Condé's advisers against Mazarin, and in April 1651, during Condé's predominance, Anne made a show of taking Chavigny as prime minister. By July, however, he no longer dared to present himself at her council. As Condé's fortunes declined, Chavigny made secret overtures to Mazarin. Condé, hearing of these during the Fronde's last days in Paris, furiously reproached Chavigny, who, shocked and chagrined, fell ill and died.

Chavín, earliest highly developed culture in pre-Columbian Peru, which flourished between about 900 and 200 BC. During this time Chavín artistic influence spread over the northern and central parts of what is now Peru. The name derives from the great ruin of Chavín de Huántar in the northern highlands, but it is not known whether this was the actual centre of origin of the culture and artistic style. Important regional manifestations are also found at Kotosh and Kuntur Wasi, in the highlands, and at sites in the Casma, Nepeña, and Chicama valleys of the northern coast. One of the best-known coastal phases is the Cupisnique of the Chicama Valley.

The central building at Chavín de Huántar is a massive temple complex constructed of dressed rectangular stone blocks, containing interior galleries and incorporating bas-relief carvings on pillars and lintels. The principal motifs of the Chavín style are human, feline, and crocodilian or serpentine figures; these are often combined in highly complex and fantastic images.

Chavín culture undoubtedly had earlier prototypes in the preceding simpler societies of the Initial Period (*c.* 1800–900 BC). During this period a sedentary agricultural way of life became fully established in Peru, with the development of such crafts as weaving, pottery making, and stone carving. The significance of Chavín is that for the first time many of the local or regional cultures of the area were unified by a common ideology or religion. The extent of political unification remains uncertain.

Chayefsky, Paddy, original name SIDNEY CHAYEFSKY (b. Jan. 29, 1923, New York, N.Y., U.S.—d. Aug. 1, 1981, New York City), American playwright and screenwriter whose work was part of the flowering of television drama in the 1950s.

Chayefsky graduated from City College of New York in 1943 and served during World War II in the U.S. Army. On his return to New York City he worked as a printer's apprentice, then began writing radio adaptations for "Theatre Guild of the Air" (1951–52) and mystery dramas for television series.

His first full-length television play was *Holiday Song* (1952). His greatest success was *Marty* (1953), about the awakening of love between two plain people, a butcher and a schoolteacher. The film version in 1955 won four Academy Awards and the Golden Palm of the Cannes Festival. Two other of his television plays also were made into motion pictures: *The Bachelor Party* (1954; filmed 1957) and *The Catered Affair* (1955; filmed 1956).

Another television drama, *The Middle of the Night* (1954), became, in expanded form, Chayefsky's first stage play (1956). His next two stage plays, *The Tenth Man* (1959) and *Gideon* (1961), were on religious themes and

attacked contemporary cynicism, while *The Passion of Josef D.* (1964) was a treatment of Joseph Stalin and the Russian Revolution. *The Latent Heterosexual* (published 1967; performed 1968) tells of a successful homosexual author who marries for tax purposes and enjoys it. Chayefsky also wrote film scripts and scenarios; he received Academy Awards for his screenplays for *Marty*, *The Hospital* (1971), and *Network* (1976), the last-named work being a brilliant satire of network television.

Chaykovsky, Nikolay Vasilyevich, Chaykovsky also spelled CHAIKOVSKY (b. Jan. 7, 1851 [Dec. 26, 1850, Old Style], Vyatka, Russia—d. April 30, 1926, Harrow, Middlesex, Eng.), revolutionary socialist and leader of the early Narodnik movement in Russia (*see* Narodnik).

Having joined a radical students' circle in St. Petersburg in 1869, Chaykovsky became its leader when its founder, Mark Natanson, was arrested (1871); the group became known as the Chaykovsky Circle. Dedicated to spreading socialist ideas as widely as possible, the circle distributed legally published political books and organized discussion groups among industrial workers. It attracted members from a variety of schools of radical thought, grew into the first major populist movement in Russia, and formed the foundation of the revolutionary parties that emerged in the late 1870s.



Chaykovsky
H. Roger-Viollet

A change in his own personal philosophy prompted Chaykovsky to part from the Chaykovsky Circle and immigrate to the United States (1873), where he lived in a socialist commune in Kansas (1875–77). After the commune failed, he went to London and again became involved in the Russian revolutionary movement, collecting funds, publishing a nonparty newspaper, and joining the Socialist Revolutionary Party. In 1907 he returned to Russia and assumed a leading role in the cooperative movement.

During 1917 Chaykovsky opposed the Bolsheviks; and, after the Bolsheviks had seized power, he became the head of an anti-Bolshevik (White) government at Arkhangelsk, which he represented at the Paris peace talks (January 1919) after World War I. After the Arkhangelsk government collapsed (1920), he shifted his support to the nonsocialist White Russian leader General Anton Denikin and then moved to Paris and later, England.

chayote, also called HUISQUIL, or CHOCHO (*Sechium edule*), tendril-bearing perennial vine of the gourd family (Cucurbitaceae), native to the New World tropics, where it is widely cultivated for its edible fruits. Chayote also is grown as an annual plant in temperate climates. The fast-growing vine bears small, white flowers and green or white pear-shaped fruits with furrows. Each fruit is about 7.5 to 10 cm (about 3 to 4 inches) long and contains one seed. The fruits are boiled, baked, or eaten



Chayote (*Sechium edule*)
Eugene Bolt—Shostal

raw, and the young root tubers are prepared like potatoes.

chazzan, also spelled CHAZAN (Judaism): *see* cantor.

Che school, Pinyin ZHE, group of conservative, academic Chinese painters who worked primarily in the 15th century, during the Ming dynasty. These painters specialized in large and decorative paintings that perpetuated the styles and interests of, especially, the Southern Sung (1127–1279) academy of painting and represent a contrast to the work of scholar-painters of the contemporary Wu school. The name derives from the first character of the name of the province in which the school flourished (Chekiang) and in which the Southern Sung capital, Hang-chou, had been located.

Artists of the Che school were no longer ensconced in an imperially sponsored academy of painting but were often given imperial support within the palace administration. Their paintings frequently are elaborations of the Sung-academy bird-and-flower painting or similarly enhanced landscapes based essentially on the Ma-Hsia style. Their compositions tend to substitute a fragmentary and additive quality for the former subtle unity, and there is an ex-



"The Pleasures of the Fishing Village," detail of a hand scroll by Wu Wei (1459–1508), ink and colour on paper, Che school; in a private collection
By courtesy of the owner; photograph, Colin C. McRae

aggerated attraction to vivid plays of ink and colour. The work of the 15th-century painter Tai Chin (*q.v.*), traditionally considered the school's founder, and of others—such as Wu Wei—is often but a loose paraphrase of Sung academic ideals. The school continued into later times, culminating with the 17th-century painter Lan Ying, but was increasingly supplanted by artists and interests identified with "literati painting" (*wen-jen-hua*).

Che-ti (Chinese emperor): *see* T'ien-chi.

Cheb, German EGER, city, Západočeský *kraj* (region), extreme western Czech Republic. Cheb lies along the Ohře River, near the German border. Its history has been full of violence, for it guards the easiest approach to Bohemia from the northwest. The city passed in the 13th century from Swabian rulers to Otakar I, king of Bohemia, and it was battered in the Hussite wars (1419–36), the Thirty Years' War (1618–48), and the War of the Austrian Succession (1740–48). Cheb's 12th-century imperial castle, now in ruins, was the scene of the murder (1634) of officers of Albrecht Wenzel von Wallenstein, Duke of Friedland, who was himself slain the same night in the burgomaster's home. The city was inhabited mainly by Germans until their expulsion after World War II.



Town hall, Cheb, Czech Republic
Paul Hufnar—Shostal

Industry in Cheb includes the manufacture of bicycles, motorbikes, agricultural machinery, textiles, carpets, and leather products and the brewing of beer. Pop. (1991 prelim.) 31,-847.

Cheboksary, also spelled ČEBOKSARY, Chuvash SHUPASHKAR, city and capital, Chuvashia republic, Russia. It lies on the right bank of the middle Volga River, between Nizhny Novgorod and Kazan. Although Cheboksary is known to have existed since the mid-15th century, and a fortress was built there in 1555, the town remained unimportant until the building of a rail link to Kanash in 1939. Thereafter it grew rapidly, with modern apartment blocks and factories spreading along the high river bluffs, though the old radial town plan was retained.

A wide range of products is manufactured in Cheboksary, including cotton textiles and heavy tractors and earth-moving equipment. Its satellite town, Novocheboksarsk, the site of a large hydroelectric station, is a chemical centre. Chuvash University (1967) and teacher-training and agricultural institutes are located within the city. Pop. (1993 est.) 444,000.

Cheboygan, city, seat (1853) of Cheboygan county, northern Michigan, U.S. The city lies along the Cheboygan River as it enters Lake



Lake Huron, east of Cheboygan, Mich.
Shostal

Huron near the eastern end of the Straits of Mackinac. According to some reports, the site was an Indian camping ground until it was settled by Jacob Sammons in the 1840s. It was first called Duncan and then Inverness, later adopting Cheboygan, an Indian word possibly meaning "Chippewa water." It developed as a lumbering centre and commercial fishing port, but with the decline of both resources it turned to tourism and manufacturing.

South of the city is Michigan's Inland Waterway, comprising many streams and lakes (including Mullett, Black, and Burt lakes) with boating and fishing facilities. The Cheboygan area is known for its fresh air and low pollen count. It is the site of the Northern Michigan State Fair (August) and the Cheboygan 250, a popular snowmobile race (January). Inc. village, 1871; city, 1889. Pop. (1992 est.) 4,955.

Chebyshev, Pafnuty Lvovich (b. May 4 [May 16, New Style], 1821, Okatovo, Russia—d. Nov. 26 [Dec. 8], 1894, St. Petersburg), founder of the St. Petersburg mathematical school (sometimes called the Chebyshev school), who is remembered primarily for his work on the theory of prime numbers.

Chebyshev became assistant professor of mathematics at the University of St. Petersburg in 1847. In 1860 he became a correspondent and in 1874 a foreign associate of the Institut de France. He developed a basic inequality of probability theory called Chebyshev's inequality, a generalized form of the Bienaymé-Chebyshev inequality, and used the latter inequality to give a very simple and precise demonstration of the generalized law of large numbers.



Chebyshev
Sovfoto

Chebyshev's work on prime numbers included the determination of the number of primes below a given number. He studied theoretical mechanics and devoted much attention to the problem of obtaining rectilinear motion from rotary motion by mechanical linkage. The Chebyshev parallel motion is a three-bar linkage that gives a very close approximation to exact rectilinear motion. His mathematical writings covered a wide range of subjects, including the theory of probabilities, quadratic forms, orthogonal functions, the theory of integrals, gearings, the construction of geographic maps, and formulas for the computation of volumes. His *Teoria sravneny* (1849; "Theory of Congruences") made him widely known in the mathematical world and was used as a textbook in Russian universities for many years.

Chechaouene, also spelled CHEFCHAOVENE, also called CHAOUEN, Spanish XAUEN, Arabic SHAFSHAWAN, Muslim holy city, northern Morocco, in the Rif Mountains. Founded in 1471 by the warrior Abū Youma and later moved by Sidi Ali ibn Rachid to its present site at the base of Mount ech-Chaouene, the city became a refuge for Moors expelled from Spain. A holy city long closed to non-Muslims, it was not occupied until 1920 by the Spanish, who restored it to the Moroccan kingdom in 1956. Chechaouene still contains 12 mosques and presents a picturesque ap-



A mosque in Chechaouene, Morocco
J. Allan Cash

pearance, with white houses roofed with round tiles common in southern Europe but rare in Morocco. The city's luxuriant gardens are watered from a constant mountain spring. It is connected by road with al-Hoceïma, Ouezzane, and Tétouan. Pop. (1982) 23,563.

Chechnia, also spelled CHECHNYA, or CHECHENIA, republic in southwestern Russia, situated on the northern flank of the Great Caucasus Range. Chechnia is bordered by Russia proper on the north, Dagestan republic on the east and southeast, Georgia on the southwest, and Ingushetia republic on the west. Chechnia falls into three physical regions from south to north. In the south is the main Caucasus Range, the crest line of which forms the republic's southern boundary. The highest peak is Mount Tebulosmta (14,741 feet [4,493 m]), and the area's chief river is the Argun, a tributary of the Sunzha. The second region is the foreland, consisting of the broad valleys of the Terek and Sunzha rivers, which cross the republic from the west to the east, where they unite. Third, in the north, are the level, rolling plains of the Nogay Steppe.

The great variety of relief is reflected in the soil and vegetation cover. The Nogay Steppe is largely semidesert, with sagebrush vegetation and wide areas of sand dunes. This gives way toward the south and southwest, near the Terek River, to feather-grass steppe on black earth and chestnut soils. Steppe also occupies the Terek and Sunzha valleys. Up to 6,500 feet (2,000 m), the mountain slopes are densely covered by forests of beech, hornbeam, and oak, above which are coniferous forests, then alpine meadows, and finally bare rock, snow, and ice. The climate varies but is in general continental.

Chechnia's main ethnic group is the Chechen, with minorities of Russians and Ingush. The Chechen and Ingush are both Muslim and are two of the many Caucasian mountain peoples whose language belongs to the Nakh group. Fiercely independent, the Chechen and other Caucasian tribes mounted a prolonged resistance to Russian conquest from the 1830s through the '50s under the Muslim leader Shāmil. They remained successful while the Russians were occupied with the Crimean War, but the Russians used larger forces in their later campaigns, and when Shāmil was captured in 1859, many of his followers migrated to Armenia. The Terek River remained a defensive frontier until the 1860s. The constant skirmishes of Chechen and Russians along the Terek form the background to Leo Tolstoy's novel *The Cossacks*.

The Chechen autonomous *oblast* (province) was created by the Bolsheviks in November 1920. In 1934 it was merged with the Ingush autonomous *oblast* to form the Chechen-Ingush autonomous *oblast,* which two years later was designated a republic. When the Soviet leader Joseph Stalin accused the Chechen and Ingush of collaboration with the Germans during World War II, they were deported to exile in Central Asia, and the republic of Checheno-Ingushetia was dissolved. The exiles were allowed to return to their homeland, and the republic was reestablished under the Soviet leader Nikita Khrushchev in 1957.

Secessionist sentiments emerged in Checheno-Ingushetia in 1991 as the Soviet Union's decline accelerated, and in August 1991 Dzhozkhar Dudayev, a Chechen politican and former Soviet air force general, carried out a coup against the local communist government in Checheno-Ingushetia. Dudayev was elected Chechen president in October, and in November he unilaterally declared Chechnia's independence from the Russian Federation (subsequently Russia). In 1992 Checheno-Ingushetia divided into two separate republics: Chechnia and Ingushetia. Dudayev's aggressively nationalistic, anti-Russian policies soon began to undermine Chechnia's economy, and in 1993 he dissolved the Chechen parliament. During 1994 armed Chechen opposition groups with Russian military backing tried repeatedly to depose Dudayev by force, but without success. On Dec. 11, 1994, Russian troops invaded Chechnia but were repelled in their assault on the capital city of Grozny, which was partly destroyed in the fighting that followed. Augmented Russian forces totaling perhaps 40,000 troops managed to take Grozny in March 1995, but at the cost of heavy civilian casualties, and Chechen guerrilla resistance continued in other areas of the republic.

The majority of Chechnia's population are urban dwellers, most of whom live in Grozny. The backbone of the economy is petroleum. Drilling is mainly in the Sunzha River valley between Grozny and Gudermes. Petroleum refining is concentrated in Grozny, one of the largest such centres in Russia, while pipelines run to the Caspian Sea (east) at Makhachkala and to the Black Sea (west) at Tuapse. Natural gas is also found in the area. Machinery for the petroleum and chemicals industries is manufactured in Grozny. There is also the manufacture of furniture, parquet flooring, and musical instruments and food processing. Agriculture is largely concentrated in the Terek and Sunzha valleys.

Transportation is mainly by rail, following the Terek and Sunzha valleys and linking with Astrakhan and Baku on the Caspian Sea and with Tuapse and Rostov on the Black Sea and the Sea of Azov. Motor roads join Grozny to other centres within and outside the republic. Area including Ingushetia, 7,400 square miles (19,300 square km). Pop. (1993 est.) including Ingushetia, 1,306,400.

check, also spelled CHEQUE, bill of exchange drawn on a bank and payable on demand; it has become the chief form of money in the domestic commerce of developed countries. As a written order to pay money, it may be transferred from one person to another by endorsement and delivery or, in certain cases, by delivery alone. Negotiability can be qualified by appropriate words, as with restrictive endorsements, or by the check form itself. Most checks are not paid in currency but by the debiting and crediting of bank deposits. Clearings are accomplished either by direct presentation, by correspondent banks, through local clearinghouses, or by central banks, such as the federal reserve banks in the United States.

A cashier's check is issued by a bank against itself and is signed by the cashier or some other bank officer. It has unquestioned acceptability as exchange. A certified check is a depositor's check that has been guaranteed by the bank upon which it is drawn and is so stamped. Traveler's checks are cashier's checks sold to

travellers that require two signatures by the payee. One signature is placed on the check in the presence of an issuing agent; the other signature is for the purpose of identification and is placed on the check when it is cashed. Purchasers of traveller's checks are guaranteed reimbursement by the issuers of the checks if the checks are lost or stolen.

checkered beetle, any of the approximately 3,000 species of the insect family Cleridae (order Coleoptera). Checkered beetles occur

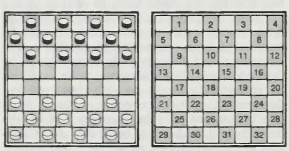


Checkered beetle (*Charissa elegans*)
William E. Ferguson

throughout the world, mainly in the tropics; the common name derives from their markings and coloration (orange, red, yellow, green, and blue). They range between 3 and 24 mm ($1/10$ to almost 1 inch) in length, with the majority between 5 and 12 mm ($1/5$ and $1/2$ inch); they have long, slender legs and resemble ants. Adult checkered beetles, usually found on flowers, are camouflaged by their bright colours as they await or search for food, which consists of insects smaller than themselves.

Some checkered beetles feed on maggots (fly larvae) in carcasses; others live in honeybee nests. The red-legged ham beetle (*Necrobia rufipes*) feeds on stored meats. Some *Trichodes* and *Hydnocera* species are pollen eaters. The predatory larvae feed mainly on wood- and bark-boring beetles and are therefore beneficial to man.

checkers, also called DRAUGHTS, board game, one of the world's oldest games. Checkers is played by two persons who oppose each other across a board of 64 light and dark squares, the same as a chessboard. The 24 playing pieces are disk-shaped and of contrasting colours (whatever their colours, they are identified as black and white). At the start of the game, each contestant has 12 pieces arranged on the board as shown in the Figure (left). While the actual playing is always done on the dark squares, the board is often shown in reverse for clarity. The notation used in describing



Checkers
(Left) Checkerboard, or draughtboard, set for play; (right) checkerboard notation, black occupying squares 1 to 12 and white 21 to 32

the game is based on numbering the squares on the board as shown in the Figure (right). The black pieces always occupy squares 1 to 12, and the white pieces invariably rest on squares 21 to 32.

Play consists of advancing a piece diagonally forward to an adjoining vacant square. Black moves first. If an opponent's piece is in such an adjoining vacant square, with a vacant space beyond, it must be captured and removed by jumping over it to the empty square. If this square presents the same situation, successive jumps forward in a straight or zigzag direction must be completed in the same play. When there is more than one way to jump, the player has his choice. When a piece first enters the king row, the opponent's back row, it must be crowned by the opponent, who places another piece of the same colour on it. The piece, now called a king, has the added privilege of moving and jumping backward. A win is scored when an opponent's pieces are all captured or blocked so that they cannot move. When neither side can force a victory and the trend of play becomes repetitious, a draw game is declared.

Games similar to checkers were played in the days of the early Egyptian pharaohs (*c.* 1600 BC) and were mentioned in the works of the Greek writers Homer and Plato. In about the 12th century AD, an early form of the game was adapted to the 64-square chessboard, and, by the 16th century, the rule compelling capture was added, producing a game essentially the same as modern checkers.

At first, all expert play was unrestricted, or go-as-you-please, with the opening moves left entirely to the discretion of the individual. Lengthy series of drawn games between overcautious experts in tournament play, however, led to the introduction of methods of forcing more varied and daring styles of play. In the two-move restriction, the first move of each side is chosen by lot from 47 playable combinations. The three-move, or American, restriction is an extension of the two-move to black's second move, with about 150 prescribed openings. Eleven-man ballot is a less popular method, in which one piece is removed by lot from each side before the start of a game. The original game of go-as-you-please has remained the most popular method of informal play. There are a number of variations on the game.

checkerwork, in architecture, masonry built of two materials, usually stone and flint or stone and brick, so arranged as to make a checkerboard pattern and to give variety in texture and colour. Stone and flint checkerwork is common in the parish churches and smaller houses of East Anglia, England; and both combinations were much used after the Reformation, when the suppressed monasteries were used as sources for building stone. Another East Anglian combination is that of brick and kidney-shaped cobbles or oval pebbles, producing a less sophisticated version of the checkerboard pattern.

checks and balances, principle of government under which separate branches are empowered to prevent actions by other branches and are induced to share power. Checks and balances are applied primarily in constitutional governments. They are of fundamental importance in tripartite governments, such as that of the United States, which separate powers among legislative, executive, and judicial departments.

The Greek historian Polybius analyzed the ancient Roman mixed constitution under three main divisions: monarchy (represented by the consul); aristocracy (the Senate); and democracy (the people). He greatly influenced later ideas about the separation of powers.

Checks and balances, which modify the separation of powers, may operate under parliamentary systems through exercise of a parliament's prerogative to adopt a no-confidence vote in a government; the government, or cabinet, in turn, ordinarily may dissolve the parliament. The British Parliament is supreme, and laws passed by it are not subject to review by the courts for constitutionality. In France, under the Fifth Republic (1958), a Constitutional Council of nine members (appointed for nine years by the president, Senate, and National Assembly) reviews the constitutionality of legislation. The Federal Republic of Germany combines features of parliamentary systems and of federal systems like that of the United States. It vests the right to declare a law unconstitutional in the Federal Constitutional Court (1951).

The framers of the U.S. Constitution, who were influenced by Montesquieu and William Blackstone among others, saw checks and balances as essential for the security of liberty under the Constitution: "It is by balancing each of these powers against the other two, that the efforts in human nature toward tyranny can alone be checked and restrained, and any degree of freedom preserved in the constitution" (John Adams). Though not expressly covered in the text of the Constitution, judicial review—the power of the courts to examine the actions of the legislative and the executive and administrative arms of government to ensure that they are constitutional—became an important part of government in the United States. Other checks and balances include the presidential veto of legislation (which Congress may override by a two-thirds vote) and executive and judicial impeachment by Congress. Only Congress can appropriate funds, and each house serves as a check on possible abuses of power or unwise action by the other. Congress, by initiating constitutional amendments, can in practice reverse decisions of the Supreme Court. The president appoints the members of the Supreme Court but only with the consent of the Senate, which also approves certain other executive appointments. The Senate also must approve treaties.

From 1932 the U.S. Congress exercised a so-called legislative veto. Clauses in certain laws qualified the authority of the executive branch to act by making specified acts subject to disapproval by the majority vote of one or both houses. In 1983, in a case concerning the deportation of an alien, the U.S. Supreme Court held that legislative vetoes were unconstitutional (the House of Representatives had overturned the Justice Department's suspension of the alien's deportation). The decision affected clauses in some 200 laws covering a wide range of subjects, including presidential war powers, foreign aid and arms sales, environmental protection, consumer interests, and others. Despite the court's decision, Congress continued to exercise this power, including the legislative veto in at least 11 of the bills it passed in 1984 alone.

Checks and balances that evolved from custom and Constitutional conventions include the congressional committee system and investigative powers, the role of political parties, and presidential influence in initiating legislation.

In one-party political systems, informal, and perhaps even illegal, checks and balances may operate when organs of an authoritarian or totalitarian regime compete for power.

See also Federalist, The; judicial review; and powers, separation of.

Cheddar, parish, Sedgemoor district, county of Somerset, England, at the mouth of a spectacular limestone gorge in the Mendip Hills. The gorge (now owned by the National Trust) and caverns, in which human remains and artifacts dating back to the Stone Age have been found, attract many tourists. Cheddar cheese was first made there at or before the beginning of the 12th century and was aged in caves nearby. Cheese-making remains a cottage industry in Cheddar. Pop. (1984 est.) 3,950.

cheddar, hard cow's-milk cheese named for the district of its origin in the southwestern county of Somerset, England. Cheddar is one of England's oldest cheeses. The original,

Some leading cheeses of the world

cheese origin	processing	type
Bel Paese Italy; 20th century	cured 6–9 weeks	soft, mild
blue Europe	cow's or goat's milk, mold-ripened by *Penicillium roqueforti*, aged several months	salty, tangy, with blue-green marbling
brick United States	cow's milk, bacteria-ripened, cured about 3 months	semisoft, mild, pungent
Brie France; 12th century	surface-ripened 2–5 months	soft, white, distinctive aroma and flavour
caciocavallo southern Italy	cow's, goat's, or ewe's milk, usually aged 6–12 months, bacteria-ripened	sharp, plastic curd, keeps well, used grated
Camembert France; 18th century	cow's milk, surface-ripened by *Penicillium camemberti* mold, at least 60 days	soft, yellow, semiliquid interior
cheddar England; 16th century	cured 2 months to 2 years	acidulous, white to yellow
Cheshire (Chester) England; 16th century	ripened 3 weeks, best aged 8–10 months	acidulous, whitish or deep yellow, hard
cottage*	skim milk, uncured	soft, white, moist, mild, perishable
cream	cow's milk and cream unripened	soft, very mild, white
Edam The Netherlands	skimmed cow's milk, aged 3–12 months	semihard, mild, yellow
farmer	whole milk, uncured	soft, white, moist, mild, perishable
feta Greece	ewe's or goat's milk, aged 4 days to 1 month	very salty
gammelost Norway	soured skim milk, mold-ripened by *Penicillium roqueforti* or similar mold, aged in straw several weeks	semisoft, rather sharp, with bluish tint of mold
Gorgonzola Italy (Po valley)	usually cow's milk, mold-ripened by *Penicillium roqueforti* (called *P. glaucum* in Italy), aged 3–6 months	semihard, with blue-green marbling
Gouda The Netherlands	cow's milk, aged 3–12 months	semihard, mild, yellow
Gruyère Switzerland; 18th century	whole cow's milk, from a small number of farms	hard, pale yellow, mild, with small eyes
hand cheese† eastern Europe	sour, skim, and buttermilk, bacteria-ripened, cured 6–8 weeks, caraway seeds may be added	sharp flavour and aroma
Lancashire England	cured 1 to several months	white, moist, crumbly, acidulous, used for toasted bread or crackers (Welsh rarebit)
Liederkranz United States; 1882	bacteria-ripened, cured 15 days	soft, semiliquid interior, strong flavour and aroma
Limburger Belgium	cow's milk, bacteria-ripened, cured 1–2 months	soft, whitish, very strong aroma and flavour
mozzarella Italy	originally buffalo milk, now also cow's milk unripened	soft, moist, rubbery, used in foods, pizza
Münster Germany	bacteria-ripened, cured 1–8 weeks (U.S.) or longer (Europe), caraway seeds may be added	semisoft, European sharper than American type
Neufchâtel France	whole or skim milk or milk and cream, unripened, pimetio and condiments may be added	mild, white, creamy
Parmesan‡ Italy; Middle Ages	partly skimmed milk, bacteria-ripened, cured 16 months to 3 years, rubbed with oil containing burnt umber or other colouring matter	very hard, sharp, used grated for seasoning
Pont l'Évêque northwestern France; 13th century	surface-ripened, cured 3–6 weeks	soft, mild
Port du Salut northwestern France; 1865	cow's milk, bacteria-ripened, cured 6–8 weeks	semisoft, mild, elastic, used chiefly as dessert
provolone§	cow's milk, bacteria-ripened, kneaded curd, aged 6 months, usually smoked and coated with paraffin or oil	hard, sharp, plastic consistency
reblochon France	whole milk, bacteria-ripened, aged 4–5 weeks	soft, strong
Romano ‖ Rome	originally ewe's milk, now also goat's and cow's milk, bacteria-ripened, cured 5 months to 1 year	very hard, sharp, piquant, used grated and for table
Roquefort France; 18th century	ewe's milk, mold-ripened by *Penicillium roqueforti*, cured 2–5 months in cool, humid caves	semihard, sharp, blue-veined, used in salads and as dessert
Saanen¶ Switzerland; 16th century	cow's milk, bacteria-ripened, cured 3–7 years; by tradition a cheese made at a child's birth is eaten in portions on his feasts through life	hard, with a few small eyes, keeps for decades
sapsago Switzerland; 15th century	soured skim milk, bacteria-ripened 3–12 months, aromatic clover mixed with the curd	very hard, light green, used grated and for cooking
Stilton eastern England; 1750	cow's milk with cream added, mold-ripened 4–6 months or longer	semihard, blue-veined, used in salads and as dessert
Swiss♀ Switzerland	bacteria-ripened by *Streptococcus thermophilus*, *Lactobacillus bulgaricus*, and *Propionibacterium shermanii* 3–6 months, one of the most difficult cheeses to make	hard, mild, light yellow, with elastic texture nutlike flavour, large holes formed by CO_2 gas
Tilsit East Prussia	whole or skim milk, bacteria-ripened, aged 5–6 months, caraway seeds may be added	firm, yellowish, mild to slightly piquant flavour
Trappist west-central Balkans; 1885	cow's milk, ripened 5–6 weeks	semisoft, mild
Vacherin Switzerland, France	slightly ripened	mild, with very soft interior, hard rind

*Pot, Dutch, ricotta, smearcase, or schmierkase. †Originally molded by hand. ‡Including Parmiglano, Reggiano. §Including salame, provolette, and provolotine. ‖ Including Caprino, Vacchino, Pecorino. ¶Walliser, Walliskase. ♀Emmenthaler.

so-called farmhouse variety remains in limited production in modern times.

In the traditional method of cheddar manufacture, the firm curd is cut, or "cheddared," into small bits to drain the whey and then pressed firmly into cylinders commonly of 12 to 15 inches (30 to 38 cm) in diameter and weighing from 60 to 75 pounds (27 to 34 kg), though size may vary widely. The cheese, a light orange-yellow in colour, is wrapped in thin muslin and coated with wax. It is aged a minimum of three to six months, preferably one and one-half to two years. Its mellow, rich flavour becomes more intense with age but should not be bitter. Factory-made cheddar, now by far the norm, attains a high standard in England and in certain North American versions, notably Canadian, Vermont, New York, and Wisconsin.

Chédiak–Higashi syndrome, group of symptoms that includes or may include many abnormalities, such as malformations in all types of white blood cells; enlargement of the liver and the spleen; abnormalities of the lymph nodes; anemia; a smaller-than-normal number of blood platelets; abnormalities of the bones, lungs, heart, and skin; and susceptibility to infection. It is thought to be a hereditary disorder and occurs in mice, cattle, mink, and man. The human disease is rare, fewer than 100 cases having been described.

Cheduba Island, also called MANAUNG ISLAND, island in the Bay of Bengal, southwestern Myanmar (Burma). It lies about 30 miles (50 km) west of Taungup on the Arakan Coast and is separated from Ramree Island to the north by the Cheduba Strait. It is 20 miles (32 km) long and 17 miles (27 km) wide and has an area of 202 square miles (523 square km). Cheduba was a stopping place on the historic coastal trade route from Bengal (India) by which Indian civilization came to Myanmar. Later came Buddhism and the earliest contacts with the British East India Company. In the 1780s, after the Burman conquest of the area, Cheduba became a province of Arakan. Small craft from Chittagong and Sittwe call at the island on their way to Yangon (Rangoon). Cheduba village on the northeast coast is linked to Kyaukpyu (Ramree Island) by steamer. Farming and cattle raising are the main economic activities. Mud cones emitting steam and sulfurous fumes indicate slight volcanic activity on the island; there are also gas and oil seepages. Pop. (1983) 63,761.

Cheek, Sir John: *see* Cheke, Sir John.

cheekbone: *see* zygomatic bone.

Cheektowaga, town ("township"), Erie county, western New York, U.S., immediately east of Buffalo, on Ellicott, Scajaquada, and Cayuga creeks, near Lake Erie. Originally part of the Holland Land Purchase and the Town of Amherst, the site was first settled in 1809 by Appolos Hitchcock, who was appointed Indian agent for the Buffalo Reservation. The town, incorporated in 1839, derived its name from an Indian word, *ji-ik-do-wah-gah* (meaning "land of the crab apple"). There was some fleeting land speculation when the railroads came through after the American Civil War. Rapid residential, industrial, and commercial growth occurred after World War II. Cheektowaga includes most of the village of Depew (incorporated 1892) and the village of Sloan (1896). About 20 cemeteries are located within the town limits, and the Greater Buffalo International Airport occupies the northeastern section. Pop. (1990) 99,314.

cheer (vehicle): *see* one-horse shay.

cheese, nutritious food consisting primarily of the curd, the semisolid substance formed

when milk curdles, or coagulates. Curdling occurs naturally if milk is not used promptly: it sours, forming an acid curd, which releases whey, a watery fluid containing the soluble constituents; and it leaves semisolid curd, or fresh cheese. In some areas, cheese is still made simply by allowing milk to curdle naturally, or by mixing milk with juices or extracts that reduce it to curds and whey.

A brief treatment of cheese follows. For full treatment, *see* MACROPAEDIA: Food Processing: *Milk and other dairy products*.

Cheese making probably originated soon after humans first took milk from wild or domesticated animals. The Christian Bible refers to "cheese of the herd" being given to King David; milk from cows, and presumably from other animals, was used for cheese making by about 1000 BC. The ancient Greeks and Romans knew and valued cheese, as did early people in northern Europe. Methods for cheese making have often been kept secret.

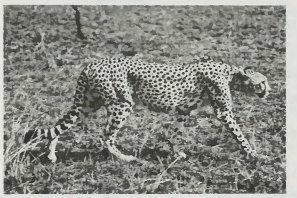
Important as a preservation technique, cheese making reduces about 10 volumes of milk to one volume of cheese. The curd, or soft gel, is formed by the chief protein in milk, casein, when enough lactic acid is developed from lactose (milk sugar) by the microorganisms present in the milk or when it is acted upon by rennin. Rennin is an enzyme usually obtained from the stomach of young calves in a brine extract called rennet. At the moment of coagulation, all the milk constituents, including most of the fat, casein, and other water-insoluble substances, are contained in the curd. The curd is cut or broken to release the whey, but a portion of the whey is always retained in the curd.

Hundreds of varieties of cheese are made from the milk of cows, goats, sheep, water buffalo, horses, llamas, and yaks. Products vary according to the selection and treatment of the milk; adjustment of its fat content; heating or pasteurizing; and addition of enzymes or cultures of bacteria, molds, or yeasts. Curd formation varies with changes in temperature, time, acidity for coagulation, proportions of rennet and acid, and the speed and extent of removal of the whey. Ripening and curing consists of biological and chemical changes that occur in the cheese and are affected by the moisture content, acidity, texture, shape, size, and microorganisms in the cheese. These changes alter the consistency as well as the flavour of the cheese. Before ripening, cheese is said to be fresh or green; after ripening it is called cured, aged, or ripened. The chemical changes may be classified broadly as the breakdown of fats to fatty acids; proteins to amino acids; and lactose to such products as lactic, acetic, and propionic acids, diacetyl, and carbon dioxide. Flavourful products of ripening include volatile fatty acids, ketones, esters, alcohols, peptides, amino acids, ammonia, and hydrogen sulfide.

In modern factories, cheese is mass produced according to standardized recipes and techniques that result in a more uniform product. It is not necessarily of higher quality, and there are fewer varieties. Cheese making has been of primary economic importance for hundreds of years in The Netherlands, France, Italy, and Switzerland. Certain cheeses are historically associated with particular areas. Keeping quality is enhanced by a variety of procedures, including heating and kneading (Italian provolone) and soaking in brine (Egyptian Domiati). The loosely knit structure of French Roquefort develops blue mold only in a cool, wet atmosphere such as occurs naturally in the caves of Roquefort.

cheetah, also called HUNTING LEOPARD (species *Acinonyx jubatus*), slender, long-legged cat, family Felidae, that lives on open plains of southern, central, and eastern Africa and in the Middle East, where it is all but extinct. The cheetah is the fastest land animal in the world over short distances, and it can attain a speed of as great as 100 km (60 miles) per hour. As its long legs and strong hindquarters suggest, it is built for running. Its claws, which provide traction, differ from those of other cats in being only partly retractile and in lacking protective sheaths.

The cheetah reaches a length of about 140 cm (55 inches), with the tail accounting for another 75–80 cm; it stands, on the average, 80 cm at the shoulder and weighs 50–60 kg (110–130 pounds). From birth to the age of about three months, the cheetah has an attractive, dark-spotted coat with long, blue-gray hair on the head, neck, and back. The crisp, coarse fur of the adult is sandy yellow above, white below, and covered with numerous small black spots; a black streak runs down the face from the corner of each eye. The king cheetah, once



Cheetah (*Acinonyx jubatus*)
Leonard Lee Rue III

erroneously separated as a distinct species (*A. rex*), is a variety in which the spots partly converge to form stripes and blotches.

The cheetah hunts alone or in small groups. It usually hunts in the morning or late afternoon, cautiously stalking its prey (usually the smaller antelopes) and then running it down in a final rapid sprint. The cheetah has long been trapped and tamed in Asia, where it has been used for coursing game, but it has seldom bred in captivity. Its litters consist of two to four kittens, and the gestation period is about 95 days.

The cheetah is the sole species of the genus *Acinonyx*. The African race of the cheetah is relatively uncommon; the Asiatic race (*A. jubatus venaticus*) is listed as critically endangered in the *Red Data Book* and is extinct in much of its former range.

Cheever, Ezekiel (b. Jan. 25, 1615, London, Eng.—d. Aug. 21, 1708, Boston, Mass. [U.S.]), a leading schoolmaster in colonial British America.

Cheever was the son of a weaver and was educated at Christ's Hospital in London and in the classics at the University of Cambridge. Cheever came to America in 1637 as a Puritan in search of religious freedom. In 1638 he settled in New Haven, Conn., as master of the public school. Active in both civil and ecclesiastical life, he remained in New Haven until 1650, then taught at Ipswich (1650–61) and Charlestown (1661–69), in Massachusetts.

Cheever's name is most closely associated with the Boston Latin School, of which he took charge in 1670 and at which he remained for the rest of his life. He was a strict disciplinarian but was loved by the several generations of young men whom he taught, and he made the Boston Latin School into a highly regarded classical academy. The governor of the Massachusetts Bay Colony—along with many other dignitaries—attended his funeral, at which Cotton Mather delivered the sermon.

Cheever wrote a volume of religious essays entitled *Scripture Prophecies Explained.* But his most influential publication by far was his *Accidence, a Short Introduction to the Latin Tongue,* written at New Haven. Cheever's *Accidence* appeared in twenty editions by 1785 and was again republished in 1838. It was regarded as the standard Latin textbook throughout colonial New England.

Cheever, John (b. May 27, 1912, Quincy, Mass., U.S.—d. June 18, 1982, Ossining, N.Y.), American short-story writer and novelist whose work described, often through fantasy and ironic comedy, the life, manners, and morals of middle-class, suburban America. Cheever has been called "the Chekhov of the suburbs" for his ability to capture the drama and sadness of the lives of his characters by revealing the undercurrents of apparently insignificant events. Known as a moralist, he judged his characters from the standpoint of traditional morality.

His expulsion at age 17 from the Thayer Academy in Massachusetts provided the theme for his first published story, which appeared in *The New Republic* in 1930. Cheever's name was closely associated with the magazine *The New Yorker,* which published many of his stories, but his works also appeared in *The New Republic, Collier's, Story,* and *The Atlantic.* A master of the short story, Cheever worked from "the interrupted event," which he considered the prime source of short stories. He was famous for his clear and elegant prose and his careful fashioning of incidents and anecdotes. But this focus on the episode caused him difficulty in constructing extended narratives in his novels.

Cheever's first collection of short stories, *The Way Some People Live* (1943), was followed by many others, including *The Enormous Radio and Other Stories* (1953) and *The Brigadier and the Golf Widow* (1964). *The Stories of John Cheever* (1978) won the Pulitzer Prize for fiction. Cheever's first novel, *The Wapshot Chronicle* (1957), earned him the National Book Award. Later novels included *The Wapshot Scandal* (1964), *Falconer* (1977), and *Oh What a Paradise It Seems* (1982). *The Letters of John Cheever,* edited by his son Benjamin Cheever, was published in 1988.

Chefoo (China): *see* Yen-t'ai.

Chegutu, formerly HARTLEY, town, central Zimbabwe. Named originally for Henry Hartley, who discovered gold in the vicinity, it was founded in 1891 on the Umfuli River but about 1900 was moved 18 miles (29 km) west. A town-management board was constituted in 1942.

On the main road and railway line from Harare (formerly Salisbury) to Bulawayo, Chegutu is the service centre for a large farming district (corn [maize], tobacco, castor beans, cattle). Zimbabwe's largest textile-weaving mill (cotton) is located there, and extensive limestone deposits are nearby. Gold and chrome are also mined locally. Weirs on the river provide a total length of 32 miles (50 km) of water for recreation, fishing, and irrigation. Pop. (1992 prelim.) 30,122.

Chehab, Fuad (b. 1902, Lebanon—d. April 25, 1973, Beirut), Lebanese army officer and statesman who served as president of Lebanon in 1958–64. Noted for his honesty and integrity, he brought a measure of stability to the government and to the nation.

Chehab received a military education in Syria and France and served with French mandatory forces in Syria after World War I. In 1945 he became commander of the Lebanese army. He first became prominent in the internal affairs of Lebanon in 1952, when violent opposition emerged to the presidency of Bishara al-Khuri. Chehab believed that his role as commander required him to defend the country against external aggression but not to maintain politicians in office, and he refused to give Khuri military support. Khuri was forced to resign and was succeeded by Camille Chamoun. In 1958, when open re-

bellion broke out against Chamoun's regime, Chehab prevented the rebellion from spreading but again refused to give positive support. Chamoun left office when his term ended that September, and Chehab was elected to the presidency.

Chehab was considered to be the one person who could ease the tensions that accompanied the termination of Chamoun's administration. He maintained a balance between the myriad sectarian, economic, and geographic interests that filled the Lebanese political scene. Working closely and harmoniously with the Cabinet, he kept basic power in his own hands and exercised direct control of the ministries of defense and the interior.

Chehab saw that the 1960 elections for the Chamber of Deputies were carried out with fairness. Taking the successful elections as an indication that the country had returned to normal, he announced his intention to resign. He was widely felt to be indispensable, however, and, bowing to popular pressure, he agreed to remain in office. He easily suppressed an attempted coup by the Syrian Social Nationalist Party (a small group trying to realize pan-Syrian unity) in 1961. Despite a proposal in the Chamber of Deputies for a constitutional amendment to allow him a second term, Chehab left office when his term ended (September 1964).

Cheikou Ahmadu Lobbo: *see* Shehu Ahmadu Lobbo.

Cheilostomata, major division of the bryozoans (small, colonial, aquatic invertebrate animals) that first appeared during the Jurassic period (208 to 144 million years ago). Individual members of the cheilostome colony are protected by a calcareous or chitinous covering that may be closed by a lidlike structure, an operculum. The cheilostomes are exclusively marine animals, and the plantlike appearance of the colony is frequently very attractive. The cheilostomes are the most abundant and varied of modern bryozoans.

Consult the INDEX *first*

Cheirolepis, extinct genus of primitive fishes whose fossils are found in European and North American rocks of the Devonian period (408 to 360 million years ago). The genus *Cheirolepis* is representative of the paleoniscoids, a group of primitive bony fishes, and may represent



Cheirolepis, model
By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

the common ancestor of the later, more progressive bony fishes. *Cheirolepis* was slim and streamlined, with many teeth, indicating that it was an active predator. The tail was upturned, and the tail fin was supported beneath it. The dorsal fin was single, whereas the pectoral fins were broadly attached and had limited flexibility. The eyes were large and placed well forward in the skull.

Cheju, city and provincial capital, Cheju *do* (province), on the northern coast of Cheju Island, off the southern coast of South Korea. It is the island's largest city and has its only airport, which handles both domestic and international flights. The political, commercial, and cultural centre of the island since it was an independent kingdom in ancient times, it developed as a seaport after 1913. Port facilities were rapidly constructed after 1946. Industries include canning and the manufacture of marine products, spirits, and starch (from sweet potatoes). Cheju National College (1955) and Cheju Teachers' College (1966) are located there. Among historical sites is Samsŏng-hyŏl, the legendary cradle of three old families (Koh, Yang, and Boo). Pop. (1985) 202,911.

Cheju Island, also called QUELPART ISLAND, Korean CHEJU-DO, island and (since 1946) *do* (province) of South Korea. It is in the East China Sea, 60 miles (100 km) southwest of Chŏlla-nam province, of which it formerly was a part. With an area of 705 square miles (1,825 square km), including 26 small associated islands, it is the smallest province of the



Village on Cheju Island, South Korea
Knodel—Shostal/EB Inc

republic. Oval in shape, Cheju Island measures 40 miles (64 km) from east to west and 16 miles (26 km) from north to south. The island is composed of a core of volcanic material that rises symmetrically to the crest of Mount Halla (6,398 feet [1,950 m]), which has a lake in its crater. The mountain and surrounding area is a national park. Hundreds of crater-formed hills from which volcanic material once flowed, seaside precipices with waterfalls, and lava tunnels are international sight-seeing attractions. Its oceanic climate supports some subtropical plants.

Until 938 the island was an independent kingdom called Tamra-guk. During the Koryŏ period (935–1392) and the Yi dynasty (1392–1910), it was used as a place of political exile and for grazing horses. The Dutch seaman Hendrik Hamel, the first Westerner known to have visited Korea, drifted to the island in 1653 and introduced it to the West by the name of Quelpart.

Although strategically related to Korea, Japan, and China, its harbours are not well developed because of its smooth coastlines and the submerged rocks that lie along the shores. Cheju, the capital city, is the island's principal port. A valuable marine product is a species of clam, the shell of which furnishes a special iridescent mother-of-pearl used for inlaid lacquer. Skilled women divers gather seaweed and shellfish. Sweet potatoes are the island's principal agricultural product, but it also supplies nearly all of the national demand for barley for beer. Oranges from the southern coast and a species of mushroom from the upland are important export products. In order to accommodate increasing numbers of international tourists, many towns on the island expanded their facilities during the 1970s. Pop. (1989 est.) 505,000.

Cheka, also called VECHEKA, early Soviet secret police agency and a forerunner of the KGB (*q.v.*).

Cheke, Sir John, Cheke also spelled CHEEK (b. June 16, 1514—d. Sept. 13, 1557, London, Eng.), English humanist and supporter of the Protestant Reformation who, as the poet John Milton said, "taught Cambridge and King Edward Greek" and who, with his friend Sir Thomas Smith, discovered the proper pronunciation of ancient Greek. Through his teaching he made the University of Cambridge the centre of the "new learning" and the Reformed religion. Henry VIII made him the first regius professor of Greek at Cambridge, and Edward VI knighted him in 1552.

On the accession of Mary I (1553), Cheke lost the last of a series of government positions, was imprisoned briefly, and fled abroad. There he published his letters on Greek pronunciation. In 1556 he was captured in Belgium and confined to the Tower of London. Faced with death, he recanted his Protestantism publicly and is said to have died of shame.

One of the most erudite men of his time, Cheke was an indefatigable translator. His English works are of little importance, except for their avoidance of foreign words and for



Cheke, engraving by William (Willem) van de Pass
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

his reformed phonetic spelling, which make his letters some of the best plain prose of the period.

Chekhov, Anton (Pavlovich) (b. Jan. 29 [Jan. 17, Old Style], 1860, Taganrog, Russia—d. July 14/15 [July 1/2], 1904, Badenweiler, Ger.), major Russian playwright and master of the modern short story. He was a literary artist of laconic precision who probed below the surface of life, laying bare the secret motives of his characters. Chekhov's best



Chekhov, 1902
David Magarshack

plays and short stories lack complex plots and neat solutions. Concentrating on apparent trivialities, they create a special kind of atmosphere, sometimes termed haunting or lyrical. Chekhov described the Russian life of his time using a deceptively simple technique devoid of obtrusive literary devices, and he is

regarded as the outstanding representative of the late 19th-century Russian realist school.

Boyhood and youth. Chekhov's father was a struggling grocer and pious martinet who had been born a serf. He compelled his son to serve in his shop, also conscripting him into a church choir, which he himself conducted. Despite the kindness of his mother, childhood remained a painful memory to Chekhov, although it later proved to be a vivid and absorbing experience that he often invoked in his works.

After briefly attending a local school for Greek boys, Chekhov entered the town *gimnaziya* (high school), where he remained for 10 years. There he received the best standard education then available—thorough but unimaginative and based on the Greek and Latin classics. During his last three years at school Chekhov lived alone and supported himself by coaching younger boys; his father, having gone bankrupt, had moved with the rest of his family to Moscow to make a fresh start.

In the autumn of 1879 Chekhov joined his family in Moscow, which was to be his main base until 1892. He at once enrolled in the university's medical faculty, graduating in 1884 as a doctor. By this time he was already the economic mainstay of his family, for his father could obtain only poorly paid employment. As unofficial head of the family Anton showed great reserves of responsibility and energy, cheerfully supporting his mother and the younger children through his freelance earnings as a journalist and writer of comic sketches—work that he combined with arduous medical studies and a busy social life.

Chekhov began his writing career as the author of anecdotes for humorous journals, signing his early work pseudonymously. By 1888 he had become widely popular with a "lowbrow" public and had already produced a body of work more voluminous than all his later writings put together. And he had, in the process, turned the short comic sketch of about 1,000 words into a minor art form. He had also experimented in serious writing, providing studies of human misery and despair strangely at variance with the frenzied facetiousness of his comic work. Gradually this serious vein absorbed him and soon predominated over the comic.

Literary maturity. Chekhov's literary progress during his early 20s may be charted by the first appearance of his work in a sequence of publications in the capital, St. Petersburg, each successive vehicle being more serious and respected than its predecessor. Finally, in 1888, Chekhov published his first work in a leading literary review, *Severny vestnik* ("Northern Herald"). With the work in question—a long story entitled "Steppe"—he at last turned his back on comic fiction. "Steppe," an autobiographical work describing a journey in the Ukraine as seen through the eyes of a child, is the first among more than 50 stories published in a variety of journals and selections between 1888 and his death in 1904. It is on this corpus of later stories, but also on his mature dramas of the same period, that Chekhov's main reputation rests.

Although the year 1888 first saw Chekhov concentrating almost exclusively on short stories that were serious in conception, humour—now underlying—nearly always remained an important ingredient. There was also a concentration on quality at the expense of quantity, the number of publications dropping suddenly from over a hundred items a year in the peak years 1886 and 1887 to only 10 short stories in 1888. Besides "Steppe," Chekhov also wrote several profoundly tragic studies at this time, the most notable of which was "A Dreary Story" (1889), a penetrating study into the mind of an elderly and dying professor of medicine. The ingenuity and insight displayed in this tour de force was especially remarkable, coming from an author so young. The play *Ivanov* (1887–89) culminates in the suicide of a young man nearer to the author's own age. Together with "A Dreary Story," this belongs to a group among Chekhov's works that have been called clinical studies. They explore the experiences of the mentally or physically ill in a spirit that reminds one that the author was himself a qualified—and remained a sporadically practicing—doctor.

By the late 1880s many critics had begun to reprimand Chekhov, now that he was sufficiently well known to attract their attention, for holding no firm political and social views and for failing to endow his works with a sense of direction. Such expectations irked Chekhov, who was unpolitical and philosophically uncommitted. In early 1890 he suddenly sought relief from the irritations of urban intellectual life by undertaking a one-man sociological expedition to a remote island, Sakhalin. This is situated nearly 6,000 miles (9,650 km) east of Moscow, on the other side of Siberia, and was notorious as an imperial Russian penal settlement. Chekhov's journey there was a long and hazardous ordeal by carriage and riverboat. After arriving unscathed, studying local conditions, and conducting a census of the islanders, he returned to publish his findings as a research thesis, which retains an honoured place in the annals of Russian penology: *The Island of Sakhalin* (1893–94).

Chekhov paid his first visit to western Europe in the company of A.S. Suvorin, a wealthy newspaper proprietor and the publisher of much of Chekhov's own work. Their long and close friendship caused Chekhov some unpopularity, owing to the politically reactionary character of Suvorin's newspaper, *Novoye vremya* ("New Time"). Eventually Chekhov broke with Suvorin over the attitude taken by the paper toward the notorious Alfred Dreyfus affair in France, with Chekhov championing Dreyfus.

During the years just before and after his Sakhalin expedition, Chekhov had continued his experiments as a dramatist. His *Wood Demon* (1888–89) is a long-winded and ineptly facetious four-act play, which somehow, by a miracle of art, became converted—largely by cutting—into *Dyadya Vanya* (*Uncle Vanya*) one of his greatest stage masterpieces. The conversion—to a superb study of aimlessness in a rural manor house—took place some time between 1890 and 1896. Other dramatic efforts of the period include several of the uproarious one-act farces known as vaudevilles: *Medved* (*The Bear*), *Predlozheniye* (*The Proposal*), *Svadba* (*The Wedding*), *Yubiley* (*The Anniversary*), and others.

Melikhovo period: 1892–98. After helping, both as doctor and as medical administrator, to relieve the disastrous famine of 1891–92, Chekhov bought a country estate in the village of Melikhovo, about 50 miles (80 km) south of Moscow. This was his main residence for about six years, providing a home for his aging parents, as also for his sister Mariya, who acted as his housekeeper and remained unmarried in order to look after her brother. The Melikhovo period was the most creatively effective of Chekhov's life so far as short stories were concerned, for it was during these six years that he wrote "The Butterfly," "Neighbours" (1892), "An Anonymous Story" (1893), "The Black Monk" (1894), "Murder," and "Ariadne" (1895), among many other masterpieces. Village life now became a leading theme in his work, most notably in "Peasants" (1897). Undistinguished by plot, this short sequence of brilliant sketches created more stir in Russia than any other single work of Chekhov's, partly owing to his rejection of the convention whereby writers commonly presented the Russian peasantry in sentimentalized and debrutalized form.

Continuing to provide many portraits of the intelligentsia, Chekhov also described the commercial and factory-owning world in such stories as "A Woman's Kingdom," (1894) and "Three Years" (1895). As has often been recognized, Chekhov's work provides a panoramic study of the Russia of his day, and one so accurate that it could even be used as a sociological source.

In some of his stories of the Melikhovo period, Chekhov attacked by implication the teachings of Leo Tolstoy, the well-known novelist and thinker, and Chekhov's revered elder contemporary. Himself once (in the late 1880s) a tentative disciple of the Tolstoyan simple life, and also of nonresistance to evil as advocated by Tolstoy, Chekhov had now rejected these doctrines. He illustrated his new view in one particularly outstanding story: "Ward Number Six" (1892). Here an elderly doctor shows himself nonresistant to evil by refraining from remedying the appalling conditions in the mental ward of which he has charge—only to be incarcerated as a patient himself through the intrigues of a subordinate. In "My Life" (1896) the young hero, son of a provincial architect, insists on defying middle-class convention by becoming a house painter, a cultivation of the Tolstoyan simple life that Chekhov portrays as misconceived. In a later trio of linked stories, "The Man in a Case," "Gooseberries," and "About Love" (1898), Chekhov further develops the same theme, showing various figures who similarly fail to realize their full potentialities. As these pleas in favour of personal freedom illustrate, Chekhov's stories frequently contain some kind of submerged moral, though he never worked out a comprehensive ethical or philosophical doctrine.

Chayka (*The Seagull*) is Chekhov's only dramatic work dating with certainty from the Melikhovo period. First performed in St. Petersburg on Oct. 17, 1896 (O.S.), this four-act drama, misnamed a comedy, was badly received; indeed, it was almost hissed off the stage. Chekhov was greatly distressed and left the auditorium during the second act, having suffered one of the most traumatic experiences of his life and vowing never to write for the stage again. Two years later, however, the play was revived by the newly created Moscow Art Theatre, enjoying considerable success and helping to reestablish Chekhov as a dramatist. *The Seagull* is a study of the clash between the older and younger generations as it affects two actresses and two writers, some of the details having been suggested by episodes in the lives of Chekhov's friends.

Yalta period: 1899–1904. In March 1897 Chekhov had suffered a lung hemorrhage caused by tuberculosis, symptoms of which had become apparent considerably earlier. Now forced to acknowledge himself a semi-invalid, Chekhov sold his Melikhovo estate and built a villa in Yalta, the Crimean coastal resort. From then on he spent most of his winters there or on the French Riviera, cut off from the intellectual life of Moscow and St. Petersburg. This was all the more galling since his plays were beginning to attract serious attention. Moreover, Chekhov had become attracted by a young actress, Olga Knipper, who was appearing in his plays, and whom he eventually married in 1901; the marriage probably marked the only profound love affair of his life. But since Knipper continued to pursue her acting career, husband and wife lived apart during most of the winter months, and there were no children of the marriage.

Never a successful financial manager, Chekhov attempted to regularize his literary affairs in 1899 by selling the copyright of all his existing works, excluding plays, to the publisher A.F. Marx for 75,000 rubles, an unduly low sum. In 1899–1901 Marx issued

the first comprehensive edition of Chekhov's works, in 10 volumes, after the author had himself rejected many of his juvenilia. Even so, this publication, reprinted in 1903 with supplementary material, was unsatisfactory in many ways.

Chekhov's Yalta period saw a decline in the production of short stories and a greater emphasis on drama. His two last plays—*Tri sestry* (1901; *Three Sisters*) and *Vishnyovy sad* (1904; *The Cherry Orchard*)—were both written for the Moscow Art Theatre. But much as Chekhov owed to the theatre's two founders, Vladimir Nemirovich-Danchenko and Konstanin Stanislavsky, he remained dissatisfied with such rehearsals and performances of his plays as he was able to witness. Repeatedly insisting that his mature drama was comedy rather than tragedy, Chekhov grew distressed when producers insisted on a heavy treatment, overemphasizing the—admittedly frequent—occasions on which the characters inveigh against the boredom and futility of their lives. Despite Stanislavsky's reputation as an innovator who had brought a natural, nondeclamatory style to the hitherto overhistrionic Russian stage, his productions were never natural and nondeclamatory enough for Chekhov, who wished his work to be acted with the lightest possible touch. And though Chekhov's mature plays have since become established in repertoires all over the world, it remains doubtful whether his craving for the light touch has been satisfied except on the rarest of occasions. Yet oversolemnity can be the ruin of *Three Sisters,* for example—the play in which Chekhov so sensitively portrays the longings of a trio of provincial young women. Insisting that his *The Cherry Orchard* was "a comedy, in places even a farce," Chekhov offered in this last play a poignant picture of the Russian landowning class in decline, portraying characters who remain comic despite their very poignancy. This play was first performed in Moscow on Jan. 17, 1904 (O.S.), and less than six months later Chekhov died of tuberculosis.

Though already celebrated by the Russian literary public at the time of his death, Chekhov did not become internationally famous until the years after World War I, by which time the translations of Constance Garnett (into English) and of others had helped to publicize his work. Yet his elusive, superficially guileless style of writing—in which what is left unsaid often seems so much more important than what is said—has defied effective analysis by literary critics, as well as effective imitation by creative writers.

It was not until 40 years after his death, with the issue of the 20-volume *Polnoye sobraniye sochineny i pisem A.P. Chekhova* ("Complete Works and Letters of A.P. Chekhov") of 1944–51, that Chekhov was at last presented in Russian on a level of scholarship worthy—though with certain reservations—of his achievement. Eight volumes of this edition contain his correspondence, amounting to several thousand letters. Outstandingly witty and lively, they belie the legend—commonly believed during the author's lifetime—that he was hopelessly pessimistic in outlook. As samples of the Russian epistolary art, Chekhov's letters have been rated second only to Aleksandr Pushkin's by the literary historian D.S. Mirsky. Although Chekhov is still chiefly known for his plays, critical opinion shows signs of establishing the stories—and particularly those that were written after 1888—as an even more significant and creative literary achievement.

(R.F.Hi./Ed.)

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A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Chekiang, Wade-Giles romanization CHECHIANG, Pinyin ZHEJIANG, second smallest *sheng* (province) of the People's Republic of China, and one of the country's most densely populated and affluent. A coastal province, Chekiang is bounded by the East China Sea on the east and by the provinces of Kiangsu on the north, Fukien on the south, Anhwei on the west, and Kiangsi on the southwest. Hang-chou is the largest city and serves as the capital of the province.

A brief treatment of Chekiang follows. For full treatment, *see* MACROPAEDIA: China.

Occupying parts of various kingdoms until the 13th century, Chekiang was divided in the 1270s into eastern and western regions, which became the traditional geographic divisions of the province. Lin-an (modern Hang-chou) was made capital of the Chinese empire during the Southern Sung dynasty (1127–1279). Hang-chou's population in 1275 was estimated at more than 1,000,000. Marco Polo described it as the finest and noblest city in the world. It continued to be a great cultural centre until 1862, when it was destroyed and virtually all of its inhabitants died during the Taiping Rebellion. Hang-chou did not fully recover but was eventually rebuilt and modernized. Foreign penetration of Chekiang began in the 1840s, with the opening of Ning-po as a treaty port city following the first Opium War. After the Chinese Revolution (1911–12), Chekiang became a power base for the Nationalist Party of Chiang Kai-shek, who was born in the province. During World War II, most of Chekiang was occupied by the Japanese. It was little affected by the 1946–49 civil war. Hang-chou has remained the capital of the province.

The landscape of Chekiang is renowned for its scenic beauty. The northwest section of the province lies within the fertile Yangtze River delta. Its coastal lowlands are protected by dikes. The greater part of Chekiang lies to the south of Hang-chou Bay and is largely mountainous. It has a rocky and deeply indented coast, dotted with numerous islands. The chief river of the province is the Fu-ch'un Chiang, meaning "River of Abundant Spring." Farther downstream it is called the Ch'ien-t'ang Chiang and flows from Hang-chou to the sea. Chekiang has a humid subtropical climate, controlled chiefly by monsoonal airflows. However, considerable climatic differences exist, particularly in winter, between the coast and the hinterland, the north and the south, and the lowlands and the highlands. The hilly interior has more precipitation than the coast, which is frequently visited by devastating typhoons, especially during late summer and early autumn.

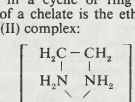
About 25 percent of the population lives in cities and towns. There are seven main urban centres, each with developed modern industry. Two-fifths of the population is concentrated in the T'ai Lake plain in the north and in the southern coastal region of Hang-chou Bay. The ethnic composition of the population is overwhelmingly Chinese.

Chekiang is one of the more prosperous of China's provinces, leading the country in farm productivity and in the tea industry. The province also ranks high in silkworm raising. Chekiang farmers practice a diversified form of agriculture. Staple food crops, including rice, wheat, barley, corn (maize), and sweet potatoes, are grown on about two-thirds of the arable land. The rest of the farmland grows either green fertilizer crops or such industrial crops as cotton, jute, ramie (a shrub yielding a fibre used for textiles), rapeseed, sugarcane, and tobacco. Soybeans, vegetables, and crops used for animal feed are also grown. Most farmers also raise poultry and pigs on their private plots. Chekiang has a thriving fishing industry and has also developed an aquaculture industry, which produces kelp; edible red algae, called Porphyra and used in making soups and condiments; mussels; scallops; clams; oysters; and crabs.

A flourishing handicraft industry exists in most rural villages. Nationally and internationally known products include the porcelain of Lung-ch'uan, the silk umbrellas and tapestry of Hang-chou, embroideries, laces, cross-stitchings, wood carvings, stone carvings, clay sculpture, and inlay ware.

Hydroelectric-power plants have spurred the development of light industry, which produces much of Chekiang's wealth. Industrial centres are Hang-chou (machinery, textiles, agricultural implements) and Ning-po (tractors, electronics, petrochemicals). Wen-chou is an important port city. Goods are moved on waterways, several railways, and a modern highway network. Area 39,300 square miles (101,800 square km). Pop. (1988 est.) 41,212,000.

chelate, any of a class of coordination or complex compounds consisting of a central metal atom attached to a large molecule, called a ligand, in a cyclic or ring structure. An example of a chelate is the ethylenediaminecadmium(II) complex:



The ethylenediamine ligand has two points of attachment to the cadmium ion, thus forming a ring; it is known as a bidentate ligand. Ligands that can attach to the same metal ion at two or more points are known as polydentate ligands. All polydentate ligands are chelating agents.

Chelates are more stable than nonchelated compounds of comparable composition, and the more extensive the chelation—that is, the larger the number of ring closures to a metal atom—the more stable the compound. This phenomenon is called the chelate effect; it is generally attributed to an increase in the thermodynamic quantity called entropy that accompanies chelation. The stability of a chelate is also related to the number of atoms in the chelate ring. In general, chelates containing five- or six-membered rings are more stable than chelates with four-, seven-, or eight-membered rings.

In medical practice, chelating agents, particularly salts of EDTA, or edetic (ethylenediaminetetraacetic) acid, are widely used for direct treatment of metal poisoning because they bind the toxic metal ions more strongly than do the vulnerable components of the living organism. Chelating agents are also em-

ployed as extractants in industrial and laboratory separation of metals and as metal-ion buffers and indicators in analytical chemistry. Many commercial dyes and a number of biological substances, including chlorophyll and hemoglobin, are chelate compounds.

Chelčický, Peter (b. *c.* 1390, Chelčic, Bohemia [now in Czech Republic]—d. *c.* 1460, Chelčic), Czech religious and political writer, the foremost thinker of the 15th-century Czech Hussite Reformation movement.

A member of the south Bohemian gentry, Chelčický was much influenced by the thought of the English heretic John Wycliffe and the martyred Czech Reformer Jan Hus. An early recruit to the radical wing of the Hussite movement, Chelčický came to reject the violent military turn the radical Taborites had taken. He condemned war and capital punishment, objected to towns, commerce, and oaths, and renounced all forms of power and secular authority, espousing a primitive, egalitarian Christianity such as he imagined to have existed before the time of Constantine the Great (d. 337). Chelčický's teachings, most fully expounded in his *Sít Víry* (1440; "Net of the Faith"), gave rise to the sect of the Bohemian Brethren. The utopian, anarchistic vein of his thought influenced the novelist Leo Tolstoy.

Cheliabinsk (Russia): *see* Chelyabinsk.

Chelif, Wadi, also spelled CHÉLIFF, or SHELIFF, French OUED CHELIF, the longest and most important river of Algeria. Its farthest tributary, the Wadi Sebgag, rises in the Amour ranges of the Saharan Atlas Mountains near Aflou. Crossing the Hauts Plateaux for most of the year as a chain of marshes and muddy pools, the river loses most of its water but is replenished by a stream near Chabounia, the Wadi Nahr Ouassel. The Chelif then turns abruptly north to rush through a deep gorge in the Tell Atlas Mountains between Ksar el-Boukhari (formerly Boghari) and Djendel (formerly Lavigerie). Below Oued Chorfa (formerly Dollfusville) the river swings to the west, flowing for about 145 miles (230 km) parallel with the coast in a depression (the Chelif plain) between the Dahra Massif, Mount Zaccar Rherbi, and the Tell Atlas. The river reaches the Mediterranean about 8 miles (13 km) north of Mostaganem.

The Chelif is unnavigable throughout its 450-mile (725-kilometre) length, and its flow is irregular, the maximum being November to March. The Chelif plain receives only moderate, undependable rainfall (average, 16 inches [400 mm] annually), and evaporation is intense. The lower reaches of the river's basin are, however, cultivated with the aid of irrigation. Three main dams have been constructed on the Chelif system at Ksar el-Boukhari (1932), Ech-Cheliff (formerly El-Asnam; 1932), and El-Khemis (1939). Cereals, oranges, and grapes are the principal crops, and there is minor cultivation of cotton around the town of Ech-Cheliff.

Cheliff, Ech-, formerly (until 1981) EL-ASNAM, or (until 1964) ORLÉANSVILLE, town, northern Algeria. It lies along the Wadi Chelif, south of the Mediterranean port of Ténès. It was founded by the French in 1843 on the site of the ancient Roman settlement of Castellum Tingitanum and is now an important rail junction, midway between Algiers and Oran, as well as an agricultural trade centre. In the surrounding region wheat and barley are the main crops, and citrus fruits, grapes, and beef and dairy cattle are raised in the irrigated areas. Other economic activities include printing, leatherworking, and the processing of fruit juices.

The former El-Asnam area was struck by a severe earthquake in 1954 and by another in 1980; the latter, measuring 7.3 on the Richter scale, destroyed more than half of the buildings in El-Asnam and killed about 5,000 people. The town's official name was changed in 1981 because of El-Asnam's association with earthquake disasters. Pop. (1987) 129,976.

Chellean industry, an early Stone Age industry characterized by crudely worked hand axes. The implements from Chelles in France that gave the industry its name are now grouped with the Acheulian industry. The term Chellean, in the sense of earliest handax culture, has been replaced by Abbevillian industry.

Chelles, town, eastern suburb of Paris, in Seine-et-Marne *département,* Paris region, north-central France, near the Marne River. It is the site of ancient Calae and has ruins of the 7th-century Abbey of Notre-Dame-de-Chelles (founded by Bathilde, widow of Clovis II, and destroyed during the French Revolution). Prehistoric remains found nearby in the 19th century were designated Chellean and gave rise to the archaeological classification Chellean/Acheulian. The town has food-processing industries. Pop. (1990) 45,495.

Chełm, *województwo* (province), eastern Poland. It was established in 1975. On the east, it borders Belarus and Ukraine; on the south, Zamość province; on the west, Lublin; and on the north, Biała-Podlaska province.

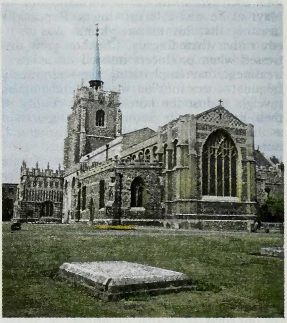
Chełm, one of Poland's least densely populated provinces, has extensive meadows among fields of potatoes, rye, and sugar beets. The Bug River, which forms the province's eastern border, is the largest river; other rivers in the province are the Wieprz, the Udal, and the Siennica. The Wieprz-Krzna drainage canal crosses both the northwestern and the southwestern corners of the province. Chełm (*q.v.*), an important city since the 13th century, is the industrial centre and capital of the province. Economic activities include cement production, food processing, textile manufacturing, and coal mining. During World War II the Nazis established the Sobibor (*q.v.*) extermination camp by the village of Sobibór near the Bug River (the Ukrainian border) south of Włodawa. Some 250,000 Jews died there. Area 1,493 square miles (3,866 square km). Pop. (1991 est.) 247,200.

Chełm, city, capital of Chełm *województwo* (province), eastern Poland. The city is located on the Uherka River, a tributary of the Bug River, 15 miles (24 km) west of the Ukrainian border. It received town rights in 1233, passed to Poland in 1377, and fell to Austria (1795) and then to Russia (1815). During World War II, 90,000 people died in two German prisoner-of-war camps in the town. The Polish republic was proclaimed in Chełm on July 22, 1944. Chełm is a rail junction and commercial centre, with an economy that includes mineral extraction, wood processing, flour milling, brewing, and the manufacture of cement and machinery. Pop. (1991 est.) 67,000.

Chełmno, German KULMHOF, German Nazi extermination camp on the Ner River, a tributary of the Warta, in western Poland. It opened in December 1941 and closed in January 1945 and was operated to execute Jews (mostly Polish) in Adolf Hitler's "final solution," as well as some Gypsies and Soviet prisoners of war. Estimates of the numbers executed range from 170,000 to 360,000. The facilities included large trucks, the entrances to which were elaborately disguised and marked "To the showers"; in them victims were gassed by exhaust fumes, and the corpses were then driven to mass graves in nearby forests or, after 1942, transferred to newly constructed crematoriums. Chełmno acquired a special reputation for its "efficient" bone-crushing machine (*Knochenmühle*). From August 1944 to January 1945 the SS burned and obliterated the installations and sought to kill all known inmates, in an attempt to erase all traces of the camp. Only two Jewish survivors were found after the war.

Chelmsford, town, district and borough, county of Essex, England. It lies in the Chelmer River valley on the northeastern periphery of Greater London.

Remains of the Roman settlement of Caesaromagus have been discovered in the locality. In 1227 Chelmsford became the regular seat of the county judicial gatherings known as assizes and quarter sessions. The ecclesias-



Cathedral of Saint Mary, Chelmsford, Eng.
The J. Allan Cash Photolibrary

tical diocese of Chelmsford, established 1914, coincides with the county of Essex, and in 1951 the 15th-century parish Church of St. Mary was designated as the diocese's cathedral. Chelmsford town has a county museum, an agricultural market, and a grain exchange. Light engineering, especially electronics, and administration provide the main employment, but some agriculturally based industries survive. From the local premises of Marconi's wireless-telegraph company, the first wireless-telegraph broadcasting service in the world was transmitted on Feb. 23, 1920.

The administrative district (1974) of Chelmsford also includes the surrounding countryside within about 10 miles (16 km) of the town. Area district, 132 square miles (342 square km). Pop. (1981) town, 92,479; (1991 prelim.) district, 150,000.

Chelmsford, town (township), Middlesex county, northeastern Massachusetts, U.S., adjacent to Lowell (northeast). Settled in 1633, it was named for Chelmsford, Eng., and incorporated in 1655. An iron foundry using local bog ore was built there in 1656. During the early 19th century, the production of lumber, powder, textiles, and granite was important. Chelmsford is now primarily residential with some light industries. In 1657 John Fiske, an early pastor of the Chelmsford Unitarian Church, compiled the *Chelmsford Catechism,* the only extant copy of which is in the New York Public Library. Joseph Spalding of Chelmsford is said to have fired the first shot at the Battle of Bunker Hill (1775). The Warren H. Manning State Park is nearby. Pop. (1991 est.) 32,273.

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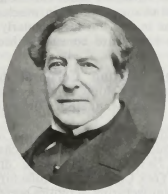
Chelmsford (of Chelmsford), Frederic John Napier Thesiger, 1st Viscount, BARON CHELMSFORD OF CHELMSFORD (b. Aug. 12, 1868, London, Eng.—d. April 1, 1933, London), English colonial administrator and statesman who served for several years

as governor of Queensland and New South Wales before becoming viceroy of India; he helped to institute reforms increasing Indian



1st Viscount Chelmsford
The Mansell Collection

representation in government but provoked opposition by his severe measures against nationalists.

The eldest son of the second Baron Chelmsford and on his mother's side a grandson of Major General Heath of the Bombay army, he was educated at Magdalen College, Oxford University, where he led the cricket team in 1890. He later served on both the London school board and county council. In 1905 he succeeded his father as Baron Chelmsford and was appointed governor of the state of Queensland. In 1909 he became governor of New South Wales, where he was active and popular despite political conflict and labour unrest.

Knighted in 1912, he left Australia the next year to serve in India as a captain in the Dorsetshire regiment. During the early part of World War I he received quick promotions, to the surprise of many, and was viceroy in 1916–21, in a time of surging Indian nationalism. As a result of the Montagu–Chelmsford reforms, based on the joint report of the secretary of state for India, Edwin Samuel Montagu, and of Chelmsford himself, the central and provincial legislatures were increased in size and given elected majorities. Dyarchy was introduced in the provinces, with certain departments of government transferred to the control of ministers who were responsible to the legislature, while others were responsible to the governor. The number of Indians on the viceroy's executive council of seven was increased from one to three.

Implemented in 1919, the reforms were preceded by serious riots in Gujarāt and the Punjab. Chelmsford thus sought to enforce the Rowlatt Acts (1919), designed to give certain emergency powers to the executive, such as the internment of persons accused of subversion, but he met strong Indian opposition. Widespread disturbances led to imposition of martial law in the Punjab and questioning of Chelmsford's competence. Mahatma Gandhi's non-cooperation campaigns led the Congress Party in 1920 to boycott the first elections to the reformed councils.

On his retirement in 1921 Chelmsford was created a viscount and in 1924 became first lord of the Admiralty in Ramsay MacDonald's Labour government. During his last years he was chairman of the Miner's Welfare Committee and active in education projects, collecting many honours.

Chelny (Russia): *see* Naberezhnye Chelny.

Chelonia (reptilian order): *see* turtle.

Chelsea (England): *see* Kensington and Chelsea.

Chelsea porcelain, soft-paste porcelain made at a factory in Chelsea, London, established in 1743 by Charles Gouyn and Nicolas Sprimont, the latter a silversmith. By the 1750s the sole manager was Sprimont, from whose genius stemmed Chelsea's greatest achievements. In 1769 the factory was sold to James Cox; and he sold it a year later to William Duesbury of Derby, Derbyshire, who maintained it until 1784, producing porcelain generally referred to as Chelsea-Derbyware. In that year the kilns and workshops at Chelsea were demolished; many molds were destroyed and others removed to Derby.

The progress of the Chelsea factory is conveniently distinguished by the respective marks of four periods: the triangle period (1743–49/50), the raised anchor period (1750–52), the red anchor period (1752–56), and the gold anchor period (1758–70). The incised triangle is found on translucent white porcelain whose body contains a proportion of crushed lead glass. Held to the light it shows points of greater translucency known as "pinholes." Forms are markedly Rococo, some based on the silver designs of Sprimont, who was obviously inspired by the work of the French silversmith and *ornemaniste* Juste-Aurèle Meissonier, an important early Rococo designer. Some of the rare cups, coffeepots, and teapots are decorated with sprays of prunus or tea blossoms in relief inspired by the *blanc de chine* made at Te-hua, China. Teapots and jars in the form of a squat Chinese figure are based, like some other specimens of triangle porcelain, on wares from Saint-Cloud and Mennecy that were probably derived from silver in the first place. A few figures are known, not all of which are really successful, but "The Lovers,"



Chelsea soft-paste porcelain vase in the French Rococo style of Sèvres ware with "mazarin blue" ground and a "reserve" panel painting by John Donaldson (after François Boucher), gold anchor mark, *c.* 1763; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

a large, vigorously modelled group existing in two versions, which was probably the work of a French modeller, bears a mark in blue of a trident intersecting a crown, and this has been assigned to Chelsea. One model of the popular "Girl in a Swing" is now known to have come from a breakaway factory probably operated by Gouyn and situated about a mile from the parent factory. Relatively common in comparison with other wares are small "goat and bee" jugs molded in relief. The jug rests on the backs of two goats lying down with an applied bee and flower decoration beneath the spout and a handle shaped like a twig.

By a rearrangement of the proprietorship in 1749, Gouyn withdrew, and Sprimont was left to manage the factory with the patronage of the Duke of Cumberland. The wares were now marked with an anchor in relief raised on a small oval medallion. At this time the factory began to do its own enamel painting. The Japanese Kakiemon porcelain was closely copied. Lively fable scenes were painted by the Irish miniaturist Jeffrey Hamet O'Neal, and harbour scenes inspired by Meissen were painted by William Duvivier from northern France. Figures are very rare, but they include a notable series of birds after illustrations in *British Birds* by George Edwards. Raised anchor, as well as early red anchor, wares exhibit small patches of greater translucency, called "moons," when held to the light. The red anchor period began in 1752. The wares include some extremely well-modelled figures, nearly all of which were based on those of Johann Joachim Kändler and his assistants at Meissen. Especially notable are the Italian comedy figures, the characters represented in typical poses. Recently some of the finest figures have been attributed to a Belgian modeller, Joseph Willems, and these include the 21-inch "Una and the Lion," the largest figure made at Chelsea. The fashion for decorative table settings, of which the figures formed part, led to the making of large centrepieces, epergnes, and tureens in a variety of forms—rabbits, carp, twin doves, asparagus bundles, and cabbages—while dessert dishes were often modelled in leaf form. Flower-painting included imitations of Meissen *indianische Blumen* (Oriental flowers) and *deutsche Blumen* (naturally delineated German flowers). The German fashion for exact botanical specimens inspired depictions of flowers from illustrations in Philip Miller's *Gardeners Dictionary.* Miller had sketched many of his illustrations at Sir Hans Sloane's Botanic Garden so the resulting porcelain designs were called "Hans Sloane" flowers. Toward the end of the period, among wares sold in 1756, the underglaze ground known as "mazarin blue" made its appearance, together with a limited amount of gilding.

From 1756 to 1758 the factory was closed due to Sprimont's illness. During this time the Seven Years' War had started, and Meissen was under occupation by the troops of Frederick II the Great. Cumberland seems to have lost interest in Chelsea, and the royal factory of Vincennes had been reestablished at Sèvres. When Chelsea reopened in 1758 it had adopted the styles of Sèvres, as well as a new mark—the gold anchor. Coloured grounds were now favoured—the so-called mazarin blue (the Sèvres *gros bleur*), claret (the Sèvres *rose Pompadour*), and turquoise in conjunction with a lustrous lead glaze much thicker and more glasslike than those glazes used earlier. Gilding was often rich and lavish. The factory received orders for specially designed services, notably one from Queen Charlotte for a service for her brother, the Duke of Mecklenburg-Strelitz. Rococo vases were fashionable, and some, like the well-known Dudley vases, were made without regard for expense, following the practice at Sèvres. Figures now had well-marked Rococo scroll bases, were often large, and were usually given backgrounds (sometimes elaborate) of modelled flowers, known as *bocage.* Two well-known groups of this kind are the "Music Lesson" and the "Dancing Lesson," both after François Boucher. Some of the painting was after Antoine Watteau, and floral decoration and exotic birds were both popular, the latter especially based on Vincennes or Sèvres prototypes. During the red and gold anchor periods Chelsea made many miniature pieces, including scent bottles in a variety of forms, *étuis* (cases for small objects, like scissors), bodkin cases, and a variety of trinkets, which were known in the 18th century as "Chelsea toys."

Reproductions and forgeries of Chelsea

porcelain are numerous. Copies in hard-paste porcelain have been made by Samson of Paris and others; those in soft-paste usually come from Tournai, Belg., with which Chelsea had some connections in the 18th century; bone-china copies were made in England during the 19th century; and bone ash was included in the body of deceptive specimens made in Torquay, Devon, in the 1950s. Many of these bear an anchor mark that purports to be a Chelsea anchor mark, but they are larger and differently placed than the genuine Chelsea anchor. The genuine marking is about one-third of an inch in height, and on figures it is placed on the back, fairly high up if possible; it is never under the base. All Chelsea plates and dishes have three or four small, widely spaced imperfections in the glaze inside the footring ("stilt" marks). If these are missing, the specimen was not made at Chelsea, even though it may be contemporary.

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Cheltenham, borough and district, county of Gloucestershire, England. It is situated where the River Chelt, a tributary of the River Severn, breaks through the western edge of the Cotswolds.

A church is known to have existed at Cheltenham as early as 803. The town is first mentioned in documents in 1223, when the benefit of markets, fairs, and the hundred (feudal administrative division) of Cheltenham were leased to the local manor. After the discovery of three mineral springs in 1716 and the ensuing erection of a pump room in 1738, Cheltenham rapidly became fashionable, its popularity being assured by a visit by King George III in 1788. Many Georgian buildings, wide tree-lined avenues, and open spaces survive in the contemporary urban plan.

The town is now an educational centre, the main schools being Cheltenham College (founded 1841), Cheltenham Ladies' College (1853), and Dean Close School (1886) and a teacher-training college. The town has an opera house and a civic playhouse. After World War II annual festivals of music and literature were established. There are some light industries. Area 14 square miles (35 square km). Pop. (1981) town, 88,687; (1992 est.) district, 107,400.

Chelyabinsk, also spelled CHELIABINSK, or ČEL'ABINSK, *oblast* (province), west-central Russia. It is sited on the eastern flank of the Ural Mountains; a winding panhandle extends across to the western slopes. In the extreme east, the *oblast* extends onto the West Siberian Plain. The higher mountain areas are clothed in pine, fir, spruce, and birch, and the lower east is in steppe, with birch groves in the north.

The *oblast,* in the Urals industrial region, is rich in minerals: iron ores, titanium, nickel, gold, lignite, copper, zinc, and chromite. Serious depletion of local iron ores in the 1960s led to their importation from Kazakhstan and also from the Kursk Magnetic Anomaly of Belgorod and Kursk *oblasti;* coking coal is brought from Karaganda. On the basis of the minerals, large-scale heavy industry has developed, with iron and steel plants in Magnitogorsk, Chelyabinsk city (the administrative headquarters), Zlatoust, Satka, and Asha and a wide range of heavy- and medium-engineering industries in many towns. The chemical industry is also important. Agriculture is significant in the eastern steppe, on which considerable acreages were plowed under the Soviet regime's Virgin and Idle Lands Campaign of the 1950s. Wheat is the main crop, but potatoes and other vegetables are grown in quantity for the towns. Beef, dairy cattle, and sheep are also important. Area 33,900 square miles (87,900 square km). Pop. (1995 est.) 3,690,000.

Chelyabinsk, also spelled CHELIABINSK, or ČEL'ABINSK, city and administrative centre, Chelyabinsk *oblast* (province), west-central Russia. It lies on the eastern flank of the Ural Mountains and on the Miass River.

Chelyabinsk was founded as a fortress in 1736 on the site of a Bashkir village; it became a town in 1787. First a local centre of an agricultural region, it began to grow with the coming of the Trans-Siberian Railroad in 1894–96. Thereafter growth was continuous; it was greatly stimulated by the eastward evacuation of industry in World War II. Today Chelyabinsk is the major focus of the southern half of the Urals industrial region, well served by rail connections to other industrial cities.

One of the most important industrial centres of Russia, it has large ironworks and steelworks, a zinc refinery, a ferroalloys plant, chemical industries, and a wide range of heavy- and medium-engineering industries, producing steel pipes and pressings, bulldozers, scrapers, tractors, industrial machinery, and machine tools. The first natural gas from Urengoy, the largest Siberian gas field in operation, reached Chelyabinsk in 1979. Chelyabinsk has a university and a large polytechnic institute as well as medical, teacher-training, and agricultural-mechanization institutes and many scientific-research institutes. There are also an opera, ballet, and other theatres and a philharmonic hall. Pop. (1994 est.) 1,124,500.

chemical analysis, qualitative: *see* qualitative chemical analysis.

chemical analysis, quantitative: *see* quantitative chemical analysis.

chemical association, the aggregation of atoms or molecules into larger units held together by forces weaker than chemical bonds that bind atoms in molecules. The term is usually restricted to the formation of aggregates of like molecules or atoms. Polymerization also denotes the formation of larger units by the union of like small units but usually with chemical bonds between the smaller units.

The molecular aggregate formed by association is commonly known as an association complex. Because of the weakness of the forces holding the small units together, an equilibrium is often observed between an association complex and the corresponding simple molecules. The equilibrium mixture behaves chemically much as would the small molecules by themselves, because the removal of some by chemical reaction shifts the equilibrium in such a way as to disassociate more of the aggregate in accordance with the law of mass action.

The forces tending to make like molecules associate are of three kinds. Most important is the hydrogen bond (or bridge), in which a hydrogen atom bonded to an electronegative atom forms a bridge to another electronegative atom. If these two electronegative atoms are in different molecules, the formation of the bridge unites the two. Molecules may also be held together, if the temperature is not too high, by dipolar attraction, resulting from the separation of positive and negative charges in each molecule. The molecule as a whole may be polar, one part having an excess of positive charge and another an excess of negative charge, or it may contain polar groups. At sufficiently low temperatures the relatively weak London forces (*i.e.,* forces acting between any two atoms brought close together) may also be strong enough to produce molecular association.

Water is one of the most highly associated compounds. An ice crystal is a giant network of water molecules held together by hydrogen bonds. In liquid water the molecules are connected to one another in much the same manner as in ice, but less regularly, and the hydrogen bonds are constantly broken and formed.

Chemical Banking Corporation, former American bank holding company that merged with The Chase Manhattan Corporation (*q.v.*) in 1996.

The holding company's principal subsidiary was Chemical Bank, which was chartered in 1824 in New York City as a division of the New York Chemical Manufacturing Company. Manufacturing activities were dropped in 1832, and in 1844 the company was reconstituted as a state bank and the chemical business was disposed of. After successive mergers and name changes, the bank assumed the name Chemical Bank in 1969, when it became part of Chemical New York Corporation, which was formed specifically for the purpose of acquiring control of the bank. In 1987 Chemical New York Corporation acquired Texas Commerce Bancshares, Inc., a large banking company based in Texas. In 1991 Chemical New York merged with Manufacturers Hanover Corporation in one of the largest bank mergers in American history. The merged company became the Chemical Banking Corporation.

In 1996 the firm, which was by then the second-largest bank in the United States, merged with another New York-based bank, The Chase Manhattan Corporation, to form the largest bank in the nation. Though the Chemical Banking Corporation had been the larger partner in the merger, the resulting firm was called The Chase Manhattan Corporation.

chemical bonding, any of the interactions that account for the association of atoms into molecules, ions, crystals, and other stable species. When atoms approach one another, their nuclei and electrons interact and tend to distribute themselves in space in such a way that the total energy is lower than it would be in any alternative arrangement. If the total energy of a group of atoms is lower than the sum of the energies of the component atoms, then they bond together and the energy lowering is the bonding energy.

A brief treatment of chemical bonding follows. For full treatment, *see* MACROPAEDIA: Chemical Bonding.

The number of bonds that an atom can form is referred to as its valence, or valency. For example, oxygen has a valence of two, and hydrogen has a valence of one; thus, two atoms of hydrogen combine with one atom of oxygen to form a water molecule, or two atoms of hydrogen combine with two atoms of oxygen to form a molecule of hydrogen peroxide. The valence number of an atom comprises the number of unpaired electrons in its valence shell, that is, its outer shell of electrons. Early theories of chemical bonding recognized that the valence of an atom could be explained by the fact that it ordinarily acquired the stable configuration of the electrons present in the nearest noble gas when it became part of a compound.

The simplest type of chemical bond is the ionic, or electrovalent, bond. In such bonds, an electron is transferred from one neutral atom to another, and the resulting charged species are held together by electrostatic attraction. Sodium chloride (common table salt) provides an example of ionic bonding. The sodium atom, which has one more electron than the stable neon atom, gives up this extra electron to chlorine, which requires one further electron to resemble the stable argon atom. The resulting ions (charged species) Na^+ and Cl^- are held together by electrostatic forces. The sulfur atom requires two electrons to attain

the electron configuration of argon. It can get these by combining with two sodium atoms to form the salt sodium sulfide (Na_2S) or by combining with one calcium atom, which has two valence electrons, forming calcium sulfide (CaS).

Other compounds are held together by covalent bonds, in which an electron pair is shared between two atoms. This is the case, for example, in the chlorine molecule (Cl_2). Each chlorine atom has seven valence electrons. The stability of the chlorine molecule is attributable to the sharing of a pair of electrons by the two atoms so that each of them acquires the stable configuration of argon. Atoms may also share more than one electron pair. By sharing two pairs of electrons, for example, two oxygen atoms (each with a valence of two) can form two covalent bonds and each attain a stable neon configuration. The oxygen molecule (O_2) therefore has a double bond. The carbon atom has four unpaired valence electrons. In the acetylene molecule (C_2H_2) a covalent bond is formed between each of the carbon atoms and a hydrogen atom, and the carbon atoms share three pairs of electrons; acetylene contains a carbon-carbon triple bond: $H-C\equiv C-H$.

Very strong forces unite the atoms in most crystalline metals. The metallic bond is recognized as a third major type of bond, alongside ionic and covalent bonds.

Hydrogen bonds are relatively weak bonds, having about one-tenth the strength of a covalent bond, and involve an interaction between hydroxyl groups (OH) and amino groups (NH_2). Hydrogen bonding plays a vital role in the exact manner of folding of the long polypeptide chains in proteins and in the base-pairing in the double strand of the DNA helix.

The bonding in molecules explains their shapes. The four unpaired electrons in the carbon atom form four covalent bonds with hydrogen atoms in the methane molecule, and the four bonding pairs of electrons thus formed adjust their positions in space so that their mutual repulsions are minimized. Methane is thus a tetrahedral molecule with bond angles of 109°. The ammonia molecule (NH_3) has three bonding pairs of electrons and one lone, or nonbonding, pair of electrons; these pairs of electrons are oriented approximately tetrahedrally. Because the hydrogen atoms pull the electrons participating in a given bond away from the nitrogen atom, however, the repulsions between the bonding electron pairs are less than the repulsions between the lone pair and the bonding pairs; the $H-N-H$ bond angle in the ammonia molecule (107°) is somewhat less than the tetrahedral angle. In the water molecule there are two bonding electron pairs and two lone pairs in the valence shell; since lone-pair interactions are greater than lone-pair–bond-pair interactions, the $H-O-H$ bond angle (104°) is less than the $H-N-H$ bond angle in ammonia.

A rigorous description of the bonding in molecules requires the use of quantum mechanical methods. Unfortunately, the quantum mechanical equations that govern the structure of molecules are too complicated to be readily solved. Two approximate methods are employed: valence bond (VB) theory and molecular orbital (MO) theory. Valence bond theory provides a quantum mechanical explanation of the electron pair-bond as resulting from the overlap (merging) of two atomic orbitals from two atoms. (An atomic orbital is a quantum mechanical function for the distribution of electrons within an atom.) A simple single bond, known as a sigma (σ) bond, results from head-to-head overlap and is symmetrical about the line between the two bonded atoms. A second type of bond, known as the pi (π) bond, results from sideways overlap. A double bond consists of one σ bond and one π bond, while a triple bond is made up of one σ bond and two π bonds. An important concept in valence bond theory is hybridization, which is the merging of atomic orbitals on the same atom to form equivalent hybridized atomic orbitals available for forming bonds with other atoms.

Molecular orbital theory treats bonding in terms of the overlap of molecular orbitals, which are functions describing the distribution of electrons over all the nuclei of a molecule. Each molecular orbital is formed by combining the atomic orbitals of the atoms in a molecule in an approximation known as the linear combination of atomic orbital (LCAO) approximation. Computational studies of the structures of molecules investigate the distribution of electrons according to MO theory.

The chemical bonding in some molecules cannot be explained in terms of electron-pair bonds between pairs of atoms, that is, two-centre bonds. Many-centre bonds are required to explain the bonding in many of the boron hydrides. For example, diborane (B_2H_6) contains four normal covalent bonds and two $B-H-B$ three-centre bonds, in which one pair of electrons is associated with three atoms; in this way the boron atoms achieve the stable electron configuration of the neon atom.

chemical compound, any substance composed of identical molecules consisting of atoms of two or more elements. There are millions of known compounds, each of which is unique. They range in complexity from water, which has two hydrogen atoms bonded to one oxygen atom, to the nucleic acids, which contain thousands of atoms. Chemical compounds vary in state and in such properties as colour, odour, and chemical behaviour.

A brief treatment of chemical compounds follows. For full treatment, *see* MACROPAEDIA: Chemical Compounds.

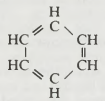
Most common materials are mixtures of different chemical compounds. Pure compounds can usually be obtained from them by physical methods, such as filtration and distillation, that do not alter the way in which the atoms are combined within the compound. Compounds can be broken down into their constituent elements or transformed into new compounds by chemical changes (reactions).

There are several ways of classifying chemical compounds. The most general division is between organic and inorganic compounds. Chemists once believed that carbon-containing compounds could be obtained only from organic—living or formerly living—sources. Although this is now known to be untrue, the branch of chemistry concerned with substances based primarily on carbon atoms is called organic chemistry.

Organic compounds. Carbon atoms are unique among the chemical elements in their ability to form strong covalent bonds readily with each other and with other elements in a wide variety of ways. Because of its atomic structure, carbon is more likely to share electrons than to gain or lose them. A carbon atom forms four bonds and can bind itself to another carbon atom while at the same time forming links to other elements or compounds. This results in an infinite number of possible molecules with potentially huge molecular weights. Chemists have identified at least 10 times as many carbon compounds as they have compounds of all the other known elements. Carbon compounds are most often formed with hydrogen, oxygen, nitrogen, chlorine, and sulfur.

Living organisms are composed primarily of water and organic compounds. The chief components of food—fats, proteins, and carbohydrates—are organic compounds, as are enzymes, hormones, and vitamins. The significance of organic chemistry extends beyond the processes of living systems, for many useful materials consist mainly or entirely of organic compounds. These include natural and synthetic fibres, most fuels, drugs, and plastics.

Organic compounds are subdivided into several categories according to the elements or groups of elements present. Hydrocarbons consist entirely of atoms of hydrogen and carbon. Alkanes are hydrocarbons with only single bonds and are referred to as saturated compounds because they contain the maximum number of hydrogen atoms. The simplest alkane, methane (CH_4), is the main component of natural gas. Hydrocarbons with carbon-carbon double bonds are called alkenes (*e.g.,* propene, $CH_3CH=CH_2$), and those with triple bonds are alkynes (*e.g.,* acetylene, $CH\equiv CH$). Alkenes and alkynes are known as unsaturated compounds because they contain multiple bonds. Hydrocarbons may also contain rings of atoms; these are known as cyclic compounds. An important class of cyclic compounds are the aromatic hydrocarbons, which possess an enhanced stability. Benzene (C_6H_6) is the simplest aromatic compound:



Double and triple bonds are examples of functional groups. A functional group is a site of chemical reactivity characterized by a particular group of elements. Other examples include the hydroxyl group (OH), characteristic of alcohols; the carbonyl group ($C=O$), in aldehydes and ketones; the carboxyl group (COOH), in carboxylic acids; and the amino group (NH_2), in amines.

Compounds with the same functional groups tend to undergo similar reactions. The characteristic reaction of alkenes and alkynes, for example, is addition, in which a reagent such as H_2 or X_2 (where X is a halogen) adds across the multiple bond, as, for example, in the addition of bromine (Br_2) to ethylene: $CH_2=CH_2+Br_2\rightarrow CHBr-CHBr$. Elimination reactions involve the loss of atoms, while substitution reactions involve the replacement of one atom by another. Carboxylic acids undergo acid-base reactions, in which the hydrogen atom of the carboxyl group is donated to a base, resulting in a carboxylate salt; *e.g.,* HCOOH (formic acid) + NaOH (sodium hydroxide) → HCOONa (sodium formate) + H_2O (water). Polymerization is the linking of a number of smaller molecules to form compounds of high molecular weight, as occurs in the formation of polyvinyl chloride ($(CH_2-CHCl)_n$, from vinyl chloride, $CH_2=CHCl$.

Organic compounds are derived from natural sources, such as petroleum, coal, plants, and animals. They also can be synthesized in chemical processes that rearrange molecular structures and build larger molecules from smaller ones. Covalent bonds sometimes lead to the formation of extended molecules of from thousands to millions of atoms. These macromolecules are also called polymers. In nature, they include proteins in nucleic acids. Synthetic polymers, such as polyethylene and saran, are produced in large amounts by the plastics industry.

Inorganic compounds. Inorganic compounds are generally those that do not contain carbon as the principal element. They are also classified according to the groups of elements they contain. Oxides consist of oxygen combined with another element. Examples include nitrous oxide (laughing gas, NO_2), carbon dioxide (CO_2), sulfur dioxide (SO_2), and hydrogen peroxide (H_2O_2). Oxyacids are produced by the reaction of water with a non-

metal oxide. Nitric acid (HNO_3) and sulfuric acid (H_2SO_4) are oxyacids that are heavily utilized in the laboratory and in industry, and their salts, such as sodium nitrate ($NaNO_3$) and barium sulfate ($BaSO_4$) are prevalent in nature. Other inorganic classes include the nitrides (containing N^{3-} ions), the sulfides (containing S^{2-} ions), and the hydrides (containing H^- ions). The most important nonmetal hydride is ammonia (NH_3), employed in greatest amounts in fertilizers.

Like organic compounds, inorganic compounds can polymerize. The major classes of inorganic polymers include borates, silicates, silicones, and silanes.

Coordination compounds consist of one or more complex units, each with a central metal atom bonded to nonmetallic atoms or groups of atoms called ligands. These compounds have various applications. The intense colours of some coordination compounds make them useful as dyes and pigments, such as the blue pigment Prussian blue, $KFe[Fe(CN)_6]$. Many biologically important compounds are coordination complexes—*e.g.,* chlorophyll, the plant pigment that initiates photosynthesis; hemoglobin, the oxygen-carrying component of blood; and metalloenzymes.

Complexes in which the carbon atom of an organic group is bonded to a metal atom constitute an important class called organometallic compounds. These compounds are utilized heavily in organic synthesis as starting materials, intermediates, and catalysts. Certain unique organometallic compounds called "sandwich" compounds have structures in which a metal atom is "sandwiched" between two cyclic organic ligands. Ferrocene, $Fe(C_5H_5)_2$, was the first such compound synthesized.

Compounds are also classified according to the types of bonds that hold them together. Ionic compounds consist of positively and negatively charged species (ions) and are bonded together by the electrostatic attraction between the opposite charges. They are typically formed by the interaction of metals and nonmetals, and they tend to be hard, stable materials with high melting points. Sodium chloride, or table salt (NaCl), potassium iodide (KI), and minerals such as galena (PbS) are common ionic compounds. Covalent compounds are held together by the sharing of electrons between two atoms, as in water (H_2O) and oxygen gas (O_2).

The distinction between ionic and covalent bonding is not absolute. Covalent bonds have a partially ionic character. Compounds often include both ionic and covalent bonds. A number of stable ionic species made up from several covalently bonded atoms form important families of compounds. The sulfate ion (SO_4^{2-}), for example, consists of four oxygen atoms covalently bonded to a central sulfur atom. This group has a charge of -2 and forms sulfate salts with electropositive elements such as sodium and magnesium. In reactions involving these compounds, the sulfate ion frequently remains unchanged; only the ionic bonds in the molecule are affected.

chemical element, also called ELEMENT, any substance that cannot be decomposed into simpler substances by ordinary chemical processes. Chemical elements constitute the fundamental materials of which all matter consists. By the late 20th century, roughly 110 elements were known. Of these, 90 are found in nature either chemically free or in combination with other elements. The others are artificially produced. *See* the accompanying Table of chemical elements.

A brief treatment of the elements follows. For full treatment, *see* MACROPAEDIA: Chemical Elements. *See also* MICROPAEDIA for entries on each of the individual elements.

Only 10 of the elements—carbon, sulfur, copper, antimony, iron, tin, gold, silver, mercury, and lead—were known in the uncombined state in ancient times. Although they were recognized as distinct varieties of matter, they were not classified as elements. In ancient and medieval philosophy, the elements were earth, air, fire, and water, the four simple substances of which all material bodies were supposed to be compounded. The modern use of the concept dates from the early 1660s, when the English chemist Robert Boyle described elements as primitive and simple, or perfectly unmixed, bodies that are not made of any other bodies or of one another. From this time the term "element" was reserved for material substances, but, as early chemistry was chiefly preparative and descriptive, no criteria were immediately available for determining whether substances were elements or compounds. By the middle of the 18th century, however, chemistry became a quantitative science based on the use of the analytic balance, and the required chemical criteria were established. In 1789 Antoine-Laurent Lavoisier of France published the first scientific list of elements in his book *Traité élémentaire de chimie* (*Elements of Chemistry*). On the basis of data obtained in experimental studies of chemical reactions, he included 23 elements in his list. In 1807 the English chemist Sir Humphry Davy isolated the elements sodium and potassium by the electrolysis of their respective molten hydroxides (alkalies). The formulation of the periodic law (*q.v.*) in 1869 by Dmitry I. Mendeleyev of Russia provided further stimulus to the search for new elements by indicating not only their existence but also their probable properties.

Early in the 20th century two presumably different radioactive elements were discovered with identical chemical properties and spectra but with different densities and radioactive properties. The two specimens were found to be variants of the element thorium and were called isotopes by the English chemist Frederick Soddy upon suggestion from Margaret Todd. They have the same atomic number

Chemical elements

Atomic weights of elements with no stable isotope are given as mass numbers, in parentheses, of the most stable isotope.

element	symbol	atomic number	atomic weight	element	symbol	atomic number	atomic weight
Actinium	Ac	89	227.028	Neon	Ne	10	20.179
Aluminum	Al	13	26.9815	Neptunium	Np	93	237.0482
Americium	Am	95	(243)	Nickel	Ni	28	58.69
Antimony	Sb	51	121.75	Niobium	Nb	41	92.9064
Argon	Ar	18	39.948	Nitrogen	N	7	14.0067
Arsenic	As	33	74.9216	Nobelium	No	102	(259)
Astatine	At	85	(210)	Osmium	Os	76	190.2
Barium	Ba	56	137.33	Oxygen	O	8	15.9994
Berkelium	Bk	97	(247)	Palladium	Pd	46	106.42
Beryllium	Be	4	9.01218	Phosphorus	P	15	30.97376
Bismuth	Bi	83	208.9804	Platinum	Pt	78	195.08
Boron	B	5	10.81	Plutonium	Pu	94	(244)
Bromine	Br	35	79.904	Polonium	Po	84	(209)
Cadmium	Cd	48	112.41	Potassium	K	19	39.0983
Calcium	Ca	20	40.08	Praseodymium	Pr	59	140.9077
Californium	Cf	98	(251)	Promethium	Pm	61	(145)
Carbon	C	6	12.011	Protactinium	Pa	91	231.0359
Cerium	Ce	58	140.12	Radium	Ra	88	226.0254
Cesium	Cs	55	132.9054	Radon	Rn	86	(222)
Chlorine	Cl	17	35.453	Rhenium	Re	75	186.207
Chromium	Cr	24	51.996	Rhodium	Rh	45	102.9055
Cobalt	Co	27	58.9332	Rubidium	Rb	37	85.4678
Copper	Cu	29	63.546	Ruthenium	Ru	44	101.07
Curium	Cm	96	(247)	Samarium	Sm	62	150.36
Dysprosium	Dy	66	162.50	Scandium	Sc	21	44.9559
Einsteinium	Es	99	(252)	Selenium	Se	34	78.96
Erbium	Er	68	167.26	Silicon	Si	14	28.0855
Europium	Eu	63	151.96	Silver	Ag	47	107.868
Fermium	Fm	100	(257)	Sodium	Na	11	22.98977
Fluorine	F	9	18.9984	Strontium	Sr	38	87.62
Francium	Fr	87	(223)	Sulfur	S	16	32.06
Gadolinium	Gd	64	157.25	Tantalum	Ta	73	180.9479
Gallium	Ga	31	69.72	Technetium	Tc	43	(98)
Germanium	Ge	32	72.59	Tellurium	Te	52	127.60
Gold	Au	79	196.9665	Terbium	Tb	65	158.9254
Hafnium	Hf	72	178.49	Thallium	Tl	81	204.383
Helium	He	2	4.00260	Thorium	Th	90	232.0381
Holmium	Ho	67	164.930	Thulium	Tm	69	168.9342
Hydrogen	H	1	1.0079	Tin	Sn	50	118.69
Indium	In	49	114.82	Titanium	Ti	22	47.88
Iodine	I	53	126.9045	Tungsten (wolfram)	W	74	183.85
Iridium	Ir	77	192.22	Unnilennium	Une	109	. . .
Iron	Fe	26	55.847	Unnilhexium	Unh	106	(263)
Krypton	Kr	36	83.80	Unniloctium	Uno	108	. . .
Lanthanum	La	57	138.9055	Unnilpentium	Unp	105	(262)
Lawrencium	Lr	103	(260)	Unnilquadium	Unq	104	(261)
Lead	Pb	82	207.2	Unnilseptium	Uns	107	(264)
Lithium	Li	3	6.941	Ununnilium	Uun	110	. . .
Lutetium	Lu	71	174.967	Uranium	U	92	238.029
Magnesium	Mg	12	24.305	Vanadium	V	23	50.9415
Manganese	Mn	25	54.9380	Xenon	Xe	54	131.29
Mendelevium	Md	101	(258)	Ytterbium	Yb	70	173.04
Mercury	Hg	80	200.59	Yttrium	Y	39	88.9059
Molybdenum	Mo	42	95.94	Zinc	Zn	30	65.39
Neodymium	Nd	60	144.24	Zirconium	Zr	40	91.224

. . . Data are currently in dispute.

and thus occupy the same position (*i.e.,* that of the element) in the periodic table but differ in the number of neutrons in the nuclei. In 1912 the English physicist Sir J.J. Thomson showed that the stable element neon, atomic number 10 and atomic weight 20.183, is a mixture of isotopes by separating the isotopes neon-20 and neon-22. Later, a third isotope, neon-21, was separated. All but 19 of the naturally occurring elements contain two or more isotopes, as identified in subsequent years. *See also* isotope.

Roughly one-third of the elements found in nature occur in a chemically free state on Earth. These elements, which obviously are not very active chemically, include nitrogen, gold, platinum, copper, and the noble gases. The five most abundant elements in the Earth's crust are oxygen (466,000 parts per 1,000,000, or 46.6 percent), silicon (27.7 percent), aluminum (8.1 percent), iron (5 percent), and calcium (3.6 percent). Hydrogen is by far the most abundant element in the universe, accounting for more than 90 percent of the total number of atoms and for about three-fourths of the mass. Helium is next in abundance, constituting about 7 percent of the number of atoms and nearly one-fourth of the total mass.

The properties of the elements are to a large degree attributable to the electronic structure and size of their atoms. Accordingly, they are extremely diverse. Helium, for example, has the lowest known melting point (−271.4° C at 29.6 atmospheres pressure) and boiling point (−268.98° C) of any of the elements, while tungsten has the highest known melting point (3,370° C) and boiling point (5,900° C). Densities range between 8.986×10^{-5} grams per cubic centimetre at 0° C and 1 atmosphere pressure for hydrogen and 22.5 g/cm³ for iridium. Most properties show fairly regular gradations within the main groups of the periodic table, whereas in the periods there is considerable divergence.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

chemical engineering, the development of processes and the design and operation of plants in which materials undergo changes in their physical or chemical state.

A brief treatment of chemical engineering follows. For full treatment, *see* MACROPAEDIA: Engineering; Industries, Chemical Process.

Although the basic concepts were developed only about a century ago, several aspects that are now accepted within the definition of chemical engineering have been known for thousands of years, the most notable examples being the distillation of alcoholic beverages and the evaporation of brine.

The chemical industry began to develop to a significant extent during the second decade of the present century. There are two distinct ancestral lines of this industry as it is today, notably that originating in the chemical industries of western Europe, particularly those based on coal as the raw material, and that with its roots in the oil-refining industry of North America.

The chemical-engineering industry in Europe originally developed from the manufacture of kettles and other vessels in copper, brass, and lead, and the impetus for the development of the industry arose during World War I. Many countries were at that time cut off from their traditional suppliers of chemicals (particularly Germany) and were therefore forced to build their own chemical industries.

Simultaneously with the evolution of the European industry from this base, there was a growing demand in North America for petroleum-based products for the motor industry. This oil boom created a demand for entirely new techniques and plants, resulting not only in the creation of new types of companies but also in the diversification of older ones. Such new techniques were not of great interest in Europe, where there was no oil-refining industry at that time.

Between the two World Wars, the chemical industry in general was characterized by a period of slow growth, but during World War II the technology base of North America grew very quickly. A vast secondary industry based on oil feedstocks took shape in North America, developing products such as synthetic rubbers, man-made fibres, and plastics. During this period, completely different techniques of chemical and process engineering were used in Europe, where the industry was still coal-based and mainly concerned with inorganic- and general-chemicals processing rather than with oil and petrochemicals. Only over the past few decades have the two branches coalesced.

There are six main types of activity in the chemical-engineering field, namely research, design, construction, operation, sales, and management. Several of these activities frequently overlap. The original chemical engineers were usually trained formally as either chemists or mechanical engineers, gaining appropriate experience of the other aspects of their profession on the job, but over the past 50 years the profession has gradually become recognized in its own right.

A chemical engineer must be well versed in the three main disciplines utilized in the profession, namely chemistry, physics, and mathematics. In addition, the competent chemical engineer must be an industrial economist, thinking habitually in terms of world resources of raw materials and of world markets for finished products and also taking into consideration the capital and operating costs of a processing plant. The chemical engineer is concerned not only with the nature of chemical reactions but also with such aspects as the effects of temperature and pressure on reaction equilibria and the effects of catalysts on rates of reaction. However, the major part of the work of a chemical engineer is concerned not with chemical reactions but with the unit operations of chemical engineering. These are the engineering science and technology of fluid flow, heat transfer, evaporation, distillation, absorption, filtration, extraction, crystallization, and various other operations.

As well as working in the chemical and oil industries, chemical engineers are employed in a wide range of other process industries, such as the food and paper industries, with some of the newer industries (nuclear, biotechnology) also claiming a growing number of chemical engineers. While the majority of chemical engineers are located in the industrially developed countries, the profession is growing rapidly in the developing countries, to such an extent that the demand is likely to exceed supply for some considerable time ahead as these countries work to develop their native resources.

chemical equilibrium, a condition in the course of a reversible chemical reaction in which no net change in the amounts of reactants and products occurs. A reversible chemical reaction is one in which the products, as soon as they are formed, react to produce the original reactants. At equilibrium, the two opposing reactions go on at equal rates, or velocities, hence there is no net change in the amounts of substances involved. At this point the reaction may be considered to be completed; *i.e.,* for some specified reaction condition, the maximum conversion of reactants to products has been attained.

The conditions that pertain to equilibrium may be given quantitative formulation. For example, for the reversible reaction $A \rightleftharpoons B + C$, the velocity of the reaction to the right, r_1, is given by the mathematical expression (based on the law of mass action) $r_1 = k_1(A)$, where k_1 is the reaction-rate constant and the symbol in parentheses represents the concentration of A. The velocity of the reaction to the left, r_2, is $r_2 = k_2(B)(C)$. At equilibrium, $r_1 = r_2$, therefore:

$$k_1(A)_e = k_2(B)_e(C)_e \text{ or}$$
$$k_1/k_2 = (B)_e(C)_e/(A)_e = K.$$

The subscript e represents conditions at equilibrium. For a given reaction, at some specified condition of temperature and pressure, the ratio of the amounts of products and reactants present at equilibrium, each raised to their respective powers, is a constant, designated the equilibrium constant of the reaction and represented by the symbol K. The value of the equilibrium constant varies with the temperature and pressure according to the principle of Le Chatelier (*see* Le Chatelier, Henry-Louis).

By methods of statistical mechanics and chemical thermodynamics, it can be shown that the equilibrium constant is related to the change in the thermodynamic quantity called the standard Gibbs free energy accompanying the reaction. The standard Gibbs free energy of the reaction, ΔG°, which is the difference between the sum of the standard free energies of the products and that of the reactants, is equal to the negative natural logarithm of the equilibrium constant multiplied by the so-called gas constant R and the absolute temperature T:

$$\Delta G^\circ = -RT \ln K.$$

The equation allows the calculation of the equilibrium constant, or the relative amounts of products and reactants present at equilibrium, from measured or derived values of standard free energies of substances.

chemical formula, any of several kinds of expressions of the composition or structure of chemical compounds. The forms commonly encountered are empirical, molecular, structural, and projection formulas.

An empirical formula consists of symbols representing elements in a compound, such as Na for sodium and Cl for chlorine, and subscripts indicating the relative number of atoms of each constituent element. (A subscript is not used, however, unless its value differs from one.) Thus, benzene is represented by the empirical formula CH, which indicates that a typical sample of the compound contains one atom of carbon (C) to one atom of hydrogen (H). Water is represented by the empirical formula H_2O, denoting that the substance contains two atoms of hydrogen (H_2) for every atom of oxygen (O).

A general formula is a type of empirical formula that represents the composition of any member of an entire class of compounds. Every member of the class of paraffin hydrocarbons is, for example, composed of hydrogen and carbon, the number of hydrogen atoms always being two or more than twice the number of carbon atoms. Given that n stands for "any number," the general formula of this class is therefore C_nH_{2n+2}.

Empirical formulas are normally used to represent substances with undetermined molecular structures or substances not made up of normal molecular entities—*e.g.,* sodium chloride (table salt), which is composed of ions. To express the chemical composition of the individual molecules of a substance—the molecule being the smallest particle in which the substance retains its chemical properties—a molecular formula is employed. For example, the molecular formulas C_2H_4 and C_3H_6 for ethylene and propylene, respectively, state the number and kind of every atom present in a molecule of each substance. In contrast,

both ethylene and propylene have the same empirical formula, CH_2, because they are both composed of carbon and hydrogen atoms in a ratio of 1 to 2. In some cases, such as water, the empirical and molecular formulas of a substance may be identical.

Structural formulas identify the location of chemical bonds between the atoms of a molecule. A structural formula consists of symbols for the atoms connected by short lines that represent chemical bonds—one, two, or three lines standing for single, double, or triple bonds, respectively. For example, the structural formula of ethane is



signifying that the compound consists of two carbon atoms each linked to the other and to three hydrogen atoms by single bonds. Structural formulas are particularly useful for showing how compounds with the identical kind and number of atoms differ.

A projection formula is a two-dimensional representation of what is actually a three-dimensional molecule. Such a formula resembles the structural type in that it consists of symbols representing atoms of the constituent elements connected to each other by dashes or curves that stand for chemical bonds. Thus, the methane molecule, characterized by a tetrahedral disposition of four chemical bonds around a carbon atom, is conveniently represented by the projection formula



Projection formulas are widely used in the study of stereoisomers—compounds that have the same composition but that differ in the spatial arrangement of the atoms comprising their molecules. Certain conventions for drawing projection formulas have been adopted so that stereoisomers can be distinguished from one another by means of appropriate differences in their formulas.

chemical hydrology, also called HYDROCHEMISTRY, subdivision of hydrology that deals with the chemical characteristics of the water on and beneath the surface of the Earth. Water in all forms and modes of occurrence is affected chemically by the materials with which it comes into contact. Often called the universal solvent, water has the ability to dissolve many elements in significant quantities. Chemical hydrology concerns itself with the processes involved and thus includes studies of exceedingly diverse phenomena. The transport of salts from land to sea (by erosion of rocks and surface runoff) and from sea to land (by evaporation, cloud formation, and precipitation), the age and origin of groundwater in desert regions, and the paleotemperature determinations based on isotope analyses of ice sheets and glaciers are a few examples.

Articles are alphabetized word by word, not letter by letter

chemical indicator, any substance that gives a visible sign, usually by a colour change, of the presence or absence of a threshold concentration of a chemical species, such as an acid or an alkali in a solution. An example is the substance called methyl yellow, which imparts a yellow colour to an alkaline solution. If acid is slowly added, the solution remains yellow until all the alkali has been neutralized, whereupon the colour suddenly changes to red.

Like most indicators, methyl yellow is visible even if its concentration is as low as a few parts per million parts of solution. Used at such low concentrations, indicators do not have any influence on the conditions for which they are recommended. The common application of indicators is the detection of end points of titrations.

The colour of an indicator alters when the acidity or the oxidizing strength of the solution, or the concentration of a certain chemical species, reaches a critical range of values. Indicators are therefore classified as acid-base, oxidation-reduction, or specific-substance indicators, every indicator in each class having a characteristic transition range. Methyl yellow, an acid-base indicator, is yellow if the hydrogen ion (acid) concentration of the solution is less than 0.0001 mole per litre and is red if the concentration exceeds 0.0001. Ferrous 1,10-phenanthroline, an oxidation-reduction indicator, changes from red to pale blue when the oxidation potential of the solution is increased from 1.04 to 1.08 volts; and diphenylcarbazone, an indicator for mercuric ion, changes from yellow to violet when the mercuric ion concentration is increased from 0.000001 to 0.00001 mole per litre. Each of these indicators thus has a relatively narrow transition range, and each is capable of giving a sensitive, sharp indication of the completion of a reaction, that is, the end point.

Although the visible change of the indicator is usually a colour change, in some cases it is a formation or disappearance of a turbidity. If, for example, a soluble silver salt is added to a solution of cyanide that contains a trace of iodide, the solution remains clear until all the cyanide has reacted to form the soluble silver cyanide complex ion. Upon the addition of more silver, the solution becomes turbid because insoluble silver iodide forms. Iodide is therefore an indicator for excess silver ion in this reaction.

Another kind of indicator is the adsorption indicator, the best-known representative of which is the dye fluorescein. Fluorescein is used to detect the completion of the reaction of silver ion with chloride ion, the colour change occurring in the following manner. After a quantity of silver large enough to precipitate all the chloride has been added, additional silver ion is partially adsorbed on the surface of the particles of silver chloride. Fluorescein also is adsorbed and, in combining with the adsorbed silver ion, changes from yellow-green to red.

chemical intermediate, any chemical substance produced during the conversion of some reactant to a product. Most synthetic processes involve transformation of some readily available and often inexpensive substance to some desired product through a succession of steps. All the substances generated by one step and used for the succeeding step are considered intermediates.

Apart from substances that can be recovered as products if the reaction is stopped at the point of generation of the intermediate, unstable molecules, some chemical substances are either known or hypothesized to be intermediate, even if they have not yet been isolated. Among the classes of generally unstable intermediates that are well studied are free radicals, carbenes, carbonium ions, and carbanions. These intermediates are highly reactive fragments of molecules that ordinarily remain uncombined for only very short periods of time.

chemical precipitation, formation of a separable solid substance from a solution, either by converting the substance into an insoluble form or by changing the composition of the solvent to diminish the solubility of the substance in it. The distinction between precipitation and crystallization lies largely in whether emphasis is placed on the process by which the solubility is reduced or on that by which the structure of the solid substance becomes organized.

Precipitation often is used to remove metal ions from aqueous solutions: silver ions present in a solution of a soluble salt, such as silver nitrate, are precipitated by addition of chloride ions, provided, for example, by a solution of sodium chloride; the chloride ions and the silver ions combine to form silver chloride, a compound that is not soluble in water. Similarly, barium ions are precipitated by sulfate ions, and calcium by oxalate; schemes have been developed for analysis of mixtures of metal ions by successive application of reagents that precipitate specific ions or groups of related ions (*see* qualitative chemical analysis).

In many cases it is possible to select conditions under which a substance precipitates in highly pure and easily separable form. Isolation of such precipitates and determination of their weights constitute accurate methods for determining the amounts of various compounds. (*See* gravimetric analysis.)

In attempts to precipitate a single substance from a solution containing several components, undesired constituents often are incorporated in the crystals, reducing their purity and impairing the accuracy of the analysis. Such contamination can be reduced by carrying out the operations with dilute solutions and by adding the precipitating agent slowly; an effective technique is that called homogeneous precipitation, in which the precipitating agent is synthesized in the solution rather than added mechanically. In difficult cases it may be necessary to isolate an impure precipitate, redissolve it, and reprecipitate it; most of the interfering substances are removed in the original solution, and the second precipitation is performed in their absence.

chemical reaction, any type of chemical process in which substances are changed into different substances, as differentiated from other kinds of changes—those of position or of form—undergone by matter. Chemical reactions are manifested by the disappearance of properties characteristic of the starting materials and the appearance of new properties that distinguish the products; within the limits of observation, the mass of the products formed is equal to the mass of the substances consumed.

A brief treatment of chemical reactions follows. For full treatment, *see* MACROPAEDIA: Chemical Reactions.

Chemical reactions were no doubt known to prehistoric cultures, and speculations on the causes of such changes in the material world led certain ancient Greek philosophers to suppose that matter is perhaps composed of discrete but minute particles. This so-called atomic theory was revived in the early 19th century in England by John Dalton, who postulated that atoms—minute, indivisible, and unalterable particles—are the smallest units of matter, that the properties of a substance depend on the types of atoms present in it, and that all atoms of a particular element are identical. Dalton then argued that a chemical reaction was the redistribution of atoms—that is, the dissociation of atoms initially conjoined and the rejoining of those atoms in a new arrangement.

During this same period the French chemist and physicist Joseph-Louis Gay-Lussac, among others, discovered that the ratio of the volumes of reacting gases could always be expressed in small whole numbers. In 1811 Amadeo Avogadro of Italy suggested that this relationship could be explained by assuming that gases of equal volume, temperature, and pressure contain the same number of particles. Initially ignored, Avogadro's theory came

to be accepted by 1860, largely through the efforts of another Italian chemist, Stanislao Cannizzaro.

Later research by chemists and physicists revealed that atoms are not indivisible but made of smaller particles of opposite electrical charge and vastly different masses. The smaller, lighter charged particle is now called the electron, and the heavier particle of opposite charge is called the nucleus. It is now known that the dissociation and regrouping of atoms or groups of atoms are mediated by the interaction of their electrons. This interaction may be expressed by sharing electrons between or among atoms or groups of atoms in a molecule, or it may be expressed by transferring electrons from one atom or one group of atoms to another. The former interaction is called a covalent bond; the latter, ionic.

A chemical reaction, then, involves the absorption of energy by the bond-forming electrons, causing the bonds to rupture. Under these conditions opportunities are created for new bonds to form; when they do, energy is released.

If in a chemical reaction the energy needed to break a bond is less than that released by the formation of a new bond, the reaction is termed exoergic (or exothermic). The converse is true in endoergic (or endothermic) reactions. In rare instances, termed aergic (or athermic) reactions, there is no net absorption or evolution of energy. In general, some form of energy must be supplied to reactants to initiate bond rupture. This energy, called activation energy, can be in the form of heat, electromagnetic radiation, or electrical energy.

When allowed to proceed in the presence of certain substances, chemical bonds can be ruptured with less activation energy than normally required. Such substances, which are not consumed during the reaction, are called catalysts; the reactions that they facilitate are said to be catalyzed.

Although the speed of a reaction is related to the energy relationships discussed above, whether a reaction will occur at all depends on changes in the entropy both of the reactants and products, and of their surroundings. Entropy is a measure of the energy unavailable to do work in a system; *i.e.,* the energy associated with disorder. A chemical reaction cannot occur unless there is an overall increase in entropy.

Principles of chemical kinetics. Molecules tend to react with each other if their products have less free energy (ΔG) than the reactants had. (The free energy of a system reflects both the energy content and the probability of a given state.) Thus, reactions tend to occur for which the free energy has a negative value. A separate issue is how fast a reaction will occur. The speed of a reaction depends on what pathways are available for the system while going from the higher to the lower state of free energy.

In the generalized reaction $A + B \rightleftharpoons C + D$, the half arrows indicate that the reaction is reversible; *i.e.,* that under suitable conditions, molecules of C and D react to form molecules of A and B. For A and B to react at all, certain conditions must be met. First of all they must collide. The frequency of collision is proportional to the concentrations of the A and B molecules. If other determining factors are held constant, an increase in collision frequency will increase the rate of reaction.

The rate of the forward reaction can be calculated by multiplying the reactant concentrations (signified by brackets) by a proportionality factor, or specific reaction rate constant, k_f:

$$v_f = k_f[A][B].$$

The rate of the reverse reaction is similarly calculated:

$$v_b = k_b[C][D].$$

If the two rates are the same—*i.e.,* if $v_f = v_b$—the reaction is said to be in equilibrium. The equilibrium constant, K, is given by the equation

$$[C][D] / [A][B] = k_f / k_b = K,$$

called the reaction-equilibrium equation.

The equilibrium constant K is related to the free energy, ΔG, which is related to the forward and backward free energy of activation. Activation energy is the energy that reacting molecules must acquire before a reaction can proceed.

The rate of a reaction can be influenced by a number of factors including solvent, temperature, pressure, catalysis, and collision considerations. For example, ionization, an important first step in many kinds of reactions, is greatly promoted by solvents with high dielectric constants, such as water.

Mechanisms of chemical reactions. The detailed study of the mechanisms of chemical reactions enable chemists to prepare reaction conditions that favour a particular (usually more economical) pathway when a reaction can proceed by more than one reaction path. Furthermore, knowledge of reaction mechanisms often makes it possible to successfully predict the course of untried reactions.

In general, the chemical reactions of most interest involve the rupture and reforming of covalent bonds; *i.e.,* those in which atoms share electrons. It is largely by these reactions that such materials as plastics, dyes, and drugs are synthesized, and the biochemical reactions of living systems proceed.

A detailed description of reaction mechanisms must cover energy requirements and any changes in the bonding patterns of molecules (including shifts in the bonding electrons) with regard to both spatial arrangement and time.

Before most reactions will occur, some form of energy must be added to the system. This energy is used to raise the reactants to a minimum energy level needed to convert the reactants to an activated complex or transition state. The formation of products then proceeds without requiring any more energy; indeed, energy is often released when the products form. If more than one possible path leads reactants to products, the actual course followed is the one requiring the least energy of activation.

A complete study of a reaction must also take into account those factors that complicate the process. The reversibility of reactions is one such complication; the existence of competing reactions and the presence of intermediate products are others.

Many factors can influence the course of a reaction. The reactants must be identified and any prereactions investigated. Because of the fleeting nature of the transition state it cannot be studied directly, but it may have properties of its own that can yield to examination. The properties of the solvent, or reaction medium, can greatly influence the course of a reaction. Solvent molecules may interact with reactant or product molecules or with the activated complex. Raising the temperature of a reacting system generally increases the rate of reaction by supplying energy to the reactants, making it more likely that they will attain the necessary activation energy.

Increasing the pressure on a reacting system usually changes the reaction rate. In the case of gaseous reactants, an increase in pressure always increases the concentration of reactants and thereby increases the rate of reaction in systems where more than one gaseous reactant is involved. Catalysts, though they do not affect the position of equilibrium of a chemical reaction, accelerate both forward and backward reactions. Catalysts may influence an existing prereaction or make a process energetically favourable. Reaction products may cause a reverse reaction to be more favourable. Products can also act as catalysts or inhibitors to a reaction. A rate-limiting energy barrier is a feature of most reactions. The nature of this barrier and the molecular configuration at its top determine the reaction mechanism. A hypothetical process is the one-stage dissociation in solution of a covalent molecule AB into its ions A^+ and B^-. If energy such as thermal energy is applied to the system, the resulting excitation from molecular collisions may stretch the bond, thereby weakening it until the transition state is reached. This point represents the minimum energy required to convert reactants into products. Depending on the conditions of the reaction and the reaction mechanism, the transition state may revert to the starting material, AB, or it may dissociate to yield the products, A^+ and B^-. More complicated reactions typically involve several successive transition states and successive intermediaries formed between the reactants.

The discovery and identification of intermediates formed during a reaction are important to a full understanding of a reaction mechanism because they are evidence of more than one distinct stage. The mechanism of each must then be determined. Likewise, identification of all the products of a reaction help to define the course of the reaction. Another important determination is that of the spatial changes that occur to the molecules as they proceed from initial state through intermediate stages to final products. Among the other factors commonly studied for their influence on reaction mechanisms are kinetic order (the effect of reaction conditions on the rate of reaction), the nature and composition of the solvent, structure-reactivity relations (correlation of changes in reaction rate with systematic changes in the structure of one reactant), and kinetic isotope effects (the effect of differences in atomic mass on bond rupture and formation).

Chemical reactions are often classified according to some prominent feature of the process under study. These categories are not mutually exclusive, however, for each may combine aspects of two or more categories. A polymerization reaction, for example, may also be a chain reaction.

In simple synthesis reaction two reactants, which may be elements or compounds, form a compound as the product. In a decomposition reaction a compound breaks up into at least two simpler parts. A polymerization reaction is a type of synthesis in which the product is formed from hundreds or thousands of simpler reagent species. A chain reaction is a series of reactions in which the product of each step is a reagent for the next. A reaction in which a compound loses one or more atoms and subsequently gains one or more other atoms is a substitution reaction. One in which a compound loses one or more atoms is an elimination reaction. One in which a compound gains one or more atoms is an addition reaction.

Oxidation-reduction reactions, a large and important class of chemical processes, are characterized by the transfer of oxygen or hydrogen atoms, or electrons, from one substance to another. A substance that loses electrons is said to be oxidized; one that gains electrons is said to be reduced. Of all the other types of reactions, perhaps the most important is the acid-base reaction. According to one widely accepted model of acid-base reaction, a proton (*i.e.,* a hydrogen ion) is given up by one substance and taken on by another. The proton donor is by definition an acid; the acceptor, a base.

There are several other useful principles of classification that can be noted. When two atoms (or groups of atoms) combine and each

supplies an electron to their covalent bond, the process is called colligation, and the reverse reaction is called homolysis. If, on the other hand, two atoms (or groups of atoms) combine to form a covalent bond and both electrons come from only one of the reactants, the process is called coordination, and the reverse reaction is called heterolysis.

Reagents in a heterolytic reaction may be classified as nucleophilic or electrophilic depending on whether the reactant carries the electron pair (and seeks a nucleus to combine with) or lacks the electron pair (and seeks to combine with a unit having a pair of electrons).

Overall reactions may be classified by the number of molecules in the rate-limiting step of a multistage reaction. Classification can also be made on the basis of kinetic order or according to the time sequence of bond-making and bond-breaking processes.

Among the major types of reaction mechanisms are nucleophilic substitutions at either saturated or unsaturated carbon centres, electrophilic substitutions, addition reactions, and elimination reactions. Addition reactions may be initiated by either electrophilic or nucleophilic attacks. In electrocyclic additions, both portions of the attacking reagent combine simultaneously with the substrate. In homolytic additions, free-radical mechanisms often operate to sustain chain processes. Elimination reactions are usually treated as the reverse of additions.

In general, modern theoretical studies centre either on reaction mechanisms (variously termed kinetics, kinetics and mechanisms, or dynamics of chemical reactions) or on the physical structure of matter (called structural chemistry). Applied chemistry draws heavily on the body of theoretical work to create and to improve substances useful to industry. The empirical study of chemical reactions usually employs techniques for separating the products of a reaction. Subsequently the products must be identified, and finally in many cases the masses or volumes of the products and any remaining reactants are measured.

chemical symbol, short notation derived from the scientific name of a chemical element—*e.g.,* S for sulfur and Si for silicon. Sometimes the symbol is derived from the Latin name—*e.g.,* Au for *aurum,* gold, and Na for *natrium,* sodium. The present chemical symbols express the systematizing of chemistry by the atomic theory of matter. The English chemist John Dalton, who followed the alchemists in representing the elements pictorially, made the important advance of letting his symbols designate single atoms of elements, not indefinite amounts.

The Scottish chemist Thomas Thomson was the first to use letters as chemical symbols in the article "Mineralogy" in the *Supplement* (1801) to the 3rd edition of the *Encyclopædia Britannica.* The Swedish scientist J.J. Berzelius proposed in 1813 that chemical symbols be based on the Latin names of the elements, a proposal generally adopted by the mid-19th century.

chemical synthesis, the construction of complex chemical compounds from simpler ones. It is the process by which many substances important to daily life are obtained. It is applied to all types of chemical compounds, but most syntheses are of organic molecules.

Chemists synthesize chemical compounds that occur in nature in order to gain a better understanding of their structures. Synthesis also enables chemists to produce compounds that do not form naturally for research purposes. In industry, synthesis is used to make products in large quantity.

Chemical compounds are made up of atoms of different elements, joined together by chemical bonds. A chemical synthesis usually involves the breaking of existing bonds and the formation of new ones. Synthesis of a complex molecule may involve a considerable number of individual reactions leading in sequence from available starting materials to the desired end product. Each step usually involves reaction at only one chemical bond in the molecule.

In planning the route of chemical synthesis, chemists usually visualize the end product and work backwards toward increasingly simpler compounds. For many compounds, it is possible to establish alternative synthetic routes. The ones actually used depend on many factors, such as cost and availability of starting materials, the amount of energy needed to make the reaction proceed at a satisfactory rate, and the cost of separating and purifying the end products.

A goal in planning a chemical synthesis is to find reactions that will affect only one part of the molecule, leaving other parts unchanged. Another goal is to produce high yields of the desired product in as short a time as possible. Often, reactions in a synthesis compete, reducing the yield of a desired product. Competition can also lead to the formation of side products which can be difficult to separate from the main one. In some industrial syntheses, by-product formation can be welcome if the by-products are commercially useful. Diethyl ether, for example, is a by-product of the large-scale synthesis of ethanol (ethyl alcohol) from ethylene. Both the alcohol and ether are valuable and can be separated easily.

The reactions involved in chemical syntheses usually, but not always, involve at least two different substances. Some molecules will change into others solely under the effect of heat, for example, while others react on exposure to radiation (*e.g.,* ultraviolet light) or to electric current. However, where two or more different substances interact, they need to be brought into close proximity with one another. This is usually done by carrying out the syntheses with the elements or compounds in their liquid or gaseous states. Where the reactants are involatile solids, reaction is often carried out in solution.

The rate of a chemical reaction generally increases with temperature; chemical syntheses are thus often carried out at elevated temperatures. The industrial synthesis of nitric acid from ammonia and oxygen, for instance, is carried out at about 900° C (1,650° F). Frequently, heating will increase the rate of a reaction insufficiently or the instability of one or more reactants prevents application. In such cases catalysts—substances that speed up or slow down a reaction—are used. Most industrial processes involve the use of catalysts.

Some substances react so rapidly and violently that only careful control of the conditions will lead to the desired product. When ethylene gas is synthesized to polyethylene, one of the most common plastics, a large amount of heat is released. If this release is not controlled in some way—*e.g.,* by cooling the reactor vessel—the ethylene molecules decompose to carbon and hydrogen.

Many techniques have been developed to separate the products of chemical synthesis. These often involve a phase change. For example, the product of a synthetic reaction may not dissolve in a particular solvent, while the starting materials do. In this case, the product will precipitate out as a solid and can be separated from the mixture by filtration. Alternatively, if both starting materials and products are volatile, it may be possible to separate them by distillation.

Certain chemical syntheses lend themselves readily to the use of automated techniques. Automatic DNA (deoxyribonucleic acid) synthesizers, for example, are widely used to produce specific protein sequences.

chemical warfare, the use of chemical compounds, usually toxic agents, in warfare, and also the methods of combating such agents. Though smoke, which is used for camouflage or to confuse an enemy, and incendiary weapons are covered by this definition, the term usually refers to the use of chemical agents, both lethal and nonlethal, which attack the human organism by paralyzing the nervous system (nerve gases); inducing temporary blindness, deafness, paralysis, nausea, or vomiting; causing severe burns to skin, eyes, or lungs; or stifling respiration. Also included are chemical defoliants and herbicides for military purposes, such as those used in the Vietnam War.

World War I saw the first significant use of chemical warfare. From 1915 to 1918 the Germans introduced a succession of poison gases, each of which was promptly duplicated on the Allied side. In January 1915 the Germans released chlorine gas against the Russians in Poland with little effect, but on April 22 they scored a tactical victory against the French and British in Flanders that went beyond their expectations. The Allies first improvised protective devices and then developed gas masks, while at the same time producing their own chlorine. When the Germans introduced phosgene, a more lethal type of choking gas, and gas projectiles fired by artillery, the Allies followed suit and also improved their gas masks. In 1917 the Germans introduced mustard gas—a vesicant (blistering agent) compounded from carbon, hydrogen, sulfur, and chlorine—and in 1918 both sides used the new poison on a large scale. Though it inflicted numerous casualties, especially when a bombardment achieved a measure of surprise, the casualties were generally not severe, with relatively few fatalities.

The universal revulsion against gas warfare, combined with its indecisive tactical effect, produced a virtual outlawing of the weapon that held good through World War II, when both chemical agents and their means of delivery (*e.g.,* air bombardment) had vastly improved. Both sides produced poison gases, as well as protective devices, in quantity, and troops were universally provided with gas masks. One major breakthrough was made—the development in Germany of nerve gases, which proved far more toxic than the World War I agents—but was never used. Other poison gases known to have been produced in various countries include several known as blood gases because they interfere with functioning of the blood and utilization of oxygen by body tissues.

Lacrimators (tear gases), widely employed by police in riot control, have also had occasional military applications. In high concentration they can produce serious irritation of the respiratory tract and of the skin, especially moist areas.

The principal ingredients in gas-mask filters are charcoal and soda lime. Charcoal absorbs and holds a large volume of gas, while soda lime neutralizes toxic materials released by the charcoal. Gas masks are usually also provided with some form of mechanical filtration to strain out finely divided solid particles.

chemiluminescence, emission of electromagnetic radiation during the course of chemical reactions. Such radiation, whether ultraviolet, visible, or infrared, is most commonly generated by oxidation. The radiation can usually be ascribed to the transfer of the oxidation energy to a molecule that is itself not undergoing oxidation. This molecule then loses the excitation energy by emitting light of the proper wavelength. A large number of substances (*e.g.,* formaldehyde, paraldehyde, acrolein, lophine, glucose, lecithin, and cholesterol) luminesce if slowly oxidized in alcoholic alkaline solution. Another group of chemiluminescences is connected with the oxidation of sulfur com-

pounds. The widespread luminescence of such living organisms as fireflies and bacteria is based on the oxidation of luciferin in the presence of an enzyme, luciferase. Chemiluminescence that occurs in living organisms is called bioluminescence (*q.v.*).

chemin de fer, also called SHIMMY, or CHERNAY, French card game played mainly in European and Latin American casinos. The game is played by up to 12 players, on a kidney-shaped table; the object is to total 9 with a hand of two or three cards. When the cards total a two-digit number, the first digit is ignored, so that 14 would count as 4. Ace counts as 1, number cards at face value, and picture cards as 10 (which counts 0). Chemin de fer derives from the Italian game baccarat, differing from it in that players bet one at a time against each other instead of against the house. As a casino game in the United States, chemin de fer was displaced by baccarat in the late 1950s.

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chemistry, the science that deals with the properties, composition, and structure of substances (defined as elements and compounds), the transformations that they undergo, and the energy that is released or absorbed during these processes. Every substance, whether naturally occurring or artificially produced, consists of one or more of the hundred-odd species of atoms that have been identified as elements. Although these atoms, in turn, are composed of more elementary particles, they are the basic building blocks of chemical substances; there is no quantity of oxygen, mercury, or gold, for example, smaller than an atom of that substance. Chemistry, therefore, is concerned not with the subatomic domain but with the properties of atoms and the laws governing their combinations and with how the knowledge of these properties can be used to achieve specific purposes.

Chemistry is treated in a number of articles in the MACROPAEDIA. For the history and principal treatment of the discipline, *see* Physical Sciences. For the primary subjects of study, *see* Atoms: Their Structure, Properties, and Component Particles; Chemical Bonding; Chemical Compounds; Chemical Elements; Chemical Reactions; Matter: Its Properties, States, Varieties, and Behaviour. For the major classes of substances that occur in life forms, *see* Biochemical Components of Organisms. For methodology and instrumentation, *see* Analysis and Measurement, Physical and Chemical. For the role of chemistry in the study of plant and animal life, *see* Biological Sciences. For its applications in industry, *see* Industries, Chemical Process.

For a description of the place of chemistry in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Ten, Division III.

Chemnitz, formerly (1953–90) KARL-MARX-STADT, city, Saxony *Land* (state), eastern Germany. The city lies along the Chemnitz River, at the north foot of the Ore Mountains, southwest of Dresden. It began as a trading place on a salt route to Prague, was chartered in 1143, and fell to the Wettin margraves of Meissen in 1308. It was granted a monopoly in textile bleaching in 1357, thus promoting the development of the linen industry there and increasing trade. In the 19th century a machine-construction industry began in Chemnitz, stimulated by the development of the coal and lignite fields of middle Saxony. The first spinning mill in Germany was operating in Chemnitz in 1800, and the first machine tools and the first German locomotive were made there.

The city was severely damaged in World War II, but it has been largely restored. Notable landmarks include the old (1496) and modern (1911) town halls and the medieval Red Tower. The Schlossberg Museum in the former Benedictine monastery (1136) includes a late Gothic hall church with valuable sculptures. Chemnitz has an opera house, a museum, a school of machine construction (founded 1836 as an industrial school), a college of education, and several technical schools. The city is a transportation hub and an expanding industrial centre, with light and heavy engineering, a diversified textile industry, and factories for automobiles, commercial vehicles, and chemicals. Pop. (1992 est.) 287,511.

Chemnitz, Martin, Chemnitz also spelled KEMNITZ (b. Nov. 9, 1522, Treuenbrietzen, Brandenburg [now in Germany]—d. April 8, 1586, Braunschweig [Germany]), leading German theologian who was known, with reference to Martin Luther, as "the second Martin" and who helped unify the Lutheran church following the Reformation.

At the University of Wittenberg (1545), Chemnitz was the protégé of the German Lutheran Reformer Philipp Melanchthon. In 1550 he became librarian to Duke Albert of Prussia, at Königsberg, an appointment that afforded him an opportunity to continue his theological studies. He returned to Wittenberg in 1553, entered the ministry as the pastor of the Church of St. Aegidi, and began to lecture on Melanchthon's *Loci communes rerum theologicarum,* the first systematic treatise on Reformation theology. The following year Chemnitz became coadjutor to Joachim Mörlin, whom he succeeded in 1567 as superintendent of the churches of Braunschweig, a post he held for the rest of his life.

In 1568 he began a decade of work with the theologian Jakob Andreä in reuniting the Lutheran church, which had been divided by theological controversy after Luther's death in 1546. This end was achieved by the Formula of Concord (1577), which inaugurated the era of Lutheran orthodoxy and was primarily the work of the two men.

Chemnitz' works include a defense of the Lutheran doctrine of the Real Presence of Christ's body and blood in the Eucharist (1561); a systematic discussion of the relation between the divine and human natures of Christ (1570); *Examen concilii tridentini* (1565–73), the standard Lutheran analysis of the doctrinal decisions of the Council of Trent (1545–63), a Roman Catholic response to the Reformation; and a partial presentation of his theology in the form of a commentary on Melanchthon's *Loci communes* (1591).

chemoreception, the process by which all organisms respond to chemical stimuli.

A brief treatment of chemoreception follows. For full treatment, *see* MACROPAEDIA: Sensory Reception.

The physiological mechanisms of chemoreception and their role in patterns of adaptation to the environment have been little studied except in humans, a few other mammalian species, and some groups of insects. The precise mode in which chemoreceptive tissues respond to stimuli is at present only partially understood. In more complex animals, neural responses are produced by direct contact with specialized nerve cells, called primary receptors, or indirectly through the stimulation of neurons by nearby cells, referred to as secondary receptors. In nearly all species two different chemoreceptive functions are controlled by these correspondingly distinct types of receptor cells.

In humans and most other mammals the olfactory response (smell) is initiated by primary receptors in the nasal lining that react to stimuli in gaseous form, while the gustatory response (taste) is channeled through secondary receptors in the tongue called taste buds. The sensation of flavour, a term often employed as a synonym for taste, is really a response to a combination of different stimuli, including texture, temperature, taste, and smell and is common to all mammals. Distinct olfactory and gustatory receptors are also found in fishes and many invertebrates, though in these organisms they are often referred to as distance and contact chemoreceptor cells, respectively. Mucous membranes and mucosal epiderma in land animals and the external layers of aquatic species also contain nerve endings linked directly to the spinal system that are highly responsive to chemical stimuli.

One of the principal adaptive functions of chemoreception is the location and selection of foods. The particular odours of potential food sources may draw organisms toward them (attractants) or evoke an avoidance response (repellents) or may stimulate feeding behaviour (phagostimulants) or inhibit it (antifeedants). Some of these chemical agents in plants and animals are different substances from those that supply nutrients to the organisms that feed on them.

Other chemical stimulants produced by many animals, called pheromones, are important regulators of social behaviour. They are often crucial among local biological populations in identifying members and excluding outsiders, and they frequently serve to establish territorial boundaries. Odorous substances secreted when there is danger may help to alert the community, as among bees. In addition to contributing to communication and identification, pheromones are also important for organisms in locating specific regions for mating or habitation, especially in certain fishes such as salmon, and in the regulation of reproductive behaviour. Chemical secretions in insects and most mammals serve to attract mates, to distinguish potential mates of the same species from those of other species, and to initiate mating patterns. In many aquatic species, such as mollusks and coelenterates, reproductive activity is induced in colonies by chemical stimulants released by one or more members into the surrounding water.

Even the unicellular protozoa react to reproductive chemical stimuli (in species that propagate by conjugation). They may locate food sources by responding to levels of carbon dioxide concentration, as do some species of roundworms (Nematoda). In many crustaceans, specialized chemoreceptive organs called esthetascs, located near the antennae and the smaller antennules, are responsive to the sea-mineral content of their habitat. In addition to these distance chemoreceptive organs, contact chemoreception in crustaceans can take place in a number of regions along the legs, tail, and gills; some fish, similarly, have chemoreceptors along their tails and fins. Chemoreceptors in insects are found primarily on the antennae, but among the other organs that serve this function are small external structures called hair sensilla. These receive chemical stimuli through micropores in their surface layer that contain minute branches of neurons located at their base.

Another specialized chemoreceptive structure, Jacobson's organ—particularly active in lizards and snakes but not found in birds, fish, and some mammals, including humans—establishes a direct link between the front of the mouth region and the olfactory portion of the brain. Among birds, taste buds and well-developed olfactory brain centres indicate a need for reassessment of their chemoreceptive faculties, which until recently were thought to be deficient and entirely subordinate to organs of visual and aural perception.

Olfactory receptors in vertebrates consist of basal, supporting, and receptor cells, which terminate in minute cilia. It has been found

that there are synaptic connections among olfactory receptors that allow for coordination and flexibility in responses among a number of sensory cells.

Though the exact structure of the vertebrate taste buds is not known, current theories suggest that they are made up of four or five different types of cells; one type, the sensory cell, is believed to be replaced frequently at regular intervals. It is no longer thought that gustatory reception in vertebrates can be described in terms of four primary taste characteristics—sweet, sour, salty, and bitter—with distinct types of taste buds that respond specifically to one of these and not to others. Rather, electrophysiological evidence indicates that although some cells are especially responsive to specific types of stimulus, they also respond to other taste stimuli to varying degrees as well. None of the several theories that have been proposed to explain the chemical mechanisms of gustatory and olfactory reception have as yet been verified, and the factors that trigger sensory responses and enable cells to discriminate among different stimuli have not yet been conclusively determined.

Chemosh, ancient West Semitic deity, revered by the Moabites as their supreme god. Little is known about Chemosh; although King Solomon of Israel built a sanctuary to him east of Jerusalem (1 Kings 11:7), the shrine was later abolished by King Josiah (2 Kings 23:13). The goddess Astarte was probably the cult partner of Chemosh. On the famous Moabite Stone, written by Mesha, a 9th-century-BC king of Moab, Chemosh received prominent mention as the deity who brought victory to the Moabites in their battle against the Israelites.

chemosterilant, any chemical compound used to control economically destructive or disease-causing pests (usually insects) by causing temporary or permanent sterility of one or both of the sexes or preventing maturation of the young to a sexually functional adult stage. The mating of sterilized insects with fertile insects produces no offspring, and if the number of sterile insects is kept constant, the percentage of sterile insects will increase, and fewer young will be produced in each successive generation.

Laboratory-reared insects are sterilized by feeding them treated foods or by placing them in contact with treated materials. Care must be exercised in the direct application of a chemosterilant to a natural population, because most chemosterilants cause genetic changes and are thus dangerous both to beneficial animals and to man.

Chemosterilants can be grouped into two types of compounds, depending on their action. Antimetabolites such as amethopterin and aminopterin cause sterility in female insects by preventing egg formation. In some species, certain doses may stop eggs from hatching or larvae from maturing. Alkylating agents such as tepa, metepa, and apholate cause changes in genetic material and chromosomal damage in both male and female reproductive cells.

The female hormone mestranol can cause sterility in rodents, and triethylenemelamine can prevent the division of reproductive cells in male birds.

Terpenes, found in some evergreen trees and ferns, are similar in chemical structure to substances called juvenile hormones, which are present in all insects during larval development but must be absent during the transition from egg or larva to adult. Application of an interfering terpene at this critical time will prevent eggs from hatching or larvae from becoming sexually mature adults. Other hormones or synthetic substitutes may cause young of some species to become mature adults with deformed reproductive organs that make them unable to copulate.

chemotaxy, also called BIOCHEMICAL TAXONOMY, method of biological classification based on similarities in the structures of certain compounds among the organisms being classified. Proponents of this taxonomic method argue that proteins, being more closely controlled by the genes and less directly subject to natural selection than are anatomical features, are more conservative (*i.e.,* more slowly evolving) and thus more reliable indicators of genetic relationships.

chemotherapy, the treatment of diseases by chemical compounds. Chemotherapeutic drugs were originally those employed against infectious microbes, but the term has been broadened to include anticancer and other drugs.

A brief treatment of chemotherapy follows. For full treatment, *see* MACROPAEDIA: Drugs and Drug Action.

Until the end of the 19th century, most drugs were derived either from minerals or from plants. The researches of Louis Pasteur in France and Robert Koch in Germany laid the foundations of bacteriology. It was Paul Ehrlich, however, who made the greatest contribution to the science (chemotherapy) he named. The problem facing medical scientists was to produce a disinfectant that would destroy parasites within a living animal without serious damage to the host.

William H. Perkin, in England, made the first aniline dye (1856) as a result of abortive attempts to synthesize quinine, the sole antimalarial drug available at that time. About 30 years later, Ehrlich found that a synthetic dye, methylene blue, has antimalarial properties. He had been led to this by a study of the specific staining of organs of an animal or of a parasite following the injection of a synthetic dye. From these studies there emerged (1901–04) Ehrlich's well-known "side-chain" theory, in which he sought for the first time to correlate the chemical structure of a synthetic drug with its biological effects. In 1903 Ehrlich invented a dye, trypan red, which was the first drug to show activity against trypanosomal infections in mice. Ehrlich's greatest triumph, however, was the discovery (1910) of the organic arsenical drug Salvarsan, which proved to be effective in the treatment of syphilis. The discovery of other chemotherapeutic agents followed, including mepacrine, proguanil, and chloroquine.

The discovery of Prontosil in the early 1930s proved that antibacterial agents could be developed. Prontosil was the forerunner of the sulfonamide drugs, which came to be widely used for the treatment of bacterial infections in humans and domestic animals.

The discovery of penicillin by Sir Alexander Fleming in 1928, and its practical development by Sir Howard Florey and Ernst Chain, marked another important advance in bacterial chemotherapy. Penicillin, which did not become widely used until World War II, was the first of the so-called antibiotics, and it was followed by other important antibiotics such as streptomycin, the tetracyclines, and the macrolides.

Antibiotics, whether they are produced by living organisms (usually fungi or bacteria) or artificially synthesized, have transformed the modern management of diseases caused by bacteria and most other microorganisms. Paradoxically, the more widely they are used, the greater the likelihood that drug-resistant bacteria will emerge. Bacteria may develop resistance to drugs in several ways: mutation changes in genetic composition; transduction, whereby resistance is transferred from a resistant to a nonresistant strain; transformation, in which a bacterial cell takes from its environment the genes from a resistant form to acquire resistance; and conjugation, in which the organism acquires resistance by cell-to-cell contact.

Another comparative failure of chemotherapy is the lack of drugs to combat viruses (although viral infections can be controlled through prophylactic measures).

Drug modes of action vary. For example, some may act on the bacterial wall, others affect cell membranes, some modify the molecular mechanism for duplication, some change the nucleic acid metabolism, and others change the intermediary metabolism of two interacting organisms.

Cancer chemotherapy is an increasingly important aspect of drug treatment. Alkylating agents (that work by impairing cell division) and antimetabolites (that interfere with enzymes and thus block vital cell processes) are used cytotoxically to attack malignant cells. Steroid hormones are used in the treatment of breast and prostate cancers, and corticosteroids are used to treat leukemia and lymphatic cancers. The periwinkle plant derivatives vincristine and vinblastine have been used effectively in treating Hodgkin's disease and leukemia.

The alkylating agents and antimetabolites have serious drawbacks. As they cannot distinguish between healthy and malignant cells, these drugs also interfere with actively multiplying noncancerous cells. They also reduce the body's resistance to infection. Work is being done on tumour-specific agents that attack only cancer cells.

Another area where chemotherapy has had a major, albeit controversial, impact is mental illness. Severe depression, anxiety, and schizophrenia are now treated with various drugs.

Concomitant with the successes of drug therapy has come increasing concern about attendant dangers. Stringent controls are operated by such regulatory agencies as the Food and Drug Administration in the United States and the Committee on Safety of Medicines in the United Kingdom. These bodies ensure the safety of pharmaceuticals before they are placed on the market and monitor any side effects thereafter. Public demands for "watchdog" agencies were triggered in large part by the 1962 Thalidomide tragedy, when thousands of severely deformed children were born to users of that insufficiently tested drug.

Chen Boda, Wade-Giles romanization CH'EN PO-TA (b. 1904, Hui-an, Fukien province, China—d. Sept. 20, 1989, Peking), revolutionist and propagandist who became the chief interpreter of the "thought of Mao Zedong" and was briefly one of the five most powerful leaders of modern China.

Born into a peasant family, Chen participated in his youth in the Northern Expedition (1926–27) that overthrew local warlords and united the mainland under a single government. He later studied at Sun Yat-sen University in Moscow for about four years. Upon his return to China in 1930, he taught at China College in Peking, using an alias. During this period he also worked as a Communist Party underground agent in North China. When war broke out between China and Japan in mid-1937, he went to the Chinese Communist headquarters at Yen-an in northwest China, to teach in party schools and work in the propaganda department.

During the war years he served as a political secretary to Mao Zedong and began writing major political tracts. In 1951, with the publication of his essay "Mao Zedong's Theory of the Chinese Revolution Is the Combination of Marxism-Leninism with the Chinese Revolution" and his book *Mao Zedong on the Chinese Revolution,* he established his claim as the interpreter of Mao's thought. Many of the important articles in the *Renmin ribao* ("People's Daily"), the organ of the Central

Committee, were drafted by him. In 1958 he became editor of the party's major journal, *Hung qi* ("Red Flag").

Although not usually associated with foreign affairs, Chen accompanied Mao to Moscow to participate in negotiations that led to the signing of the 30-year treaty of alliance (February 1950) between China and the U.S.S.R. He became a full member of the Politburo in 1965 and soon established himself as one of the major participants in and beneficiaries of the Cultural Revolution (1966–76). He was given a position on the ruling organ of the Politburo, the five-member standing committee. Early in 1971, however, during the reaction against excesses of the Cultural Revolution, he was removed from the Politburo and disappeared. Chen reappeared in November 1980 to be tried, along with Mao's widow, Jiang Qing, and eight others, for alleged crimes stemming from those excesses; he was sentenced in 1981 to 18 years in prison but was reported to have been released a short while later for reasons of health.

Chen-chiang, Pinyin ZHENJIANG, conventional CHIN-KIANG, formerly (1912–18) TAN-T'U, city and port in southern Kiangsu *sheng* (province), China, situated on the southern bank of the Yangtze River. It was capital of the province in 1928–49.

Chen-chiang was the seat of feudal domains from the 8th century BC onward, having been known first as Chu-fang-i and later as K'u-yang-i. After the Ch'in conquest in 221 BC, it became a county and was given the name Tan-t'u. It first became the seat of a higher administrative division during the middle of the 3rd century BC. On the conquest of southern China by the Sui in AD 581, it was made a garrison, commanding the entrance to the Yangtze River; and in 595 it became a full prefecture named Jun. After 780 it was the seat of a military governor, whose army was called Chen-hai. At this time, because it was the place where the Chiang-nan Canal (which in turn was connected to the Grand Canal) joined the Yangtze, its importance was greatly increased. It became the chief collecting centre for tax grain from the rich Yangtze Delta region; the grain was then shipped across the Yangtze and north via the Grand Canal. Under the early Sung dynasty (960–1127) it remained of strategic importance and in 975 became the military prefecture (*chün*) of Chen-chiang. In 1113 it was raised to the status of a *fu* (superior prefecture), Chen-chiang. It retained this name until 1912, when it became a county under its historic name of Tan-t'u; in 1918, however, the county was renamed Chen-chiang. In 1861 the port was opened to foreign trade as a result of the treaties of Tientsin. The old walled city expanded rapidly in the late 19th and early 20th centuries, but the city's traditional role as a port on the Grand Canal declined after the northern section of the canal went out of use in the 1850s and was replaced by sea transport. The port of Chen-chiang itself suffered badly from silting, and in the 20th century the entrance to the Chiang-nan Canal became seriously obstructed.

The city was the scene of fighting with the British in 1842 during the Opium War (1839–42) and suffered greatly during the Taiping Rebellion (1850–64). Having been occupied by rebels in 1853, it played a vital role in their defense of their capital at Nanking (Nanching) and became the centre of fierce battles, particularly in 1857–58.

In spite of these setbacks, Chen-chiang has remained important; it ranks high among China's ports, almost all of its trade being domestic. In addition to being connected with a dense canal and waterway system, it has been linked with Nanking and Shanghai by rail since 1908; since 1928 it has also been linked with a road network constructed after it became the provincial capital. Its trade is based not only on the area south of the river but also on the northern part of Kiangsu. Many wholesale firms in the city provide raw materials and manufactured goods to northern Kiangsu and Anhwei and collect grain, cotton, and oils from the region for transshipment to Shanghai. It has become a centre of the lumber industry, where the huge log rafts floated down the Yangtze are broken up and shipped on to the consumers in the river delta and northern Kiangsu. Chen-chiang's other industries are almost all concerned with food processing. Its large flour mills use grain from northern Kiangsu and export flour as far as China's Northeast. There are also oil-extraction and rice-polishing plants and a large paper pulp factory. Its industrial production, however, is relatively insignificant.

In spite of the damage suffered in the 19th century, Chen-chiang has many well-known temples and other relics; important archaeological finds have also been made in the area. Pop. (1988 est.) 339,000.

Ch'en Chiung-ming, Pinyin CHEN JIONG-MING (b. Jan. 13, 1875, Haifeng, Kwangtung province, China—d. Sept. 22, 1933, Hong Kong), Chinese military leader whose support allowed Sun Yat-sen to establish in Canton (1920) the revolutionary government that later spawned both the Chinese Nationalist and the Chinese Communist movements.

Originally a Nationalist revolutionary, Ch'en by 1918 had become the military leader of southern Fukien and eastern Kwangtung provinces. Occupying Canton in 1920, he took over the governorship of Kwangtung province and established Sun Yat-sen in Canton with the office of president extraordinary. Ch'en thereupon proceeded to expand his power into all of Kwangsi province, but when Sun, who was anxious to unify the country, ordered Ch'en to advance into central China, he refused and instead attacked Canton, temporarily ousting Sun. Ch'en was driven out of the city later that year, and in 1925 his forces were demolished by the Nationalist forces of Chiang Kai-shek.

Chen Duxiu, Wade-Giles romanization CH'EN TU-HSIU, original name (Wade-Giles) CH'EN CH'IEN-SHENG (b. Oct. 8, 1879, Huaining county, Anhwei province, China—d. May 27, 1942, Chiang-ching, near Chunking), a founder of the Chinese Communist Party (1920) and a major leader in developing the cultural basis of revolution in China. He was removed from his position of leadership in 1927 and was expelled from the Communist Party in 1929.

Education and early career. Chen was born to a wealthy family. His father, who had passed the first degree in the civil service examination and served as an official in the military office in Manchuria, died when Chen was a few months old. The youngest of four children, Chen was brought up by his mother and educated in the Chinese Classics and traditional literature in turn by his grandfather, several private tutors, and, finally, by his brother. In 1896 Chen passed the first civil service examination summa cum laude in Huai-ning and the next year passed the second in Nanking. His experience in the examinations, however, convinced him of the irrelevance of the traditional educational and governmental systems in the 20th century and prompted him to become a social and political reformer. Consequently, he entered the renowned Ch'iu-shih ("Truth-Seeking") Academy in Hangchou, where he studied French, English, and naval architecture.

In 1901, at the age of 22, Chen, after delivering speeches against the Manchu regime in the capital of his home province, fled to Nanking. He went to Japan the next year for study, enrolling at the Tokyo Higher Normal School. Upon his return to China in 1903 he assisted friends in establishing the subversive *Kuo-min jih-jih pao* ("National Daily News") in Shanghai, which was quickly suppressed by the authorities. He then went back to Anhwei in 1904, where he established a periodical to promote the use of the vernacular in writing. In 1906 Chen again went to Japan and studied at Waseda University in Tokyo but returned to Anhwei in the same year to teach at a high school and establish another vernacular periodical in Wu-hu. During his stay in Japan, Chen refused to join the revolutionary party led by Sun Yat-sen because he did not wish to accept nationalism, which was one of its tenets. According to some reports, in the following year Chen went to study in France and became an enthusiastic admirer of French culture. Upon his return to China in 1910 he visited Manchuria for a short time before teaching at the Army Elementary School in Hang-chou. After the overthrow of the Manchu monarchy and the establishment of the republic in 1911, Chen became secretary general to the military governor of Anhwei province and, concurrently, dean of the provincial higher normal school. After taking part in the unsuccessful second revolution against President Yüan Shih-k'ai in 1913, he fled to Japan, where he helped to edit *Chia-yin tsa-chih* ("The Tiger"), a liberal Chinese magazine calling for political reforms.

Role in the intellectual revolution. The period of Chen's greatest influence on Chinese thought and politics began on his return to China in 1915, when he established the monthly *Ch'ing-nien tsa-chih* ("Youth Magazine") in Shanghai, later renamed *Hsin ch'ing-nien* ("New Youth"). In its pages he proposed that the youth of China undertake a vast intellectual, literary, and cultural revolution to rejuvenate the nation. Many of the young writers who contributed to the monthly—among them Hu Shih, a liberal promoter of the vernacular literature, Lu Hsün, a leading short-story writer and essayist, Li Dazhao, Chen's chief collaborator in the Chinese Communist Party, and Mao Zedong—were later to become important intellectual and political leaders.

Between 1916 and 1927, in the absence of a strong central power, numerous warlords arose in most parts of the country, and their armed quarrels all but rent China. Chen's revolutionary mission thus assumed even greater importance; when, in 1917, he was appointed dean of the School of Letters at the Peking National University, he took care to gather around him many liberal and progressive professors and students. With their help, he established the short-lived radical *Mei-chou p'ing-lun* ("Weekly Critic") in December 1918. Their "new thought" and "new literature" dominated the May Fourth Movement, named after the date of the massive student protests in 1919 against the Chinese government's weak policy toward Japan and the Shantung resolution of the Versailles Peace Conference, which was going to transfer German rights in China to the Japanese. Because of his prominent role in the movement, however, Chen was forced to resign his post and was imprisoned for three months, from June to September 1919.

Foundation of the Chinese Communist Party. The Russian Revolution of 1917 impressed Chen as a way of modernizing an underdeveloped country, and shortly after his release he was converted to Marxism in Shanghai. There, in May 1920, with a handful of followers, Chen founded the Chinese Communist Party, of which he was elected secretary general. (The founding date was officially set later as July 1921 by the present party leadership.) He remained in that post as the party's undisputed leader for seven years, often regarded as "China's Lenin." In December 1920, in an

effort to promote his Communist views, Chen accepted the invitation of the rebel military governor of Kwangtung to become head of the education board of the provincial government in Canton. In the fall of 1922, Chen established the influential *Hsiang-tao choupao* ("Guide Weekly") as a successor to the "New Youth," which he had converted into a Communist organ two years earlier. After his attendance at the Fourth Congress of the Comintern (the international organization of Communist parties) in Moscow in November–December 1922, Chen reluctantly carried out the order of the Comintern to head his party's collaboration with the Kuomintang (the Nationalist Party founded by Sun Yat-sen); he was elected to that party's Central Committee in January 1924. A year later, when the right wing of the Kuomintang launched its attack on the Communists, Chen repeatedly proposed to withdraw en masse from the Nationalist Party but was overruled by the Comintern. After the collaboration collapsed in 1927, the Comintern blamed Chen for the failure of the alliance with the Kuomintang and had him removed from his position of leadership. In November 1929 he was expelled from the party. For several years, with the support of the Chinese Trotskyists and other Communist dissenters, he tried to regain influence in the party but failed.

On Oct. 15, 1932, Chen was arrested by the foreign administration of Shanghai, where he had been residing since 1927. Extradited to Nanking, he was tried and in 1933 sentenced to 15 years in prison by the Nationalist government. After the outbreak of the Sino-Japanese War, he was released on parole in August 1937. Chen moved from place to place until the end of 1938, when he arrived in the wartime capital, Chungking, where he taught for a while in a junior high school. In poor health and with few friends, he retired to Chiang-ching, a small town west of Chungking, where he died.

A fearless protester, Chen rejected China's traditional values and saw Marxism as a means to achieve a "mass democracy" with the broad labouring masses as its base. He recognized, however, the significant role played by the bourgeoisie in the Chinese revolution that he hoped to achieve. During the last years of his life, Chen, still a Socialist, denounced Stalin's dictatorship and defended such democratic institutions as an independent, nonpartisan judiciary, opposition parties, the free press, and free elections. (T.-t.C.)

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Ch'en Hung-shou, Pinyin CHEN HONGSHOU (b. 1598, Chu-chi, Chekiang Province, China—d. 1652), Chinese artist noted for his curious paintings of ancient personalities that are masterfully executed and suggest the disquiet of the artist caught between the decline of the Ming dynasty and the conquest of the foreign Manchus who established the Ch'ing dynasty.

Ch'en Hung-shou's father died when the boy was nine, but his uncle ensured his scholarly education. After twice failing the government examinations, he achieved official status in 1645, only to have to flee before the advancing Manchus. He became a Buddhist monk in 1646 but was torn between the conflicting ideals of Confucian government service and Buddhist retirement. His paintings suggest something of those tensions in dealing with ancient subjects and figure styles; indeed, Ch'en Hung-shou gave a brief but vigorous new life and dignity to the art of figure painting that had been in limbo since the Sung dynasty (960–1279). He sought the quality of his figure subjects rather than their absolute likeness. His highly finished paintings combine elegant line with decorative colour, and his figures have attenuated faces and exaggerated, curvilinear drapery—lending both an allusive and an illusive air to his art.

Ch'en I (Chinese Communist leader): *see* Chen Yi.

chen-jen (Chinese: "realized man"), in Taoism, a god or deified mortal; the term has been the official title of the head of the Cheng-i Taoist sect since the late 13th century.

The Taoist sage Chuang-tzu used the term *chen-jen,* along with *shen-jen* ("spiritualized man"), *chih-jen* ("perfected man"), and *sheng-jen* ("sage"), to refer to the Taoist ideal man who had achieved immortality and was immune to earthly desires and dangers. The term *hsien* ("immortal") was used by other philosophers somewhat synonymously.

Chen Jiongming (Chinese military leader): *see* Ch'en Chiung-Ming.

Ch'en Po-ta (Chinese Communist leader): *see* Chen Boda.

Ch'en Ssu Wang (Chinese poet): *see* Ts'ao Chih.

Chen Tsung, Pinyin ZHEN ZONG (temple name), personal name CHAO HENG (b. 968, China—d. 1022, China), third emperor (reigned 997/998–1022/23) of the Sung dynasty, who strengthened Confucianism and concluded a peace treaty with the nomadic Khitan tribes to the north that ended several decades of warfare. As a result of the Treaty of Shan-yüan (1004), the Sung agreed to the permanent loss of the northern territory between China and the Great Wall.

Claiming divine revelation, Chen Tsung created a series of new cults, which resulted in fusion of the rival Buddhist and Taoist religions. He also increased the influence of Confucianism, decreeing in 1011 that temples to Confucius were to be built in all district cities. These reforms strengthened the legitimacy of the Emperor in the eyes of the people. Toward the end of his reign, however, Chen Tsung became insane and his empress assumed power.

Ch'en Tu-hsiu (Chinese Communist leader): *see* Chen Duxiu.

Chen Yi, Wade-Giles romanization CH'EN I (b. 1901, Lo-chih, Szechwan Province, China—d. Jan. 6, 1972, Peking), one of the outstanding Chinese Communist military commanders of the 1930s and '40s. He was a party leader and served as foreign minister from 1958 to 1966.

Chen Yi studied and worked in France from 1919 to 1921 under a worker-student program sponsored by the Chinese government. Upon his return to China he continued his political activities. In 1928 he joined the newly formed 4th Red Army of Mao Zedong and Zhu De (founder of the Chinese Communist Army). Unlike most Communist leaders, Chen did not participate in the Long March (1934–35), in which the Communists were forced to transfer their base of power from south central to northwest China. Rather, he remained behind to keep alive the guerrilla movement in the south. When war broke out with Japan in mid-1937, his troops were incorporated into the New 4th Army, the major Communist force in central China, which fought throughout the war in the lower Yangtze River valley. In 1941 Chen became acting commander and then in 1946 commander of the New 4th Army.

After the Communist takeover in 1949, Chen Yi became mayor of Shanghai and a major figure in eastern China. He was made a member of the ruling Politburo in 1956 and succeeded Zhou Enlai as foreign minister in 1958. Bitterly attacked during the Cultural Revolution (1966), Chen Yi was dropped from the Politburo at the Ninth Party Congress in 1969 and stripped of all his offices.

Chenāb River, river in northwestern India and eastern Pakistan, formed by the confluence of two streams (Chandra and Bhaga) in the Punjab Himalayas in India's Himāchal Pradesh state. It flows west through Jammu and Kashmir, between the steep cliffs of the Siwālik Hills and the Lesser Himalayas, then southwest into Pakistan to its junction with the Sutlej, a tributary of the Indus. It is about 605 miles (974 km) long and feeds several irrigation canals.

Chenchu, people of southern India, numbering about 24,000, residing in the state of Andhra Pradesh. They speak variants of Telugu, the Dravidian language of the region. Their round houses of wattle and thatch are not unlike those used by other people of the region. Some of the Chenchu gain their food by hunting and by collecting the edible products of the jungle, particularly tubers; their tools are the bow and arrow, a metal-tipped digging stick, an ax, and a simple knife. These Chenchu are among the aboriginal peoples of India who are most removed from the dominant Hindu civilization. Their rituals are few and simple; religious and political specializations are slight. Small conjugal families predominate, women taking equal rank with men and marrying only upon maturity.

Most Chenchu, however, have been pressed by the expanding peasantry into agricultural and forest labour and out of their wandering, food-gathering life. Most have adopted Hindu gods and customs and have been accorded a relatively high caste status.

Cheney, Charles Edward (b. Feb. 12, 1836, Canandaigua, N.Y., U.S.—d. Nov. 15, 1916, Chicago), controversial American clergyman who helped found the Reformed Episcopal Church.

Cheney became rector of Christ Church, Chicago, in 1860, the year he was ordained a priest in the Protestant Episcopal Church. A pronounced evangelical, he joined others in signing the "Chicago Protest" against "unprotestantizing" tendencies in the church, issued on Feb. 18, 1869. Brought to trial before an ecclesiastical court for omitting the word "regeneration" from the baptismal office of the Book of Common Prayer, he was convicted and suspended. After a second trial he was deposed for continuing to officiate when under suspension, but a civil court overruled the deposition. His parish followed him when he united with the Reformed Episcopal Church on its organization in 1873. Elected missionary bishop of the Northwest, he was consecrated in December 1873; in 1878 his title was changed to bishop of the synod of Chicago. He continued to serve as rector of Christ Church and as bishop until his death.

cheng, also called TRANH, musical instrument, a Chinese board zither with 13 to 16 strings and having movable bridges; it originated in the 3rd century BC. Present-day strings are metal, although they were probably silk in ancient times. This short zither can still be heard in surviving courtly solo and chamber music in Vietnam, where it is known as a *tranh.* The Chinese form has enjoyed some revival in Taiwan, where many new pieces are written for it. The Chinese character for the *cheng* is the same as that for the Japanese koto zither, although the latter is a much bigger instrument.

Cheng Chen-to, Pinyin ZHENG ZHENDUO (b. 1898, Foochow, Fukien Province, China—d.

Oct. 17, 1958, en route from China to Afghanistan), literary historian who studied and collected examples of Chinese vernacular literature and was instrumental in promoting the "new literature" of 20th-century China.

After studying in his native Fukien Province, where he began writing short stories and verse as a youth, Cheng Chen-to went to Shanghai and then to Peking to further his education. In Peking he became involved in the movement for literary reform and began what was to become his life-long study of vernacular Chinese literature.

With other young writers Cheng Chen-to helped to change the established *Hsiao-shuo yüeh-pao* ("Short-Story Magazine") from a staid publication devoted to old-style Chinese literature into a stimulating journal of the new literature, including poetry, essays, and translations, as well as short stories, the most popular literary genre in China in the 1920s. The magazine served as the organ of the Literary Research Society, committed to social realism in literature, to the introduction of foreign literature into China, and to the creation of a new Chinese literature. Cheng Chen-to was made Peking editor of the magazine upon its reorganization in 1920, and became chief editor in 1926, also contributing essays and translations, but little fiction.

In 1927 he travelled to Europe, spending most of his time in the libraries of Paris and London in pursuit of information on his favourite subject, Chinese vernacular literature. On his return to China he continued editing and writing and published in 1932 his first major work on the history of Chinese vernacular literature, followed by three volumes of general and critical essays and an outline of Russian literature.

During the Sino-Japanese War (1937–45), Cheng Chen-to roamed the streets of Shanghai in search of the many literary treasures that private owners were forced to sell. After the war Cheng Chen-to headed institutes in the Ministry of Culture and worked to promote international cultural cooperation; he was killed in 1958 when the aircraft carrying his Chinese cultural delegation crashed en route to Afghanistan.

Cheng Ch'eng-kung, Pinyin ZHENG CHENGGONG, Western name KOXINGA, or COXINGA (b. Aug. 28, 1624, Hirado, Japan—d. June 23, 1662, Taiwan), pirate leader of Ming forces against the Manchu conquerors of China, best known for establishing Chinese control over Taiwan.

Cheng Ch'eng-kung was born in a small Japanese coastal town to a Japanese mother and a Chinese father, Cheng Chih-lung, a maritime adventurer who made a fortune through trade and piracy in the Taiwan Straits. Cheng Ch'eng-kung was raised by his mother in Japan until the age of seven, when his father, having been given an official position in maritime defense by the Ming dynasty, recalled him to the ancestral home in southern Fukien. There, separated from his mother, Cheng was given the conventional scholarly Confucian education, entering the Imperial Academy of Learning at Nanking in 1644.

With the fall of the southern capital to the invading Manchus the next year, young Cheng retired with his father to Fukien, where Cheng Chih-lung's military power was the basis for setting up the Prince of T'ang as pretender to the Ming throne. It was at this juncture that, as a sign of special favour, the Ming Prince conferred the imperial surname, Chu, upon the youthful Cheng Ch'eng-kung. Thus originated his most commonly used title, Lord of the Imperial Surname—in Chinese Kuo Hsing Yeh, corrupted by the Dutch into Koxinga.

When Manchu forces entered Fukien, his father succumbed to their offers of preferment under the new Ch'ing dynasty (the dynastic name of the Manchus) and abandoned the fragile Ming court at Foochow. The Prince of Tang was captured and killed; but Cheng Ch'eng-kung, resisting his father's orders to abandon a lost cause, vowed to restore the Ming dynasty and began to build up land and naval forces for that purpose.

Over the next 12 years the Manchu's preoccupation with larger Ming remnants in the southwest, plus Cheng's considerable strategic and organizational talents, allowed Cheng to build a strong position on the Fukien coast, centred on the islands of Amoy and Quemoy. Although this region was in effect his personal kingdom, he continued to use Ming reign titles and to acknowledge the suzerainty of the last Ming pretender—the Prince of Kuei in southwestern China. He also consistently refused blandishments of rank and power from the Manchus, even those supported by personal entreaties from his father.

In 1659 Cheng launched his most ambitious military campaign, a maritime expedition with more than 100,000 troops up the Yangtze River. With large Manchu forces still campaigning in the south, he achieved remarkable initial success, smashing through the lower Yangtze defenses to the gates of Nanking. There, however, mistaken strategy and failure to heed his field commanders' advice led to a disastrous defeat.

Forced back to his original base of Amoy, Cheng was still unbeatable at sea; but the collapse of Ming resistance in the southwest and the Ch'ing's new policy of forced inland emigration of the coastal population put him in a dangerous position. In these circumstances he hit upon the plan of taking Taiwan from the Dutch as a secure rear base area.

In April of 1661 he landed on Taiwan near the main Dutch stronghold at Anping (near the present-day city of Tainan) with a force of more than 25,000 men. After a nine-month siege, the small Dutch garrison capitulated and were allowed to leave Tainan safely with their personal possessions. Cheng followed this military success by setting up an effective civil administration based on Tainan and settling the island with his soldiers and with refugees brought from Fukien. His larger ambitions on the mainland and half-formed plans for ousting the Spaniards from the Philippines, however, were cut short by his premature death on June 23, 1662.

His son, Cheng Ching, used the Taiwan base to sustain the anti-Manchu struggle for another 20 years. But after his death in 1681, the Cheng kingdom on Taiwan fell to a Ch'ing invasion fleet in 1683. This defeat ended the longest lived of the Ming restorationist movements.

Thus Cheng's plans ultimately failed, but his posthumous reputation has grown to remarkable proportions. In Japan the famous 18th-century playwright Chikamatsu's *Battles of Koxinga* made Cheng as well known to Japanese audiences as Othello is to the English. In Europe, lurid Dutch accounts of the fall of Formosa (Taiwan) established Cheng as one of the few Chinese historical figures to bear a latinized name. In his own country he soon became a popular deity and cultural hero to the early Chinese settlers of Taiwan—Kai Shan Sheng Wang, the Sage King Who Settled the Country. On the official level, in 1875 the Ch'ing court recognized its old antagonist as a paragon of loyalty and established an official temple to him on Taiwan.

The development of modern Chinese nationalism in the 20th century has put Cheng Ch'eng-kung in the front ranks of China's historical heroes. To the anti-Manchu revolutionaries of the early 1900s he was a natural forebear. To Republican-period nationalists he was a symbol of resistance against foreign invaders. And in mid-century he continued to receive the accolade of "national hero" from both Chinese governments—from the Nationalists on Taiwan for his determination to restore proper Chinese rule and from the Communists on the mainland mainly for his great victory over Western (Dutch) imperialism.

In his own day a martyr to a lost cause, Cheng Ch'eng-kung became a hero to all sides in modern Chinese politics, although to each for a different reason. (R.C.C.)

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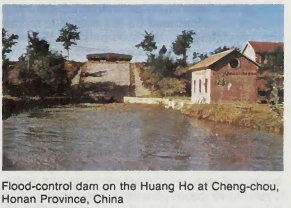
Cheng Ch'iao, Pinyin ZHENG QIAO (b. 1108, P'u-t'ien, Fukien Province, China—d. 1166, P'u-t'ien), great historian of the Sung period (960–1279). He wrote the *T'ung chih* ("General Treatises"), a famous institutional history of China from its beginnings down through the T'ang dynasty (618–907). In this work he discussed subjects such as philology, phonetics, and the development of families and clans, none of which had been systematically explored before. Cheng's method and style served as a model for many later historians.

Cheng Chih-lung, Pinyin ZHENG ZHILONG (b. 1604, Nan-an, Fukien Province, China—d. Nov. 24, 1661, Peking), Chinese pirate leader who achieved great power in the transitional period between the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties.

As a boy, Cheng found employment with the Europeans in the Portuguese settlement at Macau, where he was baptized and given the Christian name of Nicholas Gaspard. After leaving Macau, he joined a pirate band that preyed on Dutch and Chinese trade. In 1628 he was induced by the government to help defend the coast against both the Dutch and the pirates. He soon acquired great wealth and power.

When the capital of the Ming dynasty at Peking was captured in 1644 by the Manchu tribes of Manchuria who founded the Ch'ing dynasty, Cheng set up the Prince of T'ang, or Chu Yü-chien, in Fukien Province in South China as the claimant to the Ming throne. Two years later, when the Manchu army achieved a sweeping victory in central China, Cheng again changed sides and was given titles and high office by the Ch'ing government. But Cheng's son, Cheng Ch'eng-kung (also known as Koxinga), the famous pirate leader who controlled the island of Formosa (Taiwan), refused to surrender to Ch'ing forces. As a result Cheng was imprisoned and stripped of all rank in 1655. He was executed in 1661 for his son's stubborn refusal to surrender.

Cheng-chou, formerly (1913–49) CHENGHSIEN, Pinyin ZHENGZHOU, or CHENGXIAN, city in central Honan Province (*sheng*), China. The provincial capital of Honan since 1954, Cheng-chou forms a prefecture-level municipality (*shih*). It is situated to the south of the Huang Ho (Yellow River) where its valley



Flood-control dam on the Huang Ho at Cheng-chou, Honan Province, China
Paolo Koch—Rapho/Photo Researchers

broadens into the great plain and at the eastern extremity of the Hsiung-erh Shan (mountains). Cheng-chou is at the crossing point of the north–south route skirting the T'ai-hang Shan and the mountains of western Honan and the east–west route along the southern bank of the Huang Ho.

Since 1950 archaeological finds have shown that there were Neolithic settlements in the area and that the Shang Bronze Age culture, which flourished there from about 1500 BC, was centred on a walled city. Outside this city, in addition to remains of large public buildings, a complex of small settlements has been discovered. The site is generally identified with the Shang capital of Ao. The Shang, who continually moved their capital, left Ao, perhaps in the 13th century BC. The site, nevertheless, remained occupied; Chou (post-1050 BC) tombs have also been discovered. Traditionally it is held that in the Western Chou period (1111–771 BC) it became the fief of a family named Kuan. From this derives the name borne by the county (*hsien*) since the late 6th century BC—Kuan-ch'eng (City of the Kuan). The city first became the seat of a prefectural administration in AD 587, when it was named Kuan-chou. In 605 it was first called Cheng-chou—a name by which it has been known virtually ever since. It achieved its greatest importance under the Sui (AD 581–618), T'ang (618–907), and early Sung (960–1127) dynasties, when it was the terminus of the New Pien Canal, which joined the Huang Ho to the northwest. There, at a place called Ho-yin, a vast granary complex was established to supply the capitals at Lo-yang and Ch'ang-an to the west and the frontier armies to the north. In the Sung period, however, the transfer of the capital eastward to K'ai-feng robbed Cheng-chou of much of its importance.

In 1903 the Peking–Han-k'ou railway arrived at Cheng-chou, and in 1909 the first stage of the Lung-hai Railway gave it an east–west link to K'ai-feng and Lo-yang; it later was extended eastward to the coast at Lien-yün-kang, Kiangsu Province, and westward to Sian (Ch'ang-an), Shensi Province, as well as to western Shensi. Cheng-chou thus became a major rail junction and a regional centre for cotton, grain, peanuts (groundnuts), and other agricultural produce. Early in 1923 a workers' strike began in Cheng-chou and spread along the rail line before it was suppressed; a 14-story double tower in the centre of the city commemorates the strike. In 1938, during the war with Japan, the retreating Chinese Nationalist Army blew up the dikes retaining the Huang Ho about 20 mi (32 km) northeast of the town, flooding a vast area. At about the same time, in their drive to relocate industry in the interior far from the invading Japanese, the Chinese transferred all the local plants to the west.

When the Communist government came to power in 1949, Cheng-chou was a commercial and administrative centre, but it had virtually no industry. Because it was the centre of a densely peopled cotton-growing district, it was developed into an industrial city, with industry concentrated on the west side so that the prevailing northeast winds would blow fumes away from the city. There are cotton-textile plants, spinning mills, textile-machinery works, flour mills, tobacco and cigarette factories, and various food-processing plants; coal is mined nearby. Cheng-chou also has a locomotive and rolling-stock repair plant, a tractor-assembly plant, and a thermal generating station. The city's industrial growth has resulted in a large increase in population, largely of industrial workers from the north. Trees have been planted throughout the city's more than 23 sq km (60 sq mi) area, holding down the sand that formerly blew in thick gusts through the city. A water diversion project and pumping station, built in 1972, provides irrigation for the surrounding countryside. The city has an agricultural university. Pop. (1983 est.) 1,424,000.

Ch'eng Hao and Ch'eng I, Ch'eng I also spelled (Wade–Giles romanization) CH'ENG YI, Pinyin CHENG HAO and CHENG YI (respectively b. AD 1032, Honan, China—d. 1085, Honan; b. 1033, Honan—d. 1107, Honan), brothers who developed Neo-Confucianism into an organized school of philosophy. Although their philosophies are usually considered together, their ideas developed in divergent directions. Ch'eng Hao influenced the Idealist school of Neo-Confucianism, while Ch'eng I influenced the development of the Rationalist school. Ch'eng I's statement, "Principle is one but its manifestations are many," is as well known in China as Descartes' "I think, therefore I am" is in the West.

Ch'eng Hao was interested in both Buddhism and Taoism as a young man. Later he studied Confucianism, passed his civil service examinations, and attained high office; but because he opposed the radical reforms of the great innovator Wang An-shih (1021–86), he was dismissed from the government. He joined his brother in Honan, and a circle of disciples gathered around them.

After Ch'eng I passed his civil service examinations, he served briefly as Imperial tutor (1069–70), but his stern conception of morality soon alienated many of those around him and he resigned. For most of his life he declined high office. Nonetheless, he continued to criticize those in power. As a result, in 1097 his land was confiscated, his teachings barred, and he was banished to Fu-chou, in southwest China. Pardoned three years later, he was again censured in 1103. He was pardoned a second time, in 1106, shortly before his death. Because men feared to be associated with him, only four people attended his funeral.

The two brothers built their philosophies primarily on the concept of *li*—defined as the basic force, universal law, or truth underlying and governing all existence—an idea they brought to Neo-Confucianism from Buddhist and Taoist writings. While both agreed that exhaustive study of *li* is the best way to spiritual cultivation, Ch'eng Hao stressed calm introspection and taught that in his original state man was united with the universe. Ch'eng Hao's stress on meditation influenced the later Idealist school of Neo-Confucianism founded by Lu Hsiang-shan (1139–93) and Wang Yang-ming (1472–1529).

Unlike his brother, Ch'eng I—whose philosophy was originally called Tao Hsüeh (School of True Way) but came to be called Li Hsüeh (School of Universal Principles)—emphasized that the way to discover *li* is to investigate the myriad things of the universe in which *li* is present. Ch'eng I espoused many methods of investigation—induction, deduction, the study of history and other disciplines, and participation in human affairs. A decade after Ch'eng I's death Chu Hsi (1130–1200) began to expand Cheng I's ideas into what came to be called the Ch'eng–Chu (after its two most important exponents) Rationalist school of Chinese philosophy; it dominated official circles until the Republican Revolution of 1911.

Very little of the writings of the Ch'eng brothers is still extant. Collected fragments of their writings have been gathered in the *I shu* ("Surviving Works"), the *Wai shu* ("Additional Works"), and the *Ts'ui yen* ("Choice Words"). A more complete sample of Ch'eng Hao's writing is available in the *Ming-tao wen-chi* ("Collection of Literary Works of Ch'eng Hao"). The writings of Ch'eng I have been gathered in the *I-ch'uan wen-chi* ("Collection of Literary Works by Ch'eng I"), the *Ching-shuo* ("Explanation of the Classics," by Ch'eng I), and the *I chuan* ("Commentary on the Book of Changes"). All the extant writings of the two brothers were collected in the *Erh Ch'eng ch'üan-shu* ("Complete Works of the Two Ch'engs"), published in Chinese in 1606. A.C. Graham's *Two Chinese Philosophers: Ch'eng Ming-tao and Ch'eng Yi-ch'uan* appeared in 1958.

Cheng Hao and Cheng Yi (Neo-Confucianist philosophers): *see* Ch'eng Hao and Ch'eng I.

Cheng Ho, Pinyin ZHENG HE, original name (Wade–Giles romanization) MA SAN-PAO (b. *c.* 1371, K'unming, Yunnan Province, China—d. 1435, China), admiral and diplomat who helped to extend the Chinese maritime and commercial influence throughout the regions bordering the Indian Ocean.

Cheng Ho was the son of a *ḥājjī*, a Muslim who had made the pilgrimage to Mecca. His family claimed descent from an early Mongol governor of Yunnan and a descendant of King Muḥammad of Bukhara. The family name Ma was derived from the Chinese rendition of Muḥammad. In 1381, when he was about 10 years old, Yunnan, the last Mongol hold in China, was reconquered by Chinese forces led by generals of the newly established Ming dynasty. The young Ma Ho, as he was then known, was among the boys who were captured, castrated, and sent into the army as orderlies. By 1390, when these troops were placed under the command of the Prince of Yen, Ma Ho had distinguished himself as a junior officer, skilled in war and diplomacy; he also made influential friends at court.

In 1400 the Prince of Yen revolted against his nephew, the Chien-wen emperor, taking the throne in 1402. Under the Yung-lo administration (1402–24), the war-devastated economy of China was soon restored. The Ming court then sought to display its naval power to bring the maritime states of South and Southeast Asia in line.

For 300 years the Chinese had been extending their power out to sea. An extensive seaborne commerce developed to meet the taste of the Chinese for spices and aromatics and the need for raw industrial materials. Chinese travellers abroad, as well as Indian and Muslim visitors, widened the geographic horizon of the Chinese. Technological developments in shipbuilding and in the arts of seafaring reached new heights by the beginning of the Ming.

The Emperor having conferred on Ma Ho, who had become a court eunuch of great influence, the surname Cheng, he was henceforth known as Cheng Ho. Selected by the Emperor to be commander in chief of the missions to the "Western Oceans," he first set sail in 1405, commanding 62 ships and 27,800 men. The fleet visited Champa (now South Vietnam), Siam, Malacca, and Java; then through the Indian Ocean to Calicut, Cochin, and Ceylon (now Sri Lanka). Cheng Ho returned to China in 1407.

On his second voyage, in 1409, Cheng Ho encountered treachery from King Alagonakkara of Ceylon. He defeated his forces and took the King back to Nanking as a captive. In 1411 Cheng Ho set out on his third voyage. This time, going beyond the seaports of India, he sailed to Hormuz on the Persian Gulf. On his return he touched at Samudra, on the northern tip of Sumatra.

On his fourth voyage Cheng Ho left China in 1413. After stopping at the principal ports of Asia, he proceeded westward from India to Hormuz. A detachment of the fleet cruised southward down the Arabian coast, visiting Djofar and Aden. A Chinese mission visited Mecca and continued to Egypt. The fleet visited Brava and Malindi and almost reached the Mozambique Channel. On his return to China in 1415, Cheng Ho brought the envoys of more than 30 states of South and Southeast Asia to pay homage to the Chinese emperor.

During Cheng Ho's fifth voyage (1417–19), the Ming fleet revisited the Persian Gulf and the east coast of Africa. A sixth voyage was launched in 1421 to take home the foreign emissaries from China. Again he visited Southeast Asia, India, Arabia, and Africa. In 1424 the Yung-lo emperor died. In the shift of policy his successor, the Hung-hsi emperor, suspended naval expeditions abroad. Cheng Ho was appointed garrison commander in Nanking, with the task of disbanding his troops.

Cheng Ho's seventh voyage left China in the winter of 1431, visiting the states of Southeast Asia, the coast of India, the Persian Gulf, the Red Sea, and the east coast of Africa. He returned to China in the summer of 1433 and died in 1435.

Cheng Ho was the best known of the Yung-lo emperor's diplomatic agents. Although some historians see no achievement in the naval expeditions other than flattering the emperor's vanity, these missions did have the effect of extending China's political sway over maritime Asia for half a century. Admittedly, they did not, like similar voyages of European merchant-adventurers, lead to the establishment of trading empires. Yet, in their wake, Chinese emigration increased, resulting in Chinese colonization in Southeast Asia and the accompanying tributary trade, which lasted to the 19th century. (J.-p.L.)

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Cheng-hsien (China): *see* Cheng-chou.

Ch'eng Huang, Pinyin CHENG HUANG (Chinese: "Wall and Moat"), in Chinese mythology, the spiritual magistrate and guardian deity of Chinese cities. Because dead spirits reputedly informed the god of all good and evil deeds within his jurisdiction, it was popularly



Ch'eng Huang, bronze sculpture; in the Guimet Museum, Paris

By courtesy of the Musee Guimet, Paris

believed that devout prayers offered in Ch'eng Huang's temple would be liberally rewarded. The wide popularity of his cult was also due in part to imperial approbation. In 1382 his temples were appropriated by the government, and people were directed to offer sacrifices to the protector of their city.

Traditionally, before assuming a new post, local officials used to pass the night in Ch'eng Huang's temple seeking guidance. When difficult problems of law later presented themselves, officials returned to the temple, in hopes that Ch'eng Huang would reveal the answer in a dream.

When a death occurred, relatives or close friends of the deceased visited Ch'eng Huang's temple to report the fact so that records could be kept up to date. Once or twice a year the deity's figure was carried through the city streets on a tour of inspection. He was preceded by assistants, among whom were a tall figure in black (Hei Lao-yeh) and a short figure in white (Pai Lao-yeh) who watched over the city night and day.

T'ang dynasty (618–907) officials, wishing to enhance the prestige of Chinese gods, provided Ch'eng Huang, as well as other gods, with an ancient lineage. He was thus identified with Shui Jung (their names mean the same), one of the Eight Spirits to whom Emperor Yao is said to have offered sacrifice in prehistoric times. Actually, there is no mention of Ch'eng Huang in Chinese literature until the 6th century AD.

In practice, a Ch'eng Huang was often a deceased local official who had been deified because he served his community with distinction in bygone days. It was possible for a city to change the identity of its local Ch'eng Huang by simply forgetting the old god and welcoming a new protector to the existing temple with a joyous celebration.

Ch'eng I (Neo-Confucianist philosopher): *see* Ch'eng Hao and Ch'eng I.

Ch'eng-li Wang (Chinese emperor): *see* Ching-t'ai.

Ch'eng-shih (Buddhist philosophy): *see* Jōjitsu.

Ch'eng-t'ang (Chinese emperor): *see* T'ang.

Cheng-te, Pinyin ZHENGDE (reign name, or *nien-hao*), personal name (*hsing-ming*) CHU HOU-CHAO, posthumous name (*shih*) I-TI, temple name (*miao-hao*) MING WU-TSUNG (b. 1491, China—d. 1521, China), 10th emperor of the Ming dynasty (1368–1644), during whose reign eunuchs achieved such power within the government that subsequent rulers proved unable to dislodge them.

The Cheng-te emperor ascended the throne in 1505. Devoting himself entirely to pleasure-seeking, he relied on his eunuchs for information on the government. Corruption became rampant, public offices were bought and sold, and excessive taxes were levied on the people. Because the eunuchs who dominated the government were for the most part northerners, the southern provinces were without representation, and their situation was particularly bad. Rebellions were frequent there, and large numbers of people turned to banditry. Finally, in 1510, the Cheng-te emperor became aware of the corruption and ordered the execution of the chief eunuch, Liu Chin, whose house was found to be piled with rare jewels, gold, and silver.

But eunuchs still retained influential positions within the government, for the emperor refused to devote himself to statecraft. Instead, he delighted in traveling incognito throughout the country—on one occasion he was nearly captured in a Mongol raid—and spending his time learning exotic languages. He mastered Tibetan, Mongol, and Juchen and gave himself titles in these languages. Hundreds of officials who criticized his eccentric behaviour were tortured, killed, or demoted.

The young emperor drowned when his pleasure boat capsized. He was succeeded on the throne by his cousin, the Chia-ching emperor (reigned 1521–66/67).

Ch'eng-te, Pinyin CHENGDE, conventional JEHOL, city in northern Hopeh *sheng* (province), China. The city is situated in the mountains separating the North China Plain from the plateaus of Inner Mongolia, approximately 110 miles (180 km) northeast of Peking, on the Je Ho (Je River), a small tributary of the Luan River. The Je Ho ("Hot River"), so called because of the various hot springs that discharge into it above Ch'eng-te, gave its name to the city and to the province of which it was the capital.

Until comparatively recent times this area, some 43 miles (69 km) north of the Great Wall of China, was occupied by a succession of non-Chinese peoples. It first became a part of China proper under the Liao dynasty (907–1125), when it was the seat of Hsing-hua county in Pei-an prefecture. Under the 12th-century Juchen (Chin) dynasty, Hsing-hua county became part of Hsing-chou, the name of which was retained under the Mongols (1279–1368). With the fall of the Mongols, Chinese authority in the area beyond the Great Wall declined.

During the Wei dynasty (220–265/266), Ch'eng-te came under the control of the Hsing-chou Guard, but in the early 15th century it was abandoned by the Ming dynasty (1368–1644), coming under the control of the Chahar (Tsakhar), a Mongol tribe. The Mongols submitted to the Manchus in the late 1620s, but the region became the starting point for many of their incursions into China. In the early 1700s the Ch'ing emperor K'ang-hsi built a summer residence there, calling it Pi-shu-shan-chuang ("Mountain Estate for Escaping the Heat"). It became the usual practice for the Chinese emperor to leave Peking for Ch'eng-te every summer. At about this time the area around Ch'eng-te became one of the first intensively colonized and cultivated areas outside the Great Wall, and Ch'eng-te itself grew into a flourishing city, being given administrative status as a subprefecture, Je-ho Ting, in 1729, and as a prefecture, Ch'eng-te Chou, in 1733. Under the Ch'ing dynasty (1644–1911/12), Mongol vassal princes assembled annually for a great feast, and the emperor came to receive the visits of foreign envoys. The mission from Britain led by Earl Macartney was received there in 1793.

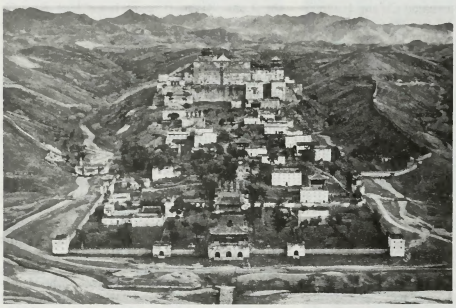
Apart from the palace buildings themselves, which occupied an enclosure some 5 miles (8 km) in circumference, there were also a number of splendid lamaseries (monasteries of Tibetan Buddhism) and many small temples and shrines constructed in the area; two of the largest were imitations of the Potala, the fortress-palace of the Dalai Lamas at Lhasa, Tibet, and of the Trashilhunpo monastery at Zhigatse, Tibet. The palace and monasteries are under government protection and have become major tourist attractions.

The city became the seat of the subprefecture of Je-ho in 1742 and a superior prefecture, Ch'eng-te Fu, in 1778, when the area was constituted a part of the province of Chihli, the former name for Hopeh. It was also the seat of a military vice governor after 1738 and of a military governor after 1810. After 1821 the summer visits of the court to Ch'eng-te were gradually discontinued. Late in the 19th century the ban on Chinese settlement in the Inner Mongolian border area was relaxed, and extensive Chinese colonization took place.

Under the republic in 1911, Ch'eng-te became a regular county and the surrounding area a special administrative district. In 1928 the Nationalist government established the new province of Jehol, with its capital at Ch'eng-te, and quartered the Cheng-kuei army there as a defense against Japanese expansion from Manchuria. In 1933 the Japanese army overran Jehol, and the area was incorporated into the Japanese-sponsored state of Manchukuo.

From 1933 to 1936 the Japanese built a railway linking Ch'eng-te with Chin-chou (Liaoning province) and with the Peking-Mukden (Shen-yang) line, with branches to Ch'ih-feng (Inner Mongolia) and to the coal mines at Pei-p'iao (Liaoning). After the Japanese conquest of northern China in 1937, a further line linked Ch'eng-te directly to Peking, via Mi-yün. The line to Mi-yün was later abandoned and replaced by another route, leaving Ch'eng-te on a spur line.

From 1949 Ch'eng-te grew steadily, and from the late 1950s it developed as a heavy-industry centre. There are coal and copper deposits to the south, while in the city itself there is a textile industry processing cotton and hemp. The city still retains an important role as a commercial and collecting centre. In 1956 Jehol province was abolished, and Ch'eng-te again became a part of Hopeh. Pop. (1990) 246,799.



Tibetan Buddhist lamasery in the area of Ch'eng-te, China
Harrison Forman

Consult the INDEX *first*

Ch'eng-te P'ing-yüan (China): *see* Jehol Uplands.

Ch'eng-ti (Chinese emperor): *see* Tao-kuang.

Cheng-ting, Pinyin ZHENGDING, town in western Hopeh *sheng* (province), China. The town has been strategically important throughout history, being situated on the edge of the North China Plain at the foot of the T'ai-hang Mountains and commanding the approaches to one of the principal routes from the plain into Shansi province.

The area was a part of the state of Chao during the Warring States period (475–221 BC), and a county town named Chen-ting was established there by the Han dynasty (206 BC–AD 220) in the 2nd century BC. It kept the name until 1723, when it was changed to Cheng-ting because the Chinese character *chen* was tabooed, being part of the emperor's name. From early Sung times (960–1127) the town was the seat of the Chen-ting superior prefecture, and until the 20th century it was a major administrative centre for western Hopeh. It was also an important route centre and trading town, benefiting from river transport to the coastal area via the Hu-t'o River and being also on the main post road from Peking through western Hopeh. In the 20th century, however, a minor market town to the south of the Hu-t'o River, Shih-chia-chuang, became an important rail junction and grew rapidly as a major trading centre and, from 1949, as a major industrial city. Thus Cheng-ting, an important trading town since T'ang (618–907) times, was rapidly eclipsed, and eventually Shih-chia-chuang took over its administrative function as well, leaving it as a minor satellite city.

Cheng-ting, however, retains many monuments and traces of its ancient importance. It has, in particular, many Buddhist monuments, because in Sui (581–618) and T'ang times it was a centre of Buddhism. The town was the seat of one of the late T'ang provincial governors who was a pious Buddhist, and in consequence the Buddhist foundations there were comparatively unscathed by the persecution of 843–845. Pop. (mid-1970s est.) 10,000–50,000.

Ch'eng-tu, Pinyin CHENGDU, city in central Szechwan *sheng* (province), China. Ch'eng-tu is the provincial capital. It is situated in the fertile Ch'eng-tu plain, the site of one of China's most ancient and successful irrigation systems, watered by the Min River.



Bamboo grove in the garden that surrounds the cottage of Tu Fu, T'ang poet, in Ch'eng-tu, Szechwan province, China
© Joan Lebold Cohen—Photo Researchers

First set up during the Ch'in dynasty (221–206 BC), the system diverted half the waters of the Min River eastward to irrigate the plain through a dense network of channels. This system has survived, basically in its original form, and enables the area to support what has been claimed to be the densest agrarian population anywhere in the world. In addition, Ch'eng-tu has always been an important communication centre, with waterways (the Yangtze River and its tributaries, the Min River and T'o River) extending throughout the Szechwan Basin and beyond. Overland communications extend north to Lan-chou in Kansu province, northeast to Sian (Ch'ang-an) in Shensi province, and southwestward and westward into Yunnan province and the Tibet autonomous region.

The city is said to have been founded by the Ch'in before they achieved control of all China during the 3rd century BC. Under their imperial regime (221–206 BC) the county of Ch'eng-tu was established; the name dates from that period. First under the Ch'in and then under the Han dynasty (206 BC–AD 220), it was the seat of the commandery of Shu, and in 221 it became capital of the independent dynasty of Shu. Under the T'ang dynasty (618–907) it was known as I-chou, one of the empire's greatest commercial cities. In the late 8th century it became a secondary capital. After 907 it again became capital of an independent regime—that of the Earlier Shu and Later Shu. In the 10th century it was immensely prosperous, and its merchants introduced the use of paper money, which rapidly spread throughout China under the Sung dynasties (960–1279).

In medieval times Ch'eng-tu was famous for its fine brocades and satins. The city was also notable for its refined culture and display of luxury. Throughout history it has remained a great city and a major administrative centre; since 1368 it has been capital of Szechwan. Ch'eng-tu developed rapidly during World War II, when many refugees from eastern China, fleeing the Japanese, settled there. The influx of Chinese to the city stimulated trade and commerce, and several universities and institutes of higher learning were also moved there.

From 1949 Ch'eng-tu's growth was rapid. Railways were built to Chungking (Szechwan) in 1952, to Pao-chi (Shensi) and extended to Sian (Shensi) in 1955, to K'un-ming (Yunnan) in the late 1950s, and via An-k'ang to Hsiang-fan (Hupeh) in 1978—making Ch'eng-tu the rail centre for all southeastern China. Highways were also built into the western plateau, into the Tibet autonomous region and Tsinghai, and into Yunnan and Kweichow provinces. Air services from Ch'eng-tu fly to and from all parts of the southwest.

The city is also a major industrial centre. In the 1950s a large thermal-generating station was built, and two important radio and electronics plants were installed by Soviet experts. A precision-tool and measuring-instrument plant was also established to serve the southwest. In addition, there are important engineering shops manufacturing railway equipment and power machinery. In the 1960s Ch'eng-tu became an important centre of China's aluminum industry. A chemical industry—producing fertilizers, industrial chemicals, and pharmaceutical products—was also developed. The city's oldest industry, textiles, remains important in the production not only of the traditional silks but also of cotton and woolen textiles.

Ch'eng-tu continues as a major cultural centre. In addition to Szechwan University (1905), there are two other universities; higher institutes of medicine, science, geology, and economics; normal colleges; a fine museum; and a variety of specialist technical schools, several connected with the radio and electronics industries. There is a minorities institute for the training of Tibetan students. Ch'eng-tu also has many historical monuments and buildings. Pop. (1990) 1,713,255.

Cheng-t'ung, Pinyin ZHENGTONG (reign title), personal name (Wade-Giles romaniza-

tion) CHU CH'I-CHEN, posthumous name (*shih*) JUI TI, temple name (MING) YING TSUNG, second reign title T'IEN-SHUN (b. 1427, Peking—d. 1464, Peking), sixth emperor of the Ming dynasty (1368–1644), whose court was dominated by eunuchs who weakened the dynasty by a disastrous war with Mongol tribes. In 1435 Chu Ch'i-chen ascended the throne and became known as the Cheng-t'ung emperor, with his mother, the Empress, as regent. He soon placed his confidence in the eunuch Wang Chen (died 1449), who came to dominate the government. By the time the Emperor came of age, Mongol power had revived under the leadership of Esen, a chief of the Oirat branch. In 1449 Wang mismanaged a campaign against the Oirats, refusing to listen to the advice of the officers and even sending the Emperor into battle at the head of the troops. As a result, the army was surrounded and the Emperor captured.

A new emperor ascended the throne, and Cheng-t'ung, no longer of value to the Mongols, was released after a year in captivity. He returned to China, where he lived in seclusion, but in 1457 when the new emperor fell ill, Cheng-t'ung was restored to the throne, reigning seven years until his death but remaining a puppet in the hands of his eunuchs. He was the first of the Ming emperors to will that his concubines not be sacrificed after his death.

Ch'eng Yi: *see* Ch'eng Hao and Ch'eng I.

Chengde (China): *see* Ch'eng-te.

Chengde Pingyuan (China): *see* Jehol Uplands.

Chengdu (China): *see* Ch'eng-tu.

Chengxian (China): *see* Cheng-chou.

chenier, beach ridge, usually composed of sand-sized material resting on clay or mud. Chenier is the Louisiana French term for the oak tree belts that mark the distribution of the ridges in the Mississippi Delta region. In that area there are several sets of cheniers, each separated from, and slightly unconformable to, the next. Some of the ridges have been reworked by waves, and several show a blanket of peat growth (indicating a regression of sea level) covered by marine sediments. The arrangement and composition of these cheniers are taken as evidence of a fluctuation in sea level and have been correlated in time with similar evidence in other areas of the world.

Chénier, André (-Marie) de (b. Oct. 30, 1762, Istanbul—d. July 25, 1794, Paris), poet and political journalist, generally considered the greatest French poet of the 18th century. His work was scarcely published until 25 years after his death. When the first collected edition of Chénier's poetry appeared in 1819, it had an immediate success and was acclaimed not only by the poets of the Romantic movement but also by the anti-Romantic liberal press. Not only was Chénier's influence felt on poetic trends throughout the 19th century but the legend of his political struggle and heroic death—celebrated in Chateaubriand's work *Le Génie du christianisme* (1802), Sainte-Beuve's *Joseph Delorme* (1829), Vigny's *Stello* (1832), and Umberto Giordano's opera *Andrea Chénier* (1896)—also made him a European symbol of the poet-hero.



André de Chénier, oil painting by François Thomise, 1784; in Béziers Museum, France

Giraudon—Art Resource/EB Inc.

His mother was Greek, and he always had a deep affection for Classical literature, in particular for elegiac poetry. He was educated in the progressive Collège de Navarre and, after an unsuccessful attempt at a military career in 1782–83, devoted himself for five years to study. In 1787 he reluctantly accepted a post in the French embassy in London. He was obsessed at that time by epic themes, notably a project for a poem on the New World, but he was psychologically inhibited from completing these works. His years in London were unhappy: he suffered from frustrated ambition and from self-doubt.

The Revolutionary upheavals in France in 1789 offered an opportunity to escape from this frustration. He returned to Paris and began to take an active part in political journalism, attacking the extremes both of monarchist reaction and of Revolutionary terror. Chénier was not a political innocent and realized the dangers of his position. At times he exposed himself unnecessarily, from the sense of moral integrity that is a fundamental theme of his work and perhaps also from an obscure hunger for self-destruction. In March 1794 he was arrested, imprisoned at Saint-Lazare, and, four months later, guillotined, a few days before the fall of the Revolutionary leader Maximilien Robespierre, an event that would have saved him.

Chénier's achievement was to have demonstrated how the qualities of the Greek lyrics could revitalize French poetry. In his works of the Revolutionary period, including poems that he smuggled out of prison in a laundry basket, he makes a passionate defense of ideals of liberty and justice: the *Iambes*, the last of which dates from very shortly before his execution, are a moving testimonial to the human spirit in the face of persecution.

Chénier, Marie-Joseph(-Blaise) de (b. April 28, 1764, Istanbul—d. Jan. 10, 1811, Paris), poet, dramatist, politician, and supporter of the French Revolution from its early stages.

The brother of the Romantic poet André de Chénier, Marie-Joseph attended the Collège de Navarre, then joined the regiment of Montmorency for two years. A member of the



M.-J. de Chénier, lithograph by François Le Villain, 19th century

J.P. Ziolo, Paris

Convention and the Council of Five Hundred, as well as the Committee of General Security and the Committee of Public Safety, he wrote patriotic songs and hymns such as the "Chant du départ" and the "Hymne à la liberté."

His tragedies, based on historical subjects, served as vehicles for his own political ideals. They include *Charles IX* (1789) and *Henri VIII* (1791). After his disapproval of the violence of the Reign of Terror was expressed in *Fénelon* (1793) and *Caius Gracchus* (1792), his tragedies were censored. He entered the Académie Française in 1803. *Épître sur la calomnie* (1797; "Treatise on Calumny") was an eloquent reply to the false accusations that he conspired to bring about his brother's death.

Chennault, Claire L(ee) (b. Sept. 6, 1890, Commerce, Texas, U.S.—d. July 27, 1958, New Orleans), U.S. brigadier general who commanded the U.S. Army Air Forces in China (1942–45) and created the American Volunteer Group (AVG), best known as the Flying Tigers.

After 20 years of service with the U.S. Army and Army Air Corps, during which he led a flying act known as "Three Men on a Flying Trapeze" and wrote an aviation textbook, *The Role of Defensive Pursuit* (1935), Chennault was retired because of increasing deafness. Following the Japanese invasion of China (1937), he became air adviser to Gen. Chiang Kai-shek and formed the Flying Tigers to combat Japanese air superiority. Achieving an outstanding combat record, the group was incorporated into the regular U.S. Army Air Forces and Chennault was recalled to active duty. He resigned in 1945, but he and his Chinese wife, Anna, remained strong supporters of Chiang.

Chenonceaux, village, Indre-et-Loire *département,* Centre region, central France, on the right bank of the Cher River. Chenonceaux



Château de Chenonceaux, bridging the Cher River, France

Ray Manley—Shostal/EB Inc.

is famous for its château, which bridges the Cher. Founded on the pilings of a mill in 1513 or 1515 by Thomas Bohier, financial minister in Normandy, the château was completed in 1522 and represents a type of architecture transitional between Gothic and Renaissance. An isolated tower flanking a drawbridge is part of an earlier building of the 15th century. The château was confiscated by Francis I in 1535. Henry II presented it to his mistress Diane de Poitiers, who on his death was forced by his queen, Catherine de Médicis, to exchange it for Chaumont-sur-Loire. Catherine built the gallery that leads to the left bank of the Cher. *Son et lumière* (French: "sound and light") displays, using varicoloured lights and historical sound track, are now produced at the chateau. Chenonceaux was extensively restored in the 19th century. The village was occupied by the Germans and slightly damaged in World War II. Pop. (1982) 358.

Cheops (ancient Egyptian king): *see* Khufu.

Chephren (ancient Egyptian king): *see* Khafre.

Chepstow, Welsh CAS-GWENT, market town and historic fortress, Monmouth district, Gwent county, Wales, on the west bank of the

River Wye near its confluence with the River Severn. Situated at a strategic point in the Wye valley, Chepstow was a site of fortifications in prehistoric, Roman, and Saxon times. These efforts culminated in the great 12th-century Norman castle that was constructed on a spur of rock overlooking the river and the old Roman road to South Wales. The town grew up around the castle during the 14th and 15th centuries and was granted a charter in 1524. Parts of the ancient town walls are still visible, and the impressive 16th-century town gate houses a small museum.

Chepstow was active as a port until the 19th century, when larger vessels were handicapped by the shallow draft and narrowness of the channel. The town's economy now rests mainly on agriculture and engineering. Tintern Abbey, Cistercian abbey ruins, made famous by the English poet William Wordsworth, lies 4 miles (6 km) north. Pop. (1981) 9,233.

cheque: *see* check.

Chequers, formally CHEQUERS COURT, country house, county of Buckinghamshire, England, situated 30 miles (50 km) northwest of London, the official country residence of the prime ministers of Great Britain. The estate is about 1,500 acres (600 hectares) in extent. Chequers owes much of its present character to the remodeling, in 1565, of its predecessor. In the 19th century the exterior was plastered and the interior redecorated in neo-Gothic style. In 1917 Viscount Lee of Fareham made provision, with parliamentary approval, for the house to become a weekend retreat and place for prime ministers to entertain guests. Since 1921, when David Lloyd George became the first prime minister occupant, his successors have usually spent time there during their terms of office, and ministerial weekends at Chequers have become a part of British political life.

Cher, *département,* Centre *région,* central France. It was created from the eastern part of the historical province of Berry and from small parts of the provinces of Bourbonnais and Nivernais. It comprises wooded and agricultural land and is bordered on the east by the Allier and Loire rivers. The Cher River flows in a northwesterly direction to the west of the departmental capital, the ancient cathedral city of Bourges.

There is some timber cutting in the woodlands to the north and west. Widespread agriculture in the *département* includes wheat farming, cattle raising, beekeeping, and viticulture, particularly in vineyards around the historic village of Sancerre, situated on a spur above the Loire River. Cher's industry, which includes metalworks, aircraft construction, and the manufacture of agricultural machinery, armaments, and porcelain, is concentrated around Bourges and Vierzon. The *département* has two *arrondissements,* Bourges and Saint-Amand-Montrond. It is in the educational division of Orléans. Area 2,793 square miles (7,235 square km). Pop. (1991 est.) 322,842.

Cher River, river in central France, a tributary of the Loire River. It rises in the northwest of the Massif Central and flows north across the Combrailles Plateau through the towns of Montluçon and Saint-Amand-Montrond. Veering northwest through the pastures and woodland west of Bourges, it is joined at Vierzon by the Yèvre River and, a little downstream, by the Arnon. Flowing generally westward, it passes through Chenonceaux, where it is bridged by a historic château. The river passes south of Tours to join the Loire at Cinq-Mars-la-Pile after a course of 217 miles (350 km). Its basin is 5,400 square miles (14,000 square km) in area.

Cherbourg, naval station, fortified town, and seaport in Manche *département,* Basse-Normandie *région,* northwestern France. It lies along the English Channel, west-northwest of Paris, and is situated at the mouth of the small Divette River on the north shore of the Cotentin peninsula. The steep Roule Mountain nearby offers a panoramic view of the town. The port benefits from a remarkable harbour, well-sheltered except to the north, and is situated close to the great maritime routes that ply the English Channel. Although the port's cargo traffic is now light, passenger traffic is intense, especially passengers and their cars crossing between Cherbourg and Southampton, Eng. Both yachting and commercial fishing have developed in Cherbourg in recent years. Industries depending on the port are very important; shipbuilding and ship repair yards employ thousands. The construction of oil tankers and offshore oil platforms, as well as nuclear submarines, is supplemented by industries relocated from Paris, including electronics, telephone equipment, and specialized small metallurgical manufactures. Nearby, the nuclear power plant at La Hague recycles nuclear wastes. Cherbourg is thus a major industrial centre, despite its relative isolation from the rest of French industry. A museum in the *hôtel de ville* (town hall) houses many paintings by the 19th-century French painter Jean-François Millet, who was born near the town. The Emmanuel-Liais park has interesting tree and plant specimens.

In the 11th century Cherbourg was known as Carusburc and (like the rest of Normandy) was fought over by the French and English. Charles VII of France finally recovered it in 1450. The town was pillaged by the English in a surprise attack in 1758. A vast breakwater, begun under Louis XVI in 1776, was completed 70 years later. During World War II, most of the port installations were destroyed in the fighting when the town was taken from the Germans by Allied forces after the Normandy Invasion in June 1944. A temporary port was rapidly rebuilt and handled a vast quantity of war materiel until hostilities ended. Pop. (1990) 28,773.

Cherchell (Algeria): *see* Iol.

Cherebert (name of Merovingian kings): *see under* Charibert.

Cheremis (people): *see* Mari.

Cheremis language: *see* Mari language.

Cheremkhovo, also spelled ČEREMCHOVO, city, Irkutsk *oblast* (province), far eastern Russia, on the Trans-Siberian Railroad. Founded in 1772 as a station on the Great Siberian Post Road, the town developed as a chief mining centre of the Cheremkhovo bituminous coalfield, but in the 1960s it began a steady decline because of limited reserves and the availability of coal nearby at Tulun. Other industries include machine building and mica processing. Pop. (1991 est.) 73,600.

Cherenkov, Pavel Alekseyevich, Cherenkov also spelled ČERENKOV (b. July 15 [July 28, New Style], 1904, Novaya Chigla, Russia—d. Jan. 6, 1990, U.S.S.R.), corecipient of the Nobel Prize for Physics in 1958 with Igor Y. Tamm and Ilya M. Frank, both also of the Soviet Union, for their investigation and interpretation of the phenomenon called Cherenkov radiation (*q.v.*).

Cherenkov graduated from Voronezh State University in 1928. He discovered the Cherenkov radiation effect in 1934, when he was a research student at the Institute of Physics of the Academy of Sciences of the Soviet Union, where he remained as a member and, from 1959, full professor.

Cherenkov radiation, light produced by charged particles when they pass through an optically transparent medium at speeds greater than the speed of light in that medium. Devices sensitive to this particular form of radiation, called Cherenkov detectors, have been used extensively to detect the presence of charged subatomic particles moving at high velocities.

Cherenkov radiation, when it is intense, appears as a weak bluish white glow in the pools of water shielding some nuclear reactors. The Cherenkov radiation in cases such as this is caused by electrons from the reactor traveling at speeds greater than the speed of light in water, which is 75 percent of the speed of light in a vacuum. The energetic charged particle traveling through the medium displaces electrons in some of the atoms along its path. The electromagnetic radiation that is emitted by the displaced atomic electrons combines to form a strong electromagnetic wave analogous to the bow wave caused by a power boat traveling faster than the speed of water waves or to the shock wave (sonic boom) produced by an airplane traveling faster than the speed of sound in air.

Cherepnin, Aleksandr (Nikolayevich): *see* Tcherepnin, Alexander (Nikolayevich).

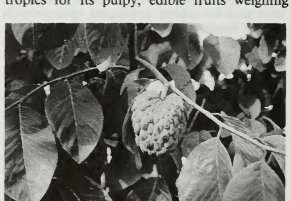
Cherepnin, Nicolas (Nikolayevich): *see* Tcherepnin, Nikolay (Nikolayevich).

Cherepovets, also spelled ČEREPOVEC, city, Vologda *oblast* (province), northwestern Russia. Cherepovets lies on the right bank of the Sheksna River where it flows into the Rybinsk Reservoir of the Volga River. The city's iron and steel plant, established in 1955 and enlarged several times since, is one of the largest in Russia. Shipbuilding, fertilizer production, and timber working are also important. The rebuilding of the Volga-Baltic Waterway, of which the Sheksna River is a part, has enhanced Cherepovets' trading function. Pop. (1992 est.) 317,000.

Cheribon (Indonesia): *see* Cirebon.

Cheribon Agreement (Indonesian history): *see* Linggadjati Agreement.

cherimoya (species *Annona cherimola*), tree of the custard apple family (Annonaceae), of the order Magnoliales. It is native to frost-free, higher elevations throughout tropical America and is widely cultivated in the Old World tropics for its pulpy, edible fruits weighing



Cherimoya (*Annona cherimola*)
Edward F. Anderson

about 0.5 kg (1 pound). The tree grows up to 9 m (30 feet) tall but in cultivation is kept pruned to about 5 m with a 6-metre spread to permit hand pollination of the 2.5-centimetre (1-inch), fleshy, white, fragrant flowers. Cherimoya trees have long and elliptically shaped, light green and velvety leaves. The large, globose, pale green fruits are smooth or have round protrusions, and the flesh is white and pulpy, with a sweet, acid flavour. A few black, bean-size seeds are embedded in the pulp. The crushed seeds are used as insecticides in Mexico and Guatemala, as are the seeds of the sugar apple, or sweetsop (*A. squamosa*). A hybrid, *A. atemoya,* produced by crossing a cherimoya with a sweetsop, tastes like the cherimoya, ships better than either parent,

and is less likely to split than the sugar apple. *See also* custard apple.

Cherkasy, Russian CHERKASSY, or ČERKASSY, *oblast* (province), central Ukraine. The smaller part of the *oblast* lies on the low left-bank floodplain of the middle Dnieper River; the larger, western part lies on the rolling hills of the Dnieper Upland and is much dissected by small valleys and erosion gullies. The natural vegetation of steppe grasses, with occasional oak groves, has largely been removed by the plow, greatly accelerating erosion of the subsoils. Agriculture predominates, and about half of the population is rural. Winter wheat and sugar beets are the main crops, though barley, corn (maize), sunflowers, tobacco, and hemp are important; and dairying and hog raising are well developed. Industry is concentrated mainly in Cherkasy city, the *oblast* headquarters. Area 8,100 square miles (20,900 square km). Pop. (1991 est.) 1,531,800.

Cherkasy, Russian CHERKASSY, or ČERKASSY, city and administrative centre, Cherkasy *oblast* (province), central Ukraine. It lies on the high right bank of the Dnieper River, along the reservoir created by the Kremenchuk hydroelectric station. Founded in the 15th century in the Polish Ukraine, Cherkasy became Russian in the first partition of 1772 and received town status in 1795. It began to grow only in the late 19th century, when the Moscow-Odessa railway crossed the Dnieper there. Modern Cherkasy developed rapidly in the 1960s, when a chemical industry supplemented the older machine, food-processing, and furniture industries. Pop. (1991 est.) 302,000.

Cherkes, also spelled CHERKESS (people): *see* Circassian.

Chern, Shiing-shen (b. Oct. 26, 1911, Chiahsing, Chekiang province, China), Chinese-American mathematician and educator whose researches in differential geometry include the development of the Chern characteristic classes in fibre spaces, which play a major role in mathematics and in mathematical physics.

Chern graduated from Nankai University in Tientsin, China, in 1930; he received his M.S. degree in 1934 from Tsing Hua University, Peking, and his doctor of sciences degree from the University of Hamburg in 1936. A year later he returned to Tsing Hua University as professor of mathematics. Chern was a member of the Institute for Advanced Study at Princeton, N.J., from 1943 to 1945. In 1946 he returned to China to become acting director of the Institute of Mathematics at the Academia Sinica in Nanking.

Chern returned to the United States in 1949 and taught at the University of Chicago and later at the University of California, Berkeley. In 1961 he became a naturalized U.S. citizen. Chern served as vice president of the American Mathematical Society (1963–64) and was elected to both the National Academy of Science and the American Academy of Arts and Science. He was awarded the National Medal of Science in 1975 and the Wolf Prize in 1983/84. He founded and was the director of the Mathematical Sciences Research Institute, Berkeley, Calif. (1981–84), and the Nankai Institute of Mathematics, Tianjin, China (from 1985).

Chernenko, Konstantin Ustinovich (b. Sept. 11 [Sept. 24, New Style], 1911, Bolshaya Tes, Yeniseysk, Russian Empire [now in Krasnoyarsk *kray,* Russia]—d. March 10, 1985, Moscow), chief political leader of the Soviet Union from February 1984 until his death in 1985.

Born to a Russian peasant family in the Yeniseysk region of Siberia, Chernenko joined the Communist Party in 1931. Trained as a party propagandist, he held several administrative posts before becoming head of agitation and propaganda (agitprop) in Moldavia (1948–56), where he was first noticed by Leonid Brezhnev and brought to Moscow to head a similar department for the party's Central Committee (1956–60). When Brezhnev took over the party in 1964, he made Chernenko his chief of staff. Chernenko was a full member of the Central Committee from 1971 and of the Politburo from 1977.

An old-line conservative, Chernenko traveled extensively with Brezhnev and was considered his aide, confidant, and, by some observers, his heir apparent. After Brezhnev's death, however, he was unable to rally a majority of the party factions behind his candidacy to be head of the party and lost out to Yury V. Andropov, the former KGB chief, who became general secretary on Nov. 12, 1982. However, Andropov had become mortally ill by the following August, and after his death six months later, Chernenko succeeded him as general secretary of the Communist Party of the Soviet Union on Feb. 13, 1984. On April 12 he became chairman of the Presidium of the Supreme Soviet.

Like his predecessor, Chernenko began showing signs of deteriorating health shortly after taking office. His frequent absences from official functions because of illness left little doubt that his election had been an interim measure, and upon his death he was succeeded by Mikhail S. Gorbachev.

Cherniaev, Mikhail Grigoryevich: *see* Chernyayev, Mikhail Grigoryevich.

Chernihiv, Russian CHERNIGOV, or ČERNIGOV, *oblast* (province), north-central Ukraine. It lies in the basin of the Desna River, in a low plain, largely covered by tracts of reed and grass marsh and by mixed forests of oak, pine, hornbeam, and maple. In the south around Pryluky, the terrain is drier and more open, and most of the rich chernozem soils are now farmed. The economy is mainly agricultural, and about half of the population is rural. Grain crops take up two-thirds of the arable area; sugar beets, tobacco, and corn (maize) are also important. The Nizhyn area is noted for its cucumbers and onions. In the northern section of the *oblast,* drainage has been undertaken; the reclaimed land is used for growing flax, hemp, rye, and potatoes. Most of the industry is concentrated in the city of Chernihiv, the *oblast* headquarters. The small towns process farm and forest products. Petroleum is extracted near Pryluky. Area 12,300 square miles (31,900 square km). Pop. (1991 est.) 1,398,000.

Chernihiv, Russian CHERNIGOV, or ČERNIGOV, city and administrative centre of Chernihiv *oblast* (province), north-central Ukraine, on the Desna River, northeast of Kiev. Archaeology suggests a 7th-century origin, although Chernihiv was first mentioned in 907. It was one of the chief towns of Kievan Rus and the centre of a princedom. Its Spassky Cathedral dates from 1024. Chernihiv lost importance after the Tatar invasion (1239–40) and remained a minor provincial centre until modern times, when it developed as a railway junction. A large synthetic-fibre plant produces tire cord. Other industries produce pianos, foodstuffs, and consumer goods. Chernihiv has a teacher-training institute and a branch of the Kiev Polytechnic Institute. Pop. (1991 est.) 306,000.

Chernikhovsky, Saul Gutmanovich: *see* Tchernichowsky, Saul Gutmanovich.

Chernivtsi, Russian CHERNOVTSY, or ČERNOVCY, *oblast* (province), southwestern Ukraine. It extends from an apex on the crestline of the Carpathian Mountains, across the foothills and the Seret and Prut valleys, to a baseline on the Dniester River. The *oblast* was formed in 1940 from the northern part of the Bukovina, when that area together with Bessarabia was ceded to the U.S.S.R. by Romania.

Chernivtsi's economy is predominantly agricultural, and about three-fifths of the population is rural, concentrated in the valleys, though many live in dispersed farmsteads. Principal crops are wheat, corn (maize), sugar beets, and sunflowers, and there are extensive orchards. Cattle and sheep use summer pastures in the highest areas, and pig keeping is important in the valleys. Lumbering is well developed, and there are small-scale timber-processing industries in the towns. A major dam on the Dniester was constructed in the late 1970s and early '80s in neighbouring Vinnytsya *oblast,* with its support facilities in Chernivtsi *oblast.* Apart from the city of Chernivtsi, the *oblast* headquarters, the towns are all small, and most of their industries are concerned with processing agricultural produce. Area 3,100 square miles (8,100 square km). Pop. (1991 est.) 940,500.

Chernivtsi, Russian CHERNOVTSY, or ČERNOVCY, Romanian CERNĂUȚI, German CZERNOWITZ, formerly (until 1944) CHERNOVITSY, city and administrative centre of Chernivtsi *oblast* (province), southwestern Ukraine, situated on the upper Prut River in the Carpathian foothills. First documentary reference to Chernivtsi dates from 1407, when it was a town in the Polish-Lithuanian kingdom and the chief centre of the area known as the Bukovina. In the 18th century, Chernivtsi passed first to the Turks and then to Austria-Hungary. After World War I, it was given to Romania, and in 1940 the town was acquired by the U.S.S.R. Always a major focus of trade, it grew in the early 20th century as an industrial centre and an important railway junction, with lines to Lviv, Ternopil, Moldova, and Romania. The modern town has woolen- and cotton-textile, light-engineering, food-processing (especially meat and sugar), and timberworking industries. Chernivtsi stretches for more than 7 miles (11 km) along the Prut, and new suburbs have grown up on the low left bank. It has a university, founded in 1875, and a medical institute. Pop. (1991 est.) 259,000.

Chernobyl accident, accident at the Chernobyl nuclear power station in the Soviet Union, the worst in the history of nuclear power generation. The Chernobyl station is situated at the settlement of Pryp'yat, 10 miles (16 km) northwest of the city of Chernobyl (Ukrainian: Chornobyl) and 65 miles (104 km) north of Kiev, in Ukraine. The station consisted of four reactors, each capable of producing 1,000 megawatts of electric power; the station came on-line in 1977–83.

The accident occurred on April 25–26, 1986, when technicians at reactor Unit 4 attempted a poorly designed experiment. Workers shut down the reactor's power-regulating system and its emergency safety systems, and they withdrew most of the control rods from its core, while allowing the reactor to continue running at 7 percent power. These mistakes were compounded by others, and at 1:23 AM on April 26 the chain reaction in the core went out of control. Several explosions triggered a large fireball and blew off the heavy steel and concrete lid of the reactor. This and the ensuing fire in the graphite reactor core released large amounts of radioactive material into the atmosphere, where it was carried great distances by air currents. A partial meltdown of the core also occurred.

On April 27 the 30,000 inhabitants of Pryp'yat began to be evacuated. A cover-up was attempted, but on April 28 Swedish monitoring stations reported abnormally high levels of wind-transported radioactivity and pressed for an explanation. The Soviet government admitted there had been an accident

at Chernobyl, thus setting off an international outcry over the dangers posed by the radioactive emissions. By May 4 both the heat and the radioactivity leaking from the reactor core were being contained, albeit at great risk to workers. Radioactive debris was buried at some 800 temporary sites; and later in the year the highly radioactive reactor core was enclosed in a concrete-and-steel sarcophagus (which was later deemed structurally unsound).



Areas of most serious radioactive contamination from the Chernobyl accident as of 1990

Initially, the Chernobyl accident caused the deaths of 32 people. Dozens more contracted serious radiation sickness; some of these people later died. Between 50 and 185 million curies of radionuclides escaped into the atmosphere—several times more radioactivity than that created by the atomic bombs dropped on Hiroshima and Nagasaki. This radioactivity was spread by the wind over Belarus, Russia, and Ukraine and soon reached as far west as France and Italy. Millions of acres of forest and farmland were contaminated; and although many thousands of people were evacuated, hundreds of thousands more remained in contaminated areas. In addition, in subsequent years many livestock were born deformed, and among humans several thousand radiation-induced illnesses and cancer deaths were expected in the long term. The Chernobyl accident sparked criticism of unsafe procedures and design flaws in Soviet reactors, and it heightened resistance to the building of more such plants. Chernobyl Unit 2 was shut down after a 1991 fire; Units 1 and 3 remained on-line.

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Chernogorsk, also spelled ČERNOGORSK, city, Khakassia republic, south-central Russia, situated just west of the port of Podkunino on the Yenisey River. The city is the centre of mining in the Minusinsk coal basin, which has been in operation since before 1917. Consumer-goods industries are also important. Chernogorsk became a city in 1936. A mining college is located there. Pop. (1993 est.) 80,000.

Chernov, Viktor Mikhaylovich, also called BORIS OLENIN (b. Nov. 19 [Dec. 1, New Style], 1873, Kamyshin, Russia—d. April 15, 1952, New York, N.Y., U.S.), a founder of the Russian Social Revolutionary Party in 1902, who spent much of his life in exile but was briefly a minister in provisional governments in Russia (May 5–Sept. 1, 1917).

A revolutionist from 1893, Chernov became a member of his party's central committee, wrote the party's platform, and edited *Revolyutsionnaya Rossiya* ("Revolutionary Russia"). In exile in western Europe when World War I broke out, Chernov attended the Zimmerwald Conference of 1915 (a meeting convened by Italian and Swiss Socialists to press for immediate cessation of World War I) and supported the "defeatist" resolution of his party's left wing, which condemned the "imperialist war." But after he returned to Russia following the February Revolution (1917) and became minister of agriculture, he advocated defending his country against the Germans.

During 1917 Chernov edited *Delo Naroda* ("Cause of the People") and opposed the left wing of his party and the Bolsheviks. He became popular as leader of the party representing the peasants' interests and was elected president of the constituent assembly that opened in Petrograd (now St. Petersburg) on Jan. 18, 1918, and was dispersed the next day by the Bolsheviks. After a brief association with the Socialist Revolutionary government established at Samara to oppose the Bolsheviks, he emigrated in 1920, wrote and lived in Paris until the outbreak of World War II, and then went to the United States, where he contributed to anticommunist periodicals.

Chernovtsy (*oblast* and city, Ukraine): *see* Chernivtsi.

chernozem, also called BLACK EARTH, grassland soil with a dark humic horizon (a layer with at least one percent carbon) more than 25 cm (10 inches) thick. Chernozems are neutral soils, and they contain no layers of aluminarich clays or layers in which the clay has been transported away by water (eluviated). The chernozems on the Russian steppes, where they were first identified, were formed from calcium carbonate-rich material and therefore have a calcareous layer that underlies or overlaps the humic layer. The leaching rainfall is low, and clay seldom is accumulated by aqueous transport. In the United States, Canada, and Argentina, however, these soils have formed from noncalcareous materials rich in sodium, magnesium, and silica. These areas often have a greater leaching rainfall, and the accumulation of clay is favoured.

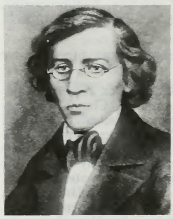
Chernyayev, Mikhail Grigoryevich, Chernyayev also spelled CHERNIAEV (b. Oct. 22 [Nov. 3, New Style], 1828, Bendery, Bessarabia, Russian Empire [now Bendery, Moldova]—d. Aug. 4 [Aug. 16], 1898, Tubyshki, Belorussia [Belarus]), Pan-Slavist and Russian general noted for expanding the Russian Empire into Central Asia and for his leadership of the Serbs against the Turks in 1876.

Chernyayev attended the Military Academy of the General Staff and then served as a junior officer in the Crimean War (1853–56). In 1864 he was sent on a minor mission to Central Asia, where he captured Aulie Ata and Chimken and then exceeded his instructions by conquering Tashkent (1865). In 1865 the conquered territories were incorporated into the Russian Empire, and Chernyayev was appointed military governor of this new province named Turkestan; however, he was removed from his post in 1866 after defeat in further campaigns of expansion.

An insurrection against the Turks in Bosnia and Herzegovina (1875) spread throughout the Balkans, and the Turkish rulers reacted by attempting brutally to suppress the Balkan Slavs. Chernyayev was part owner of a conservative, nationalistic periodical, *Russky Mir,* in which he supported the Balkan Slavs' rebellions and promoted Pan-Slavism, advocating Russia's mission to free the Slavs from subservience to Turkey while spreading Russian culture and influence in the Balkans. When Serbia declared war on Turkey (1876), the Serbian government asked the Pan-Slav hero Chernyayev to lead Serbian forces. He accepted and was aided by 5,000 Russian volunteers. Contrary to Serbia's expectations, however, Russia did not officially enter the war and Chernyayev's forces were decisively defeated. Chernyayev was given only a staff position in the Caucasus during the subsequent Russo-Turkish War of 1877–78. In 1882, following the accession of the conservative Slavophile emperor Alexander III, Chernyayev returned to favour, was promoted, and again served as military governor-general of Turkestan (1882–84) until his bellicose expansionist plans finally forced his retirement.

Chernyshevsky, N.G., in full NIKOLAY GAVRILOVICH CHERNYSHEVSKY (b. July 12 [July 24, New Style], 1828, Saratov, Russia—d. Oct. 17 [Oct. 29], 1889, Saratov), radical journalist and politician who greatly influenced the young Russian intelligentsia through his classic work, *What Is to Be Done?* (1863).

Son of a poor priest, Chernyshevsky in 1854 joined the staff of the review *Sovremennik* ("Contemporary"). Though he focused on social and economic evils and tried to expound predictable laws of economic change, he followed his fellow journalist Vissarion Belinsky and the English utilitarians in preaching a highly purified egoism as the most natural and desirable mainspring of human conduct. Landowners accused him of stirring up class hatred; and, although the extent to which he was actively subversive is a matter of controversy, he was arrested in 1862 and, after two years' imprisonment, was exiled to Siberia, where he remained until 1883. While in prison



Chernyshevsky, detail of a portrait by an unknown artist
Novosti Press Agency

he wrote his didactic novel *Shto Delat?* (1863; *A Vital Question* or *What Is to Be Done?*). He was a Westernizer who opposed nationalist Slavophiles. In the U.S.S.R. he was considered by many to be a forerunner of Vladimir Lenin.

Cherokee, North American Indian people of Iroquoian lineage who inhabited eastern Tennessee and the western Carolinas. Formerly they had lived around the Great Lakes, migrating to the south after their defeat by the Delaware and Iroquois. Their population in 1650 has been estimated at 22,500, spread over 40,000 square miles (100,000 square km) of the Appalachian Mountains.

Cherokee life and culture greatly resembled that of the Creek (*q.v.*) and other Indians of the Southeast. The Cherokee nation was composed of a confederacy of red (war) and white (peace) towns. The chiefs of the red towns were subordinated to a supreme war chief, while the officials of the white towns were under the supreme peace chief. The white towns provided sanctuary for wrongdoers; war ceremonies were conducted in red towns.

When first encountered by Europeans in the mid-16th century, the Cherokee possessed a variety of stone implements including knives, axes, and chisels. They wove baskets, made pottery, and cultivated corn (maize), beans, and squash. Deer, bear, and elk furnished meat and clothing. Cherokee dwellings were windowless log cabins roofed with bark, with

one door and a smokehole in the roof. A typical Cherokee town had between 30 and 60 such houses and a council house where general meetings were held and the sacred fire burned. An important religious ceremony was the Busk, or Green Corn, festival, a first-fruits and new-fires rite.

The Cherokee wars and treaties, a series of battles and agreements around the period of the U.S. War of Independence, effectively reduced Cherokee power and landholdings in Georgia, eastern Tennessee, and western North and South Carolina, freeing this territory for speculation and settlement by the white man. Numbering about 22,000 tribesmen in 200 villages throughout the area, the Cherokee had since the beginning of the 18th century remained friendly to the British in both trading and military affairs.

In 1773 the Treaty of Augusta, concluded at the request of both Cherokee and Creek Indians, ceded more than 2,000,000 tribal acres in Georgia to relieve a seemingly hopeless Indian indebtedness to white traders. In 1775 the Overhill Cherokee were persuaded at the Treaty of Sycamore Shoals to sell an enormous tract of land in central Kentucky. Although this agreement with the Transylvania Land Company violated British law, it nevertheless became the basis for the white takeover of that area. Threatened by colonial encroachment upon their hunting grounds, the Cherokee announced at the beginning of the American Revolution their determination to support the crown. Despite British attempts to restrain them, in July 1776 a force of 700 Cherokee under Chief Dragging-canoe attacked two U.S.-held forts in North Carolina: Eaton's Station and Ft. Watauga. Both assaults failed, and the tribe retreated in disgrace. These raids set off a series of attacks by Cherokee, Creek, and Choctaw on frontier towns, eliciting a vigorous response by militia and regulars of the Southern states during September and October. At the end of this time, Cherokee power was broken, crops and villages destroyed, and warriors dispersed. The humiliated Indians could win peace only by surrendering vast tracts of territory in North and South Carolina at the Treaty of DeWitt's Corner (May 20, 1777) and the Treaty of Long Island of Holston (July 20, 1777). As a result, peace reigned on this frontier for the next two years.

When Cherokee raids flared up again in 1780 during American preoccupation with British armed forces elsewhere, punitive action led by Col. Arthur Campbell and Col. John Sevier soon brought them to terms again. At the second Treaty of Long Island of Holston (July 26, 1781), previous land cessions were confirmed and additional territory yielded.

After 1800 the Cherokee were remarkable for their assimilation of white culture. The Cherokee formed a government modelled on that of the U.S. Under Chief Junaluska they aided Andrew Jackson against the Creek (*see* Creek War), particularly in the Battle of Horseshoe Bend. They adopted white methods of farming, weaving, and home building. Perhaps most remarkable of all was the syllabary of the Cherokee language, developed in 1821 by Sequoyah (*q.v.*), a half-blooded Cherokee who had served with the U.S. Army in the Creek War. The syllabary—a system of writing in which each symbol represents a syllable—was so successful that almost the entire tribe became literate within a short time. A written constitution was adopted, and religious literature flourished, including translations from the Christian scriptures. An Indian newspaper, the *Cherokee Phoenix,* the first of its kind, began publication in February 1828.

But the Cherokee's rapid acquisition of white culture did not protect them against the land hunger of the settlers. When gold was discovered on Cherokee land in Georgia, agitation for the removal of the Indians increased. In December 1835 the Treaty of New Echota, signed by a small minority of the Cherokee, ceded to the U.S. all their land east of the Mississippi River for $5,000,000. The overwhelming majority of Cherokees repudiated the treaty and took their case to the Supreme Court of the United States. The court rendered a decision favourable to the Indians, declaring that Georgia had no jurisdiction over the Cherokees and no claim to their lands.

Georgia officials ignored the court's decision, and Pres. Andrew Jackson refused to enforce it. As a result, the Cherokees were evicted under the Indian Removal Act of 1830 by 7,000 troops commanded by Gen. Winfield Scott. Some 15,000 Cherokees were first gathered into camps while their homes were plundered and burned by local residents. Then the Indians were sent west in groups of about 1,000, most on foot.

The eviction and forced march, which came to be known as the Trail of Tears, took place during the fall and winter of 1838–39 and was badly mismanaged. Inadequate food supplies led to terrible suffering, especially after frigid weather arrived. About 4,000 Cherokees died on the 116-day journey, many because the escorting troops refused to slow or stop so that the ill and exhausted could recover.

When the main body had finally reached its new home in what is now northeastern Oklahoma, new controversies began with the settlers already there. Feuds and murders rent the tribe as reprisals were made on those who had signed the Treaty of New Echota.

In Oklahoma the Cherokee joined four other tribes, the Creek, Chickasaw, Choctaw, and Seminole, all forcibly removed from the Southeast by the U.S. government in the 1830s. For three-quarters of a century each tribe had a land allotment and a quasi-autonomous government modelled on that of the U.S. In preparation for Oklahoma statehood (1907), some of this land was allotted to individual Indians; the rest was opened up to white homesteaders, held in trust by the federal government, or allotted to freed slaves. Tribal governments were effectively dissolved in 1906 but have continued to exist in a limited form. Some Indians now live on tribal landholdings that are informally called reservations. In the late 20th century there were approximately 47,000 Cherokee descendants living in eastern Oklahoma and about 15,000 full-bloods. At the time of removal in 1838, a few hundred Cherokee escaped to the mountains and furnished the nucleus for the 3,000 Cherokee who in the 20th century lived in western North Carolina.

Cherokee, city, seat (1857) of Cherokee county, northwestern Iowa, U.S., on the Little Sioux River, 50 mi (80 km) northeast of Sioux City. A colony from Milford, Mass., settled a site north of the present city in 1856. The community was moved in 1870 to its present location on the railroad (then under construction). Cherokee is now a trading and shipping centre for one of the state's largest cattle-feeding and hog-raising areas. Farm implements are manufactured, and a major meat-packing plant is located there. The Sanford Museum and Planetarium has archaeological, geological, and historical exhibits relating to northwestern Iowa. Inc. 1873. Pop. (1990) 6,026.

Cherokee language, a North American Indian language, member of the Iroquoian family, spoken by the Cherokee people originally inhabiting Virginia, North Carolina, South Carolina, and Georgia. Cherokee was one of the first American Indian languages to have a system of writing devised for it—a syllabary, so called because each of the graphic symbols represents a syllable.

Sequoyah, the half-Cherokee Indian who invented the Cherokee syllabary in 1821, began by trying to devise a logographic alphabet (one graphic symbol for one word). When this proved too complex, he borrowed letters of the Roman alphabet from English (he did not read English), modified some Roman letters, and made up others, then assigned these symbols arbitrarily to syllables of the Cherokee language (usually a consonant plus a vowel). He began with 200 symbols but reduced them to 86. This syllabary was taken by the Cherokees to Oklahoma when they migrated there in 1830 and was used in official documents and newspapers. Although its public use gradually declined over the next 100 years, it still appeared in private correspondence, renderings of the Bible, and descriptions of Indian medicine.

Cherrapunji, village, East Khāsi Hills district, Meghālaya state, northeastern India, located on the Shillong plateau about 35 mi (55 km) southwest of Shillong. It is noted for having the world's second highest recorded average annual precipitation, 450 in. (11,430 mm) over a 74-year period, exceeded only by the 460 in. recorded at Mt. Waialeale, Hawaii. In addition, it had the greatest recorded total rainfall in a 12-month period, 1,042 in. (Aug. 1860–July 1861), and the greatest recorded total rainfall in one month, 366 in., in July 1861. The heavy precipitation results from the village's location on the plateau's southern edge, at which point the monsoon rises up the southern slope and cools rapidly, releasing enormous quantities of condensed water.



Tribesman and village huts of Cherrapunji, Meghālaya, India
David Channer—Nancy Palmer Agency

Cherrapunji was the capital of the independent Khāsi states until succeeded by Shillong in 1864; it is still inhabited by Khāsi tribes, who are largely Christian and who have a matriarchal social system. It serves as a trade centre for the area's agricultural products; the Chera coal mine is nearby. The population is mainly Khāsi. Pop. (1981) 6,097.

cherry, any of various trees belonging to species of *Prunus* and their edible fruits. Most cherry species are native to the Northern Hemisphere, where they are widely grown. Some 10 to 12 species are recognized in North America and a similar number in Europe. The greatest concentration of species, however, appears to be in eastern Asia.

Three types of cherry are mainly grown for their fruit. These are the sweet cherries, *P. avium,* the sour, or tart, cherries, *P. cerasus,* and, grown to a much smaller extent, the dukes, which are crosses of sweet and sour cherries. Sweet-cherry trees are large and rather

upright, attaining heights up to 11 metres (36 feet). The fruit is generally heart-shaped to nearly globular, about 2 centimetres (1 inch) in diameter, and varies in colour from yellow through red to nearly black. The acid content of the sweet cherry is low; the higher acid content of the sour cherry produces its characteristic tart flavour. Sour-cherry trees are smaller, rarely over 5 m in height. The fruit is round to oblate in shape, generally dark red in colour, and it has so much acid that it is not appealing for eating fresh. The duke cherries are intermediate in both tree and fruit characteristics. The fruits of all varieties provide vitamin A and small amounts of such minerals as calcium and phosphorus.

The native habitat of the species from which the cultivated cherries came is believed to be western Asia and eastern Europe from the Caspian Sea to the Balkans. Cherries had



Cherry (*Prunus cerasus*)
Grant Heilman

spread throughout Europe, however, before agricultural history was recorded.

Cherries are grown in all areas of the world where winter temperatures are not too severe and where summer temperatures are moderate. They require winter cold in order to blossom in spring. The trees bloom quite early in the spring, just after peaches and earlier than apples.

The U.S. is the leading cherry producer, with an annual crop of 230,000 metric tons. Cherries are a major crop in western Europe, however; total production is about 700,000 tons annually, with Germany, Italy, France, and Switzerland the leaders. Turkey, Japan, Argentina, Chile, Australia, and Canada also produce substantial quantities. About three-quarters of the U.S. production is sour cherries, which are frozen or canned and used in sauces and pastries, notably cherry pie. Sweet cherries, in season, are consumed fresh and widely canned and are the principal type preserved in true or imitation maraschino liqueur. In Europe the fruit is used fresh, canned, or for wine.

The wood of a number of cherry species is close grained, dark red in colour, and especially esteemed for the manufacture of fine furniture.

In the Orient, particularly Japan, cherry varieties have been selected for the beauty of their flowers; most of them do not set fruit. These beautiful ornamentals are featured in many gardens and after about 1900 were widely disseminated throughout the moderate-temperature areas of North America and Europe. The Japanese flowering cherries around the Tidal Basin in Washington, D.C., were presented by the mayor of Tokyo in 1912.

cherry birch: *see* sweet birch.

cherry laurel (*Prunus laurocerasus*, also *Laurocerasus officinalis*), evergreen shrub, of the rose family (Rosaceae), native to Europe but cultivated, particularly as a hedge plant, in other temperate regions. The Carolina cherry



Cherry laurel (*Prunus laurocerasus*)
Carlo Bevilacqua—SCALA from Art Resource

laurel (*P. caroliniana*) is a closely related species. *P. laurocerasus* grows about 5.4 metres (18 feet) tall and has glossy, rather oval or lance-shaped leaves 10–15 centimetres (4–6 inches) long. The small white flowers grow in an elongated cluster 5–12 cm long.

Cherry Valley Raid (Nov. 11, 1778), during U.S. War of Independence, Iroquois Indian attack on a New York frontier settlement in direct retaliation for colonial assaults on two Indian villages. Earlier in the year the Americans had decided to increase military pressure against Britain's Indian allies in the West who had been intensifying their depredations of frontier settlements. In the fall a small American army annihilated the Indian villages of Oghwaga and Unadilla. Enraged, Iroquois chief Joseph Brant joined Tory captain Walter Butler in a surprise raid on Cherry Valley, N.Y., one of the few remaining fortified villages south of the Mohawk River. The town was destroyed; 30 of its defenders were killed and 71 wounded or captured before the invaders withdrew.

Chersky Range, Russian KHREBET CHERSKOGO, range running northwest to southeast through the republic of Yakutiya (Yakut-Sakha) and Magadan *oblast* (province), Russia. The range, extending more than 900 miles (1,500 km), forms a part of the extensive Verkhoyansk mountain system and comprises a series of highly dissected parallel ranges with several peaks about 10,000 feet (3,000 m) above sea level (*e.g.*, Mount Pobeda [Victory], 10,325 feet [3,147 m]). The upper courses of the Kolyma and Indigirka rivers flow along narrow valleys between the ranges, cutting through them in majestic gorges. The southern part of the Chersky Range is a series of plateaus separated by depressions.

Cherso (Croatia): *see* Cres.

Cherson (*oblast* and city, Ukraine): *see* Kherson.

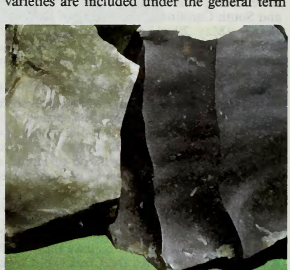
Chersonese, Tauric, ancient region comprising the Crimea and, often, the city of Chersonesus, located three miles west of modern Sevastopol, Ukraine. The city, founded on the Heracleotic Chersonese (or Chersonesos Micra [Small Chersonese]) by Ionian Greeks in the 6th century BC, probably as a trading factory, was refounded in the 5th century by Megarian Greeks from Heraclea Pontica and became a Dorian city. Prosperous from the 4th century BC, it maintained a free constitution of the Greek type and fought for its continued independence against the Scythians of southern Russia, against the native Tauri of the southern Crimea, and against the kings of Bosporus in the west. It traded with Athens and cities on the Pontic coast in the early period and with Delos, Rhodes, and Delphi in the Hellenistic Age. About 110 BC it turned to Pontus for protection against the Scythians and was subsequently incorporated into the Pontic Empire of Mithradates VI. Under the Roman Empire, Chersonese was treated as a free city protected by the Bosporan client king; a Roman military station guarded its considerable grain trade. The city continued to flourish in the 1st and 2nd centuries AD and again under the Byzantine Empire. Uninhabited since the 14th century, the site of the city contains the remains of a wall from the 4th century BC and also a wall and many churches of Byzantine times.

Chersonese, Thracian, ancient region comprising the modern Gallipoli Peninsula, located on the European side of the Hellespont (the Dardanelles, in modern Turkey). A major wheat-exporting region, it was on the main trade route between Europe and Asia; one of its cities, Sestos, was at the main crossing point of the Hellespont. Aeolians from Lesbos and Ionian Greeks from Miletus founded about 12 cities on the peninsula in the 7th century BC.

The Athenian general Miltiades the Elder established a colony there and built a defensive wall across the Bulair Isthmus, at the request of the native Dolonci, who chose him to be their king. Miltiades became tyrant of the Greek cities and founded a dynasty that survived until his nephew Miltiades the Younger abandoned the Chersonese to Darius I of Persia in 493 BC.

After the Greco-Persian Wars, Athens enrolled the area into the Delian League in 478 and sent 1,000 additional settlers (cleruchs) there *c.* 448. Sparta briefly controlled it after the Peloponnesian War (431–404), but it reverted to the Athenians, who sent settlers there in 353. In 338 Athens ceded it to Philip of Macedon. It became part of the Seleucid Empire and was then given to Eumenes II of Pergamum (188) and to the Romans (133), who turned most of the area into *ager publicus* (state-owned land). Under the emperor Augustus it was imperial property.

chert and flint, very fine-grained quartz (*q.v.*), a silica mineral with minor impurities. Several varieties are included under the general term



(Left) Chert from Pelham, Mass., (right) flint from Sussex and Suffolk
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard

chert: jasper, chalcedony, agate (*qq.v.*), flint, and novaculite.

Flint is gray to black and nearly opaque (translucent brown in thin splinters) because of included carbonaceous matter. Opaque, dull, whitish to pale-brown or gray specimens are simply called chert; the light colour and opacity are caused by abundant, extremely minute inclusions of water or air. The physical properties are those of quartz (*see* silica mineral [table]).

Chert and flint provided the main source of tools and weapons for Stone Age man. The uniform fine grain, brittleness, and conchoidal fracture made it relatively easy to shape ar-

rowheads by flaking off chips, and the edges produced were quite sharp. Quarrying and manufacture of flint weapons were among mankind's earliest business ventures, and it is sometimes possible to trace ancient trade routes by knowing where a particular type of flint was obtained. From the 17th through the early 19th century, flints again found extensive military use in flintlock rifles. Several thousand tons of flint pebbles are now used yearly in mills that grind raw materials for ceramic and paint industries; the use of flint pebbles instead of steel balls as a grinding agent is desirable in order to avoid contaminating the product with iron. Considerable amounts of chert find use in road construction and concrete aggregate, although some types are objectionable because they react with cement and may crack the structure. Some chert takes an excellent polish and serves as semiprecious jewelry.

Chert and flint occur as individual nodules or layers of nodules in limestone or dolomite; they are common in rocks of all ages (notably in the Cretaceous chalk of England). Hard and chemically resistant, the nodules become concentrated in residual soils as the surrounding carbonate rock weathers away. In places, chert forms massive beds several hundred metres thick with a lateral extent of hundreds of kilometres. Chert also occurs as a fine powder disseminated throughout carbonate rock; it impregnates shale and, rarely, forms cement in sandstone. It also develops in the vicinity of some metalliferous veins, precipitated by hot ore-depositing (hydrothermal) solutions. Erosion of chert beds or chert-bearing limestone produces chert pebbles, which are abundant in river and beach gravel.

Most chert and flint has formed by replacement of the enclosing carbonate sediment after burial beneath the seafloor. This replacement origin (similar to the petrification of wood) is substantiated by preservation in chert of the minute textural details of the enclosing carbonate rocks.

Bedded chert is not usually associated with carbonate beds and shows little evidence of replaced carbonate rock structure. This only indicates that perhaps bedded cherts were precipitated directly from seawater.

cherub, plural CHERUBIM, in Jewish, Christian, and Islāmic literature, a celestial winged being with human, animal, or birdlike characteristics; a throne bearer of the deity. Derived from ancient Near Eastern mythology and iconography, these celestial beings serve important liturgical and intercessory functions in the hierarchy of angels.

The term most likely derives from the Akkadian *kāribu,* or *kūribu* (from the verb *karābu,* meaning "to pray," or "to bless").

Old Testament descriptions of the cherubim emphasize their supernatural mobility and their cultic role as throne bearers of God, rather than intercessory functions. In Christianity the cherubim are ranked among the higher orders of angels and, as celestial attendants of God, continually praise him. Known as *karūbiyūn* in Islām, the cherubim continuously praise God by repeating the *tasbīḥ* ("Glory to Allāh") and dwell in peace in an area of the heavens that is inaccessible to attacks from Iblīs, or the devil. *Compare* seraph.

Cherubini, Luigi, in full MARIA LUIGI CARLO ZENOBIO SALVATORE CHERUBINI (b. Sept. 14, 1760, Florence [Italy]—d. March 15, 1842, Paris, France), Italian-born French composer during the period of transition from Classicism to Romanticism; he contributed to the development of French opera and was also a master of sacred music. His mature operas are characterized by the way they use some of the new techniques and subject matter of the Romantics but derive their dramatic force from a Classical dignity and restraint.

The son of a musician, Cherubini studied under Giuseppi Sarti, noted composer of opera and religious music. The bulk of Cherubini's early work consists of sacred music, but he later turned most of his attention to the musical stage, writing 15 Italian and 14 French operas. He was composer to King George III of England in 1785. The next year he settled in France, and in 1795 he became an inspector of the newly established Paris Conservatoire. He found little favour with Napoleon, but with the restoration of the French monarchy in 1814 he became music director of the royal chapel of Louis XVIII. In 1822 he was made director of the Conservatoire, a position that gave him great influence over the younger generation of composers.



Cherubini, portrait by J.-A.-D. Ingres, 1842; in the Louvre, Paris
Cliché Musees Nationaux

Cherubini presents the paradox of an innate conservative compelled to function in an era politically and musically revolutionary. He was trained in the traditions of the opera seria, the aristocratic style of 18th-century opera, and his earlier works, including those written as director of the Italian opera house in Paris, the Théâtre de Monsieur, retain that style's heroic and aristocratic grandeur. His later works, however, especially those in French, follow the operatic reforms of Christoph Gluck (1714–87) in seeking subjects relevant to a changing world. The heroism of aristocrats becomes the nobility of ordinary men and women. Even in operas that dealt with subjects from classical antiquity, such as *Médée* (1797), he reveals a concern for human traits. The opera that inaugurated his new style was *Lodoïska* (1791). It moved away from the emphasis on the solo voice found in opera seria to give new scope to ensembles and choruses and a fresh dramatic importance to the orchestra. He thus forged a link between the older style and the grand opera of 19th-century France.

In his harmonies, rhythms, and use of musical form, he remained in the Classical idiom and did not attempt the incipient Romantic style. Those who did, however, were influenced by his operas. Ludwig van Beethoven, before writing *Fidelio,* studied the score of a Cherubini opera with a similar "rescue" theme: *Les Deux Journées* (1800; *The Two Days,* also known as *The Water Carrier* from its German title, *Der Wasserträger*). This opera is considered by many to be Cherubini's masterpiece.

In later life he turned to church music. Works such as his *Mass in F Major* (1809) and his two requiems, especially that in D minor, for male voices (1836), are characterized by a Classical lucidity combined with a sense of religious grandeur.

He wrote several treatises, including the celebrated *Cours de contrepoint et de fugue* (1835; "Course in Counterpoint and Fugue"), which is far more conservative musically than Cherubini's actual music.

Long eclipsed by Beethoven and other less musically conservative composers of his time, he became the focus of renewed interest with modern revivals of such works as his opera *Médée* and his *Requiem in D Minor.*

Chéruel, Adolphe, in full PIERRE-ADOLPHE CHÉRUEL (b. Jan. 17, 1809, Rouen, France—d. May 1, 1891, Paris), French historian known for his pioneer work from original sources on the reign (1643–1715) of Louis XIV of France.

Chéruel pursued an academic career and rose to the highest posts. His early work was concerned with Norman history and with the general history of France; but his epoch-making edition of the memoirs of the Duc de Saint-Simon, 20 vol. (1856–58), was followed by editions of older memoirs and diaries and by publication, 6 vol. (1872–91), of the letters of Cardinal Jules Mazarin, chief minister during the first 18 years of Louis XIV's reign. These books transformed the historiography of the period of the Fronde, a series of uprisings against the policies of Mazarin in 1648–53. His most important original works include *Histoire de France pendant la minorité de Louis XIV,* 4 vol. (1879–80; "History of France During the Minority of Louis XIV"), and *Histoire de France sous le ministère de Mazarin, 1651–1661,* 3 vol. (1882; "History of France Under the Ministry of Mazarin, 1651–1661").

chervil (*Anthriscus cerefolium*), annual herb of the family Apiaceae (Umbelliferae). It is native to regions of the Black Sea and Caspian Sea and to western Asia. Chervil is cultivated in Europe for its lacy, decompound, aromatic leaves, which are dried and used to flavour foods, particularly fish, salads, soups, eggs, meat dishes, and stuffings for poultry and fish. Herb mixtures such as the French fines herbes frequently contain chervil. Pale green in colour, dried chervil has a delicate aroma and a taste reminiscent of anise. The essential oil occurs in a duct accompanying each of the veins in the leaflets and rachis (the axis of the leaflets).



Chervil (*Anthriscus cerefolium*)
G.R. Roberts

In some parts of Europe, chervil root is eaten as a vegetable.

Cherwell, district, county of Oxfordshire, south-central England, occupying an area of 228 square miles (590 square km). The River Cherwell and the Oxford Canal extend north from Oxford city and bisect the district. Predominantly rural, Cherwell is a lowland area bordering the limestone Cotswold Hills on the west and the North Oxfordshire Heights on the north. It has experienced industrial, resi-

dential, and commercial growth in the urban areas of Banbury, Bicester, and Kidlington. Cereals (including wheat, barley, and oats), beef and dairy cattle, and sheep are raised throughout the district. Banbury, the district seat in the north, is a market centre for wool and cattle and has industries that manufacture machinery and rolled aluminum. Bicester, a fox-hunting and cattle-marketing parish, is located in the Vale of Aylesbury in central Cherwell. Kidlington, immediately north of Oxford, experienced residential growth in the 1950s and '60s. Pop. (1992 est.) 128,400.

Chesapeake, city, southeastern Virginia, U.S. It lies along the Elizabeth River, adjacent to Suffolk, Portsmouth, Norfolk, and Virginia Beach and extends southward from Hampton Roads (roadstead) to the North Carolina border. Formed as an independent city in 1963 by a merger of the city of South Norfolk (incorporated 1921) and Norfolk county (created 1636), it is the largest (341 square miles [883 square km]) city in area in the state and one of the largest in the United States, encompassing sections of farmland and portions of the Dismal Swamp (*q.v.*). The area, once the home of the Chesapeake Indians, was settled by colonists in the early 1630s. Urban development began in the 1900s. Crisscrossed by inland waterways, Chesapeake has port facilities and is a major oil-storage centre. Its manufactures include steel products, cement, fertilizer, and lumber. Nursery, greenhouse, and truck-farm produce contribute to the economy. Pop. (1994 est.) 173,447.

Chesapeake and Delaware Canal, American waterway 14 miles (22 km) long connecting the head of the Chesapeake Bay with the Delaware River estuary. The canal cuts across the narrow northern neck of the 180-mile- (290-kilometre-) long Delmarva Peninsula, thereby providing shortened northern and European routes from the Atlantic Ocean to Baltimore. Completed in 1829, the privately owned canal operated with locks until 1919, when the United States government bought it and converted it to a tidal, toll-free waterway 27 feet (8 m) deep. Between 1962 and 1981 the waterway was deepened to 35 feet (11 m) and widened to 450 feet (137 m) to accommodate container ships.

Chesapeake and Ohio Canal, former waterway, extending 184.5 miles (297 km) along the east bank of the Potomac River between Washington, D.C., and Cumberland in western Maryland. Begun in 1828, the canal was intended to provide cheap transportation between the Atlantic seaports and the Midwest via the Potomac River. It immediately faced competition from the Erie Canal, however, and further construction was abandoned in 1850 after the canal had reached Cumberland. From the 1840s the canal also faced stiff competition from the Baltimore and Ohio Railroad, which was able to buy the waterway in 1894. The canal was purchased in 1938 by the U.S. government and was restored as a unit of the national parks system; it became a national historical park in 1971.

Chesapeake and Ohio Railway Company (C&O), byname CHESSIE SYSTEM, American railroad company established in 1868 with the consolidation of two smaller lines, the Virginia Central and the Covington and Ohio. It subsequently acquired a number of other lines, culminating in its merger with the Pere Marquette Railroad Company in 1947.

The C&O acquired the Baltimore and Ohio Railroad in 1963 but continued to operate it as a separate system. In 1973 the Chessie System, Inc., was established as a holding company with the C&O as a subsidiary. The railroad operates mainly in Virginia, West Virginia, Kentucky, Ohio, Indiana, and Michigan. Half of its freight revenues are drawn from coal, with motor vehicles and parts also contributing significantly. Its passenger services were taken over by the National Railroad Passenger Corporation (Amtrak) in 1972.

In 1980 the Chessie System merged with Seaboard Coast Line Industries, Inc., operator of track extending from Washington, D.C., to Miami, New Orleans, St. Louis, and Chicago, to form the CSX Corporation (*q.v.*). The 17 railroad companies included in the new corporation are operated as separate entities, yet offer coordinated single-system transportation. Coal is the major cargo hauled. CSX also owns a large line of container ships and another of barge carriers.

Chesapeake Bay, largest inlet in the Atlantic Coastal Plain of the eastern United States. Created by the submergence of the lower



Tylerton, Smith Island, Chesapeake Bay
© David W. Harp

courses of the Susquehanna River and its tributaries, it is 193 miles (311 km) long and 3 to 25 miles (5 to 40 km) wide. The southern part of the bay is bordered by Virginia and its northern part by Maryland. Its entrance from the Atlantic is flanked by Cape Charles to the north and Cape Henry to the south. Besides the Susquehanna, major rivers emptying into the bay include the James, York, Rappahannock, Potomac, and Patuxent from the west and the Wicomico, Nanticoke, Choptank, and Chester from the east. Most of the bay's irregular eastern shore is low and marshy, while the straighter western shore consists, for long distances, of cliffs.

The first European settlement in the bay area, Jamestown, was founded in 1607. One year later the English colonist Captain John Smith explored and mapped the bay and its estuaries, and soon afterward settlers came to the bay's easily accessible, well-protected shores. In the War of 1812, the British invaded through Chesapeake Bay.

The William Preston Lane, Jr., Memorial Bridge spans the upper bay near Annapolis, Md. It was opened to traffic in 1952 and is 4 miles (6.4 km) long. The Chesapeake Bay Bridge-Tunnel was completed across the lower bay in 1964. The bay forms part of the Atlantic Intracoastal Waterway.

Baltimore is the chief port on the upper (northern) portion of the bay. The Chesapeake and Delaware Canal connects the head of the bay with the Delaware River estuary. The port group of Hampton Roads, around Norfolk, Va., at the mouth of the James River, exports coal and tobacco. An important naval base is located at Norfolk.

Until the latter half of the 20th century, Chesapeake Bay's sheltered, nutrient-rich waters supported vast populations of fish, shellfish, and other marine life. Commercial fishing and recreational activities abounded. By the 1970s, however, residential and industrial development of the surrounding land had led to significant pollution of the bay by sewage, industrial wastes, and sediment. Commercial fishing dropped off sharply during the 1970s and into the 1980s, as did recreational use of the bay. Various projects have been undertaken in an effort to reverse the environmental damage that the bay has suffered.

Chesapeake Bay Bridge-Tunnel, complex of trestles, man-made islands, tunnels, and bridges that runs across the entrance to Chesapeake Bay, providing a vehicular roadway between the Norfolk–Hampton Roads area (southwest) and Cape Charles at the tip of the Delmarva Peninsula (northeast). It was begun in 1958 and completed in 1964. The bridge-tunnel complex is 17.6 miles (28 km) long from shore to shore and consists mostly of low trestle bridges carrying a two-lane highway. Because of the importance of shipping in the bay, the crossing was sunk deep beneath the main shipping channels in tunnels at two points, each tunnel being more than a mile long. Four man-made islands, constructed in water averaging 40 feet (12 m) in depth, provide portals by which the roadway enters the tunnels. Near the north end of the bridge-tunnel complex, flanking Fisherman Island off Cape Charles, two high-clearance bridges provide part of the crossing.

Cheselden, William (b. Oct. 19, 1688, Somerby, Leicestershire, Eng.—d. April 10, 1752, Bath, Somersetshire), British surgeon and teacher of anatomy and surgery who wrote *Anatomy of the Human Body* (1713) and *Osteographia, or the Anatomy of the Bones* (1733). Both books were used as texts by anatomy students for nearly a century.

Cheselden was apprenticed to a Mr. Wilkes, surgeon of Leicester. He also studied under the anatomist William Cowper in 1703 and under James Ferne, a surgeon and lithotomist (specialist in removal of bladder stones) at St. Thomas' Hospital. By 1711 he was already established as a lecturer in anatomy. Cheselden was named assistant surgeon at St. Thomas' in 1718 and was elected one of the institution's principal surgeons the following year. Queen Caroline appointed him to be her surgeon in 1727. In 1733 he published *Osteographia,* an atlas of the bones of the human body that was widely celebrated for the beauty and accuracy of its illustrations.

Cheselden was known for his swift and skillful operations; it was reported that he could perform a lithotomy in 54 seconds. He was, in 1727, the first surgeon to extract bladder stones using the lateral (rather than the suprapubic) approach, a technique invented by him and soon used by surgeons throughout Europe.

Cheshire, county of northwestern England, bordering Wales on the west, fronting the Dee and Mersey estuaries to the north, and flanked by the Pennine uplands, partly within the Peak District National Park, to the east. With an area of 901 square miles (2,333 square km), it is divided into the following districts: the city of Chester and the boroughs of Congleton, Crewe and Nantwich, Ellesmere Port and Neston, Halton, Macclesfield, Vale Royal, and Warrington.

Geologically most of the county is underlain by sandstones and marls of Triassic age; many soils and building stones in churches are of the distinctive red colouring. But the structural simplicity of the Cheshire plain is complicated by a highly fragmented pattern of glacial clays, sands, and gravels through which rivers meander and among which lie distinctive small lakes, or meres.

Hill forts of the Bronze and Iron ages were established on the lightly wooded sandstone mid-Cheshire ridge, the watershed between the catchments of the River Dee in the west and the Rivers Weaver and Dane in the east. In the north the density of tree cover on the ridge has been raised in the present century by the Forestry Commission in the ancient

hunting ground of Delamere Forest; the commission has likewise planted large tracts of Macclesfield Forest on the western flanks of the Pennines.

The county is largely agricultural, with dairy farming predominant. Large, efficient farms on the plain specialize in milk production. In only a few farmhouses is Cheshire cheese still made—it is now largely a factory product. The density of dairy cattle is the highest of any county in England; black and white Friesian cows often graze in proximity to black and white half-timbered farmhouses. This vernacular style has also survived in several ancient towns, such as Nantwich, and was even revived in the 19th century in Chester.

Chester, the county town (seat), is of Roman origin. Unusual for England, the city walls and entrance gates are well preserved, and the richly carved timbers in its buildings, especially in two-tiered galleried shops called the Rows, constitute a considerable tourist attraction. Three towns with the suffix "-wich"—Northwich, Middlewich, and Nantwich—owed their early prosperity to salt extraction. In scale of operation, the industry now serves a national market. Silk mills still function in Macclesfield, although this branch of the textile industry has declined at Congleton, another early silk town. Crewe is a product of the railway age; it remains a centre for railway and luxury automobile engineering.

Several former large houses and their estates in the county have been converted into research establishments and headquarters offices. The county operates a strict policy of building control in the countryside and of conservation in the historic towns. Earlier, however, the chemical industry had been attracted to Halton and Warrington. These districts were added to Cheshire in the government boundary reforms of 1974. Runcorn and Warrington have been designated as new towns. At the same time, Cheshire lost most of the Wirral Peninsula to the Merseyside area, and many leafy commuter suburbs in the north of the county were annexed by Greater Manchester. The population involved in the transfers approached 700,000. Pop. (1986 est.) 946,500.

Chesil Beach, also called CHESIL BANK, beach, county of Dorset, England, that stretches 18 miles (29 km) from Bridport to the Isle of Portland. One of the best-known natural features in Britain, it consists of shingle, 98.5 percent of which is hard flint or chert rock. From Abbotsbury to Portland (12 miles [19 km]) the beach is separated from the mainland by a lagoon. The most remarkable



Chesil Beach as seen from the Isle of Portland, Dorset

By courtesy of the Tourist Photo Library, London

feature of the beach is the lateral sorting of the shingle: at the northern end it is pea-sized, and at Portland the average diameter of the stones is 2 inches (5 cm).

Chesneus, Andreas: *see* Duchesne, André.

Chesney, Francis Rawdon (b. March 16, 1789, Annalong, County Down, Ire.—d. Jan. 30, 1872, Mourne, County Down), British soldier, explorer, and Middle East traveler whose fame rests on his projects for the Suez Canal and for an overland route to India by the Euphrates River valley.

After a cadetship at the Royal Military Academy at Woolwich, near London, Chesney was gazetted to the Royal Artillery in 1805 and later rose to be a general. During



Chesney, detail from a painting over a photograph; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

a tour of military duty at Constantinople in 1829, he formulated plans for the Suez Canal that were the basis of Ferdinand de Lesseps' undertaking completed in 1868.

After a daring journey from ʿĀnah on the Euphrates to the Persian Gulf, Chesney in 1831 suggested the overland route to India and, with the support of the East India Company, pressed the proposal on the British government. In 1835 he was sent in command of a small expedition to test the navigability of the Euphrates. In spite of much opposition from the Egyptian pasha, he transported two steamers in sections overland from the Mediterranean at Antioch to the middle Euphrates. The *Tigris* went down in a storm, but Chesney and the *Euphrates* reached the Persian Gulf in the summer of 1836. Though the voyage was deemed a success, the British government took no steps to implement his plan. His report of the expedition was published in *The Expedition for the Survey of the Rivers Euphrates and Tigris,* 2 vol. (1850), and *Narrative of the Euphrates Expedition* (1868).

Chesney was sent to Hong Kong (1843–47) to command the British artillery after the first Opium War with China. He retired from the army in 1847, and, though he went to the Middle East again in 1856 and 1862, he made his home in Ireland until his death.

Chesnut, Mary Boykin Miller (b. March 31, 1823, Pleasant Hill, S.C., U.S.—d. Nov. 22, 1886, Camden, S.C.), author of *A Diary from Dixie,* an insightful view of Southern life and leadership during the American Civil War.

The daughter of a prominent South Carolina political leader, Mary Boykin Miller attended private schools in Camden and Charleston. In 1840 she married James Chesnut, Jr., who later served as a U.S. senator from South Carolina until he resigned to take an important role in the secession movement and the Confederacy.

Accompanying her husband, who was a staff officer, on his military missions during the Civil War, Chesnut began recording her views and observations on Feb. 15, 1861, and closed her diary on Aug. 2, 1865. After the war she reworked her manuscript many times in anticipation of publication. But *A Diary from Dixie* was not published until 1905, long after her death. Although not a day-by-day account, *A Diary* is regarded highly by historians for its perceptive views of Confederate military and political leaders and for its insight into Southern society during the Civil War.

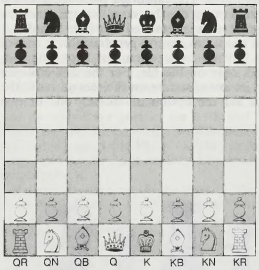
Chesnutt, Charles W(addell) (b. June 20, 1858, Cleveland, Ohio, U.S.—d. Nov. 15, 1932, Cleveland), first important black American novelist.

Chesnutt was the son of free blacks who had left their native North Carolina prior to the American Civil War. Following the war his parents moved back to North Carolina. By the time Chesnutt was 25, he was married and was already a successful school principal, but he became so distressed about the treatment of blacks in the South that he moved his wife and children to Cleveland. He worked as a clerk-stenographer while becoming a practicing attorney and establishing a profitable legal stenography firm. In spare moments he wrote stories.

Between 1885 and 1905 Chesnutt published more than 50 tales, short stories, and essays, as well as two collections of short stories, a biography of the antislavery leader Frederick Douglass, and three novels. His "The Goophered Grapevine," the first work by a black accepted by *The Atlantic Monthly* (August 1887), was so subtle in its refutation of the plantation school of Thomas Nelson Page that most readers missed the irony. This and similarly authentic stories of folk life among the North Carolina blacks were collected in *The Conjure Woman* (1899). *The Wife of His Youth and Other Stories of the Color Line* (1899) scores colour prejudice among blacks as well as between the races in a manner reminiscent of George W. Cable. *The Colonel's Dream* (1905) dealt trenchantly with problems of the freed slave. A psychological realist, Chesnutt made use of familiar scenes of North Carolina folk life to protest social injustice.

His works outranked any written by blacks until the 1930s. Chesnutt's thematic use of the humanity of blacks and the contemporary inhumanity of man to man, black and white alike, anticipates the work of later writers as diverse as William Faulkner, Richard Wright, and James Baldwin.

chess, a game for (usually) two players, using a checkered board and specially designed pieces. Each player moves the 16 pieces of his set in accordance with fixed restrictions on the movement of each type of piece, attempting to force the opponent's principal piece, the king, into a position where it is unable to escape capture—in "checkmate." The game originated in India, or China, during or before the 6th century from ancient forms, derivations of which may still persist in certain regional variants such as Chinese, Korean, Japanese, and Malay chess. The game spread westward



Position of chessmen at beginning of game
queen's rook (QR), queen's knight (QN), queen's bishop (QB), queen (Q), king (K), king's bishop (KB), king's knight (KN), king's rook (KR); chessmen in front of these pieces are the pawns

through Persia to Arabia and thence was most likely passed on to the Spaniards by the Muslims and to the Italians by the Byzantines. In later times it even acquired a patron goddess, Caissa, the muse of chess, first appearing in a poem by Sir William Jones in 1763.

The chessboard and chessmen. The chessboard consists of 64 squares, coloured alternately light and dark, arranged in eight vertical rows called files and eight horizontal rows called ranks. The rows, or lines, of squares of the same colour that crisscross the chessboard are called diagonals. The players—or opponents—are called white and black (regardless of the actual colours of the chess set). The players are seated opposite each other with the board placed between them, so that each player has a white corner square at his right hand. In printed diagrams the black side is by convention on top, with the white pawns imagined to be moving upward, the black pawns downward. The conventional chessboard consists of black (or brown) and white (or beige) squares.

Each opponent has a set of 16 men, one set light in colour for the white side, the other dark for the black side, both placed facing each other. The first row is occupied by the "pieces," distinguished by their shapes into five kinds: king, queen, rook, bishop, knight, abbreviated in conventional notation: K, Q, R, B, N. The men in front of these pieces, positioned in the second row, are called pawns, abbreviated P. Though the term pieces is often interchanged for the word chessmen, in an accurate sense it should exclude pawns and apply only to the pieces standing in the first row. To avoid ambiguity, the pieces and pawns together are sometimes designated as the material.

The moves. The king moves in any direction, one square at a time. The queen, rook, and bishop are "long-range" pieces that can cover all the distance across the board in any direction as long as they are not obstructed. The rook moves on the rank and files, the bishop on the diagonals; the queen combines the powers of rook and bishop inasmuch as it moves on any open line, horizontally, vertically, or diagonally. The knight has a peculiar L-shaped movement, moving two squares in one row (rank or file) and one square in a row perpendicular to the first; the knight is permitted to "jump" over any black or white piece that might occupy any of these intermediate squares. Any piece other than a pawn captures in the same way as it moves; that is, it may capture an enemy man standing on a square to which the capturing man may legally move. The capturing piece replaces the captured man on the same square, and the captured man is removed from the board.

The pawn has several peculiarities. It moves only forward and, when not capturing, advances only on the file. For the first advance from its initial square on the second rank, the pawn has the option of moving one or two squares, but thereafter it may move only one square at a time. If it reaches the eighth rank, farthest from the owner, the pawn is immediately replaced by a queen, rook, bishop, or

	a	b	c	d	e	f	g	h	
8	QR1	QN1	QB1	Q1	K1	KB1	KN1	KR1	8
	QR8	QN8	QB8	Q8	K8	KB8	KN8	KR8	
7	QR2	QN2	QB2	Q2	K2	KB2	KN2	KR2	7
	QR7	QN7	QB7	Q7	K7	KB7	KN7	KR7	
6	QR3	QN3	QB3	Q3	K3	KB3	KN3	KR3	6
	QR6	QN6	QB6	Q6	K6	KB6	KN6	KR6	
5	QR4	QN4	QB4	Q4	K4	KB4	KN4	KR4	5
	QR5	QN5	QB5	Q5	K5	KB5	KN5	KR5	
4	QR5	QN5	QB5	Q5	K5	KB5	KN5	KR5	4
	QR4	QN4	QB4	Q4	K4	KB4	KN4	KR4	
3	QR6	QN6	QB6	Q6	K6	KB6	KN6	KR6	3
	QR3	QN3	QB3	Q3	K3	KB3	KN3	KR3	
2	QR7	QN7	QB7	Q7	K7	KB7	KN7	KR7	2
	QR2	QN2	QB2	Q2	K2	KB2	KN2	KR2	
1	QR8	QN8	QB8	Q8	K8	KB8	KN8	KR8	1
	QR1	QN1	QB1	Q1	K1	KB1	KN1	KR1	
	a	b	c	d	e	f	g	h	

Descriptive and algebraic systems of notation
The descriptive system names the file after the piece on the first rank, as the KR file at extreme right, and the ranks are counted away from the player whose piece moves; in the algebraic system the files are lettered a to h, from white's left to right, and the ranks are numbered 1 to 8 from white to black (in diagrams the bottom edge is always the white side; in this diagram heavy type indicates system from white's side, and lighter type system from black's side)

knight of the same colour, at the option of the owner. This Cinderella-type transformation, called promotion, is also called queening because the usual choice is a queen, the most powerful piece. If for a particular reason the chosen substitute is not a queen but a minor piece, the change is called an underpromotion. A pawn may promote even though the piece that is chosen to replace it has not been removed from the board by capture—*e.g.*, a player may have two or more queens or other pieces—but promotion to a king is not permitted.

Of all chessmen, only the pawn captures differently from its noncapturing move. It captures to either square that is adjacent diagonally forward. If a pawn makes the double advance for its first move, an adverse pawn that could have captured it had the first pawn moved only one square may capture it en passant (*i.e.*, in passing); but this en passant capture may be made only on the immediate turn, not later.

Castling is a compound move of the king and one rook (the rook was formerly also called the castle); it may be made, if at all, only once in a game. The move is executed by moving the king two squares toward the rook and then placing the rook on the square passed over by the king. Either rook may be used in castling. The move is legal only if neither the king nor the rook has yet moved from its original square, if all the squares between them on the rank are vacant, if the king is not in check (threatened with capture on the opponent's next move), and if the squares over which and to which the king moves are not exposed to check.

Promotion, castling, and en passant capture are the only exceptions to the otherwise strictly geometrical norms of movement, but these exceptions create a great range of permutations of calculable moves.

Evaluation of pieces and pawns. Rating the value of the pawn as 1, the fighting power of the pieces is approximately as follows: knight 3, bishop 3, rook 5, queen 9. Although knight and bishop are often rated as equal, two bishops are usually stronger than two knights. This scale provides a measure of whether material equality is disturbed by an exchange of captures of unlike pieces, whereby any gain may be potentially decisive. Tactical considerations, however, often override the abstract evaluations. Sacrifices of material are often made for long-range positional advantage.

Object of play. The game is won by capturing the adverse king. A threat to capture the king is a "check." The only ways of meeting a check are to move the king, capture the attacker, or interpose a man on the line of check. The capture of the king is never consummated and remains symbolic; for, when the king is attacked ("in check") and cannot escape by any of the aforementioned means, then he is "checkmated" and the game ends forthwith. Often, games end by resignation when it is obvious that ultimate defeat cannot be avoided.

Drawn games. A game is drawn by reason of (1) the inability of either player to checkmate, (2) a perpetual check, (3) the triple recurrence of an identical position with the same player having the move, (4) the absence of material exchange or any pawn move within a sequence of 50 moves, with certain exceptions if so laid down before the game, (5) a stalemate, whereby a player can make no legal move although his king is not in check, or (6) a mutual agreement by the players, although in some instances this requires assent by a referee.

International competition. The World Chess Federation, officially the Fédération Internationale des Échecs (FIDE), is the body with which almost all national or local chess organizations are affiliated. It controls world chess events and is in charge of the revision and interpretation of the rules of the game. Every year it holds a congress and every two years supervises the International Team Tournament, held in a sponsoring country, with each country represented by a team of four players with two reserves. It also organizes the World Championship and various other events. For winners of international team championships and of men's and women's world championships, *see* Sporting Record: *Chess.*

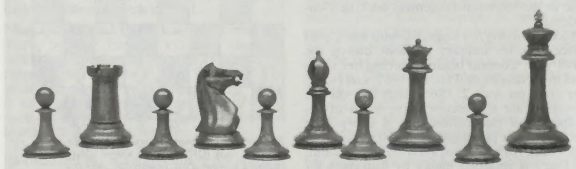
The game of chess is played according to the Laws of Chess (or Chess Code) as formulated by the World Chess Federation. These include not only the basic rules but also specialized regulations that apply to official tournaments and matches. A few of the tournament regulations may be mentioned:

Unless preceded by the warning "I adjust" (French *j'adoube*), a piece that is touched must be moved or captured, and a completed move shall not be retracted. (This is the "touched piece" rule.)

In tournament play each player must make a given number of moves in a given period of time, specified in advance, called the "time limit."

If a game is not finished by the closing time designated for the session, it is "adjourned."

Disputes between players are decided by the referee (or umpire) or by the tournament director or directors or ultimately by the World Chess Federation. A provision formalized by FIDE in 1968 allows each champion or contender the legitimate use of a second, to advise



Staunton chessmen showing (front row) pawns and (back row, from left) rook, knight, bishop, queen, and king
John Jaques & Son Ltd., Thornton Heath, Eng



Carved oak chest, French, 14th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

on stratagems and help analyze and evaluate positions during adjournments. The privilege of using seconds was extended also to grand masters on the occasion of important international events.

Chessie System: *see* Chesapeake and Ohio Railway Company.

Chessman, Caryl (Whittier) (b. May 27, 1921, St. Joseph, Mich., U.S.—d. May 2, 1960, San Quentin, Calif.), American criminal whose writings during 12 years on death row made him the symbol of an enduring controversy over capital punishment.

Chessman had been sent to reform school and the county jail four times before he was sentenced in March 1941 to San Quentin prison for a term of 16 years to life on several counts of robbery, assault, and attempted murder. He escaped from prison in 1943 but was recaptured in 1944; he was paroled in December 1947. On Jan. 23, 1948, he was arrested as the accused "Red Light Bandit," who, posing as a policeman in a car with a red spotlight, had robbed couples in Los Angeles' lovers' lanes; twice the bandit had kidnapped women and forced them at gunpoint to commit acts of "sexual perversion." Chessman protested his innocence and conducted his own defense, but on May 18 he was sentenced to death—death then being the punishment for kidnapping in California if the victim was physically harmed.

In the following years Chessman made numerous legal appeals and wrote four books—*Cell 2455, Death Row* (1954; expanded ed. 1960), *Trial by Ordeal* (1955), *The Face of Justice* (1957), and *The Kid Was a Killer* (1960), a novel—that brought his case to widespread public attention. (*Cell 2455, Death Row* was also filmed.)

His last reprieve was granted Feb. 19, 1960, by the governor of California. During the reprieve the California state legislature refused to substitute mandatory life imprisonment for capital punishment, and Chessman was executed in the gas chamber in the California State Prison at San Quentin.

chessylite (mineral): *see* azurite.

chest, the earliest form of container for storing clothes, documents, valuables, or other possessions, and the most important piece of furniture in the European home until after the end of the Middle Ages. Chests with flat tops were also sometimes used as seats or beds.

Chests are known from the 18th dynasty (*c.* 1539–1292 BC) in Egypt, when they were mounted on short legs. The skills used in making such ancient furniture were lost during the early Middle Ages, when the dugout was made, simply a crudely hollowed tree trunk fitted with a lid and often strengthened with iron bands to prevent splitting. Dugouts were gradually replaced by heavy chests made from boards, some of which survive in old European churches. They were generally fitted with a hinged lid, and many were strengthened with iron bands and fitted with locks. Sometimes they contained a small lidded box, fixed across one end, to hold sweet-smelling herbs. The French, in the 13th century, were among the first to relieve the plainness of the chest with decoration, covering the planks with elaborate wrought-iron scrolls. One of the most outstanding chests decorated with wrought-iron work is preserved in the Museo de Artes Decorativas at the Palacio de la Virreina in Barcelona. Other chests of this period copied Romanesque and Gothic architectural forms; the museum in Valère, Switz., for example, contains a chest decorated with roundels and Romanesque arches. Many pictorial scenes were carved on the sides of the chests, especially chivalric scenes such as St. George and the dragon or jousting knights.

Architectural forms continued to be imitated during the Renaissance, and as late as the 16th century the chest was still an important piece of furniture. In France, where Italian forms were copied, the front of the chest usually had a single panel to allow greater freedom of decoration. Early Tudor chests in England were still decorated with Gothic styles and linenfold paneling (carving that resembles vertical folds of material).

Chests are among the earliest pieces of American furniture. Examples with flat carvings of leaves, flowers, and vines are known to have been made in the Connecticut River valley in the late 17th century, whereas more austere chests, with geometric carving, sometimes painted, were made along the coast of Massachusetts. Marriage chests made by Germans in Pennsylvania in the 18th century, decorated with inlay and sometimes the name of the owner, were based on southern German models. *See also* chest of drawers.

chest cavity: *see* thoracic cavity.

chest of drawers, type of furniture developed in the mid-17th century from a chest with drawers in the base. By the 1680s the "chest" was entirely made up of drawers: three



Walnut chest of drawers in the Chippendale manner by Jonathan Gostelowe, Philadelphia, *c.* 1770; in the Philadelphia Museum of Art
By courtesy of the Philadelphia Museum of Art

long ones of varying depth, topped by two short ones side by side. Sometimes a flat slide with two small pull handles was included at the top, to extend the table space. Early chests of drawers were mounted on bun or ball feet or on stands with legs joined by stretchers. Drawer pulls were initially of turned wood and later of brass, with ornamental brass shields, or escutcheons, that varied in design with the fashion. Double chests, or chest-on-chests, known as tallboys in England and highboys in America, were also made.

In the mid-18th century the rectangular lines of the chest of drawers were often modified. Beveled corners with chinoiserie, or Chinese-style, fretwork (decoration consisting of small straight bars intersecting one another at right or oblique angles) were introduced, and serpentine fronts and bowfronts became popular. A heavier version, with corner pilasters (partially projecting columns), was introduced during the Regency period, and turned wooden handles returned to favour in the Victorian period. *See also* commode.

Chester, city ("district"), county of Cheshire, England, on a small sandstone ridge at the head of the estuary of the River Dee.



The Rows with the High Cross, Chester
Kenneth Scowen

The location was chosen by the Romans as headquarters of the 20th Legion. Known as Deva, or Castra Devana, it was an important Roman town but was deserted by the early 5th century. There are a number of Roman remains, including the foundations of the north and east walls. By the 10th century Chester was a flourishing Mercian settlement, trading with northern Wales, Ireland, and the Wirral Peninsula, and had its own mint, established in 970. William I the Conqueror made it the centre of a palatinate earldom in 1071, virtually independent of royal government, but in 1237 the earldom reverted to the crown. The earliest city charter dates from 1176. Chester was an important port in the 13th and 14th centuries, trading especially with Ireland. The gradual silting of the River Dee led to its decline, and by the 18th century Liverpool had outstripped it.

In the 19th century the coming of the railways made Chester again a thriving commercial centre, and the many black-and-white buildings dating from this period reflect this prosperity. Chester became a cathedral city in 1541 when the Benedictine abbey of St. Werburgh was dissolved. The cathedral and the buildings grouped around the cloisters are important examples of medieval architecture. The city was (and remains) an administrative as well as a commercial and ecclesiastical

centre, for it is the historic county town of Cheshire.

Chester still has its walls intact in their entire circuit (2 miles [3 km]). The street plan of the central area is Roman in origin, with four main streets radiating at right angles. Perhaps the most distinctive feature of the town is the Rows, a double tier of shops with the lower ones set back and the upper ones projecting over them.

The administrative district, with an area of 173 square miles (448 square km), extends far beyond the old city walls to include an extensive rural area adjoining the Welsh border. The countryside is important for dairying and includes a number of small settlements. Malpas has a fine medieval church, and the ruins of Beeston Castle give views over the Cheshire plain to the Welsh hills. Pop. (1981) urban area, 82,363; (1989 est.) district, 114,200.

Chester, city, seat of Randolph county, southwestern Illinois, U.S., on the Mississippi River (there bridged to Missouri) near the mouth of the Marys River. Founded in 1829 and named for Chester, Eng., it developed as a trading centre for an agricultural area yielding wheat, corn, and soybeans. There are grain elevators and flour mills in the city, and stone quarries are nearby. Manufactures include clothing and leather goods. The Menard Correctional Center was established there as a penitentiary in 1877. Two other state institutions, the Chester Mental Health Center and the Menard Psychiatric Center, are in the city. Fort Kaskaskia and Fort de Chartres state historic sites are local tourist spots. Inc. 1855. Pop. (1990) 8,194.

Chester, city, Delaware county, southeastern Pennsylvania, U.S., on the Delaware River (across from Bridgeport, N.J.), within the Philadelphia metropolitan area. One of the oldest communities in the state, the Chester area was granted by the Swedish crown to a bodyguard of the governor of New Sweden in 1644. After 1655 Dutch settlers joined the Swedes in establishing the town of Upland. William Markham, the deputy governor to William Penn, located his seat of government there when he arrived in 1681 to establish the English colony of Pennsylvania. Upon Penn's arrival in 1682 the province's first assembly was convened there. Penn probably renamed the settlement Chester for a Quaker centre in Cheshire, Eng. From this early period date the John Morton (1654) and the Caleb Pusey (1683) houses.

The community declined after Penn moved his government to Philadelphia, and not until after 1850, when the city became a southwestern adjunct of a rapidly industrializing Philadelphia, did substantial growth begin. The John Roach Company, founded there in 1872, was one of the nation's first iron or steel shipbuilding enterprises. Diversified industries now include shipbuilding and the manufacture of steel, chemicals, and paper.

Chester is the seat of Widener University. Swarthmore College (1864) is 4 miles (6.5 km) north. Inc. borough, 1701; city, 1866. Pop. (1990) 41,856.

Chester, EARLS OF, titled English nobility of a Norman family, grouped below chronologically and indicated by the symbol •.

Since 1301 the title has been held only by the heir apparent of the English monarch.

• Chester, Hugh of Avranches, 1st Earl of, VICOMTE (Viscount) D'AVRANCHES, also called HUGH THE FAT, or HUGH THE WOLF, French HUGUES LE GROS, French-Latin HUGUES LUPUS (b. *c.* 1047—d. July 27, 1101), son of Richard, Viscount d'Avranches, and probable companion of William the Conqueror, who made him Earl of Chester in 1071. (He inherited his father's viscountship sometime after 1082.) He had special privileges in his earldom, and he held land in 20 counties. Hugh was called *Le Gros* because of his great bulk and *Lupus* because of his ferocity. He regarded Saint Anselm as his friend, and he showed the customary liberality to religious houses. His life was mainly spent fighting in Wales and in Normandy. Hugh's only son Richard, who was childless, drowned in the White Ship (*see* William the Aetheling) in November 1120.

• Chester, Ranulf de Gernons, 4th Earl of, VICOMTE (Viscount) DE BAYEUX, VICOMTE D'AVRANCHES, Ranulf also spelled RANDULF, or RALPH (b. *c.* 1100—d. Dec. 16, 1153), a key participant in the English civil war (from 1139) between King Stephen and the Holy Roman empress Matilda (also a claimant to the throne of England). Initially taking Matilda's part, he fought for her in the Battle of Lincoln (1141), capturing and briefly imprisoning Stephen. Later (1149) he transferred his allegiance to the king in return for a grant of the city and castle of Lincoln. Coventry received its original charter from him.

• Chester, Ranulf de Blundeville, 6th Earl of, EARL OF RICHMOND, EARL OF LINCOLN, VICOMTE (Viscount) DE BAYEUX, VICOMTE D'AVRANCHES, also called DUKE OF BRITTANY, Ranulf also spelled RANDULF, or RALPH (b. *c.* 1172, Oswestry, Powys, Wales—d. Oct. 28, 1232, Wallingford, Oxfordshire, Eng.), most celebrated of the early earls of Chester, with whom the family fortunes reached their peak.

Ranulf succeeded his father Hugh de Kevelioc (1147–81), son of Ranulf, the 4th earl, in 1181 and was created Earl of Lincoln in 1217. He married Constance, widow of King Henry II's son, Geoffrey of Brittany, and was thus wont to style himself the Duke of Brittany and Earl of Richmond. He fought in Wales, was on the side of King John during his struggle with the barons over Magna Carta, and was one of this king's executors; he also fought for the young King Henry III against the French invaders and their allies. In 1218–19 he went on the Fifth Crusade to the Holy Land and took part in the capture of Damietta, Egypt; then returning to England he died in 1232.

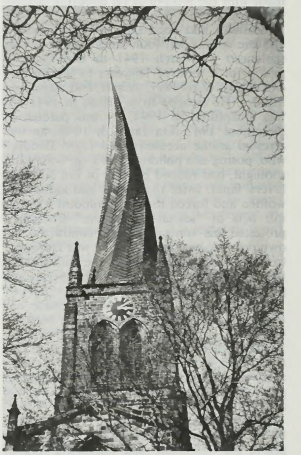
He has been described as the last relic of the great feudal aristocracy of the Norman Conquest. Although twice married, he left no children, and his immense possessions passed to his four sisters. The earl's memory remained noted for a long time, and in the *Vision of Piers Plowman* his name was linked with that of Robin Hood. In November 1232 the earldom of Chester was granted to his nephew John the Scot, Earl of Huntingdon (*c.* 1207–1237), and in 1246, nine years after John had died childless, the title was annexed to the English crown.

Chester-le-Street, district, county of Durham, England, on the northern periphery of Durham city near the River Wear. It has an area of 25 square miles (66 square km). It was the site of a Roman station behind the frontier of Hadrian's Wall, a defensive barrier erected across northern Britain as protection against raids from what became Scotland. The modern development of the town dates from the 17th century, when it began to grow as a centre for the local colliery settlements. The district is now mainly residential. Pop. (1981) urban area, 34,975; (1989 est.) district, 53,100.

Chester Plays, a 14th-century cycle of 25 scriptural plays, or mystery plays, performed at the prosperous city of Chester, in the north of England, during the European Middle Ages. They are traditionally dated about 1325, but a date of about 1375 has also been suggested. They were presented on three successive days at Corpus Christi, a religious feast day that falls in summer. On the first day there was a performance of plays 1–9 (from the fall of Lucifer, through key episodes in the Old Testament, up to the Nativity and the adoration of the Wise Men); on the second day a performance of plays 10–18 (from the flight into Egypt, through Jesus' public ministry, up to the Passion and Crucifixion, the descent into hell, and the arrival in paradise of those virtuous men who had died before the redemption had been achieved); and, finally, on the third day a performance of plays 19–25 (from the Resurrection, through events leading to the Ascension of Christ into heaven, the descent of the Holy Spirit, the coming of Antichrist, up to the Last Judgment).

The Chester Plays are rich in content, yet tell the great story of man's redemption more simply than the other surviving cycles of York, Wakefield, and "N-Town." The text, containing more than 11,000 lines of verse, has been preserved in five manuscripts, which are kept in the Bodleian Library, Oxford; the Huntington Library, California, U.S.; and the British Museum, London. The Chester cycle has been published by the Early English Text Society (1892–1916). *See also* mystery play.

Chesterfield, district and borough, county of Derbyshire, England, at the junction of the Rivers Rother and Hipper. It has an area of

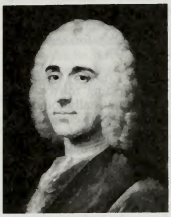


Crooked spire of the Church of St. Mary and All Saints, Chesterfield, Derbyshire, Eng.

Ron Bonser—Bruce Coleman Inc./EB Inc.

25 square miles (66 square km). Recent excavations have confirmed the extent of Roman military and civil occupation near the Rother, and the Roman road from the south, Ryknield Street, bears a pre-Roman name. The ancient borough and market town received boosts to industrialization following the construction of the canal from Chesterfield to the River Trent (1777) and the Midland Railway in 1841. George Stephenson, locomotive maker and railway engineer, lived and died in Chesterfield and assessed the commercial potential of local coal and ironstone. By 1900 the town possessed railway stations on each of three companies' lines. Staveley nearby grew rapidly after the establishment in 1845 of the Staveley Iron and Coal Company. The 14th-century parish church, dedicated to St. Mary and All Saints, has a lead-covered wooden spire 228 feet (69 m) high, which, as a result of timber warping, is twisted nearly 8 feet (2.5 m) out of the vertical. Pop. (1981) urban area, 74,180; (1989 est.) district, 100,200.

Chesterfield, Philip Dormer Stanhope, 4th earl of (b. Sept. 22, 1694, London—d. March 24, 1773, London), British statesman, diplomat, and wit, chiefly remembered as the author of *Letters to His Son* and *Letters to*



Chesterfield, detail of an oil painting by an unknown artist after W. Hoare, c. 1742; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

His Godson—guides to manners, the art of pleasing, and the art of worldly success.

After a short period of study at Trinity Hall, Cambridge, he spent some time abroad, mainly in Paris. He was a great admirer of French manners, culture, and taste. He succeeded to the earldom in 1726 and became ambassador to Holland in 1728. His illegitimate son, Philip Stanhope, the recipient of the letters, was born there in 1732. Returning to England in the same year, Chesterfield took up a parliamentary career for the next decade as a strong opponent of Sir Robert Walpole. In spite of his connection by marriage to the king, he lost favour at court until he demonstrated his abilities as a statesman in his short term (August 1745–April 1746) as lord lieutenant of Ireland. After a term as secretary of state (1746–48), he gradually retired from public life because of increasing deafness.

Chesterfield's winning manners, urbanity, and wit were praised by many of his leading contemporaries, and he was on familiar terms with Pope, Swift, and Voltaire. He was the patron of many struggling authors but had unfortunate relations with one of them, Samuel Johnson, who condemned him in a famous letter (1755) attacking patrons. Johnson further damaged Chesterfield's reputation when he described the *Letters* as teaching "the morals of a whore, and the manners of a dancing master." Dickens later caricatured him as Sir John Chester in *Barnaby Rudge* (1841). The opinion of these two more popular writers—both of whom epitomized middle-class morality—has contributed to Chesterfield's image as a cynical man of the world and a courtier. Careful readers of Chesterfield's letters consider this an injustice. The strongest charge against his philosophy is that it leads to concentration on worldly ends. But within this limitation his advice is shrewd and presented with wit and elegance. Ironically, Chesterfield's painstaking advice seems to have fallen on deaf ears: his son was described by contemporaries as "loutish," and his godson was described by Fanny Burney as having "as little good breeding as any man I ever met."

Chesterfield left many other letters that are models of wit and charm, especially those written to the diplomat Solomon Dayrolles, a lifelong friend who was with him at his deathbed.

Chesterian Series, uppermost major stratigraphic division of North American rocks of the Mississippian Period (the Mississippian began about 345,000,000 years ago and lasted about 20,000,000 years). Excellent exposures of Chesterian rocks occur in the Mississippi Valley region, where they consist of about 458 metres (1,500 feet) of alternating limestones, sandstones, and shales. The lowest unit of the series is a sandstone, which is succeeded by cyclically recurring sandstones and limestones. The sandstones contain economically important petroleum reserves, and extensive drilling has provided détailed information about the shapes of the deposits. Many of the sandstones are thought to represent channel fillings of Mississippian stream systems.

Chesterton, G(ilbert) K(eith) (b. May 29, 1874, London—d. June 14, 1936, Beaconsfield, Buckinghamshire, Eng.), English critic and author of verse, essays, novels, and short stories, known also for his exuberant personality and rotund figure.

Chesterton was educated at St. Paul's School and later studied art at the Slade School and literature at University College, London. His writings to 1910 were of three kinds. First, his social criticism, largely in his voluminous journalism, was gathered in *The Defendant* (1901), *Twelve Types* (1902), and *Heretics* (1905). In it he expressed strongly pro-Boer views in the South African War. Politically, he began as a Liberal but after a brief radical period became, with his Christian and medievalist friend Hilaire Belloc, a Distributist, favouring the distribution of land. This phase of his thinking is exemplified by *What's Wrong with the World* (1910).

His second preoccupation was literary criticism. *Robert Browning* (1903) was followed by *Charles Dickens* (1906) and *Appreciations and Criticisms of the Works of Charles Dickens* (1911), prefaces to the individual novels, which are among his finest contributions to criticism. His *George Bernard Shaw* (1909) and *The Victorian Age in Literature* (1913) together with *William Blake* (1910) and the later monographs *William Cobbett* (1925) and *Robert Louis Stevenson* (1927) have a spontaneity that places them above the works of many academic critics.

Chesterton's third major concern was theology and religious argument. He was converted from Anglicanism to Roman Catholicism in 1922. Although he had written on Christianity earlier, as in his book *Orthodoxy* (1909), his conversion added edge to his controversial writing, notably *The Catholic Church and Conversion* (1926), his writings in *G.K.'s Weekly*, and *Avowals and Denials* (1934). Other works



Chesterton, chalk drawing by James Gunn, 1932; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

arising from his conversion were *St. Francis of Assisi* (1923), the essay in historical theology *The Everlasting Man* (1925), and *St. Thomas Aquinas* (1933).

In his verse Chesterton was a master of ballad forms, as shown in the stirring "Lepanto" (1911). When it was not uproariously comic, his verse was frankly partisan and didactic. His essays developed his shrewd, paradoxical irreverence to its ultimate point of real seriousness. He is seen at his happiest in such essays as "On Running After One's Hat" (1908) and "A Defence of Nonsense" (1901), in which he says that nonsense and faith are "the two supreme symbolic assertions of truth" and "to draw out the soul of things with a syllogism is as impossible as to draw out Leviathan with a hook."

Many readers value Chesterton's fiction most highly. *The Napoleon of Notting Hill* (1904), a romance of civil war in suburban London, was followed by the loosely knit collection of short stories, *The Club of Queer Trades* (1905), and the popular allegorical novel *The Man Who Was Thursday* (1908). But the most successful association of fiction with social judgment is in Chesterton's series on the priest-sleuth Father Brown: *The Innocence of Father Brown* (1911), followed by *The Wisdom ...* (1914), *The Incredulity ...* (1926), *The Secret ...* (1927), and *The Scandal of Father Brown* (1935).

Chesterton's friendships were with men as diverse as H.G. Wells, Shaw, Belloc, and Max Beerbohm. His *Autobiography* was published in 1936.

chestnut, any of four species of deciduous ornamental and timber trees of the genus *Castanea* in the beech family (Fagaceae), native to temperate regions of the Northern Hemisphere, the burlike fruits of which contain two



European chestnut (*Castanea sativa*)
H. Oakman

or three edible nuts. The remaining six or more *Castanea* species bear single-fruited burs and are known as chinquapins, which is also a common name for trees in the related genus *Castanopsis*.

Plants commonly called chestnut but not of the genus *Castanea* are the cape chestnut, a South African evergreen tree of the rue family (Rutaceae); the horse chestnut (*see* buckeye); the Moreton Bay chestnut; the palm chestnut, a tree of the palm family (Arecaceae); and the water chestnut (*q.v.*).

A chestnut tree is usually tall, with furrowed bark and lance-shaped leaves. Most male flowers are borne in long, upright catkins; female flowers are arranged singly or in clusters at the base of short male catkins.

The American chestnut (*C. dentata*), a fast-growing tree that often reached 30 metres (100 feet), formerly extended over a large area of eastern North America from which it has been virtually eliminated by chestnut blight (*q.v.*), a fungal disease. Vigorous stump sprouts are found in many areas, but most harbour the fungus, and repeated attacks deter the cultivation of the species for its timber or nuts. Crosses of the remaining trees with resistant Asian species have produced a few blight-resistant hybrids, now being developed to replace the American chestnut.

The European chestnut (*C. sativa*), also 30 m tall, is native to Eurasia and northern Africa; it is often called sweet, Spanish, or Eurasian chestnut. The Chinese chestnut (*C. mollissi-*

ma), usually less than 18 m tall, grows at altitudes up to 2,440 m. The Japanese chestnut (*C. crenata*), a similar shrub or tree that may grow to 9 m or more, is found at elevations of less than 915 m; it has heart-shaped leaves about 17 cm long.

The nuts of the European, Chinese, and Japanese chestnuts have local importance as food and are exported in large quantities. Small nuts of the European chestnut are used as feed for livestock or are milled into flour; choice nuts, called marrons, come from varieties developed to produce one large nut in the bur. Varieties of all three trees are cultivated as ornamentals in Europe, North America, and Asia. The European chestnut produces useful timber as well; the American chestnut also was an important source of lumber and nuts before the arrival of the blight.

chestnut blight, a plant disease caused by the fungus *Endothia parasitica*. It has killed virtually all native American chestnuts (*Castanea dentata*) in the United States and Canada and is also destructive in other countries. Other blight-susceptible species include Spanish chestnut (*C. stavia*), post oak (*Quercus stellata*), and live oak (*Q. virginiana*). In Europe several oak species are affected.

Accidentally imported from the Orient, the disease was first observed in 1904 in the New York Zoological Gardens. By 1925 it had decimated the American chestnut population in an area extending over 1,000 miles (1,600 km) north, south, and west of its entry point. Symptoms include reddish brown bark patches that develop into sunken or swollen and cracked cankers that kill twigs and limbs. Leaves on such branches turn brown and wither but remain attached for months. Gradually the entire tree dies. The fungus persists for years in short-lived sprouts from old chestnut roots and in less susceptible hosts. It is spread locally by splashing rain, wind, and insects; over long distances, by birds. Chinese (*C. mollissima*) and Japanese (*C. crenata*) chestnuts are resistant. Crosses between American and Asian species have produced varieties with excellent nuts, but timber quality is closely linked with blight susceptibility. In the 1970s a native American strain of chestnut blight was identified. Experiments indicated that the native strain was less virulent than other strains and that it had a nullifying effect on lethal strains. Unfortunately, the mild strain of blight does not readily spread from tree to tree among American chestnuts.

chestnut oak, any of several species of North American timber trees, with chestnut-like leaves, belonging to the white oak group of the genus *Quercus* in the beech family (Fagaceae). Specifically, chestnut oak refers to *Q. prinus* (or *Q. montana*), also called rock chestnut oak, a tree found on rocky soils of the eastern United States and southern Canada. It is usually about 21 m (70 feet) tall but may grow to 30 m. It has blackish, tannin-rich bark, with deep longitudinal ridges; the chestnutlike, lance-shaped leaves, about 18 cm (7 inches) long, have 10 to 15 pairs of parallel veins, each ending at a rounded tooth. Yellow-green above, paler and fuzzy beneath, the leaves turn orange-red or rust brown in autumn.

The swamp chestnut oak (*Q. michauxii*), sometimes considered a variety of *Q. prinus*, is a valuable bottomland timber tree of the Atlantic and Gulf coastal plains and Mississippi Valley region. The tree is usually 24 to 36 m tall, with branches rising at narrow angles from a columnar trunk to a round, compact head. It has silver-white, red-tinged bark and bright green, glossy leaves, velvety and whitish beneath, usually 20 cm long, and turning red in autumn. Swamp chestnut oak is often called either cow oak, because the acorns are eaten by cattle, or basket oak, from local use of wood strips for basket material.

Q. muehlenbergii, sometimes referred to as yellow chestnut oak, is also called chinquapin oak. The dwarf chestnut oak, or dwarf chinquapin oak, is *Q. prinoides*.

Chétardie, Joachim-Jacques Trotti, marquis de La: *see* La Chétardie, Jacques-Joachim Trotti, Marquis de.

Chetnik, Serbo-Croatian ČETNIK, member of a Serbian nationalist guerrilla force that formed during World War II to resist the Axis invaders and Croatian collaborators but that primarily fought a civil war against the Yugoslav communist guerrillas, the Partisans.

After the surrender of the Yugoslav royal army in April 1941, Serb soldiers throughout Yugoslavia set up *čete*, or "bands," named after armed irregulars who had harrassed the Turks in the 19th century. The most important were those organized in the Ravna Gora district of western Serbia under Colonel Dragoljub (Draža) Mihailović. Mihailović directed his units to avoid large-scale fighting with the Germans (who exacted horrible reprisals for every act of resistance) and to wait for an Allied invasion that would liberate Yugoslavia and restore the monarchy. This cautious strategy soon led the Chetniks into open conflict with the Partisans. Even after the Germans drove both forces out of Serbia, many Chetniks occasionally joined German, Italian, and Croatian units in operations against their communist rivals. The Allies, who at first considered Mihailović the pillar of the Yugoslav resistance, eventually shifted their support to the Partisans. By the end of the war, the Chetniks were greatly reduced in number. Some retreated north to surrender to Anglo-American forces; Mihailović and his few remaining followers tried to fight their way back to the Ravna Gora to continue the anticommunist struggle, but they were beaten and dispersed by the victorious Partisans. In March 1946 Mihailović was captured and brought to Belgrade, where he was tried and executed.

Chetrī (people): *see* Pahāṛī.

Chettle, Henry (b. *c.* 1560—d. *c.* 1607), English dramatist, typical of the versatile, popular writer of the Elizabethan age.

Chettle began his career as a printer and associated with such literary men as Robert Greene and Thomas Nashe. He prepared for posthumous publication *Greenes groatsworth of witte* (1592), with its attack on William Shakespeare as an "upstart Crow," but offered Shakespeare compliments and an olive branch in his own *Kind harts dreame* (1593), a topical satire framed in a dream fable. His *Piers Plainnes Seaven Yeres Prentiship* (1595) is a picaresque romance. Francis Meres, in *Palladis Tamia* (1598), commends him as one of our "best for comedy," and between 1598 and 1603 he is known to have had a hand in 49 plays. On many of them he collaborated with other writers; *The Tragedy of Hoffman* is the only extant play that is attributed to Chettle alone. A play of the popular revenge type, it enjoyed a revival shortly before its publication in 1631.

Chetumal, in full CIUDAD CHETUMAL, town, capital of Quintana Roo *estado* ("state"), eastern Mexico, on the eastern coast of the Yucatán Peninsula, on the Bay of Chetumal, just north of the Belize (formerly British Honduras) border, at only 20 feet (6 m) above sea level.

The settlement, originally known as Payo Obispo, was founded in 1899 to prevent illegal exploitation of timber and shipments of contraband arms and ammunition by rebellious Maya Indians. It became the territorial capital when Quintana Roo was separated from Yucatán state in 1902.

Set in tropical rain forests, Chetumal depends heavily upon forestry and forest products for its income. Chicle, lumber, and plywood are its principal exports. Fishing is only for the local market. Communication with the rest of Mexico and other nations is mostly by sea or air, though roads lead both to Mérida, the capital of Yucatán state, 282 miles (454 km) to the north, and to Belize City, former capital of Belize. Pop. (1980) 56,709.

cheval glass, also called HORSE DRESSING GLASS, or PSYCHE, tall dressing mirror, suspended between two pillars, usually joined by horizontal bars immediately above and below the mirror and resting on two pairs of long feet. The cheval glass was first made toward the end of the 18th century. The glass could be tilted at any angle by means of the swivel screws supporting it, and its height could be adjusted by means of lead counterweights and a horse, or pulley, from which the name was taken. Thomas Sheraton, in *The Cabinet Dictionary* (1803), included a design with a nest of drawers at one side and another with a writing fitment. When wardrobes were fitted with mirrored doors, the cheval glass became unnecessary in bedrooms.

chevalier (French: "horseman"), a French title originally equivalent to the English knight. Later the title chevalier came to be used in a variety of senses not always denoting membership in any order of chivalry; it was frequently used by men of noble birth or noble pretensions who could not claim any of the standard territorial titles. An ordinance of 1629 tried to forbid its being assumed except by virtue of royal letters patent or "eminence of personal quality" (*éminence de qualité personnelle*). A younger son of a great family, however, who could not claim a title by other means might be admitted to the Order of the Hospital of St. John of Jerusalem (Knights of Malta) and thereby assume the title of chevalier. Chevaliers of the French royal orders usually had some territorial title by which they remained designated; but it was questionable whether the nobility attached to the title was hereditary. Napoleon outlined conditions for the assumption of the title by members of the Legion of Honour and reserved the right to himself of appointing chevaliers of the empire. *See also* knight.

Chevalier, Albert (b. March 21, 1861, Notting Hill, London—d. July 10, 1923, London), actor and music-hall entertainer known as the "costers' laureate" because of his songs in cockney dialect on London common life (a coster is a cart peddler).



Albert Chevalier
BBC Hulton Picture Library

An actor from 1877, he made his music-hall debut in 1891 at the London Pavillion, where he was an immediate hit, singing such songs as "The Coster's Serenade" and "It's the Nasty Way 'E Sez It." In 1896 he commenced a successful U.S. tour. Chevalier composed about 80 songs, of which the most popular was "My Old Dutch"; from 1920 he acted in a play of that name written by himself and Arthur Shirley. As he refused to introduce obscenity into his performances, Chevalier is credited with improving the general repute of music halls.

Chevalier, Jules (b. March 15, 1824, Richelieu, Fr.—d. Oct. 21, 1907, Issoudun), priest, author, and founder of the Missionarii Sacratissimi Cordis Jesu (Missionaries of the Sacred Heart of Jesus), commonly called Sacred Heart Missionaries, a Roman Catholic congregation of men originally dedicated to teaching and restoring the faith in the rural sections of France and later expanded to world missions.

Educated in the French seminaries at Saint-Gauthier and at Bourges, he was ordained priest in 1851. After ministering in various towns in the archdiocese of Bourges, he became curate, in 1854 in the parish of Issoudun, where, on December 8, he founded the Sacred Heart Missionaries, serving as their first superior general until 1901. His new community was officially recognized in 1869 by Pope Pius IX, who directed the men to foreign mission work. In 1872 Chevalier became archpriest in Issoudun.

In 1881 Chevalier sent missionaries to the South Pacific islands of Micronesia and Melanesia. Then, with Marie-Louise Hartzer, he cofounded the Daughters of Our Lady of the Sacred Heart at Issoudun in the following year. These nuns dedicated themselves to educational, hospital, and missionary work. Their papal approval (1928) occurred after Chevalier's death. He is considered one of the outstanding promoters of the devotion to the Sacred Heart of Jesus, a cult that, though originating in the Middle Ages, is peculiar to the modern Roman Catholic Church in that it honours Christ's heart as the symbol of his love. In 1856 Pius introduced the devotion as a feast into the church's calendar.

Chevalier's writings on the Sacred Heart include *Notre-Dame de Sacré-Coeur de Jésus* (1863) and *Le Sacré-Coeur de Jésus* (3rd ed., 1886). Father Charles Piperon's *Le Très Révérend Père Jules Chevalier* appeared in 1924, followed by Father Henri Vermin's *Le Père Jules Chevalier* in 1957.

Chevalier, Maurice (b. Sept. 12, 1888, Paris—d. Jan. 1, 1972, Paris), debonair French musical-comedy star best known for witty and sophisticated films that contributed greatly to the establishment of the musical as a film genre during the early 1930s. Characterized by a suave manner and using a cane and tilted straw hat and an exaggerated French accent as his trademarks, he also gained international fame as a stage personality.

Chevalier made his debut as a Parisian café singer in 1901. By the 1920s he was a famous entertainer in French musical revues and appeared in French films. His first Hollywood film, *The Innocents of Paris* (1929), was the prototype of the popular gay and charming musicals that followed, in which he often co-starred with Jeanette MacDonald—*e.g., The Love Parade* (1930), *One Hour with You* (1932), *Love Me Tonight* (1932), and *The Merry Widow* (1934). During World War II his popularity suffered because he continued to entertain in German-occupied France and on tour, but after the war he was cleared of suspected collaborationist activities. His later motion pictures included *Love in the Afternoon* (1957), *Gigi* (1958), *Can-Can* (1960), and *Fanny* (1961). In 1958 Chevalier was awarded a Special Academy Award for his more than 50 years of contributions to the entertainment field.



Maurice Chevalier
Brown Brothers

Chevalier, Ulysse (b. Feb. 24, 1841, Rambouillet, Fr.—d. Oct. 27, 1923, Romans-sur-Isère), French priest, scholar, and author of major bibliographical works in medieval history.

As a student under Léopold Delisle, professor of ecclesiastical history at the University of Lyon, he began work on his massive *Répertoire des sources historiques du moyen âge* ("Collection of Historical Sources for the Middle Ages") published in two parts: the *Bio-bibliographie,* 1877–88, and the *Topo-bibliographie,* 1894–1903. The former contains information on all historical personages alive between the years 1 and 1500 who are mentioned in printed books, and the latter contains place-names and other information. Chevalier was himself a professor at Lyon from 1887.

Cheverus, Jean-Louis Lefebvre de (b. Jan. 28, 1768, Mayenne, Fr.—d. July 19, 1836, Bordeaux), first Roman Catholic bishop of Boston.

He was made assistant, then pastor, of Notre-Dame of Mayenne in France, but because of the Revolution he fled in 1792 to England, where he founded Tottenham Chapel. Arriving in Boston (1796), he assisted at Holy Cross Church and served Indian missions in Maine. His courage and charity during the yellow fever epidemic of 1798 and his eloquent preaching attracted many Protestants. In 1808 the diocese of Boston was created with Cheverus as its bishop; he was consecrated in 1810. At the insistence of King Louis XVIII he returned to France (1823) to become bishop of Montauban. In 1826 he was made archbishop of Bordeaux and peer of France, serving in the upper chamber of the legislature until 1830. Nominated by Louis-Philippe to the college of cardinals, he was invested in 1836.

chevet, eastern end of a church, especially of a Gothic church designed in the French manner. Beginning about the 12th century, Romanesque builders began to elaborate on the design of the area around the altar, adding a curved ambulatory behind it and constructing a series of apses or small chapels radiating from the ambulatory. Chevet design became most elaborate during the 13th century, and examples can be seen in the cathedrals of Rheims and Chartres.

In its most specific sense, the word, which derives from an Old French term for "head," refers to this type of ambulatory-apse structure, although it can also be applied more generally to the area containing the principal apse of a church.

Cheviot, breed of hardy, medium-wool, white-faced, hornless sheep developed in Scotland and Northumberland, England. Cheviots have no wool on their heads and ears or on their legs below the knees and hocks. As a consequence they present a trimmed and alert appearance. The wool of their fleeces is relatively straight, of moderate length, close set, and free from black fibre. Cheviots are frequently used in crossbreeding, especially with Border Leicesters and Lincolns, for market lambs.

cheviot, woollen fabric made originally from the wool of Cheviot sheep and now also made from other types of wool or from blends of wool and man-made fibres in plain or various twill weaves. Cheviot wool possesses good spinning qualities, since the fibre is fine, soft, and pliable. Cheviot fabric has a crispness of texture similar to serge but is slightly rougher and heavier.

Cheviot fabric may be produced either from woollen or worsted yarns according to the character, texture, and feel desired in the finished fabric. Some qualities are produced from crossbred worsted yarns adapted for furnishing crispness. Cheviot suitings for sportswear are made from harder spun worsted yarns, and some are also made from botany worsted. Cheviot shirting is a stout, twilled, cotton fabric woven with small geometrical patterns or with warp stripes and bleached weft. Some suitings of inferior quality containing an admixture of cotton, and others of low grade, weighted with flocks, are improperly called cheviot.

Cheviot Hills, tract of highland followed for more than 30 mi (50 km) by the boundary between England and Scotland. In the east a great pile of ancient volcanic rocks rises to 2,676 ft (816 m) in Cheviot Hill. The hills are steep but smoothly rounded; they are dissected by deep glens almost deserted except for a few shepherds' cottages. Evidence of prehistoric occupation is widespread. Farther west lower hills of shale and sandstone, heavily coated with glacial drift, form peaty moorlands that have been extensively afforested since World War II. The land controlled by the Forestry Commission became a National Forest Park in 1955, and an even larger area was designated as the Northumberland National Park.

Chevreul, Michel-Eugène (b. Aug. 31, 1786, Angers, Fr.—d. April 9, 1889, Paris), French chemist who began the study of the chemistry of fats.

Although Chevreul had numerous teaching posts, his most important affiliation was with the Muséum National d'Histoire Naturelle, Paris, where he was an assistant from 1810, a professor from 1830, and director from 1864. In 1809 he began studying soaps and isolated oleic, palmitic, and stearic acids, the most common fatty acids found in fats and oils. His findings changed soap manufacture from an art to an exact science. In 1825, in collaboration with the French chemist Joseph-Louis Gay-Lussac, he patented manufacturing methods for producing candles far superior to those then in general use.

Appointed director of dyeing at the Manufacture des Gobelins in 1824, Chevreul investigated the psychology of colour and established chemical standards that were invaluable to tapestry and carpet artist and artisan alike. A pioneer in gerontology, he investigated the psychological effects of aging.

Chevreuse, Marie de Rohan-Montbazon, duchesse de (duchess of) (b. December 1600—d. Aug. 12, 1679, Gagny, Fr.), French princess, a tireless participant in the conspiracies against the ministerial government during Louis XIII's reign (1610–43) and the regency (1643–51) for Louis XIV.

The daughter of Hercule de Rohan, duc de Montbazon, Marie was married in 1617 to Charles d'Albert, later duc de Luynes. The following year she became superintendent of the household of Louis XIII's queen, Anne

of Austria. Widowed in December 1621, she married the influential Claude de Lorraine, duc de Chevreuse, in April 1622. In 1625 her attempts to promote a liaison between Anne and the English lord George Villiers, 1st duke of Buckingham, failed when Buckingham scandalized the French court by openly declaring his passion for the Queen. Exiled to



Madame de Chevreuse, portrait by Jean Le Blond
By courtesy of the Bibliothèque Nationale, Paris

Poitou for her part in a plot (1626) against Louis XIII's powerful minister, the Cardinal de Richelieu, the Duchesse soon withdrew to the duchy of Lorraine, where she persuaded Duke Charles IV to join Buckingham's anti-French coalition.

Permitted by Richelieu to return to France in 1628, Mme de Chevreuse was exiled to Touraine in 1633 for betraying to Spain state secrets extracted from her lover, the Marquis de Châteauneuf, keeper of the seals. France went to war with Spain in 1635, and two years later Richelieu discovered that the Queen and Mme de Chevreuse were conducting treasonable correspondence with the Spanish court. The Duchesse fled in disguise to Spain.

When Anne became regent upon the accession of her young son, Louis XIV, Mme de Chevreuse was again allowed to return to France. She immediately resumed her intrigues. In the abortive conspiracy of "les Importants," she plotted with a group of high nobles to assassinate the Queen's first minister, Cardinal Jules Mazarin (1643). Anne sent her into exile, but she returned to Paris in 1649 during the first phase of the aristocratic uprising against Mazarin known as the Fronde (1648–53). Although she helped form the coalition of noble and bourgeois elements that supported the revolt of the Prince de Condé (the Great Condé) in 1651, Mme de Chevreuse was reconciled to Mazarin after Condé broke his agreement to marry his brother to her daughter Charlotte. In 1652 the Duchesse retired to Dampierre.

Chevrolet, Louis (b. Dec. 25, 1878, La Chaux de Fonds, Neuchâtel, Switz.—d. June 6, 1941, Detroit), automobile designer and racer whose name is borne by the Chevrolet Division of General Motors Corporation, an enterprise from which he derived little profit and of which he was a minor employee in the last years of his life.

He emigrated to the United States from France in 1900. Five years later, in his first automobile race, he defeated the great American driver Barney Oldfield, and thereafter he set records on every important track in the United States. His time for the measured mile, 52.8 seconds, was, in 1905, remarkable.

In 1911, with William Crapo Durant, he built the first Chevrolet car; but he had little confidence in it, and in 1915 he sold his interest to Durant, who, the next year, brought the Chevrolet Motor Company into the General Motors organization. Other cars designed by Chevrolet won the Indianapolis 500-mile race in 1920 (a Monroe driven by his brother Gaston Chevrolet) and in 1921 (a Frontenac driven by Tommy Milton).

Subsequently, Chevrolet was active in motorboat racing; worked for the Stutz Automobile Company, Indianapolis, Ind.; and established an unsuccessful aircraft factory in that city. In 1936 he returned to the General Motors division named for him.

Chevron Corporation, formerly (1926–84) STANDARD OIL COMPANY OF CALIFORNIA, U.S. petroleum corporation formed in 1926 with the merger of Standard Oil Company of California (Socal) and Pacific Oil Company. Headquartered in San Francisco, it operates today in more than 90 countries, either directly or through affiliates. The company trade name is Chevron.

The company's origins trace back to 1879 and the founding of Pacific Coast Oil Company, with became California's major oil producer and refiner. In 1900 the Standard Oil Company (*see* Standard Oil Company and Trust) purchased Pacific Coast Oil and six years later combined it with its own West Coast marketing operations to form Standard Oil Company (California). In 1911, when the U.S. Supreme Court dissolved the giant New Jersey-based Standard Oil combine, the California-based company became an autonomous entity with its own oil fields, pipelines, tankers, refineries, and markets. In 1926 it acquired the properties of Pacific Oil Company (previously owned by Southern Pacific Railway). Soon pipelines and refineries extended from California to Texas.

Company geologists discovered vast quantities of oil in Bahrain and Saudi Arabia in the early 1930s, and in 1936 a marketing enterprise was formed—the Caltex Group of Companies, owned jointly by Standard Oil of California and Texaco. In 1939 the California company began operations in Louisiana and later offshore in the Gulf of Mexico. Canadian production began in 1941. Subsidiaries and affiliates later were formed in Libya, Nigeria, Spain, Indonesia, and elsewhere. In 1961 the company purchased Standard Oil Company (Kentucky) and, in 1984, in one of the largest mergers ever, Gulf Oil Corporation.

The company currently engages in all phases of petroleum operations, from exploration to marketing and research. It also produces asphalt and a wide range of chemicals and fertilizers.

chevrotain, also called MOUSE DEER, any of several species of small, delicately built hoofed mammals comprising the family Tragulidae (order Artiodactyla). Found in the warmer parts of Asia and in parts of Africa, chevrotains are shy, solitary, evening- and night-active vegetarians. They stand about 30 centimetres (12 inches) at the shoulder and characteristically seem to walk on the hoof tips of their slender legs. The fur is reddish brown with spots and stripes of paler colour or white; the underside is pale. The males have small, curved tusks protruding downward out of the mouth from the upper jaw.



Asiatic chevrotain (*Tragulus*)
Photo Yila—Rapho/Photo Researchers

The Asiatic chevrotains are placed in the genus *Tragulus,* which includes about three species found in forests from India to the Philippines. The water chevrotain (*Hyemoschus aquaticus*), larger than the Asiatic forms, is found in western equatorial Africa. It inhabits thick cover on the banks of rivers and, when disturbed, seeks escape in the water.

Chevy Chase (Maryland, U.S.): *see* Bethesda–Chevy Chase.

Chewa, Bantu-speaking people living in the extreme eastern zone of Zambia, northwestern Zimbabwe, and Malaŵi. They share many cultural features with their Bemba kinsmen to the west. The Chewa language, also called Chinyanja, is important in Malaŵi.

The economy rests primarily on swidden (slash-and-burn) agriculture, major crops being corn (maize) and sorghum. Considerable hunting and fishing are done. In the past, slavery was a universal feature of Chewa society.

Descent, inheritance, and succession are matrilineal. Polygyny is general. The Chewa occupy compact and frequently stockaded villages. Each settlement has a hereditary headman and an advisory council of elders. *See also* Maravi.

chewing, also called MASTICATION, up-and-down and side-to-side movements of the lower jaw that assist in reducing particles of solid food, making them more easily swallowed; teeth usually act as the grinding and biting surface. In cats and dogs, food is reduced only to a size that permits easy swallowing. Cows and other cud-chewing animals diminish their food to a semifluid state. In humans, food is usually the size of a few cubic millimetres before it is swallowed, but the size is somewhat dependent on the nature of the food, personal habits, and early training. The amount of chewing has little effect on digestion, but inadequately broken meat or vegetable fibres may slow digestion.

The muscles controlling the jaw movements are voluntarily controlled. The act of chewing, however, may become a conditioned reflex stimulated by the presence of food in the mouth. The crushing force exerted by the adult molar teeth is between 75 and 200 pounds per square inch, while that of the incisors is 30 to 70 pounds per square inch. Reasons for chewing food are to soften the tough fibres and to expose them to enzymes necessary for digestion. When food is mixed with the saliva of the mouth, it becomes hydrated and permeated with salivary enzymes; food is also lubricated by the mucus in saliva, which makes it more easily swallowed.

chewing gum, sweetened product made from chicle and similar resilient substances and chewed for its flavour. Peoples of the Mediterranean have since antiquity chewed the sweet resin of the mastic tree (so named after the custom) as a tooth cleanser and breath freshener. New England colonists borrowed from the Indians the custom of chewing aromatic and astringent spruce resin for the same purposes. Similarly, for centuries inhabitants of the Yucatán Peninsula have chewed the latex, called chicle, of the sapodilla tree (*Achras zapota*), an evergreen that flourishes in the rain forests of the region.

In the 19th century, chicle was heralded by industrial developers as an equivalent to rubber. Although attempts to vulcanize chicle were unsuccessful, it was discovered in the process that the desiccated resin was insoluble in water and extremely plastic, and that it was able to retain flavour. Thus, although unsuitable as a rubber substitute, chicle did invite exploitation in the latter half of the 19th century as a replacement for the sweet-

ened paraffin that had itself outmoded the less refined spruce resin for chewing.

To begin the gum manufacturing process, blocks of gathered, hardened chicle are broken up, then screened and strained before mixed with other gum bases, sweeteners, and flavourings during cooking. The blended mass is passed between rollers onto a belt for cooling, after which it is sugared, cut, wrapped, and packaged.

After World War II various waxes, plastics, and synthetic rubber virtually replaced chicle in chewing gum manufacture. Artificially sweetened chewing gum found a wide market in the United States in the late 20th century, while mint remained the favourite among a wide variety of flavours.

chewing louse, also called BITING LOUSE, any of about 2,900 species of small (one to five millimetres), wingless insects of the suborder Mallophaga (sometimes considered an order) having chewing mouthparts, a flattened body, and shortened front legs used to transport food to the mouth. Chewing lice are worldwide in distribution. Colour ranges from white to black. The life cycle is spent on the feathers or hair of the host, though one genus lives in the throat pouches of pelicans and cormorants.

Chewing lice attack mainly birds (*see* bird louse) and some mammals (as Bovicola on cattle); they are not human parasites. Many species are host specific. One dog louse is the intermediate host of the dog tapeworm, and one rat louse transmits murine typhus among rats. Chewing lice that are parasitic on mammals feed on skin secretions, dried blood, fur, and skin debris. Although they are not blood suckers, chewing lice can cause serious discomfort. Symptoms of infestation include itching, loss of appetite, and lowered egg production in fowl. Infested animals are usually treated with a dust or dip.

chewing tobacco, tobacco used for chewing and appearing in a variety of forms, notably (1) "flat plug," a compressed rectangular cake of bright tobacco, sweetened lightly or not at all, (2) "navy," a flat rectangular cake of barley tobacco, highly flavoured with either licorice, rum, cinnamon, nutmeg, sugar, honey, or some other spice or sweetener, (3) "twist," tough, dark tobacco rolled and braided into ropes, (4) "fine-cut," shredded, stripped leaf, not compressed, of expensive blend, and (5) "scrap," cigar by-products consisting of loose leaf ends and clippings.

Tobacco chewing was common among certain American Indian groups. After 1815 it became almost a distinctive mode of tobacco usage in the United States, replacing pipe smoking. Partly the switch was a chauvinistic reaction against European snuff-taking and pipe-smoking; partly it was a matter of convenience for pioneering Americans on the move, since chewing was easier than lighting up a cumbersome pipe. The symbol of the change was the spittoon or cuspidor, which became a necessity of 19th-century America. Manufacturing statistics are revealing: of 348 tobacco factories listed by the 1860 census for Virginia and North Carolina, 335 concentrated wholly on chewing tobacco, and only 6 others even bothered with smoking tobacco as a sideline, using scraps from plug production.

The rising popularity of manufactured cigarettes by the beginning of the 20th century spelled the decline of chewing tobacco. After World War I, plug-taking fell off abruptly.

chewink, bird species also known as the rufous-sided towhee. *See* towhee.

Chewtonian Stage, division of time within the Ordovician Period in Australia and New Zealand (the Ordovician Period began about 505 million years ago and lasted about 67 million years). The Chewtonian Stage follows the Bendigonian Stage and precedes the Castlemainian Stage. Several zones, shorter spans of time, are recognized within the Chewtonian Stage and are based upon the vertical ranges of several species of fossil graptolites of the genera *Didymograptus* and *Tetragraptus*. These forms allow correlations to be made with rocks in North America and Europe.

Cheyenne, North American Plains Indian people of Algonkian stock who inhabited the regions around the Platte and Arkansas rivers during the 19th century. Before 1700 the home of the Cheyenne was in central Minnesota, where they farmed, hunted, gathered wild rice, and made pottery. They later occupied a village of earth lodges on the Cheyenne River in North Dakota; it was probably during this period that they acquired horses and became more dependent on the buffalo for food. After the town was destroyed by the Ojibwa (Chippewa), the Cheyenne settled along the Missouri River near the Mandan and Arikara Indians. Toward the close of the 18th century, smallpox and the aggression of the Dakota decimated the village tribes at the same time that the horse and gun were becoming generally available in the northeastern plains. The Cheyenne moved farther west to the area of the Black Hills, where they developed their unique version of the tepee-dwelling nomadic Plains culture and gave up agriculture and pottery. During the early 19th century, they migrated to the headwaters of the Platte River. In 1832 a large segment of the tribe established itself along the Arkansas River, thus dividing the tribe into northern and southern branches. This division was made permanent in the First Treaty of Ft. Laramie with the U.S. in 1851.



Wolf Robe, Southern Cheyenne Indian, photographed by De Lancey Gill, 1909

By courtesy of the Smithsonian Institution, National Anthropological Archives, Washington, D.C.

Cheyenne religion recognized two principal deities, the Wise One Above and a god who lived beneath the ground. In addition four spirits lived at the points of the compass. The Cheyenne were among the Plains tribes who performed the sun dance in its most elaborate form. They placed heavy emphasis on visions in which an animal spirit adopted the individual and bestowed special powers upon him so long as he observed some prescribed law or practice. Their most venerated objects, contained in a sacred bundle, were a hat made from the skin and hair of a buffalo cow and four arrows—two painted for hunting and two for battle. These objects were carried in war to insure success over the enemy.

The Cheyenne were organized in 10 major bands governed by a council of 44 chiefs and 7 military societies, of which the Dog Soldiers society was the most powerful and aggressive. There were also social, dance, medicine, and shamanistic societies.

The Cheyenne fought constantly with the Kiowa until 1840, when a lasting peace was established between them. From 1857 to 1879 the Cheyenne were embroiled in raids and wars with the whites. They began raiding white settlements and posts on a wide front after Black Kettle's peaceful village was massacred on Sand Creek. In the Treaty of Medicine Lodge (1867), the southern Cheyenne were assigned a reservation in Oklahoma but settled there only after 1875. After Custer's attack on the Washita River village in 1868, the southern Cheyenne were fairly peaceful until 1874–75, when they joined in the general uprisings of the southern Plains tribes. The northern Cheyenne joined the Dakota in the Battle of the Little Bighorn in 1876. In the late 20th century there were about 2,000 northern Cheyenne on the Tongue River Indian Reservation in southeastern Montana and more than 3,000 intermingled among southern Cheyenne and Arapaho in Oklahoma.

Cheyenne, capital (since 1869) and largest city of Wyoming, U.S., and seat of Laramie county, in the southeastern corner of the state, on Crow Creek, 49 mi (79 km) east of Laramie city; it sprawls over high prairie that slopes westward to the Laramie Mountains. Squatters arriving in 1867 just ahead of the Union Pacific Railroad named the place for the Cheyenne Indians; they were removed from the railroad's land grant by federal troops. In the 1870s the town became an outfitting point for the Black Hills goldfields to the northeast and a major shipping point for cattle from Texas. Its own grazing lands became famed for Hereford herds and wealthy cattle barons. Peopled by gunmen, gamblers, and transients, Cheyenne's reputation worsened during the days of the Vigilantes and the war between cattlemen and sheepmen.

Now a trade and distribution centre for the middle Rocky Mountain region, its major economic activities include transportation, oil, timber, livestock interests, chemicals, plastics, tourism, and governmental activities. Ft. D.A. Russell (1867) became Ft. Francis E. Warren in 1930 and as an Air Force base was designated (1957) as headquarters for the nation's first Atlas intercontinental ballistic missile base. The State Capitol with its lantern-type cupola atop a 145-ft (44-m) dome displays Western murals within. The Supreme Court Building houses the state museum. Laramie County Community College was opened (1968) in Cheyenne. Frontier Days, featuring one of America's oldest and largest rodeos, is a six-day celebration held each July, recalling the spirit of the Wild West and the cattle kingdom days. Inc. 1867. Pop. (1990) city, 50,008; Cheyenne MSA, 73,-142.



State Capitol, Cheyenne, Wyo.

Milt and Joan Mann from CameraMann

Cheyenne River, river, formed by the confluence of South Fork and Beaver Creek in Fall River County, South Dakota, U.S., flowing northeast across the state to join the Missouri River at the Cheyenne River Indian Reservation, north of Pierre. The 527-mi (848-km) river drains 25,000 sq mi (64,750 sq km). Angostura Dam, begun in 1946 as part of the

Missouri River basin irrigation project, is on the river near Hot Springs, S.D.

Cheyne, Sir William Watson, 1ST BARONET (b. Dec. 14, 1852, at sea off Hobart, Tasmania—d. April 19, 1932, Fetlar, Shetland Islands, Scot.), surgeon and bacteriologist who was a pioneer of antiseptic surgical methods in Britain.

Cheyne studied medicine at the University of Edinburgh, taking degrees in surgery and medicine there in 1875. In 1876 he became a house surgeon to Joseph Lister, the British scientist who founded antiseptic medicine. In 1877 he and Lister took up posts at King's College Hospital; Cheyne served there as assistant surgeon and then surgeon (1880–1917) and also was a professor of surgery there (1891–1917). Cheyne was a devoted follower of Lister and a staunch advocate of the latter's antiseptic surgical methods. In 1882 Cheyne published the important work *Antiseptic Surgery: Its Principles, Practice, History and Results* and followed this three years later with his book *Lister and His Achievements* (1885). The work he did in his early career on preventive medicine and on the bacterial causes of disease was strongly influenced by that of the pioneer German bacteriologist Robert Koch.

During 1900–01 Cheyne was consulting surgeon to the British military forces in South Africa. In 1914 he became a consulting surgeon to the Royal Navy, and in 1915 he served temporarily as surgeon general. He then retired from active practice and served as lord lieutenant of the Orkney and Shetland Islands from 1919 to 1930. His other published works include *Manual of the Antiseptic Treatment of Wounds* (1885) and *Manual of Surgical Treatment,* 7 vol. (1899–1903; with F. Burghard).

Chézy, Antoine de (b. 1718, Châlons-sur-Marne, Fr.—d. Oct. 5, 1798, Paris), French hydraulic engineer and author of a basic formula for calculating the velocity of a fluid stream.

One of the group of brilliant engineers produced by the French School of Bridges and Highways (École des Ponts et Chaussées) in the 18th century, Chézy carried out studies in connection with the construction of French canals, notably in 1764 the difficult project of the Canal de Bourgogne, uniting the Seine and Rhône basins.

Chézy was exceptionally modest and even timid, and, though he served as right-hand man to the celebrated bridge-builder Jean-Rodolphe Perronnet, whose Pont de la Concorde in Paris he completed (1795), his genius was only tardily recognized; he was appointed director of the School of Bridges and Highways in the last year of his life.

Chhātak, town, northeastern Bangladesh, on the left bank of the Surma River. The town rose to prominence when a natural gas field was discovered nearby in 1959. Chhātak has a large cement factory powered by natural gas; the town also exports limes, oranges, potatoes, and tea. Pop. (1974) 13,248.

Chhatarpur, town, north central Madhya Pradesh state, central India. The town is a major road junction and is a trade centre for agricultural products and cloth fabrics. Founded in 1707 by Chhatrasal, a Bundelā king who successfully resisted the Mughal authority, it was the capital of the former princely state of Chhatarpur of the British Central India Agency. Constituted a municipality in 1908, Chhatarpur has a museum, a modern officers' colony, and three colleges and a law school affiliated with Awadesh Pratāp Singh University.

The surrounding region is a fertile plain lying between the Dhasān and Ken rivers and is dotted with wooded hills rising to 1,500 feet (450 m) in the south. Rice, sorghum, wheat, barley, and legumes are the major crops. The region contains many ancient monuments, including Khajurāho (*q.v.*) and Rājgarh fort and palace. Pop. (1981) town, 51,959.

Chhattīsgarh Plain, plain, central India, forming the upper Mahānadi River Basin. About 100 miles (160 km) wide, it is bounded by the Chota Nāgpur plateau (north), the Maikala Range (west), the Raigarh hills (northeast), the Raipur Upland (southeast), and the Bastar plateau (south). A vast, undulating tract, it consists of rich rice fields and grainfields. Bilāspur, Raipur, Raigarh, and Durg are the chief towns.

The name Chhattīsgarh (Thirty-six Forts) was formerly applied to the territory of the Haihaya dynasty of Ratanpur, founded *c.* 750, and the plain long remained an isolated protected area. Under British rule the Chhattīsgarh states consisted of a subagency of 14 feudatory princely kingdoms under the Eastern States Agency. Raipur was the agency headquarters.

Chhindwāra, town, south central Madhya Pradesh state, central India. Situated at a major road and rail junction, it is heavily engaged in cotton trade and coal shipping. Cotton ginning and sawmilling are the chief industries. The town was constituted a municipality in 1867. It has four colleges affiliated with the University of Saugar. A mining school is just northwest at Barkuhi.

The surrounding area comprises chiefly a central plateau of the Sātpura Range, which rises in the northwest to rugged hills. The plateau slopes toward the Nāgpur Plain in the south. The southern and eastern parts of the plateau include the fertile Chaurai wheat plain. The Nāgpur Plain is a rich cotton and jowar area and is the richest and most populous part of the region. The Wainganga, Pench, and Kanhān rivers drain the area. Oilseeds and sunn hemp are other important crops; cattle breeding is extensive on the plateau. Coal, manganese, bauxite, and marble deposits are worked. Near Chhindwāra town lies Deogarh, the old capital of the Gond dynasty. Pop. (1981) town, 75,178.

Ch'i, Pinyin QI, one of the largest and most powerful of the many small states into which China was divided between about 771 and 221 BC.

In the 7th and 6th centuries BC, Ch'i, which was located on the extreme eastern edge of the North China Plain in what is now Shantung and Hopeh provinces, began to increase in size, expanding at least sixfold by incorporating many previous "barbarian" areas into its realm. Moreover, under the rule of its semilegendary prince Duke Huan and his famous adviser Kuan Chung, a uniform tax system was instituted, a central army was created, and state monopolies of salt and iron production were formed. At the same time, a centralized bureaucracy based on talent rather than hereditary rank began to grow up. Although all of these changes were not unique to Ch'i, Ch'i was the first state to fully institute all of them.

As a result, Ch'i began to dominate most of China proper; in 651 BC it formed the little states of the area into a league, which was successful in staving off invasions from the semibarbarian regimes to the north and south. Although Ch'i thus gained hegemony over China, its rule was short-lived; after Duke Huan's death, internal disorders caused it to lose the leadership of the new confederation. Meanwhile, other states also began to grow in power.

In the 4th century BC, Ch'i, under the leadership of a new ruling house, again became a predominant power in Chinese politics, and early in the 3rd century it made an unsuccessful attempt to regain sole hegemony. Thereafter it declined. Finally, in 221 BC, the state of Ch'in absorbed the remnants of Ch'i, completing the unification of all of China under a strong central government.

ch'i, Pinyin QI (Chinese: "breath," or "force"), in Chinese philosophy, the ethereal substance of which everything is composed. Early Taoist philosophers and alchemists regarded *ch'i* as a vital force inhering in the breath and bodily fluids and developed techniques to alter and control the movement of *ch'i* within the body; their aim was to achieve physical longevity and spiritual power.

Neo-Confucian philosophers of the Sung dynasty (AD 960–1279) regarded *ch'i* as emanating from the Great Ultimate (T'ai Chi; *q.v.*) by way of *li,* the prime ordering principle of the universe. This school, whose ideas predominate in traditional Chinese thought, held that *ch'i* was transformed through the yang (active) and yin (passive) modes into the Five Elements (Wu hsing; wood, metal, earth, water, and fire), which in turn formed the basic constituents of the physical universe.

Chi-an, Pinyin JI'AN, conventional KIAN, formerly (until 1914) LULING, city, west central Kiangsi Province (*sheng*), China. Chi-an is situated on the west bank of the Kan Chiang (river), at the head of navigation for small steamboats from Nan-ch'ang. The city is a highway centre located on the north–south route up the Kan Chiang Valley at the point where it is joined by northeastern and western routes.

Chi-an's history goes back to the foundation there, in the late 2nd century AD, of a commandery, Lu-ling. In 589 this became the prefecture of Chi. The present name was first used under the Yüan (Mongol) dynasty, and from 1368 to 1911 the city was a superior prefecture. Historically, it was an important centre of learning, with many well-known academies. It produced many notable scholars, particularly during the Sung and Ming dynasties. It is now an important local market and commercial centre, collecting agricultural and forest products from the surrounding areas and distributing manufactures obtained from Nan-ch'ang. Until 1949 it was also a centre of traditional Chinese banking. Pop. (1985 est.) city centre, 127,900; city, 180,300.

Ch'i-ch'i-ha-erh (China): *see* Tsitsihar.

Ch'i-chia culture, Pinyin QIJIA, the only Neolithic culture to be uncovered in China that shows North Eurasian influence. Although most archaeologists date the Ch'i-chia in the Late Neolithic Period, it survived into historic times, and remains from as late as the 1st century BC have been found.

Evidence of the culture was first unearthed in the small village of Ch'i-chia-p'ing, in the northwestern Chinese province of Kansu, in the early 1920s by the Swedish geologist Johan Gunnar Andersson. In the 1950s more important finds were explored in the nearby villages of Yang-wa-wan and Ts'ui-chia-chuang by the Chinese archaeologists Pei Wen-chung and Hsia Nai.

The dominant characteristic of the culture appears to have been comblike designs and amphora-like vases, both of which are alien to China. The Ch'i-chia people lived in large villages in terraces along the Huang Ho (Yellow River) and buried their dead in pits. Their most common implements were axes and rectangular knives.

Chi Fa (Chinese emperor): *see* Wu Wang.

Chi-hsi, Pinyin JIXI, city in southeastern Heilungkiang Province (*sheng*), China. Located on the upper Mu-leng Ho (river), it is in a mountainous area rich in timber and in various minerals, including coal, iron, oil shale, graphite, fluorite, and limestone. Chi-hsi is, however, predominantly

a coal-mining city, with some of the largest and best equipped coal mines in China. The coal is of high quality and is suitable for coking and for use in the chemical industry. Apart from a small amount used by the local power generating plant, most of the coal mined there is shipped to Harbin (Ha-erh-pin) and southern Manchuria (Northeast Provinces), or (via T'u-men in Kirin Province) to North Korea. Until the Sino-Soviet dispute of the 1960s, some was also exported to the eastern maritime provinces of the Soviet Union. Chi-hsi also has a large lumber industry, much of the timber being used in the local mines. There is also an engineering industry, established to serve the mines. Chi-hsi is linked by rail to the line from Chia-mu-ssu to Mu-tan-chiang (both in Heilungkiang Province) and is the centre of branch lines running north and south to the Korean border areas. Pop. (1983 est.) 793,000.

Ch'i Huang (Chinese painter): *see* Ch'i Pai-shih.

Ch'i Ju-shan (b. Dec. 23, 1876, Kao-yang, Hopeh Province, China—d. March 18, 1962, Taiwan), playwright and scholar who revived interest in traditional Chinese drama in 20th-century China and in the West.

Born into a prosperous and well-educated family, Ch'i Ju-shan received a Classical Chinese education, also studying traditional Chinese theatre from childhood and learning European languages as a young man. Between 1908 and 1913 he travelled to Paris several times, first on family business and later as the supervisor of a group of Chinese students. While in Paris Ch'i Ju-shan managed to take in a great deal of European drama, which spurred his desire to restore traditional Chinese theater to its former place of importance.

On his return to China, Ch'i met Mei Lan-fang, then emerging as one of China's greatest actors. The two combined talents, with Mei Lan-fang executing the new dramas of Ch'i Ju-shan that were based on historical and legendary sources. The highly successful partnership culminated in 1930 when Ch'i Ju-shan accompanied Mei Lan-fang on a dramatic tour of the United States. From 1931 until 1948 Ch'i Ju-shan spent most of his time compiling his life-long research on Chinese drama. With friends he founded The Traditional Chinese Theatre Association, which sponsored a school and a museum that published most of Ch'i Ju-shan's writings.

In 1948 the political situation in China forced Ch'i Ju-shan to go to Taiwan, where he contined to occupy himself with research on the theatre until his death.

Chi K'ang (Chinese philosopher): *see* Hsi K'ang.

Ch'i-lien Mountains, Wade–Giles romanization CH'I-LIEN SHAN, Pinyin QILIAN SHAN, rugged mountain range on the border of Tsinghai and Kansu provinces, west central China. It forms part of the Nan Shan, the eastern outlier of the Kunlun Mountains. Heavily glaciated in many places, the mountains rise to 18,194 ft (5,547 m), and most peaks exceed 13,000 ft. Snow covers the mountain tops; herds graze in the well-watered valleys. Impassable throughout, the range forms the southern border of the Kansu Corridor, the historic route from eastern China to Central Asia.

Chi-lin, Pinyin JILIN, conventional and Japanese KIRIN, city, Kirin Province (*sheng*), China. It is a prefecture-level municipality (*shih*) whose territory was enlarged in the early 1970s to encompass the former Yung-chi Prefecture (*ti-ch'ü*). Situated on the left bank of the Upper Sungari River, it lies among surrounding hills about 60 mi (100 km) east of the provincial capital, Ch'ang-ch'un.

Chi-lin is one of the most ancient cities in the Northeast. Originally it was a small village in the territory of the Ula (a Juchen tribe of Manchuria). In 1651 the Manchus, concerned about Russian incursions into the Amur River region, set up a shipyard there to construct boats for defense and transport on the Sungari River (a tributary of the Amur). In 1673 Chi-lin was fortified, and in 1676 the headquarters of the Manchu military governor was transferred there from Ninguta (now Ning-an in Heilungkiang Province). The town was temporarily constituted as a regular civil prefecture in 1726–34 but remained under military governorship until 1882, when it was walled and given the status of a superior prefecture (*fu*). Although a government postal relay system was established in the area in the late 17th century, Chi-lin had poor land communications until the construction of the railway to Ch'ang-ch'un in 1913. The line was later extended to T'u-men on the Korean border, and another main line joined Chi-lin with Mukden (Shen-yang).

After rapid colonization of the surrounding area, Chi-lin became a commercial and collecting centre for agricultural products and timber. Various light industries such as oil extraction, flour milling, brewing, and the manufacture of lumber and matches also developed. At the time of the Japanese occupation of Manchuria in 1931, it had a population of about 100,000 but was to some extent overshadowed by the rapid growth of the new capital of the Japanese state of Manchukuo at Ch'ang-ch'un. After the outbreak of war between Japan and China in 1937, large-scale industrial growth began. The Japanese constructed an enormous hydroelectric station at Feng-man, on the Sungari River above Chi-lin, and established various industrial plants in the city, the most important of which manufactured synthetic rubber, petroleum, chemicals, and paper.

The city was much damaged during the Soviet occupation at the end of World War II and the Chinese Civil War. Since 1949, Chi-lin has continued to expand as an industrial centre. The Feng-man Dam was repaired and connected by a grid to Harbin (Ha-erh-pin) and Shen-yang. Three huge chemical plants and a paper mill were installed under the First Five-Year Plan (1953–57). The lumber and match industries were expanded, and large-scale manufacture of construction materials such as cement, bricks and tiles, and glass was begun. Sugar refining from local beets and oil extraction are also important. A thermal generating plant, using coal from the Chiao-ho field to the east, was brought into operation in the 1950s. Pop. (1983 est.) 1,071,000.

ch'i-lin, Pinyin QILIN, in Chinese mythology, the unicorn whose rare appearance often coincides with the imminent birth or death of a sage or illustrious ruler. (The name is a combination of the two characters *ch'i,* "male," and *lin,* "female,") A *ch'i-lin* has a single horn on its forehead, a yellow belly, a multicoloured back, the hooves of a horse, the body of a deer, and the tail of an ox. Gentle of disposition, it never walks on verdant grass or eats living vegetation.

The first *ch'i-lin* is said to have appeared in the garden of the legendary Huang Ti (Yellow Emperor) in 2697 BC. Some three centuries later a pair of *ch'i-lin* were reported in the capital of Emperor Yao. Both events bore testimony to the benevolent nature of the rulers.

The advent of a great sage was made known when a *ch'i-lin* appeared to the pregnant mother of Confucius (6th century BC). She thereupon coughed up an inscribed jade tablet that foretold the future greatness of her son. The death of Confucius was foreshadowed when a *ch'i-lin* was injured by a charioteer.

In 1414 a live giraffe was brought to China for the first time and presented as a *ch'i-lin* to the Ming emperor Yung-lo. The tough old warrior, seeing through the intended flattery, curtly remarked that he certainly was no sage and the animal was certainly no *ch'i-lin.* In Japanese, a giraffe is called *kirin,* but the characters are those for *ch'i-lin.*

Chi-lung, conventional KEELUNG, *shih* (municipality), northern Taiwan, and the principal port of Taipei, 16 mi (26 km) southwest. The municipality has an area of 51 sq mi (133 sq km). Chi-lung first became known by that name, said to have been a corruption of Ketangalan, the name of a tribe of aboriginal peoples who lived in the district, in the 17th century. The location was occupied in 1626



Shipping dock at Chi-lung, Taiwan
Shostal—EB Inc.

by the Spanish, who built a fort on the island of Ho-p'ing at the mouth of the harbour, and then in 1642 was occupied by the Dutch, who again occupied it from 1664 to 1668. After the incorporation of Taiwan as part of the Chinese *sheng* (province) of Fukien in 1638, the settlement of northern Taiwan began in earnest. Most of the immigrants to the area around Chi-lung were from Chang-chou in southern Fukien. The settlement of Chi-lung itself began in 1723, and a small township grew up in the late 18th century. In 1800 a road was opened up to I-lan, on the east coast to the south, and by 1840 Chi-lung had grown into a small port with about 700 households. In the mid-19th century, foreign ships began to call there. Chi-lung has an excellent natural harbour, surrounded by mountains and free of silt. Coal, moreover, was discovered in the vicinity. In 1860 Chi-lung was opened to foreign trade as a treaty port, and its trade began to expand rapidly. In 1875 it became a subordinate division of the prefectural administration at Taipei. The Ch'ing dynasty (1644–1911) government made some attempt to fortify the port, but the fortifications were never completed. In 1883–85, during the Sino-French War, the port was occupied by French troops. Later, a reformist governor of Taiwan, Liu Ming-chuan, refortified the port and further developed the coal-mining industry. It was, however, during the Japanese occupation (1895–1945) that Chi-lung grew into a large, modern city. Its growth was helped by the fact that the administration of Taiwan, formerly centred in T'ai-nan, had been transferred to Taipei in 1891. At the same time, Tan-shui, Taipei's traditional port, had fallen into decline when its harbour had silted up. The completion of the railway system based on Chi-lung ensured the latter's dominance.

The Japanese expanded the area of the city, partly by filling in portions of the bay. It became a commercial centre, and, in the later stages of the Japanese occupation, some industry was established there. With ample

coal reserves and several hydroelectric facilities nearby. Chi-lung since 1945 has continued to prosper under the Chinese Nationalist regime. It has developed fertilizer and cement industries, several shipbuilding yards, and some small engineering works. As an international port its role has changed considerably. Whereas under the Japanese it was essentially an exporting port, sending raw materials for processing to Japan, it is now primarily an importing centre for Taipei. It is connected with the rest of Taiwan by railway and by the Sun Yat-sen Memorial Freeway, which opened in 1978. Chi-lung is also a large fishing port, equipped with fish-freezing and canning plants, and has the Taiwan Provincial College of Marine and Oceanic Technology. Pop. (1992 est.) 356,501.

Chi-nan, Pinyin JINAN, conventional TSINAN, city and provincial capital of Shantung *sheng* (province), China. Chi-nan lies in the northern foothills of the T'ai Mountains, on the high ground just south of the Huang Ho (river), which provides the major route along the north side of the Shantung Hills.

Well watered from natural springs, the area was settled in early times. From the 8th century BC it was the site of Li-hsia, a major city of the state of Ch'i, which flourished in the Chou period (*c.* 1122–221 BC). Later, in the 2nd century BC, the town became the seat of Li-ch'eng county in the commandery (district controlled by a commander) of Chi-nan. The Chinese name Chi-nan ("South of the Chi") came from the Chi River, which formerly flowed along what is now the lower course of the Huang Ho. The seat of the commandery was shifted to the present city at the beginning of the 4th century AD.

Chi-nan remained an important centre of administration, under various names, during the next two centuries and also became a major religious centre. Nearby Mount T'ai (now Yu-huang), to the south, was one of China's greatest holy mountains, and from the 4th to the 7th century many Buddhist cave temples were built in the hills south of Chi-nan. During the Sui and T'ang periods (581–907) it remained a major city, under the names Ch'i prefecture and Chi-nan commandery. In 1116 it became Chi-nan superior prefecture, a title that it retained until 1911. Marco Polo, the Venetian traveler to China in the 13th century, visited it and described it under the name Chingli. When the Ming dynasty (1368–1644) created Shantung province, Chi-nan became its capital. In 1911 it became a county, under its old name Li-ch'eng. In 1930, however, it was made a municipality, incorporating the old city, the modern commercial area developed after 1906, and the northern suburb of Li-k'ou.

Chi-nan's modern growth began in 1852, when the Huang Ho shifted its course to the old riverbed of the Chi, just north of the city. Although the Huang Ho was not a major waterway, this shift provided a link, used by small craft, with the Grand Canal and the waterways of northern Shantung and southern Hopeh provinces. The Hsiao-ch'ing River, flowing from Chi-nan to the sea south of the Huang Ho, was also a route for small craft. In 1904 Chi-nan's growing importance as a transport centre was increased when the German-built railway was completed from Tsingtao, which opened the city for foreign trade. In 1912 the north-south railway from Tientsin to P'u-k'ou was completed, with a rail junction at Chi-nan. The city rapidly became a major commercial and collecting centre for the rich agricultural region to the north. A great market for cotton, grain, peanuts (groundnuts), and tobacco, it developed a textile-manufacturing industry, flour mills, oil presses, and paper, cement, and match factories, thus becoming Shantung's second industrial centre after Tsingtao.

When Japanese influence replaced the German presence in Shantung after World War I, a sizable Japanese colony became established in Chi-nan. In 1928, during the Northern Expedition of the Kuomintang (Chinese Nationalist Party) armies, the Japanese army intervened—ostensibly to protect their own nationals—in what became known as the Tsinan Incident. A sizable arsenal in the city made Chi-nan the object of contention between rival forces throughout the pre-World War II period. It was occupied by the Japanese from 1937 to 1945.

Chi-nan was taken by Chinese Communist forces in 1948. It was then rapidly developed both as a major administrative and industrial centre. The existing textile and flour-milling industries were expanded, and an important machine-building industry was developed. By the early 1970s Chi-nan had become a major centre of the automotive industry, manufacturing a wide range of heavy trucks and earth-moving machinery. In the late 1950s Chi-nan became the site of a major iron and steel industry, producing pig iron, ingot steel, and finished steel. It also is a major centre of the chemical industry.

Chi-nan is the chief cultural centre in Shantung, with agricultural, medical, and engineering colleges and a large university. There are also many relics of Chi-nan's historical importance. The surrounding area has many well-known sites of natural beauty. Pop. (1990) 1,480,915.

Chi-ning, Pinyin JINING, Pinyin (Mongolian) ULAN QAB, town, Inner Mongolia autonomous *ch'ü* (region), China. Before the Communist Revolution of 1949, the town was a minor station named P'ing-ti-ch'üan and was a collecting point on the east-west Peking–Pao-t'ou railway. It experienced phenomenal growth after the completion in 1955 of a trunk railway northward to Erh-lien-hao-t'e on the Mongolian border, linking it with Ulaanbaatar (capital of the Mongolian People's Republic) and with the Trans-Siberian Railroad at Ulan-Ude in the Soviet Union (now in Russia). At Chi-ning this line also connects with the east-west route from Peking to Pao-t'ou and Lan-chou (Kansu province), and with the line via Ta-t'ung and T'ai-yüan to central China. Chi-ning thus became a key rail junction during the period when collaboration with the Soviet Union and overland trade with eastern Europe was at its peak. Additionally, it was a rail-gauge junction, where trains were transferred from the Chinese gauge to the wider Mongolian and Russian gauge.

Since the Chinese gauge was extended to Erh-lien-hao-t'e in the early 1960s, Chi-ning's importance has decreased. Industries, mostly based on agriculture, have developed, including the processing of crops and meats, oil pressing, and wool production. Chi-ning is also linked by highway to Kalgan (Hopeh province) and Hohhot. Pop. (1990) 163,552.

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Chi-ning, Pinyin JINING, conventional TSINING, city in southwestern Shantung *sheng* (province), China. In early times the seat of the state of Jen, it later became a part of the state of Ch'i, which flourished in the Chou period (*c.* 1122–221 BC). It underwent many changes of name and administrative status. The present name, Chi-ning, first appeared under Mongol rule in AD 1271. In early times the city was usually subordinated to Yen-chou, about 20 miles (30 km) to the northeast, which was on the main road skirting the foothills of the T'ai Mountains.

Although Chi-ning may have been the terminus of a canal to K'ai-feng in Honan province during the 6th and 7th centuries, its historical importance began with the opening of China's Grand Canal under Mongol rule in the 13th century. Chi-ning is situated on the canal northeast of the long string of lakes (Chao-yang, Wei-shan, and Tu-shan) that made it a key crossing place linked to the road system of the plain to the west. It also developed into a major canal port, the immense commerce of which was mentioned by the 13th-century Venetian traveler Marco Polo, who knew it as Singui Matu. Its importance grew still further when, in the 15th century, sea transport from southern China was abandoned, after which all grain supplies to Peking were taken up the canal. Chi-ning was a major staging point on the canal and served as a revenue-collecting centre for taxes on the grain from eastern Honan and southwestern Shantung. The city, which had huge granaries, was walled in the early 16th century and grew into a thriving commercial centre.

In the late 19th century, however, various factors combined to reduce its importance. The change of course of the Huang Ho (river) in the early 1850s created havoc on the canal, and the northern section beyond Chi-ning fell into disrepair. The Ch'ing dynasty (1644–1911) gradually abandoned its massive grain transport system and began importing grain for Peking through Tientsin. A further blow came with the construction in 1912 of the railway from Tientsin to P'u-k'ou, opposite Nanking (Nan-ching), on a line following higher ground to the east. Chi-ning was connected to Yen-chou by a spur line, but some of its wider commercial functions passed to Chi-nan in the north or to Suchow farther south.

Chi-ning, nevertheless, has remained a flourishing commercial and collecting centre for the region. Since 1949 the city's importance has revived as a result of the reconstruction of the Grand Canal, which has once more become a major traffic artery. It is also a road junction as well as a centre of traditional handicraft industries, producing farm implements, irrigation machinery, wooden and bamboo utensils, and other products for sale in the rural districts. The city also has a food-processing industry. Pop. (1990) 265,248.

Chi-nui (Buddhist priest): *see* Bojo Guksa.

Ch'i Pai-shih, Pinyin QI BAISHI, also called CH'I HUANG (b. Nov. 22, 1863, Hsiang-t'an, Hunan province, China—d. Sept. 16, 1957, Peking), with Chang Ta-ch'ien (*q.v.*), one of the last of the great traditional Chinese painters.

Ch'i Pai-shih was of humble origins and largely through his own efforts became adept at the arts of poetry, calligraphy, and painting. He was active to the end of his long life and served as head of the Peking Institute of Chinese Painting. His prodigious output reflects a diversity of interests and experience, generally within the smaller things of the world rather than the large landscape, and he continued the styles of such 17th- and 18th-century Individualists as Shih-t'ao and Chu Ta (*qq.v.*).

Ch'i-ping (military organization): *see* Banner System.

Chi-tsang, Pinyin JIZANG (b. 549, China—d. 623, China), Chinese Buddhist monk who systematized the teachings of the San-lun ("Three Treatises," or Middle Doctrine) school of Mahāyana Buddhism in China and who is sometimes regarded as its founder.

Chi-tsang was the son of a Parthian father and a Chinese mother, but his education and upbringing were wholly Chinese. In an age characterized by social unrest and military struggle, he produced an astonishing volume

of literary works, of which the best-known are his commentaries on the basic texts of the San-lun school. Because of his great reputation as a teacher and writer, Chi-tsang was invited by Emperor Sui Yang Ti to the capital, Ch'ang-an, where he lectured before huge throngs of monks and laymen.

The San-lun school's basic doctrine is that, while the things of the material world may possess a temporary reality or existence, on the level of absolute truth there is "no production or extinction, no permanence or annihilation, no unity or diversity, no coming or departure." Although the school itself did not survive past the 9th century AD, many Chinese Buddhists continue to study Chi-tsang's teachings. Chi-tsang's ideas also influenced the Neo-Confucian philosophy of the Sung dynasty (960–1126).

Chi-yang-tse (Tibet): *see* Chiang-tzu.

Chi Yen-Tsung (Mongol emperor): *see* Buyantu.

Ch'i-ying, Pinyin QIYING (d. June 29, 1858, Peking), Chinese official who negotiated the Treaty of Nanking, which ended the first Opium War (1839–42), fought by the British in China to gain trade concessions there.

A member of the Imperial family of the Ch'ing dynasty (1644–1912), Ch'i-ying served in various high governmental positions before being sent to the east-central Chinese city of Nanking in 1842 to negotiate a treaty with the advancing British forces. The document finally signed by Ch'i-ying granted the British the island of Hong Kong, opened five other ports to British trade and residence of British citizens, and agreed to the payment of a large indemnity. The following year, on Oct. 8, 1843, Ch'i-ying signed the British Supplementary Treaty of the Bogue, which governed the execution of the Nanking Treaty and granted the British the right of extraterritoriality; *i.e.*, the right to try British subjects by British courts set up on Chinese soil. The Bogue Treaty also granted the British a "most favoured nation" clause, which promised that any concession granted later to other foreign powers would also then be granted to the British. In 1844 Ch'i-ying signed similar treaties with the United States and France and, in 1847, with Sweden and Norway. In his ignorance of the West, Ch'i-ying felt he was ridding the Chinese Empire of an immediate nuisance by agreeing to the foreigners' demands. This practice was, however, the beginning of a series of treaties that humiliated the Chinese for more than a century.

Ch'i-ying pursued his policy of appeasement until 1848, when he was recalled after the British, in an attempt to pressure the Chinese, conducted a short raid on Canton and the forts along the coast. In 1858 Ch'i-ying returned to government service to aid in the negotiation of a treaty to end the "Arrow" War (1856–60). The British negotiators, however, took a hostile attitude toward him, confronting him with a letter he had written to the emperor in 1845, in which he discussed the proper methods for dealing with "barbarians." Ch'i-ying, by then old and half-blind, panicked and gave up his assigned duty. For his disobedience, the emperor had him imprisoned and then ordered him to commit suicide.

chia, Pinyin JIA, type of Chinese bronze vessel produced during the Shang (18th–12th century BC) and early Chou (1111–*c.* 900 BC) dynasties. It is a deep, cup-shaped vessel supported on three or four pointed, splayed legs. There is a vertical handle on the body and two small, capped, pillarlike additions on opposite sides of the circular rim. The function of the latter is uncertain, though possibly they served to suspend the vessel over a fire to heat the wine inside.

The decoration is often simple, consisting usually of a *t'ao-t'ieh* (*q.v.*), or monster mask,



Bronze *chia*, Shang dynasty (18th–12th century BC); in the William Rockhill Nelson Gallery and Mary Atkins Museum of Fine Arts, Kansas City, Mo.

By courtesy of the Nelson Gallery-Atkins Museum, Kansas City, Missouri (Nelson Fund)

on either side of the body. There may be a pottery predecessor in the Neolithic Period (*c.* 3000–1500 BC), shaped much like a *li-ting* (*see* ting), but the *chia* is generally unique to the bronze art of the Shang and early Chou periods.

Chia-ching, Pinyin JIAJING (reign title), personal name (Wade–Giles romanization) CHU HOU-T'SUNG, posthumous name (*shih*) SU TI, temple name (MING) SHIH TSUNG (b. 1507, China—d. 1566, China), 11th emperor of the Ming dynasty, whose long reign (1521–66) added a degree of stability to the government but whose neglect of official duties ushered in an era of misrule.

Notoriously cruel, Chia-ching caused hundreds of officials who had the temerity to disagree with him to be tortured, demoted, or killed. He spent much of his time and money, especially in his later years, patronizing Taoist alchemists in the hopes of finding an elixir to prolong his life. The government was left in the hands of a few favourites who allowed the situation on China's borders to deteriorate. Mongol tribesmen under the leadership of Altan Khan (died 1583) raided the northwest frontier and several times even besieged the Chinese capital at Peking. Japanese pirates harassed trade along the coast, and rebellions in the southern provinces were frequent. Chia-ching's successors, however, were able to revive Ming power temporarily.

Chia-ch'ing, Pinyin JIAQING (reign title), personal name (Wade–Giles romanization) YUNG-YEN, posthumous name (*shih*) JUI TI, temple name (CH'ING) JEN TSUNG (b. Nov. 13, 1760, Peking—d. Sept. 2, 1820, Jehol [now Ch'eng-te], Hopeh province, China), fifth emperor (reigned 1796–1820) of the Ch'ing dynasty, during whose reign a partial attempt was made to restore the flagging state of the empire.

He was proclaimed emperor and assumed the reign title of Chia-ch'ing in 1796, after the abdication of his father, the Ch'ien-lung emperor (reigned 1735–96). Power, however, remained in the hands of his father and his corrupt minister Ho-shen until 1799; the Chia-ch'ing emperor's duties were confined to directing ceremonial functions.

Meanwhile, the great White Lotus Rebellion (1796–1804) had broken out in central and western China. Under Ho-shen's management, the campaign was prolonged so that he and his friends could embezzle money meant for the war effort. The Ch'ien-lung emperor died in 1799, and Chia-ch'ing immediately ordered Ho-shen's arrest and forced him to commit suicide. Capable generals were appointed to quell the rebellion, but it took the depleted Ch'ing armies five more years to put it down. Pirates had begun to infest the southern coast, nearly stopping trade; almost 10 years (1800–10) were required to suppress them.

After the death of his father and the arrest of Ho-shen, the Chia-ch'ing emperor made efforts to restore the finances of the Imperial treasury; but he was not a strong ruler and rather than cut down on the rampant official corruption, he attempted to hold down the expenses of the court—a program that rankled members of the Imperial family. Although this policy was partly successful in refilling the treasury, it did not deal with mounting governmental ineffectiveness. In fact, corruption may even have increased as a result of the practice of selling high office as a means of collecting more revenue. In addition, the burden of taxes on the people remained high. In 1803 the emperor was attacked by a mob in the streets, and in 1813 a band of conspirators attempted to storm the palace. Chia-ch'ing died one of the most unpopular emperors of the Ch'ing dynasty.

Chia-hsing, Pinyin JIAXING, city, northern Chekiang *sheng* (province), eastern China. Chia-hsing is a communications centre in the southern Yangtze River delta, situated to the southeast of T'ai Lake on the Grand Canal, north of the port of Hang-chou and on the railway between Hang-chou and Shanghai. It is joined to the dense waterway network that serves the northern Chekiang plain.

The city was founded in the 3rd century BC when the Ch'in dynasty (221–206 BC) established Yu-ch'üan county. In AD 231 the city's name was changed to Ho-hsing (meaning "flourishing grain"), after the rich rice of the area, and shortly afterward to Chia-hsing. From the late 3rd century AD until 589 it was the seat of the commandery of Wu; it was then reduced to the status of a county seat and placed under the jurisdiction of Su-chou in Kiangsu province. In 608, when the Grand Canal was constructed, it joined Chia-hsing to the Yangtze at Chen-chiang (northwest) and to Hang-chou (south). In 938 Chia-hsing became the seat of a prefecture and was called Hsiu-chou. In 1195 it was made a superior prefecture because it had been the birthplace of the Sung emperor Hsiao Tsung (reigned 1163–89). The Yüan (Mongol) dynasty (1279–1368) renamed it Chia-hsing, and from 1368 to 1911 it was the superior prefecture of Chia-hsing. The city suffered considerable damage during the latter stages of the Taiping Rebellion, when for a time it was occupied by the rebels (1862–63).

Chia-hsing has been a commercial centre of modest importance from the 11th century onward. From the 15th century it has been, with Wu-hsing, a major silk industry centre. Silk reeling and weaving remains a major handicraft industry in the rural villages of the surrounding area. Although the city produces silk textiles, it does not rival Wu-hsing or Hang-chou. Chia-hsing also has a woolen industry (producing textiles and knitted goods) and rice-polishing and oil-extracting plants. Another old, established industry is papermaking—the city produces most of China's cigarette paper. Chia-hsing's prime importance, however, is as a collecting centre for the agricultural products of the surrounding area—including the quality rice produced in the fertile plain south of T'ai Lake—most of which are shipped to Shanghai by rail or water. Pop. (1985 est.) 168,300.

Chia huang-ti (Chinese emperor): *see* Wang Mang.

Chia-i, also spelled CHIAYI, *hsien* (county), west-central Taiwan, with an area of 734 square miles (1,902 square km). It is bounded by the *hsien* of Yün-lin and Nan-t'ou (north), Kao-hsiung (east), and T'ai-nan (south) and by the Taiwan Strait (west). The A-li Mountains dominate the eastern region, and there are coastal plains in the west. Paddy rice, sugarcane, peanuts (groundnuts), corn (maize), jute, bananas, pineapples, and citrus fruits are grown.

Chia-i is Taiwan's leading woodworking region, producing railroad ties and thin wood sheets for packing. Machinery, food canning, sugar and rice milling, and petroleum industries are also important. Asbestos and coal are mined in the *hsien*, and marble is quarried. In the 17th century the region came under Chinese (Ming) control during the rule of Cheng Ch'eng-kung (Koxinga) in Taiwan (1624–62). The county has many places of interest, including the A-li Mountains (a forested vacation area), the Tropic of Cancer Monument, Wu-feng Temple, and Mei-shan Park. Each leap year, a festival "temple meeting" is held at Chia-i, the administrative seat. Chia-i is connected by air to Taipei city in the north and P'eng-hu Island in the west. Pu-tai and Tung-shih are the *hsien*'s two main ports. Pop. (1989 est.) 552,946.

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Chia-i, also spelled CHIAYI, *shih* (municipality) and seat of Chia-i *hsien* (county), on the western coastal plain of Taiwan. It lies at the foot of the A-li Mountains, on Taiwan's main north–south rail and highway routes. Narrow-gauge branch railways built by the Japanese (who occupied Taiwan from 1895 to 1945) run from Chia-i to the sugar-producing plains to the west and into the A-li Mountains for the transport of lumber. Because of its excellent position as a communication centre, Chia-i has developed into a rice market and a centre of trade.

Chia-i's importance was increased between 1920 and 1930 by the completion of the Chianan irrigation system, which waters a large area in the plain between Chia-i, the administrative centre of the system, and T'ai-nan to the south. Lumbering is practiced in the region, and in consequence Chia-i has become a papermaking and plywood-manufacturing centre. It also has wineries and plants producing tires, cement, and alcohol. Junior colleges offer vocational training in agriculture, education, commerce, and technology. Pop. (1987 est.) 254,875.

chia-ku-wen, Pinyin JIAGUWEN, English BONE AND SHELL SCRIPT, pictographic script, the earliest known in China, found on oracle bones used in divination in the Shang dynasty (*c.* 1766–*c.* 1122 BC). Turtle carapaces and ox scapulae with inscriptions scratched into them were discovered about 1900 in the area of Hsiao-t'un, a village in Honan province. In subsequent excavations, scholars uncovered extensive remains and conclusive evidence for the existence of the Shang dynasty. Apparently, characters were first brushed on the bone in red or black ink and then incised with a sharp instrument. Heat was then applied to the bone or shell, which caused it to crack, and omens were divined from the resulting patterns. The script's characters are not consistent in either size or structure, and, while generally written from top to bottom, the configuration of the bone or shell determined a free and sometimes arbitrary arrangement.



Chia-ku-wen on a tortoise shell (*c.* 1300–1100 BC); in the Academia Sinica, Taipei

By courtesy of the Academia Sinica, Taipei, Taiwan, Republic of China

Chia-mu-ssu, Pinyin JIAMUSI, city in northeastern Heilungkiang *sheng* (province), northeastern China. Chia-mu-ssu is situated on the lower reaches of the Sungari River and has good natural communications by river upstream to such towns as Harbin (Ha-erh-pin) and I-lan, as well as with the Amur and Ussuri rivers during the summer months.

Until the 18th century this region, which has fertile agricultural land, was largely unsettled because of the harsh climate and short growing season. When Chinese and Manchu settlers began to move into the area, Chia-mu-ssu developed as a small trading post under the name Tung-hsing-chen. In 1910 it became the seat of a county administration, under the name Hua-ch'uan; but after several floods the county seat was moved to Hao-li (Ho-kang), about 30 miles (50 km) to the north. Subsequently, Chia-mu-ssu continued to grow as a commercial centre and became a county-level municipality. A road system was constructed, providing year-round transport.

After the Japanese occupation of Manchuria began in 1931–32, Chia-mu-ssu became an administrative centre of the puppet Manchukuo government and the capital of San-chiang province. It also became a major military base. Many settlers came into the area, not only from China but also from Korea and Japan. In 1937–38 it was connected by rail to Sui-hua and Harbin, as well as to Mu-tan-chiang. After 1949 the rapid development of Heilungkiang province continued, and Chia-mu-ssu grew still further as the transport and communications centre of the region. It also developed into an industrial city, manufacturing agricultural equipment, mining machinery, fertilizers, plastics, and chemicals. Since 1956 it has been a major producer of wood pulp and newsprint, having one of the biggest paper mills in China. It also has food-processing plants, some of which refine sugar from locally grown beets. Pop. (1988 est.) 449,000.

Chiabrera, Gabriello (b. June 18, 1552, Savona [Italy]—d. Oct. 14, 1638, Savona), Italian poet whose introduction of new metres and a Hellenic style enlarged the range of lyric forms available to later Italian poets.

Chiabrera studied philosophy in Rome, lived for a time in the household of a cardinal, and then returned to Savona, where civic and diplomatic posts and the protection of several princes gave him the leisure to write a prodigious amount of poetry in various forms: lyrics, narrative poems, eclogues, epitaphs, epics, tragedies, and satires. His canzones (lyrics derived from Provençal poetry) introduced stylistic innovations. His best works, however, are his graceful, musical canzonettas; these are lighthearted compositions, apparently influenced by the 16th-century French Pléiade poets, in which he experiments with the introduction of 4-, 5-, 6-, 8-, and 9-syllable lines (rather than the 11- and 7-syllable lines of previous practice) and with varieties of syllabic stress. Because of the success of Chiabrera's experiments, subsequent poets had a choice of many new lyric types. His work was imitated by the 18th-century Italian Arcadian poets and was admired by the 19th-century Romantic poet William Wordsworth, who translated some of his epitaphs.

Chianciano Terme, town and mineral spa, Siena *provincia,* Toscana (Tuscany) *regione,* central Italy. It lies at an elevation of 1,500 feet (450 m), just southeast of Montepulciano. The mineral springs, which have been frequented since Etruscan times, are located about 1.25 miles (2 km) from the town; they are a popular tourist attraction, and there are numerous hotels for the accommodation of visitors. The town also has cement and pottery industries. Pop. (1987 est.) mun., 7,344.

Chiang Ch'ing (Chinese leader): *see* Jiang Qing.

Chiang Ching-kuo (b. March 18, 1910, Ch'i-k'ou, Chekiang province, China—d. Jan. 13, 1988, Taipei, Taiwan), son of Chiang Kai-shek, and his successor as leader of the Republic of China (Taiwan). His father's death in 1975 was followed by a caretaker presidency until March 21, 1978, when Chiang Ching-kuo was formally elected by the National Assembly to a six-year presidential term; he was reelected to a second term in 1984.

The son of Chiang Kai-shek and his first wife (whom Chiang Kai-shek subsequently divorced), Chiang Ching-kuo attended primary school in China and was arrested several times during his youth for involvement with revolutionary activities. In 1925 he went to Moscow, where he studied at Sun Yat-sen University. At that time his father was one of the leaders of the Nationalist Party (Kuomintang), which included many Communists, but in 1927 Chiang Kai-shek dissolved the Nationalist–Communist alliance. Chiang Ching-kuo denounced his father's actions and soon was selected for advanced studies at the Central Tolmachev Military and Political Institute in Leningrad, from which he graduated. While employed in one of a number of minor jobs that he held in the Soviet Union, he met the Russian woman whom he married in 1935.

Chiang Ching-kuo again denounced his father's policies in 1936, but he later claimed that he was forced to do so and also to remain in the Soviet Union. When, early in 1937, Chiang Kai-shek formed a new United Front



Chiang Ching-kuo

J.-Claude Francolon—Gamma/Liaison

with the Chinese Communist Party, father and son were reunited in China.

During the war with the Japanese that followed the formation of the second United Front, Chiang Ching-kuo held various military and administrative posts in the Nationalist government. After 1941 his father came to rely increasingly on his advice, and when the Communists gained control of mainland China in 1949, father and son moved to Taiwan (Formosa), where they reestablished the headquarters of the Nationalist government, continuing to style it the Republic of China (according to the 1946 constitution). There Chiang Ching-kuo was given control of the military and security agencies of the Nationalist government, and in 1965 he became Minister of National Defense, with command of the army. In 1972 he was appointed prime minister by his father.

During his father's illness (1973–75) and after his own election to the presidency in 1978, Chiang moved to eliminate governmental corruption and favouritism and to broaden the government's base by bringing more native-born Taiwanese into the legislative and executive branches, which were dominated by former mainland Chinese officials of the Nationalist Party. Chiang tried to maintain Taiwan's vital foreign-trade relationships as well as its political independence, since many members of the international community, including the United States, broke diplomatic relations with his country in the 1970s in order to establish ties with China. In the 1980s Chiang remained opposed both to Taiwanese recognition of the Chinese Communist regime and to negotiations for his country's reunification with the mainland.

Chiang Hai-ch'eng (Chinese poet): *see* Ai Qing.

Chiang Kai-shek, Wade-Giles romanization CHIANG CHIEH-SHIH, official name CHIANG CHUNG-CHENG (b. Oct. 31, 1887, Chekiang province, China—d. April 5, 1975, Taipei, Taiwan), soldier and statesman, head of the Nationalist government in China from 1928 to 1949, and subsequently head of the Chinese Nationalist government in exile on Taiwan.

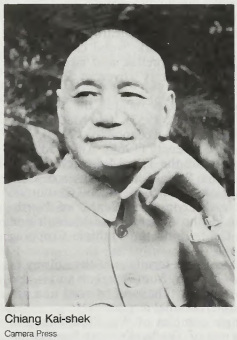
Chiang was born into a moderately prosperous merchant and farmer family in the coastal province of Chekiang. He prepared for a military career first (1906) at the Paoting Military Academy in North China and subsequently (1907–11) in Japan. From 1909 to 1911 he served in the Japanese army, whose Spartan ideals he admired and adopted. More influential were the youthful compatriots he met in Tokyo; plotting to rid China of its alien Manchu dynasty, they converted Chiang to republicanism and made him a revolutionary.

In 1911, upon hearing of revolutionary outbreaks in China, Chiang returned home and helped in the sporadic fighting that led to the overthrow of the Manchus. He then participated in the struggles of China's republican and other revolutionaries in 1913–16 against China's new president and would-be emperor, Yüan Shih-k'ai.

After these excursions into public life, Chiang lapsed into obscurity. For two years (1916–17) he lived in Shanghai, where he apparently belonged to the Green Gang (Ch'ing-pang), a secret society involved in financial manipulations. In 1918 he reentered public life by joining Sun Yat-sen, the leader of the Nationalist Party, or Kuomintang. Thus began the close association with Sun on which Chiang was to build his power. Sun's chief concern was to reunify China, which the downfall of Yüan had left divided among warring military satraps. Having wrested power from China's alien dynasty, the revolutionists had lost it to indigenous warlords; unless they could defeat these warlords, they would have struggled for nothing.

Shortly after Sun Yat-sen had begun to reorganize the Nationalist Party along Soviet lines, Chiang visited the Soviet Union in 1923 to study Soviet institutions, especially the Red Army. Back in China after four months, he became commandant of a military academy, established on the Soviet model, at Whampoa near Canton. Soviet advisers poured into Canton, and at this time the Chinese Communists were admitted into the Nationalist Party. The Chinese Communists quickly gained strength, especially after Sun's death in 1925, and tensions developed between them and the more conservative elements among the Nationalists. Chiang, who, with the Whampoa army behind him, was the strongest of Sun's heirs, met this threat with consummate shrewdness. By alternate shows of force and of leniency, he attempted to stem the Communists' growing influence without losing Soviet support. Moscow supported him until 1927, when, in a bloody coup of his own, he finally broke with the Communists, expelling them from the Nationalist Party and suppressing the labour unions they had organized.

Meanwhile, Chiang had gone far toward reunifying the country. Commander in chief of the revolutionary army since 1925, he had launched a massive Nationalist campaign against the northern warlords in the following year. This drive ended only in 1928, when his forces entered Peking, the capital. A new central government under the Nationalists, with Chiang at its head, was then established at Nanking, farther south. In October 1930 Chiang became Christian, apparently at the instance of the powerful westernized Soong family, whose youngest daughter, Mei-ling, had become his second wife. As head of the new Nationalist government, Chiang stood committed to a program of social reform, but most of it remained on paper, partly because his control of the country remained precarious. In the first place, the provincial warlords, whom he had neutralized rather than crushed, still disputed his authority. The Communists posed another threat, having withdrawn to rural strongholds and formed their own army and government. In addition, Chiang faced certain war with Japan, which, after seizing Manchuria (Northeast Provinces) in 1931, showed designs upon China proper. Chiang decided not to resist the coming Japanese invasion until after he had crushed the Communists—a decision that aroused many protests, especially since a complete victory over the Communists continued to elude him. To give the nation more moral cohesion, Chiang revived the state cult of Confucius and in 1934



Chiang Kai-shek
Camera Press

launched a campaign, the so-called New Life Movement, to inculcate Confucian morals.

War with Japan broke out in 1937, and Chiang was compelled during the Sian Incident (*q.v.*) to end his military campaigns against the Communists and form an alliance with them against the Japanese invaders. For more than four years China fought alone until it was joined by the Allies, who with the exception of the Soviet Union declared war on Japan in 1941. China's reward was an honoured place among the victors as one of the Big Four. But internally Chiang's government showed signs of decay, which multiplied as it resumed the struggle against the Communists after the Japanese surrendered to the United States in 1945. Civil war recommenced in 1946; by 1949 Chiang had lost continental China to the Communists, and the People's Republic of China was established. Chiang moved to Taiwan with the remnants of his Nationalist forces, established a relatively benign dictatorship with other Nationalist leaders over the island, and attempted to harass the Communists across the Formosa Strait. The chastened Chiang reformed the ranks of the once-corrupt Nationalist Party, and with the help of generous American aid he succeeded in the next two decades in setting Taiwan on the road to modern economic development. In 1955 the United States signed an agreement with Chiang's Nationalist government on Taiwan guaranteeing its defense. Beginning in 1972, however, the value of this agreement and the future of Chiang's government were seriously called in question by the growing rapprochement between the United States and the People's Republic of China. Chiang did not live to see the United States finally break diplomatic relations with Taiwan in 1979 in order to establish full relations with the People's Republic of China. After his death in 1975 he was succeeded temporarily by Yen Chia-kan (C.K. Yen), who was in 1978 replaced by Chiang's son Chiang Ching-kuo.

Among the reasons for Chiang's overthrow by the Communists, one frequently cited is the corruption that he countenanced in his government; another was his loss of flexibility in dealing with changing conditions. Growing more rigid in his leadership over the years, he became less responsive to popular sentiment and to new ideas. He came to prize loyalty more than competence and to rely more on personal ties than on ties of organization. His dependence on a trusted clique also showed in his army, in which he favoured narrow traditionalists over many abler officers. Chiang initially maintained his position as republican China's paramount leader by shrewdly playing off provincial warlords and possible Nationalist rivals against each other and later by his adroit cultivation of American military, diplomatic, and financial support for his regime. His overthrow by the Communists can perhaps be traced to his strategy during World War II; he generally refused to use his U.S.-equipped armies to actively resist China's Japanese occupiers and counted instead on the United States to eventually defeat Japan on its own. He chose rather to preserve his military machine until the time came to unleash it on the Communists at the war's end and then crush them once and for all. But by that point Chiang's strategy had backfired; his passive stance against the Japanese had lost him the prestige and support among the Chinese populace that the Communists ended up gaining by their fierce anti-Japanese resistance. The morale and effectiveness of his armies had decayed during their enforced passivity in southwestern China, while the Communists had built up large, battle-hardened armies on the strength of their appeal to Chinese nationalist sentiment. Finally, it can be said that Chiang "lost China" because he had no higher vision or coherent plan for making the deep social and economic changes needed to bring Chinese society into the 20th century. From

his purge of the Nationalists' Communist partners in 1927 and his subsequent alliance with the landowning and mercantile classes, Chiang inexorably followed an increasingly conservative path that virtually ignored the plight of China's oppressed and impoverished peasantry. The peasants formed almost 90 percent of China's population, though, and it was their support, as demonstrated by the Communist victory, which proved crucial in once more establishing a strong central government that could achieve the modern unification of China.

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Chiang Kai-shek, Madame: *see* Soong Mei-ling.

Chiang K'ang-hu, Pinyin JIANG KANGHU (b. July 18, 1883, Shangjao, Kiangsi province, China—d. 1945?, China), Chinese scholar, teacher, and reformer who was a leading proponent of socialism in China in the early 20th century.

Born into a scholar-official family, Chiang studied at home and briefly in Japan before returning to China in 1901 to take charge of the compilation of elementary-school textbooks for the schools of five northern provinces. He became a professor at Peking Imperial University in 1904 and also organized a succession of teacher-training schools for women in that city. Chiang became interested in socialism during his second trip to Japan, in 1907. Returning to China in 1910, he gave what were perhaps the first public lectures on socialism ever delivered in China. In his application of socialism to China, Chiang advocated the abolition of the family and of inherited wealth, the emancipation of women, and the establishment of universal and equal education as the means to end the class divisions and status hierarchies that plagued Chinese society. He envisaged a mixed economy utilizing both private enterprise and selective state ownership of industry.

Upon the overthrow of the Ch'ing (Manchu) dynasty and the establishment of the Chinese republic in 1911/12, Chiang began openly propagandizing for socialism. The Chinese Socialist Party developed in 1912 in Shanghai from a study society he had started, and under his leadership the party quickly established 250 branches in other Chinese cities, with a membership of perhaps 20,000. However, in 1913 President Yüan Shih-k'ai suppressed the party, and Chiang fled to the United States, where he spent his time teaching at the University of California (Berkeley) until 1920.

After visiting the Soviet Union in 1921–22, Chiang returned to China once more to try to establish socialism there. He organized the Southern University at Shanghai with himself as its president and in 1924 revived the Chinese Socialist Party, which he reorganized in 1925 into the Social Democratic Party, giving it a platform similar to those of western European social-democratic organizations. Chiang's growing political momentum came to an abrupt end in 1925, however, when a correspondence between him and the deposed Manchu emperor P'u-i was published as evidence that he was plotting to restore the Ch'ing dynasty to power (Chiang had merely wished to convert P'u-i to socialism). Hounded out of the presidency of Southern University by outraged students and recognizing that the disgrace had ended his political career, Chiang went to Canada. He soon underwent an ideological about-face, abandoning socialism and becoming a resolute Confucian and Chinese traditionalist. He returned to China in 1934, taught courses on Chinese civilization, and in 1940 took a post at Nanking under the Japanese-sponsored government of Wang Ching-wei supervising civil-service examinations. His whereabouts and fate as a collaborator after the Japanese surrender in 1945 remain unknown.

Consult the INDEX *first*

Chiang Mai, also spelled CHIENGMAI, largest city in northern Thailand and the third largest city in the nation after metropolitan Bangkok and Nakhon Ratchasima. It is located on the Ping River, a major tributary of the Chao Phraya River, near the centre of a fertile intermontane basin at an elevation of 1,100 feet (335 m). It serves as the religious, economic, cultural, educational, and transportation centre for both northern Thailand and part of neighbouring Myanmar (Burma). Once the capital of an independent kingdom, the city also has strong cultural ties with Laos.

The settlement, founded as a royal residence in 1292 and as a town in 1296, served as the capital of the Lanna Thai kingdom until 1558, when it fell to the Myanmar. In 1774 the Siamese king Taksin drove out the Myanmar; but Chiang Mai retained a degree of independence from Bangkok until the late 19th century.

In contrast to the normally densely populated Asian city, Chiang Mai has the appearance of a large village—orderly, clean, traditional, and almost sprawling. The older part of town, particularly the 18th-century walled settlement, is on the west bank of the river; it contains ruins of many 13th- and 14th-century temples. The modern east-bank portion is a more open area. Two bridges cross the broad Ping River. Chiang Mai is a flourishing tourist and resort centre. Phu Ping Palace, the summer home of the Thai royal family, is nearby.

The city is renowned as a centre of Thai handicrafts. Small villages nearby specialize in crafts such as silverwork, wood carving, and making pottery, umbrellas, and lacquerware. Traditional Thai silk is woven at San Kamphaeng to the east.

Educational facilities include the Northern Technical Institute (1957), the Maejo Institute of Agricultural Technology (1934), and Chiang Mai University (1964). Affiliated with the university are the Tribal Research Centre, the Lanna Thai Social Sciences Research Centre, the Regional Centre of Mineral Resources, the Industrial Economics Centre of Northern Thailand, the Anaemia and Malnutrition Research Centre, and the Multiple Cropping Project.

Chiang Mai is the terminus of the railway of 467 miles (752 km) from Bangkok and is also linked to southern Thailand by road and air. It has an international airport.

The temple complex of Wat Phra That Doi Suthep is one of Thailand's most famous pilgrimage sites. The temple lies at an elevation of 3,520 feet (1,073 m) on the slopes of Mount Suthep, one of Thailand's highest peaks (5,528 feet [1,685 m]), just outside the city. The Doi Pui National Park occupies 40,000 acres (16,000 hectares) around the mountain. King Kue-Na built the monastery of the complex in the 14th century; its spired pagoda is said to hold relics of the Buddha.

Many other temples are in the city itself. Wat Phra Sing (1345) houses Phra Sing, the most venerated Buddha figure of the north. Wat Chedi Luang (1411) housed Bangkok's famous Emerald Buddha during the 15th and 16th centuries. Pop. (1986 est.) 157,843.

Chiang-men, Pinyin JIANGMEN, also called KONGMOON, city in central Kwangtung *sheng* (province), China. The city is situated on the west bank of the main channel of the Hsi River, at the southwest corner of the Canton Delta, some 45 miles (70 km) from Canton. It has excellent waterway communications and is the chief collecting centre and agricultural market for the coastal region west of Canton. Chiang-men was opened as a treaty port to foreign trade in 1904, but its development was stunted by the rapid growth of Canton and Hong Kong, as a result of which it suffered severely during the economic depression of the mid-1930s. In 1909 a railway—the first Chinese line entirely financed and constructed by the Chinese—was built from Chiang-men to Fo-shan. Chiang-men is also the focus of a highway network running into the western coastal region of Kwangtung. Although Chiang-men has remained predominantly a commercial centre, since the mid-1950s it has experienced some development of industry. A large sugar and chemical plant, initially built to make sugar and pulp, has been expanded to convert the wastes into chemicals, medicines, bricks, cement, yeast, alcohol, and a variety of other products. Pop. (1988 est.) 193,000.

Chiang Rai, also spelled CHIENGRAI, town, northern Thailand.

Chiang Rai lies at an elevation of 1,150 feet (350 m) in the basin of the Kok River, near the Khun Tan Range. It has an airport with scheduled flights, and road connections lead south to Lampang and north to Myanmar (Burma) and the Laotian border. It is a trading centre dealing in teak, coffee, and rice. The town was once the walled capital city of an independent principality. The well-known Emerald Buddha, now in Bangkok, was at a temple in the town until 1436, when it was removed to Chiang Mai.

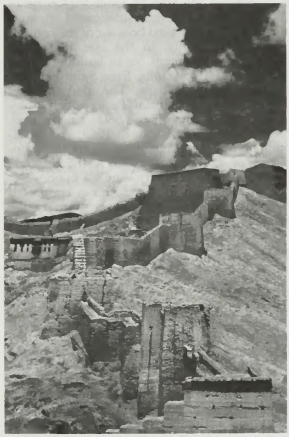
The surrounding mountainous region has a historic orientation to the north, which was somewhat altered by the completion of the southern highway in the 1920s; its population still shows strong cultural ties to Laos, reinforced by Laotian immigration. Rice and tobacco are the major crops, and there are numerous rice mills. Pop. (1986 est.) 37,847.

Ch'iang-t'ang, Pinyin QIANGTANG, Tibetan BYANG THANG, enormous alpine basin in the northern part of the Tibetan autonomous *ch'ü* (region), China. With an average elevation of more than 16,500 feet (5,000 m) above sea level, it lies between the Kunlun Mountains to the north and the T'ang-ku-la Mountains and A-ling Mountains to the south and stretches 800 miles (1,300 km) from the mountain complex called the Pamir Knot in the west to the region of the Tsaidam Basin in the northeast. At its widest it is almost 300 miles (480 km) from north to south. The Ch'iang-t'ang is a series of slightly undulating plains separated by ranges of hills. The surface is stony and rocky, with great accumulations of friable rock, broken up by frost weathering in the intensely cold climate occurring at such high altitudes. A large part of the basin is a sterile expanse of rock and gravel. There are no perennial rivers, but great numbers of salt lakes represent the remnants of bodies of water that were once much larger. Where these have dried up in the arid climate—the area receives less than 4 inches (100 mm) of rain annually and experiences high evaporation rates

because of the constant winds—huge deposits of salt have formed.

The climate is as inhospitable as the landscape. Summer lasts only three months, and temperatures in July average only 50° F (10° C); even in summer the night temperature often drops below freezing. In the winter the temperatures frequently fall below −31° F (−35° C); snow never settles, and the area is blasted by constant high winds. All the lakes and watercourses freeze solid. The area is at its most bleak in the north, most of which either is sterile rocky desert or has a sparse cover of hardy grasses. The southern section is somewhat less dry and has a much more continuous grass covering, with a few shrubs and hardy juniper trees growing around Namu-ts'o, the largest of the lakes. The mountain areas within the Ch'iang-t'ang are permanently covered with snow and ice at elevations above about 19,000 feet (5,800 m). The whole area is unsuitable for permanent settlement. Its only population, consisting of nomadic herders, is found in the south.

Chiang-tzu, also called CHI-YANG-TSE, Pinyin JIANGZU, or JIYANGZE, Tibetan GYANGZÊ, town in the southern part of the Tibetan autonomous *ch'ü* (region), China. It is situated on the Nien-ch'u River some 45 miles (70 km)



Massive walls of stone, brick, and mud built in Chiang-tzu, Tibet, to defend the city from Mongol attacks

Fosco Maraini—Monkmeyer

southeast of Jih-k'a-tse and about halfway between Lhasa, capital of Tibet, and the border town of Ya-tung between the frontiers with India and the Himalayan state of Bhutan. Chiang-tzu is an important route centre for traffic from Lhasa to India, Bhutan, the western Tibetan region, and Ladākh, a region in eastern Jammu and Kashmir.

Under the Ch'ing dynasty (1644–1911) Chiang-tzu was a frontier defense post with a small Chinese garrison and a much larger Tibetan guard force. Its importance was, however, largely commercial. It was a great marketplace to which caravans from the interior of Tibet brought gold, salt, musk, wool, and hides, which were bartered with Indian and Nepalese merchants for tea, tobacco, sugar, cloth, and metal goods. The town's importance as the chief market of south-central Tibet was increased when, following the Lhasa Treaty of 1904 between Tibet and the United Kingdom and its modification by the Anglo-Chinese Convention of 1906, it was opened to foreign trade and a British resident was stationed there. With the closing by China of the border between the Tibetan autonomous *ch'ü* and adjacent states, it lost some of its importance as a centre of seasonal trade. Pop. (mid-1980s est.) 10,000–50,000.

Chiao-tso, also spelled TS'IAO-TSO, Pinyin JIAOZUO, or CIAOZUO, city in northern Honan *sheng* (province), China. It lies in the foothills at the southern end of the T'ai-hang Mountains, to the west of Hsin-hsiang, in a mining district. Since Sung times it has been known for its ceramics, which in recent times have been called Chiao-tso, or Hsiu-wu, ware.

Its modern development has been almost entirely based on its rich coal deposits. The mining rights were originally obtained by an Anglo-Italian company in 1898. In the early 20th century a railway was constructed linking the mines at Chiao-tso with Hsin-hsiang on the Peking–Han-k'ou main line and beyond to Hua-hsien (Tao-k'ou) on the Wei River northeast of Hsin-hsiang. The syndicate that first developed the mines was later replaced by a Sino-British company, the Chung-fu Administration, which by 1937 was the second largest coal-mining concern in China. After 1949 the mines were extensively modernized and mechanized and by the early 1950s were producing more than half of Honan's total production. Chiao-tso is the second industrial city in Honan, being exceeded in capacity only by Lo-yang. Pop. (1990) 409,100.

Chiapas, *estado* ("state") of southern Mexico. It is bounded southwest by the Gulf of Tehuantepec and the Pacific Ocean, east by Guatemala, north by Tabasco, and west by Veracruz and Oaxaca. Much of its territory is mountainous and forested. The mountainous region of the Sierra Madre, in the south, includes a fertile, temperate plateau inhabited by most of the state's population, mainly Indians, but isolation and lack of transportation facilities have retarded its development. The extension across Chiapas of the Pan-American Highway and an inter-American railway in the 1950s improved the economic and social conditions of the people. In 1994, however, Chiapas was the scene of an armed uprising against the federal government. The rebels consisted of impoverished Indians protesting the expulsion of many others from their farmlands and forest tracts by large-scale cattle ranchers and loggers. Agriculture (coffee and rubber), stock raising, timber cutting, fruit farming, and salt making are the state's principal sources of income and furnish the main exports. Mineral resources include gold, silver, copper, and petroleum.

Linked with Guatemala in colonial days, Chiapas became a Mexican state in 1824; its boundaries were fixed in 1882. The early Maya ruins of Palenque, now accessible to tourists, are in the northeastern rain forest. Bonampak, with its famous Maya temple murals, may be reached from Tuxtla, the state capital. Area 28,653 square miles (74,211 square km). Pop. (1990 prelim.) 3,203,915.

Chiapas Highlands, high-altitude region of dissected plateaus enclosing a central valley (Valle Central de Chiapas) in Chiapas state, southeastern Mexico. The highlands constitute the northwestern end of a mountainous region extending northward from the lowlands of Nicaragua to the Isthmus of Tehauntepec and are composed of three main features running parallel to the Pacific Ocean. The western section of the highlands is the Chiapas Sierra Madres, a crystalline range of mountains reaching elevations of 9,000 feet (2,700 m) within 20 miles (32 km) of the ocean. The Valle Central de Chiapas farther inland constitutes the central section. The Northern Mountains of Chiapas, block mountains capped with volcanic materials and reaching elevations above 12,000 feet (3,650 m), compose the eastern section. The Tacaná volcanic cone, located on the southern extreme of the highlands at the Mexico-Guatemala border, rises to 13,484 feet (4,110 m).

Rainfall is heaviest along the coastal slopes of the Chiapas Sierra Madres, where the Aztec peoples historically grew their supply of cacao. The Spaniards entered the region in 1524 and succeeded in dominating the Aztecs only after bitter fighting. Cacao is still produced on the coastal slopes, together with coffee at higher elevations. The central valley floor, drained by the Grijalva River, supports crops of corn (maize), bananas, and coffee; higher parts of the valley produce wheat, and, above the tree line in the northeastern mountains, there is a zone devoted to cattle grazing. Tuxtla, located at the northern end of the Grijalva valley, is the largest population centre of the region. Chicoasén, a major hydroelectric project, is situated about 12 miles (19 km) north of Tuxtla on the Grijalva River. The extraction of oil from the eastern side of the highlands increased greatly in economic importance in the late 1970s. An inter-American railway and a paved highway run along the base of the Chiapas Sierra Madres, and the Pan-American Highway extends through the central Chiapas valley to the Guatemala border.

chiaroscuro (from Italian *chiaro,* "light"; *oscuro,* "darkness"), technique employed in the visual arts to represent light and shadow as they define three-dimensional objects.

Some evidence exists that ancient Greek and Roman artists used chiaroscuro effects, but in European painting the technique was first brought to its full potential by Leonardo da Vinci in the late 15th century in such paintings as his "Adoration of the Magi" (1481; Uffizi, Florence). Thereafter, chiaroscuro became a primary technique for many painters, and by the late 17th century the term was routinely used to describe any painting, drawing, or print that depends for its effect on an extensive gradation of light and darkness.



"Christ Healing the Sick" (The Hundred Guilder Print), detail of an etching by Rembrandt showing the use of chiaroscuro, *c.* 1643–49

By courtesy of the Victoria and Albert Museum, London

In its most dramatic form—as in the works of those Italian artists of the 17th century who came under the influence of Caravaggio—it was known as *tenebrismo,* or tenebrism (*q.v.*). Caravaggio and his followers used a harsh, dramatic light to isolate their figures and heighten their emotional tension. Another outstanding master of chiaroscuro was Rembrandt, who used it with remarkable psychological effect in his paintings, drawings, and etchings. Peter Paul Rubens, Diego Velazquez, and many other, lesser painters of the Baroque period also used chiaroscuro to great effect. The del-

icacy and lightness of 18th-century Rococo painting represents a rejection of this dramatic use of chiaroscuro, but the technique again became popular with artists of the Romantic period, who relied upon it to create the emotive effects they considered so important in their art.

In the graphic arts, the term chiaroscuro refers to a particular technique for making a woodcut print in which effects of light and shade are produced by printing each tone from a different wood block. The technique was first used in woodcuts in Italy in the 16th century, probably by the printmaker Ugo da Carpi. To make a chiaroscuro woodcut, the key block was inked with the darkest tone and printed first. Subsequent blocks were inked with progressively lighter tones and carefully measured to print in register with the key block. Chiaroscuro woodcuts are printed in only one colour, brown, gray, green, and sepia being preferred. The process attempted to imitate wash and watercolour drawings and also became popular as an inexpensive method of reproducing paintings.

chiastolite, a variety of the mineral andalusite (*q.v.*).

Chiatura, also spelled ČIATURA, city, central Georgia. Chiatura lies along the Kvirila River in a deep trench in the southern foothills of the Great Caucasus range. It is the centre of one of the largest manganese-mining areas of the world. The ore, which was first discovered in 1849, has been exploited since 1879. The city and its ore-enriching plants cluster in the narrow valley, with the mines in the surrounding hills linked by cable railways and aerial carriers. Pop. (1991 est.) 68,900.

Chiavari, town, Genova *provincia,* Liguria *regione,* northwestern Italy. It lies on the Riviera di Levante at the mouth of the Entella River, east of Genoa. The town grew up on the traces of a Roman camp on the Via Aurelia. A pre-Roman necropolis dating from the 8th to 7th century BC has been uncovered there. The old town contains numerous arcades and buildings from the 13th century, including the castle, several mansions, and the nearby Church of San Salvatore di Lavagna, founded (1224) by Pope Innocent IV. The cathedral (1613) was later rebuilt. Long famous as a centre of ancient humanistic tradition, the town has a public library with a collection of manuscripts and incunabula. Situated in a fertile plain surrounded by hills, with the sea to the south-southwest, Chiavari is a tourist centre and regional market for agricultural produce. Chair making, lace and silk manufacture, and slate working are also carried on. Pop. (1991 prelim.) mun., 28,396.

Chiayi (Taiwan): *see* Chia-i.

Chiba, *ken* (prefecture), Honshu, Japan, lying on the Pacific coast of the Kantō Plain. It consists of the Bōsō Peninsula, which lies east of Tokyo Bay and south of the Tone River. Surpluses of rice, vegetables, eggs, and flowers are produced for Tokyo, and offshore fisheries flourish. The Tokyo-Yokohama industrial belt (*see* Keihin Industrial Zone) has expanded into Chiba prefecture to include the Keiyō Industrial Zone (*q.v.*). Factories built on reclaimed land produce chemicals, iron, steel, petroleum products, and sake. Large natural-gas deposits have been tapped.

Chiba, the capital and largest city of the prefecture, is located on the northeastern coast of Tokyo Bay. It is the commercial and cultural centre of the peninsula. Chōshi is a major fishing port on the eastern coast, and Tateyama and Katsuura are important southern ports. Chiba and Tateyama have Air Defense headquarters. Sawara, on the Tone River, is a



Flower cultivation at Emi, Chiba prefecture, Japan
Shostal

base for Suigo-Tsukuba Quasi-national Park. The southern part of the peninsula abounds with Shintō shrines and Buddhist temples; the Buddhist Shinshō Temple (often called Narita Fudō) in Narita attracts millions of pilgrims annually. Area 1,989 square miles (5,151 square km). Pop. (1992 est.) 5,673,000.

Chiba, city and capital of Chiba *ken* (prefecture), Honshu, Japan. It lies on the Bōsō Peninsula about 20 miles (30 km) southeast of Tokyo and on the east coast of Tokyo Bay. It was a castle town controlled by the Chiba family in the 12th–15th century, and during the Tokugawa period (1603–1867) it served as a post-station town for several major roads. The town grew after the construction of a railway connecting it with Tokyo in the second half of the 19th century. After World War II Chiba underwent great industrial growth that brought it large steel factories, a major electric-power plant, and complexes producing various chemicals. The city's port is also one of the busiest in Japan. Chiba University (1949) is located in a suburb. Pop. (1992 est.) 841,914.

Chibcha, also called MUISCA, South American Indians who at the time of the Spanish conquest occupied the high valleys surrounding the modern cities of Bogotá and Tunja in Colombia. With a population of more than 500,000, they were notable for being more centralized politically than any other South American people outside the Inca empire. Numerous small districts, each with its own chief, had been consolidated through conquest and alliance into two major states and several lesser ones, each headed by a hereditary ruler. Although these states were not very stable, it seems clear that the arrival of the Spanish cut short the development of even larger political units. Their political structure was crushed in the 16th century. In the 18th century their language ceased to be spoken, and the Chibcha became assimilated with the rest of the population.

Chibcha society was based on an economy featuring intensive agriculture, a variety of crafts, and considerable trade. Weekly markets in the larger villages facilitated the exchange of farm produce, pottery, and cotton cloth; and trade with neighbouring peoples provided the gold that was used extensively for ornaments and offerings. The use of gold was a prerogative of the upper class, who were also carried in litters and shown great deference. Because descent was matrilineal, chiefs and religious leaders were succeeded by their sisters' sons, although land was inherited patrilineally. Heirs to important offices underwent long periods (6 to 12 years) of fasting and seclusion in preparation for their future duties.

The religion was dominated by a hereditary but unorganized priesthood that maintained numerous temples and shrines and held elaborate but infrequent public ceremonies. Offerings, especially of gold and cloth, were a prominent part of all religious observances, and on special occasions human sacrifices were made to the Sun.

Chibchan languages, a group of South American Indian languages that were spoken before AD 1500 in the area now comprising Nicaragua, Costa Rica, Panama, western Colombia, and Ecuador. A now extinct Chibchan language sometimes known as Muisca was the language of a powerful Indian empire with its centre near Bogotá. Important present-day Chibchan languages include Guaymí and Move in Panama, Cuna and Páez in Colombia, and Cayapa (or Colorado) in Ecuador. Some scholars classify a number of minor languages of Central and South America together with Chibchan in a Macro-Chibchan stock.

Chibougamau, city, Nord-du-Québec region, central Quebec province, Canada. It lies on the northwest shore of the Lac Doré part of Chibougamau Lake. Gold and copper were discovered in the area by Peter McKenzie in 1903, but his and several subsequent attempts at mining the ore failed because of the region's remoteness. Finally, in the late 1940s, the provincial government began building a road 150 miles (240 km) long, from Saint-Félicien, and laid out a townsite. The road traverses Chibougamau Provincial Park, which occupies 3,000 square miles (7,800 square km). Mineral extraction began in 1949, and development was further stimulated by the completion of a railway westward to the Noranda smelter in 1959. The city is now a major gold, copper, and zinc producer and is connected by both road and rail southeastward to the Saguenay–Lac-Saint-Jean industrial area. Pop. (1991) 8,855.

Chicacole (India): *see* Srīkākulam.

Chicago, city, seat of Cook county, northeastern Illinois, U.S. Located on the southwestern tip of Lake Michigan, Chicago became the main transshipment centre for the grain and livestock of the growing Midwest in the 19th century. In the 20th century it remained the leading transportation, commercial, and industrial centre of the north-central United States. Chicago was long the second largest American city in population (after New York City), but in 1982 it dropped to third, having been supplanted in this regard by Los Angeles.

A brief treatment of Chicago follows. For full treatment (including a map), *see* MACROPAEDIA: Chicago.

Chicago meets its suburbs in a ragged pattern of boundaries on the north, west, and south, while on the east the curving lakefront trends northwest and southeast along a narrow lakeside strip. The lakeshore is the city's prime scenic resource, and to a degree unusual among the world's metropolises it has been largely preserved as parkland, open space, and beach. The entire mass of the metropolitan area reaches out over the former prairie, spilling over city limits into a continually expanding belt of suburbs and industrial satellites. Parks and forest preserves are scattered throughout the area. The city's site is generally level, built mostly on a postglacial plain. The narrow Chicago River extends one mile inland from Lake Michigan, where it splits, dividing the city into North, West, and South sides. Chicago's climate is subject to rapid fluctuation. The lake mitigates extremes for nearby areas, but overall the climate is cold and windy in winter and hot in summer. Occasional heavy snows contribute to the annual precipitation of about 33 inches (838 mm).

Many ethnic and racial groups form more or less homogeneous communities within the city; the diverse population includes blacks, the descendants of immigrants from eastern and western Europe, Spanish-speaking peoples of Latin-American origin, and a variety of Middle Easterners and Asians.

Chicago's geographic location as a transportation link between the Great Lakes and the Mississippi River system made its importance in trade and industry almost inevitable. Because Lake Michigan extends so far south, railways running east-west across the Midwest tended to converge at the lake's southern tip and thus helped make Chicago the largest railway centre in the United States from the late 1850s. The Chicago metropolitan area remains an important focus of economic activity in the interior of North America, although it has suffered from the migration of some industry to the Sun Belt states of the southern United States. The Chicago region's diversified manufacturing includes steel, metal products, food products and confections, chemicals, and communications equipment and electronic goods. Chicago is also a major printing and publishing centre. Commerce and its related activities include trading in commodities and financial futures on the Chicago Board of Trade and the Chicago Mercantile Exchange. Trade shows, conventions, and fairs attract retailers and wholesalers nationwide. Chicago is the site of a Federal Reserve Bank (1914), many large private banks, insurance companies, and the Midwest Stock Exchange.

Chicago's striking skyline, stretching along the lakeside express artery, Lake Shore Drive, and spacious Michigan Avenue, contains some of the world's tallest buildings. The city's downtown area entered a building boom in the mid-1950s. North Michigan Avenue's commercially elegant "Magnificent Mile" is dominated by the 100-story John Hancock Center. More recently built commercial and residential complexes add further interest to the city skyline. To the southwest is the 110-story Sears Tower.

Chicago was the birthplace of the steel-frame skyscraper in the late 19th century. The city's notable architectural heritage includes designs by Daniel H. Burnham, Louis Sullivan, William Le Baron Jenney, Frank Lloyd Wright, and Ludwig Mies van der Rohe. Among its cultural institutions are the Art Institute of Chicago, the Chicago Cultural Center, the Field Museum of Natural History, the Adler Planetarium, the Shedd Aquarium, and the Museum of Science and Industry. Chicago has mainstream and avant-garde companies for theatre and dance. The city is the birthplace and chief centre of urban blues music, and the Chicago Symphony Orchestra and Lyric Opera are world-renowned.

Among Chicago's educational institutions are the University of Chicago, the Chicago campus of Northwestern University, Illinois Institute of Technology, Loyola University, DePaul University, and the University of Illinois at Chicago.

The metropolitan area's mass-transit system includes buses, elevated and subway lines, and commuter railroad lines to the suburbs; a freeway system extends in all directions. The city is a major inland port and railroad hub. O'Hare International Airport is supplemented by the smaller Midway Airport for domestic and private flights. Area city, 228 square miles (591 square km). Pop. (1992 est.) city, 2,832,901; Chicago PMSA, 7,541,468; (1990) Chicago–Gary–Lake County CMSA, 8,065,633.

Chicago, Art Institute of: *see* Art Institute of Chicago.

Chicago, University of, one of the outstanding private universities in the United States, founded in 1891 with the endowment of John D. Rockefeller. William Rainey Harper (president, 1891–1906) did much to establish what has come to be regarded as the traditional outlook and character of the university. Internationally recognized as a centre for research and advanced study, it was also a pioneer in adult education and has influenced undergraduate programs elsewhere through its "Chicago plan," which was designed to avoid excessive academic and vocational specialization. Under the administration of Robert M. Hutchins (president, 1929–45; chancellor, 1945–51), the college attracted national attention for such innovative policies as measuring student achievement by comprehensive examinations and stressing the reading of original sources.

The university has fostered events of both academic and world significance. In 1892 it established the world's first department of sociology. In 1942 it was the site of the first controlled self-sustaining nuclear chain reaction, achieved under the direction of the physicist Enrico Fermi. Other notable achievements by Chicago scholars include the development of carbon dating and the isolation and first weighing of the element plutonium (1942).

The university has several professional schools and a number of centres for advanced scholarship and research, including the Oriental Institute (Middle Eastern studies); Yerkes Observatory at Williams Bay, Wis.; the McDonald Observatory at Fort Davis, Texas, staffed by the University of Chicago in cooperation with the University of Texas; the James Franck Institute; the Enrico Fermi Institute for Nuclear Studies; the Adlai Stevenson Institute of International Affairs; the Center for International Study; and the Center for Policy Study. Under contract with the U.S. government, the university employs the staff and operates the Argonne National Laboratory, southwest of the city.

Chicago and North Western Transportation Company, only major American railroad owned by employees, formed when employees of the Chicago and North Western Railway Company purchased its assets in 1972.

The railroad was incorporated in 1859 as a successor to the foreclosed Columbus, Hocking Valley and Toledo Railway. Its first president was William Butler Ogden, the first mayor of Chicago. A constituent company that was acquired in 1864, the Galena and Chicago Union Railroad, was the first railroad to run west of Chicago, in 1848. Other major acquisitions were the Chicago Milwaukee and North Western Railway Company and the Elgin and State Line Railroad Company, added in 1883. Following bankruptcy in 1935, the company was reorganized in 1944. The railroad streamlined its operations and abandoned many unprofitable lines of track, but continuing losses led to the employee buyout of 1972, at which time the company adopted its current name.

The system serves an 11-state region west of Lake Michigan and south of Lake Superior, extending from Chicago to Duluth, Minn., in the north and to central Wyoming in the west. Its principal routes are in Wisconsin, Minnesota, Iowa, and Nebraska. In conjunction with the Union Pacific and Southern Pacific, it operates an express freight service to the West Coast.

About 30 percent of its freight revenues are from grain and food products. Its commuter service out of Chicago carries about 30 million passengers a year.

Chicago, Burlington and Quincy Railroad Company, American railway company founded in 1859 by John Murray Forbes, who combined several smaller Midwestern railroads. It grew until it extended from the Great Lakes to the Rocky Mountains. In 1901 James J. Hill bought control and sought to combine it with his Great Northern Railway and with J.P. Morgan's Northern Pacific Railway, but in 1904 the U.S. Supreme Court, in the Northern Securities case, declared the scheme illegal under the Sherman Anti-Trust Act.

In the 1930s the Burlington won attention for its well-designed, streamlined passenger train, the *Zephyr,* the cars of which were made of stainless steel and were pulled by a diesel-electric locomotive.

In 1970 the Hill plan was revived; the Chicago, Burlington and Quincy was merged with the Northern Pacific and the Great Northern to form Burlington Northern, Inc. (*q.v.*). The new system, which in 1980 merged with the Saint Louis–San Francisco Railway Company, had lines extending from Chicago and Minneapolis, Minn., to Denver, Colo., and the Pacific Northwest; and through Denver to Houston and Galveston, Tex.

Chicago critic, any of a group of literary critics whose work as theorists and historians of criticism and as students of literature was a major influence in the development of modern American criticism.

The group, which was associated from the 1940s with the University of Chicago, is frequently called "Aristotelian," or "Neo-Aristotelian," because of its debt to the critical writings of Aristotle, in particular to his method of analyzing the parts of a text in terms of their relative importance in producing the author's desired effect. This practical approach enabled the Chicago critics, as teachers, to emphasize the author's achievement in terms of his responses and solutions to specific artistic problems involved in the construction of a given text. The most complete expression of the group's critical approach is that set forth in *Critics and Criticism: Ancient and Modern* (1952), edited by Ronald Crane. A full exposition of the theoretical basis of the group's method is to be found in Crane's study *The Languages of Criticism and the Structure of Poetry* (1953). Wayne C. Booth, a younger critic, made a brilliant application of the group's principles to fiction in *The Rhetoric of Fiction* (1961).

Consult the INDEX *first*

Chicago Daily News, evening daily newspaper published in Chicago between 1876 and 1978. In its heyday, it was famed for the excellence of its international coverage, which was widely syndicated throughout the United States. It was generally regarded as one of the great American dailies.

The *Daily News* was established in 1875 as a four-page, five-column daily by Melville E. Stone, who dedicated it to covering the news broadly, guiding public opinion, and providing entertainment. But competition was fierce and money scarce, and in 1876 a financier, Victor F. Lawson, was persuaded to become the paper's business manager and ended up owning two-thirds of its stock. When Lawson took over full ownership in 1888, the *Daily News* had a circulation exceeding 200,000.

The paper under Stone's editorship had been sprightly. Under Lawson it emphasized contributions by well-known writers. Stimulated by the Spanish-American War, the *Daily News* built up a staff of foreign correspondents second to none; by the 1920s it included the brothers Paul Scott Mowrer and Edgar Ansel Mowrer and many other great reporters and analysts. Frank Knox, who became U.S. secretary of the navy under President Franklin D. Roosevelt, bought the paper in the early 1930s. Knox's absentee ownership

during World War II nevertheless upheld the *Daily News*'s traditional excellence in international reporting. When Knox died, his will required the sale of the paper to another publisher who would treat it similarly, and John S. Knight acquired it in 1944 and operated it for 15 years before selling it to Marshall Field IV, who also owned the *Chicago Sun-Times*. Circulation problems and rising expenses, combined with a steady decline in the fortunes of afternoon newspapers, put the paper in constant economic trouble, and the *Chicago Daily News* folded in 1978.

Chicago Heights, city, southern suburb of Chicago, Cook county, northeastern Illinois, U.S. The elevation averages 95 ft (29 m) above the surrounding area, hence the name. The site was the intersection of the Hubbard Trail (from Vincennes, Ind., to Ft. Dearborn on the Chicago River) and the Sauk Trail (used by Indians going from their hunting grounds to the fur post at Detroit). Settled by Scots-Irish in the 1830s and known as Thorn Grove, it was renamed Bloom in 1849 by German immigrants to honour Robert Blum, a German patriot executed in 1848 in Vienna. It was given its present name at its incorporation in 1901, after the Chicago Heights Land Association had induced manufacturers to establish factories there. It was the earliest, and, for a time, the most important of the steel-making communities in the Chicago area. The city's manufactures are now highly diversified; in addition to steel, they include automobile-body stampings, chemicals, alloys, asphalt roofing, tile flooring, and paints. Prairie State College was established at Chicago Heights in 1958. Pop. (1990) 33,072.

Chicago literary renaissance, the flourishing of literary activity in Chicago during the period from approximately 1912 to 1925. The leading writers of this renaissance—Theodore Dreiser, Sherwood Anderson, Edgar Lee Masters, and Carl Sandburg—realistically depicted the contemporary urban environment, decrying the loss of traditional rural values in the increasingly industrialized and materialistic American society and the failure of the romantic promise that hard work would automatically bring material and spiritual rewards. Most of these writers were originally from small Middle Western towns and were deeply affected by the Regionalism of the 1890s that foreshadowed the Realism of 20th-century literature. The renaissance also encompassed the revitalization of journalism as a literary medium; writers such as Floyd Dell, Anderson, Dreiser, and Sandburg all were associated at one time with Chicago newspapers. The Little Theatre established in 1912 by Maurice Browne became an important outlet for the creative talents of young playwrights.

The first stirrings of the Chicago renaissance were felt after the World's Columbian Exhibition of 1893, an event that attracted young Middle Western writers to the city. The Little Room, a literary group that included both artists and patrons of the arts, encouraged literary activity. *The Dial* magazine, established in 1880, grew to be a respected literary organ. Henry Blake Fuller and Robert Herrick, who belonged to the genteel tradition, wrote several novels that foreshadowed the later Realistic novels of Dreiser and Anderson. Hamlin Garland, already famous for novels on the bleakness of Middle Western rural life, was associated briefly with the Little Room.

The appearance of Theodore Dreiser's Naturalistic novel *Sister Carrie* (published 1900; suppressed until 1912), Sherwood Anderson's *Winesburg, Ohio* (1919), Edgar Lee Masters' collection of poetic epitaphs, *Spoon River Anthology* (1915), and Carl Sandburg's *Chicago Poems* (1916) marked the height of the Chicago renaissance. Two Chicago literary magazines—*Poetry: A Magazine of Verse*, founded 1912 by Harriet Monroe (*q.v.*) and the *Little Review* (1914–29), founded by Margaret Anderson—published exciting new verse by such local poets as Vachel Lindsay, Edgar Lee Masters, and Carl Sandburg. Floyd Dell, a journalist associated with the *Friday Literary Review* (1908), the weekly literary supplement to the *Chicago Evening Post*, was the centre of a vital literary circle that included Dreiser, Sherwood Anderson, Margaret Anderson, and Monroe.

After World War I the writers began to disperse, and by the Great Depression of the 1930s the Chicago literary renaissance had ended.

Chicago, Milwaukee, St. Paul and Pacific Railroad Company, byname MILWAUKEE ROAD, U.S. railway operating in central and northern states. It began in 1863 as the Milwaukee and St. Paul Railway Company. It added Chicago to its route and name in 1863, and in 1927 it was incorporated under its present name.

After acquiring many smaller lines, it reached Kansas City, Mo. and Omaha, Neb., by the beginning of the 20th century. It was the first railway to illuminate its passenger trains with electricity (1880) and the first railroad west of Chicago to equip all passenger trains with steam heat. In 1909 it completed a line west across Montana and Idaho to the Pacific coast at Seattle, Wash. The mountainous section of this line was electrified between 1914 and 1918. In 1935 railway's the first streamlined train, the "Hiawatha," entered service, but the line plunged into a 10-year period of bankruptcy.

By 1973 the Milwaukee Road operated about 10,000 miles (16,000 kilometres) of main track, but it was losing business to its chief competitor, the newly merged Burlington Northern, and to interstate trucking. In 1977 it again entered bankruptcy proceedings and in 1980 it began selling and abandoning parts of its transcontinental line in order to shrink to a core system serving the Middle West. Intercity passenger service was turned over to the National Railway Passenger Corporation (Amtrak) in 1971, although it continued to operate commuter service between Chicago and its suburbs.

Chicago Race Riot of 1919, most severe of approximately 25 race riots throughout the U.S. in the "Red Summer" (meaning "bloody") following World War I; a manifestation of racial frictions intensified by large-scale Negro migration to the North, industrial labour competition, overcrowding in urban ghettos, and greater militancy among black war veterans who had fought "to preserve democracy." In the South revived Ku Klux Klan activities resulted in 64 lynchings in 1918 and 83 in 1919; race riots broke out in Washington, D.C.; Knoxville, Tenn.; Longview, Texas; and Phillips County, Ark. In the North the worst race riots erupted in Chicago and in Omaha, Neb.

Chicago racial tension, concentrated on the South Side, was particularly exacerbated by the pressure for adequate housing: the black population had increased from 44,000 in 1910 to more than 109,000 in 1920. The riot was triggered by the death of a black youth on July 27. He had been swimming in Lake Michigan and had drifted into an area tacitly reserved for whites; he was stoned and he shortly drowned. When police refused to arrest the white man whom black observers held responsible for the incident, indignant crowds began to gather on the beach, and the disturbance began. Distorted rumours swept the city as sporadic fighting broke out between gangs and mobs of both races. Violence escalated with each incident, and for 13 days Chicago was without law and order despite the fact that the state militia had been called out on the fourth day. By the end, 38 were dead (23 blacks, 15 whites), 537 injured, and 1,000 black families made homeless.

The horror of the Chicago Race Riot helped shock the nation out of indifference to its growing racial conflict. Pres. Woodrow Wilson castigated the "white race" as "the aggressor" in both the Chicago and Washington riots, and efforts were launched to promote racial harmony through voluntary organizations and ameliorative legislation in Congress. The period also marked a new willingness on the part of black men to fight for their rights in the face of injustice and oppression.

Chicago River, navigable stream that originally flowed into Lake Michigan after being formed by the north and south branches about 1 mi (1.6 km) west of the lake, in Chicago, northeastern Illinois, U.S. After a severe storm in 1885 caused the river to empty large amounts of sewage-polluted water into the lake, plans were begun to reverse its flow through the construction of a canal, which was completed in 1900. The river now flows inland, through the south branch, into the Illinois Waterway (Sanitary and Ship Canal and the Des Plaines and Illinois rivers), to connect with the Mississippi River. The reversal of the river's flow is considered to be one of the greatest feats of modern engineering.

Chicago, Rock Island, and Pacific Railroad Company, byname ROCK ISLAND RAILROAD, or THE ROCK, U.S. railroad company founded in 1847 as the Rock Island and La Salle Railroad Company to build a line from Rock Island to La Salle, Ill. By 1866 its lines extended from Chicago to Council Bluffs, Iowa.

Management in the late 19th century was extremely conservative, but new interests took over in 1901. By 1907 the line attained its peak length of 14,270 miles (22,975 kilometres) in 13 states, but this rapid expansion impaired its credit and it was reorganized in 1917 and again in 1947.

In the 1960s the Rock Island again began to decline. Merger discussions with other railroads failed, and it began bankruptcy proceedings in March 1975. Federal loan guarantees kept it running, but in January 1980 a federal judge ordered the railroad liquidated on the grounds that there was no way of reorganizing it for profitable operation. Its properties were sold off piecemeal in the early 1980s.

Chicago Sanitary and Ship Canal, U.S. waterway linking the south branch of the Chicago River with the Des Plaines River at Lockport, Illinois. The chief purpose of the canal, conceived in 1885, was to reverse the flow of the Chicago River away from Lake Michigan in order to halt pollution of the lake waters by the city's sewage. Construction of the canal was the largest earth-moving operation undertaken on the North American continent up to that time and was notable for training a generation of engineers, several of whom later worked on the Panama Canal. Opened in 1900, the Chicago canal was acquired in 1930 by the United States government. It has a length of 30 mi (48 km), minimum width of 160 ft (50 m), depth of 9 ft (2.7 m), and 2 locks. It was eventually linked to the Little Calumet River by the Calumet Sag Channel.

Chicago School, group of architects and engineers who, in the late 19th century, developed the skyscraper. They included Daniel Burnham, William Le Baron Jenney, John Root, and the firm of Dankmar Adler and Louis Sullivan.

Among the buildings representative of the school in Chicago are the Montauk Building (Burnham and Root, 1882), the Auditorium Building (Adler and Sullivan, 1889), the Monadnock Building (Burnham and Root, 1891), and the Carson Pirie Scott Store (originally

the Schlesinger-Mayer Department Store; Sullivan, 1899–1904). Chicago, because of this informal school, has been called the "birthplace of modern architecture."

Chicago Stock Exchange, formerly (1949–93) MIDWEST STOCK EXCHANGE, largest of the regional stock exchanges in the United States. The Chicago Stock Exchange was founded in 1882 to trade primarily local securities, particularly stocks and bonds of utility, banking, and railroad companies. In 1949 the exchange merged with those of St. Louis, Cleveland, and Minneapolis–St. Paul to form the Midwest Stock Exchange; the New Orleans Stock Exchange joined in 1959. In 1993 the name reverted to the Chicago Stock Exchange.

The Chicago Stock Exchange offers trading in over 3,000 stocks, including New York Stock Exchange, American Stock Exchange, and NASDAQ (over-the-counter) issues along with stocks of many Chicago-area companies. It specializes in trading large blocks of stock for financial institutions.

Chicago style, approach to jazz group-instrumental playing that developed in Chicago during the 1920s and moved to New York City in the '30s, being preserved in the music known as Dixieland (*q.v.*). Much of it was originally produced by trumpeter Jimmy McPartland, tenor saxophonist Bud Freeman, clarinetist Frank Teschemacher, and their colleagues in imitation of the New Orleans Rhythm Kings, a white New Orleans band playing at Chicago's Friar's Society.

Though much like New Orleans style (*q.v.*), Chicago style can sometimes be differentiated by its greater emphasis on individual solos, a less relaxed feeling, and a somewhat smaller reliance on elements of 19th-century black ethnic music. These styles employed simple accompanying rhythms (often just a chord on each beat by piano, guitar, or banjo, with bass and drums) and improvised counterlines among the melody instruments (trumpet, clarinet, trombone, saxophone, and occasionally violin). Some choruses contained mutual embellishments, whereas most had some sort of solo in the foreground while backgrounds were partly or completely worked out by the musicians who were not soloing. The degree of complexity seems to have depended primarily on the particular interests of the leader. For example, Jelly Roll Morton, a black leader from New Orleans, worked out elaborate arrangements for his Chicago record dates, yet Louis Armstrong, another black New Orleans native, did not. Similarly, some recordings by the Austin High Gang, as McPartland and his fellow white players were often called, are quite elaborate, yet others by them are informal.

For decades, the Chicago style was kept alive through the work of Eddie Condon. Chicago style is depicted in *We Called It Music* (1947) by Eddie Condon; *Really the Blues* (1946) by Mezz Mezzrow and Bernard Wolfe; and *You Don't Look Like a Musician* (1974) by Bud Freeman.

Chicago Tribune, daily newspaper published in Chicago, one of the leading American newspapers and long the dominant, sometimes strident, voice of the Midwest.

It was founded in 1847 by three Chicagoans and was close to bankruptcy in 1855 when Joseph Medill (1823–99), a Canadian-born editor who became an Ohio newspaper publisher, along with five partners, bought the paper. Medill made the *Tribune* a profitable operation while using it to promulgate his Free Soil, or Abolitionist, views. In addition, he made the *Tribune* one of the most influential early advocates of Abraham Lincoln for the U.S. presidency. The paper gained in stature through its coverage of the Civil War. Following the war, it called repeatedly for government reforms, and Medill was elected mayor of Chicago. He bought a controlling ownership interest in the *Tribune* in 1874 and continued as publisher until his death.

The *Tribune,* politically liberal in outlook in much of the 19th century, became increasingly conservative during the tenure of Robert R. McCormick (1880–1955), who gained control in 1914, becoming the paper's guiding force and a colourful figure in American journalism. McCormick was particularly noted for his nationalist-isolationist views, embodied in his unceasing opposition to the presidency (1933–45) of Franklin D. Roosevelt. After McCormick's death the paper gradually relaxed its jingoism and unyielding political conservatism. The *Tribune*'s thorough coverage of Chicago and Midwestern commerce, industry, agriculture, and social life, as well as government and politics, won it great reader loyalty. It has also long been noted for its technical excellence.

Chicago Zoological Park: *see* Brookfield Zoo.

Chicama (South America): *see* Huaca Prieta.

Chichén Itzá, ruined ancient Mayan city located in south-central Yucatán state, Mexico. The only source of water in the arid region around the site is from wells (Mayan: *cenotes*) formed by the collapse of portions of the limestone formation of the area. Two big *cenotes* on the site made it a suitable place for the city and gave it its name, from *chi* (Mayan: "mouths"), *chen* ("wells"), and Itzá, the name of the tribe that settled there—thus, the Mouths of the Wells of the Itzá.



The Castillo (background) and a portion of the Colonnade, Chichén Itzá
Josef Muench

Chichén was founded about the 6th century AD, presumably by Mayan peoples of the Yucatán Peninsula who had occupied the region since Pre-Classic, or Formative, Period times (1500 BC–AD 300). The principal early buildings are in an architectural style known as the Puuc, which shows a number of divergences from the styles of the southern lowlands. These earliest structures include the Akabtzib ("House of the Dark Writing"), the Chichanchob ("Red House"), the House of the Deer, the Iglesia ("Church"), and the Monjas ("Nunnery"). In the 10th century, after the collapse of the Maya cities of the southern lowlands, Chichén was invaded by foreigners, probably Mayan-speakers but who had been strongly influenced by, and perhaps were under the direction of, the Toltecs of central Mexico. Possibly these invaders were the Itzá for whom the site is named; this is disputable, however, and some authorities believe the Itzá arrived 200 to 300 years later. In any event, the invaders were responsible for the construction of such major buildings as the Castillo (the great pyramid), the ball court (for playing the game *tlachtli*), the High Priest's Grave, the Colonnade, and the Temple of the Warriors. Most of these buildings probably were completed in the Early Post-Classic Period (*c.* AD 900–1200). In the Late Post-Classic Period (*c.* 1200–1540), Chichén appears to have been eclipsed by the rise of the city of Mayapán. For a time Chichén Itzá joined Uxmal and Mayapán in a political confederacy known as the League of Mayapán.

About 1450 the League and the political supremacy of Mayapán dissolved. When the Spanish entered the country in the 16th century, the Maya were living in many small towns, but the major cities, including Chichén, were largely abandoned. Long left to the jungle, Chichén Itzá remained sacred to the Mayan Indians. Excavation began in the 19th century, and Chichén Itzá became one of Mexico's prime archaeological zones.

A legendary tradition at Chichén was the cult of the Cenote, involving human sacrifice, in which youths were thrown into the city's major *cenote,* along with gold and jade ornaments and other valuables. In 1904 Edward Herbert Thompson, an American who had bought the entire site, began dredging the *cenote;* his discovery of skeletons and sacrificial objects confirmed the legend.

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Chicherin, Boris Nikolayevich (b. May 26 [June 7, New Style], 1828, Tambov, Russia—d. Feb. 3 [Feb. 16], 1904, Karaul, Tambov province), liberal Russian historian and philosopher who argued vigorously for social change. Although widely regarded as a brilliant scholar, Chicherin's advocacy of the peaceful legislative reform of tsarist autocratic rule blighted his public career and led to his neglect by Soviet historiographers.

Born into the gentry, Chicherin early embraced a Western outlook, devoting himself to the study of Hegelian philosophy. His historical studies led him to advocate in 1857 a three-point reform program for Russia: emancipation of the serfs, freedom of conscience, and freedom of speech and the press. He viewed the reform of the established order through legal processes as the principal means of implementing these ideas, and eventually he came to advocate a constitutional monarchy. He was a lifelong opponent of socialism and violent or revolutionary change.

Frequently at odds with the authorities and with other Russian intellectuals, Chicherin was appointed a professor of law at the University of Moscow in 1861, but he resigned in 1868 as a protest against government interference in a tenure case. He was elected mayor of Moscow in 1881 but was forced to resign in 1883 because of his publicly expressed preference for popular government in Russia. He spent the remainder of his life in scholarly pursuits. His works include *The History of Political Doctrines* (1877), *The Foundations of Logic and Metaphysics* (1894), and *The Philosophy of Law* (1900).

Chicherin, Georgy Vasilyevich (b. Nov. 24, 1872, Tambov province, Russia—d. July 7, 1936, Moscow), diplomat who executed Soviet foreign policy from 1918 until 1928.

An aristocrat by birth, Chicherin entered the imperial diplomatic service after graduating from the University of St. Petersburg (1897). He became involved in the Russian revolutionary movement, however, and in 1904 resigned his post, renounced title to his estates, and went to Berlin, where he joined the Menshevik faction of the Russian Social Democratic Party (1905). For the next 12 years he devoted himself to party activities, working closely with the French Socialists and the British labour movement.

During World War I he took part in pacifist and relief activities in London. After the Bolsheviks seized power in Russia (October 1917, O.S.), the British arrested him and, in exchange for their ambassador, Sir George Buchanan, released him on Jan. 3, 1918. Chicherin returned to Russia and joined the Bolshevik Party. He then resumed his diplomatic career, participating in the final stage of negotiating the Brest-Litovsk peace treaty with Germany and subsequently becoming people's commissar for foreign affairs (May 1918). After negotiating treaties resolving territorial and commercial disputes, Chicherin headed the Soviet delegation to the conference of European nations held at Genoa to consider reconstruction of the European economy (1922). There he secretly negotiated the Treaty of Rapallo with Germany (signed April 16, 1922), which established normal commercial and diplomatic relations between the two countries and thereby ended the diplomatic and economic isolation that had been imposed on Russia and Germany after World War I. Although he had little influence in determining the foreign policies of the Soviet Union, Chicherin continued to carry them out skillfully until illness prevented him from performing his duties in 1928; he retired in 1930.

Chichester, district, county of West Sussex, England, with an area of 304 sq mi (787 sq km). It comprises the smaller City of Chichester plus a wide rural area. The district is mainly residential and agricultural with most of the land designated as Areas of Outstanding Natural Beauty and Great Landscape Value. Chichester is known for its cathedral and harbour for sailing; there is a Roman palace at Fishbourne, a villa at Bignor, and the Cowdray ruins at Midhurst. Pop. (1991 prelim.) 100,300.

Chichester, city, Chichester district, county of West Sussex, England. It lies on the coastal plain of the English Channel at the foot of the chalk South Downs a mile from the head of Chichester Harbour, with which it is connected by canal. The basic plan of the Roman town (Noviomagus Regnensium) is preserved in the modern city, and the elaborate octagonal Market Cross (1501) marks the town centre. Alongside is the cathedral, founded when the see was transferred from nearby Selsey in 1075 and dedicated in 1108. There are examples of the Norman and the Early English styles of architecture. It is unique among English cathedrals in having a detached Perpendicular-style bell tower, a skillful replacement of the original 14th-century structure, which collapsed in 1861. The bishop's palace nearby retains its Early English-style chapel. Several medieval churches, as well as part of the medieval city wall, are preserved. There are also many Georgian buildings.

During the Middle Ages Chichester was an important centre of the English wool trade, and its wool staple (right to trade in wool) was probably established as early as 1314. It was incorporated earlier than 1135, the date of the extant charter.

Chichester remains an agricultural market and is a district shopping and service centre and the county town (seat) for West Sussex, as well as a cultural centre of distinction. The extensive sheltered harbour is a sailing resort, and Goodwood (3 mi northeast) is the scene of a fashionable English horse-race meeting. The district occupies 304 sq mi (787 sq km). Pop. (1981) city, 24,242.

Chichester (of Belfast), Arthur Chichester, Baron (b. May 1563, Devon, England—d. Feb. 19, 1625, London), English lord deputy of Ireland from 1604 to 1614, who developed the plan for colonizing Ulster with English and Scottish settlers.

A member of a family of Devonshire gentry, he served in the successful expedition against the Spanish port of Cádiz (1596), where he was knighted. From 1597 to 1599 he fought the Spanish in the Netherlands.

Sent to Ireland as a general in 1599, Chichester helped suppress the Ulster rebellion led by the great Irish chieftain Hugh O'Neill, 2nd earl of Tyrone. In 1604 King James I appointed Chichester lord deputy. He immediately began to enforce harsh measures against Roman Catholics, but his Irish Catholic opponents persuaded the English council to intervene and reverse his policies (1606).

Chichester's main concern, however, was the Anglicization of Ulster. He gained his opportunity when O'Neill, realizing that he could not maintain his authority under Chichester's rule, fled to the Continent with a number of other Ulster lords in 1607. Chichester immediately confiscated their lands and devised a scheme for the colonization of Ulster. Although his plan accommodated the interests of the native Irish landholders, the abortive Ulster rebellion of Sir Cahir O'Dogherty in 1608 convinced the London government that Chichester's proposals were too moderate. Accordingly, a revised plan (1609) granted the largest estates to English and Scottish settlers and drastically reduced the amount of land held by the native Irish.

In 1613 Chichester was made a baron. As part of his continuing efforts to obtain anti-Catholic legislation, he attempted to create additional electoral districts in order to assure a large Protestant majority in the lower house of the Irish Parliament, but James I intervened (1614) and invalidated most of the scheme. Chichester was recalled in 1614 and retired with the honorary post of lord high treasurer.

Chichester, Sir Francis (Charles) (b. Sept. 17, 1901, Barnstaple, Devon, Eng.—d. Aug. 26, 1972, Plymouth, Devon), adventurer who in 1966–67 sailed around the world alone in a 55-foot sailing yacht, the "Gipsy Moth IV."

As a young man he worked in New Zealand as a miner, salesman, and land agent. Back in England in 1929, in December he began a solo flight to Australia. In 1931, having fitted



Sir Francis Chichester, 1966
Pictorial Parade

a biplane with floats, he made the first east–west flight across the Tasman Sea from New Zealand to Australia. A plan to circumnavigate the globe by air ended in a crash near Yokohama, in which he was badly injured.

After serving in World War II as an air-navigation expert in England, he founded a map-publishing business in London. He took up ocean sailing in 1953 and won the first solo transatlantic race in 1960 in the "Gipsy Moth III," sailing from Plymouth to New York City in 40 days.

On his around-the-world voyage, he left Plymouth Aug. 27, 1966, sailing the 14,100 miles to Sydney in 107 days. Embarking again on Jan. 29, 1967, he returned to Plymouth around Cape Horn in 119 days, the 15,517 miles being the longest passage made by a small sailing vessel without a port of call. He was knighted in May 1967 by Queen Elizabeth II. His last solo voyage in January–February 1971, from Portuguese Guinea to Nicaragua, covered 4,000 miles in 22 days. He died shortly after illness in 1972 prevented him from making the solo transatlantic race. His books include the autobiography *The Lonely Sea and the Sky* (1964) and *The Gipsy Moth Circles the World* (1967).

Chichi rug, small, handmade floor covering ascribed to the Chechens, a group living in the republic of Checheno-Ingushetiya, Russia. The definitive pattern has many transverse

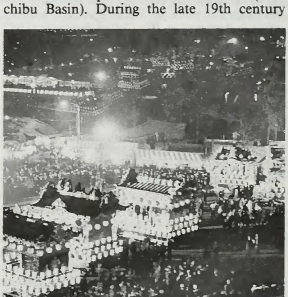


Chichi rug from the Caucasus, 19th century; in the H. McCoy Jones Collection
In the collection of H. McCoy Jones; photograph, Bruce A. Humphrey

rows of small motifs, such as a latch-hooked, stepped polygon or a figure resembling an outstretched animal hide, upon a field edged with a dainty reciprocal pattern; the principal stripe of the multiple border contains rosettes between broad diagonal bars. The coloration usually has a peculiar greenish cast.

The weft is of cotton, and the warp yarns may include cotton strands. As in nearly every other Caucasian rug, the pile, which here is short, is of wool, as is most of the warp.

Chichibu, city, Saitama Prefecture (*ken*), Honshu, Japan, on the Ara-kawa (Ara River), in the eastern part of Chichibu-bonchi (Chichibu Basin). During the late 19th century



Lighted floats at the Chichibu festival in Japan
Tokyo Photo—FPG

silk textile mills were established, and there are now about 450 mills in the city and surrounding villages. The rich limestone quarries of Mount Bukō, to the south, support a large cement plant. There are also reserves of iron ore and other construction stone. The city is a district transport centre. A tourist base for Chichibu-Tama National Park, it is known for the annual festival of the Chichibu Shintō shrine. Pop. (1985) 61,013.

Chichicastenango, town, west-central Guatemala, 6,447 feet (1,965 m) above sea level. It is the market centre for many Quiché Maya Indian villages in the neighbouring highlands and is one of Guatemala's most famous tourist spots. On Thursdays and Sundays, Indians market their products in the large central plaza. They worship, in a combination of Indian and Christian elements, in the parish church of Santo Tomás and at El Calvario church, which stand at opposite ends of the plaza. Next to the parish church is a Dominican monastery dating from 1542; in it the Popol Vuh, a well-known Mayan manuscript,



Open air market on the steps of El Calvario church, Chichicastenango, Guatemala
Herbert Lanks

was found in 1690. Chichicastenango is on a highway 90 miles (145 km) northwest of Guatemala City. Pop. (1989 est.) 14,483.

Chichimec, any of several groups of Indians who invaded central Mexico from the north in the 12th and 13th centuries AD and ended the Toltec hegemony in the region. Their language, also called Chichimec, is of the Oto-Pamean language stock. It is uncertain to what extent these Chichimec peoples were seminomadic hunters and gatherers and to what extent they were agriculturists. Quite probably, they were originally a nonagricultural people who gradually assimilated to farming and to other sedentary and civilized habits on the northern fringes of the centres of Mexican civilization. Eventually, they moved southward to take over these centres. Their advent has been compared to that of the barbarian penetration of western Europe in the 5th century AD, which marked the end of the declining western Roman Empire. The Aztec, or Mexica, were one of the competing Chichimec tribes.

chick-pea, also called GRAM, or GARBANZO (species *Cicer arietinum*), annual plant of the pea family (*Fabaceae*), widely grown for its nutritious seeds. The bushy, 60-centimetre (2-foot) plants bear pinnate leaves and small white or reddish flowers. The yellow-brown peas are borne one or two to a pod. Chick-peas are an important food plant in India, Africa, and Central and South America. Hummus, or hummous—chick-peas mashed to a paste with lemon juice, olive oil, and sesame paste—is widely eaten in the Middle East as a sauce and dip for bread. Mashed cooked chick-peas are formed into small flat cakes and fried for falafel (or felafel), a popular Israeli snack. In southern Europe, chick-peas are a common ingredient in soups, salads, and stews. A kind of meal or flour is also made from chick-peas.

chickadee, any of seven North American bird species of the genus *Parus*, of the family Paridae (order Passeriformes). The name imitates their call notes. Old World members of the



Black-capped chickadee (*Parus atricapillus*)
William D. Griffin

genus are called tits, or titmice. Found across North America is the black-capped chickadee (*P. atricapillus*), 13 cm (5 inches) long, with dark cap and bib. *See also* tit.

Chickamauga Creek, Battle of (Sept. 19–20, 1863), in the American Civil War, a vital part of the maneuvering and fighting to control the railroad centre at nearby Chattanooga, Tenn. Union General William S. Rosecrans had established his army at Chickamauga, Ga., 12 miles (19 km) southeast of Chattanooga. Confederate General Braxton Bragg collected reinforcements and prepared to do battle, assisted by General James Longstreet. For two days the conflict raged in a tangled forest along Chickamauga Creek. Dazed by the ferocious Confederate assault, the main body of the Union Army gave way and retreated in disorder. Union General George H. Thomas, the "Rock of Chickamauga," skillfully organized the defenses and withstood the attack until the assistance of a reserve corps made possible an orderly withdrawal to Chattanooga. Of 120,000 troops participating, casualties numbered 16,000 Union troops and 18,000 Confederate troops, making this one of the bloodiest engagements of the Civil War.

Chickamauga was considered a decisive victory for the South, but General Bragg did not choose to follow it up, and two months later the results were completely nullified at the Battle of Chattanooga. In 1890 an Act of Congress created a national military park at the two battlegrounds.

Consult the INDEX *first*

Chickasaw, North American Indian tribe of Muskogean linguistic stock who formerly inhabited what is now northern Mississippi and Alabama. In their earlier history the Chickasaw and the Choctaw (*q.v.*) may have been a single tribe. The Chickasaw were a seminomadic people who not only patrolled the immense territory that they claimed for themselves but also raided tribes far to the north. They absorbed the remnants of the tribes that they conquered, thus becoming a mixed-blood group. At the beginning of colonial times they were known to traders as the "breeds." Their dwellings were scattered for miles along a stream or river rather than clustered in villages. They traced descent through the maternal line. The supreme deity was associated with the sky, sun, and fire; and a harvest and new-fire rite similar to the Green Corn ceremony of the Creek was celebrated annually.

Probably the earliest contact between Europeans and the Chickasaw was Hernando de Soto's expedition in 1540–41. In the 18th century the Chickasaw became involved in the power struggles between the British and French, siding with the British against the French and the Choctaw. They also gave refuge to the Natchez in their wars with the French. Relations with the United States began in 1786, when their northern boundary was fixed at the Ohio River. In the 1830s they were forcibly removed to Indian Territory (present Oklahoma) where, with the Creek, Cherokee, Choctaw, and Seminole, they were among the Five Civilized Tribes. For three-quarters of a century each tribe had a land allotment and a quasi-autonomous government modeled on that of the United States. In preparation for Oklahoma statehood (1907), some of this land was allotted to individual Indians; the rest was opened up to non-Indian homesteaders, held in trust by the federal government, or allotted to freed slaves. Tribal governments were effectively dissolved in 1906 but have continued to exist in a limited form. Some Indians now live on tribal landholdings that are informally called reservations.

Early estimates placed the tribe's population at 3,000–4,000. At the time of their removal to Indian Territory they numbered about 5,000. In the late 20th century, descendants of the Chickasaw numbered about 25,000.

Chickasaw, city, northern suburb of Mobile, Mobile county, southwestern Alabama, U.S., on Chickasaw Bogue, a tributary of the Mobile Bay delta region. Named after the Chickasaw Indian tribe, it was founded during World War I as a shipbuilding community. It also has fisheries and port facilities for exporting steel from Birmingham but is primarily residential. Inc. village, 1917; town, 1946. Pop. (1990) 6,649.

Chickasha, city, seat (1907) of Grady county, central Oklahoma, U.S., on the Washita River, southwest of Oklahoma City. Founded in 1892 near a Rock Island Railroad stop, it was named for an Indian tribe. Chickasha is in an oil and agricultural (cotton, corn, wheat, and dairy cattle) area. Industries include cotton ginning, cottonseed-oil milling, oil refining, and the manufacture of oil-field equipment, horse trailers, and farm machinery. The Chickasha natural gas field is one of the world's largest. The University of Science and Arts of Oklahoma was established there as a liberal arts college in 1908. Inc. 1899. Pop. (1990) 14,988.

chicken, one of the most widely domesticated fowl, raised worldwide for its meat and eggs. *See* fowl.

chicken pox, also called VARICELLA, contagious viral disease characterized by an eruption of vesicles (blisters) in the skin. The disease usually occurs in epidemics, and the patients are generally between two and six years old, although they can be of any age. The incubation period is at least two weeks; there are practically no premonitory symptoms, though slight fever for about 24 hours may precede the eruption. A number of raised, itching red papules appear on the back or chest; in from

12 to 24 hours these develop into tense vesicles filled with a clear fluid, which in another 36 hours or so becomes opalescent. During the fourth day these vesicles shrivel up and the scabs fall off, leaving, as a rule, no scar. Fresh spots appear during the first three days, so that at the end of that time they can be seen in all stages of growth and decay. The eruption is most marked on areas covered by clothing, but it also occurs on the face and limbs and on the mucous membrane of the mouth and palate. The temperature rarely rises above 39° C (102° F). The disease runs a favourable course in most cases and usually produces permanent immunity. Negative aftereffects are rare.

During initial treatment, the patient should be isolated and confined to bed. The diet should be light, and the patient should be prevented from scratching, which could lead to ulceration of the vesicles and scarring.

Chicken pox is caused by the varicella-zoster virus, the same virus that causes herpes zoster (shingles). Chicken pox is the clinical reaction to a first exposure to the virus. After clinical recovery of the patient, the virus may settle in a nerve cell and be reactivated many years later. The cause of reactivation is not known. Upon reactivation, the virus travels along a nerve to the skin and causes shingles.

A person with herpes zoster is able to infect another person with chicken pox, but the reverse seems not to occur, because herpes zoster generally appears after a period of latency. Occasionally, however, herpes zoster occurs in children as the primary response to the virus.

Injections of zoster immune globulin (ZIG), a preparation made from the blood of adults who have recently had shingles, are sometimes given to prevent the development of chicken pox in exposed children. ZIG contains antibodies to the varicella-zoster virus and provides temporary protection against the virus. ZIG administration is usually reserved for children with leukemia or immune-system disorders, for whom varicella poses significant risks. A chicken-pox vaccine was developed in Japan in the early 1970s and has been used widely there. *See also* herpes zoster.

chicken turtle (species *Deirochelys reticularia*), edible freshwater turtle (family Emydidae) found in the southeastern United States. The chicken turtle has an exceptionally long neck and a finely grooved upper shell covered with an open network of yellowish lines on a brownish background. Shell length is usually about 10 to 15 cm (4 to 6 inches).

The chicken turtle inhabits quiet bodies of water and probably feeds on both animal and vegetable material. It frequently leaves the water and travels about on land.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

chickweed, either of two species of often troublesome weeds, of the pink family (Caryophyllaceae). The common chickweed, or stitchwort (*Stellaria media*), is native to Europe but is widely naturalized. It usually grows to 45 cm (18 inches) but becomes a low-growing and spreading annual weed in mowed lawns.

Mouse-ear chickweed (*Cerastium vulgatum*), which is also from Europe, is a mat-forming, spreading perennial that has many upright stems, but it is usually not so tall as common chickweed. It grows in lawns, pastures, and cultivated fields throughout temperate regions. The stems and leaves are hairy and somewhat sticky.



Mouse-ear chickweed (*Cerastium vulgatum*)
Grant Heilman—EB Inc.

Both species have inconspicuous but delicate white, somewhat star-shaped flowers.

Chiclana de la Frontera, city, Cádiz *provincia*, in the *comunidad autónoma* ("autonomous community") of Andalusia, southwestern Spain. The city is an agricultural centre and summer resort near the Atlantic coast (Gulf of Cádiz) and is surrounded by vineyards and pine groves. Salt processing is a leading industry. The city was founded in 1303 by Alonso Pérez de Guzmán, warrior captain of Ferdinand IV of Castile. In the municipality are Barrosa, where Anglo-Spanish forces won an indecisive victory over the French during the Peninsular War (March 5, 1811), and Sancti Petri, where there are ruins of an ancient temple of Hercules. Pop. (1981) 36,203.

Chiclayo, capital of Chiclayo *provincia* and Lambayeque *departamento* in northern Peru. It is located on the Pan-American Highway more than 400 miles (640 km) northwest of



Chiclayo cathedral and central plaza, Peru
Walter Aguiar—EB Inc.

Lima, in an irrigated area producing sugarcane, cotton, and rice. Founded in 1720, it became a city in 1835 and is the leading commercial centre of Lambayeque. The city has many parks and gardens and a large marketplace. It has an airport and is connected by rail and highway with the ports of Eten and Pimentel. Pop. (1990 est.) 426,300.

chicle, gum, obtained as pinkish to reddish brown pieces, consisting of the coagulated milky juice (latex) of the sapodilla, or naseberry, tree (*Achras zapota*), a tropical American fruit tree principally from Yucatán, Guatemala, and other regions of Central America. Chicle is said to contain both rubber and gutta-percha. Introduced as a substitute for rubber, chicle was imported to the United States in quantity as the principal ingredient of chewing gum by about 1890, but in the 1940s it was largely replaced by synthetic products. The latex is collected by making deep intersecting zigzag cuts in the bark to a height of 10 m (30 feet) or more up the trunk. The "milk" runs slowly to a receptacle at the base.

Chico, city, Butte county, northern California, U.S., in the Sacramento River valley. It was founded in 1860 by John Bidwell, state congressman and horticulturist, and developed as an agricultural-processing centre, especially for almonds, rice, and fruit. California State University, Chico, was founded as a normal school in 1887. Manufacturing began in 1904 with a match factory; after World War II there was planned diversified industrial expansion. The Bidwell Mansion State Historic Park includes the 26-room Victorian home (1868) of John Bidwell. The U.S. (experimental) Plant Introduction Station is 3 miles (5 km) southeast. Inc. 1872. Pop. (1990) city, 40,079; Chico MSA, 182,120.

Chicom 1 (Earth satellite): *see* China 1.

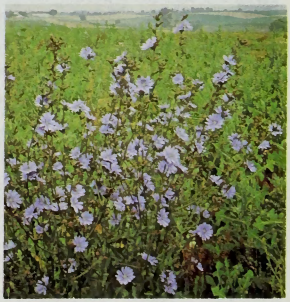
Chicomecóatl (Nahuatl: "Seven Snakes"), also called XILONEN ("Young Maize-Ear Doll"), Aztec goddess of sustenance and, hence, of corn (maize), one of the most ancient and important goddesses in the Valley of Mexico. The number seven in her name is associated with luck and generative power. She was often portrayed as the consort of the corn god, Centéotl.

Chicomecóatl is depicted in Aztec documents with her body and face painted red, wearing a distinctive rectangular headdress or pleated fan of red paper. She is similarly represented in sculpture, often holding a double ear of corn in each hand.

Chicopee, city, Hampden county, south-central Massachusetts, U.S., at the juncture of the Chicopee and Connecticut rivers. Originally part of Springfield, it was settled in the 1650s. Industrialization began in 1825 with the damming of the river and the construction of cotton mills. Manufactures now include radios, tires, sports equipment, plastic tiles, and textiles. Chicopee is the seat of the College of Our Lady of the Elms (1928). Westover Air Force Base is nearby. Inc. township, 1848; city, 1890. Pop. (1990) 56,632.

chicory (species *Cichorium intybus*), blue-flowered perennial plant of the family Asteraceae. When cultivated, it is eaten as a vegetable or salad, or its roasted and ground roots are used as a flavouring additive in or substitute for coffee. Native to Europe and introduced into the United States late in the 19th century, chicory is cultivated extensively in The Netherlands, Belgium, France, and Germany and to some extent in North America.

Chicory has a long, fleshy taproot; a rigid, branching, hairy stem that grows to a height



Chicory (*Cichorium intybus*)
Grant Heilman—EB Inc.

of about 1 to 1.5 m (3 to 5 feet); and lobed, toothed leaves, similar in appearance to dandelion leaves, around the base. The roots may be boiled and eaten with butter, and the leaves may be eaten as salad. The plant is also grown as a fodder or herbage crop for cattle. Chicory is sometimes used to impart additional colour, body, and bitterness to coffee; in the United States this practice is especially popular in the city of New Orleans.

The roots are grown in the open during the summer and are taken up in the fall to be forced, or grown indoors out of season, during the winter. One method of forcing produces *barbe de capucin,* the loose, blanched leaves much esteemed by the French as a winter salad. Another method produces *witloef,* or *witloof,* the tighter heads or crowns preferred in Belgium and elsewhere. Throughout Europe the roots are stored to produce leaves for salads during winter.

In temperate regions having a growing season of five and a half to six months, if the seed is sown too early in the spring the plants may go to seed instead of forming large storage roots suitable for forcing; in such areas seed should be sown in June. The roots may be forced in cellars, under greenhouse benches, or outdoors.

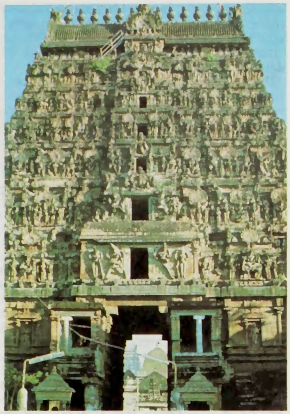
Chicoutimi, city, seat of Saguenay–Lac-Saint-Jean region, southern Quebec province, Canada. Chicoutimi is situated at the head of navigation on the Saguenay River. Established in 1676 as a Jesuit mission and trading



Chicoutimi on the Saguenay River, Que.
By courtesy of the Canadian Government Travel Bureau, Ottawa; photograph, H. Barash

post, it grew rapidly after 1850 with the development of lumbering. The city, 120 miles (190 km) north of Quebec city, is a rail hub and administrative, commercial, and industrial centre that is closely associated with the extensive Saguenay hydroelectric development. Its manufactures include pulp, paper, furniture, aluminum window frames, wrought iron, leather goods, and textiles. Chicoutimi is the site of a large hospital and the seat of a bishopric established there in 1878. It also has a branch of the University of Québec. In 1976 a new city of Chicoutimi was created from several neighbouring municipalities and a parish. Surrounding areas were annexed, including Chicoutimi-Nord, Rivière-du-Moulin, and Saguenay. Inc. town, 1930; city, 1976. Pop. (1991) city, 62,670; metropolitan area, 160,928.

Chidambaram, city, east-central Tamil Nādu state, southeastern India. It is situated in the fertile Coleroon River valley, on the Madras-Thanjāvūr (Tanjore) road and rail system. The city supports silk and cotton handloom weaving and garment industries but is primarily a food-processing centre. Its name is derived from the Tamil words *citt* ("wisdom") and *ampalam* ("atmosphere") and refers to the Hindu temple dedicated to the god Śiva as Naṭarāja, the cosmic dancer. The temple contains the famous early Cōla (2nd century BC) bronzes. It is entered by lofty tower gates, and its hall is supported by more than 1,000



Tower gate of the Hindu Śiva temple at Chidambaram, Tamil Nādu, India
Tom Putnam

pillars. The city is the seat of Annamalai University and is a centre of Hindu religious education. Pop. (1991 prelim.) 58,927.

chief, a political leader of a primitive social group, such as a band, tribe, or confederacy of tribes. Among many primitive peoples chiefs have very little coercive authority and depend on community consensus for implementing recommendations; also, often among such peoples a number of recognized chiefs may form a tribal chiefs' council. Among more advanced preliterate peoples there may be a single paramount tribal chief with coercive authority.

Popular Western literature has introduced a number of mistaken notions about the chief in primitive society. In loose usage, the word has been used to denote any famous war leader or orator who frequently appears in negotiations with whites. Such a man may well be a leader in his community but not a chief. An example is the Sauk Indian Black Hawk, who led a band of Sauk and Fox in the Black Hawk War (1832). Black Hawk was not a member of the Sauk chiefs' council and was never recognized as a chief by the Sauk tribe, despite his prominence as a warrior and spokesman.

chief justice, the presiding judge in the Supreme Court of the United States, and the highest judicial officer of the nation. The chief justice is appointed by the president with the advice and consent of the Senate and has life tenure. His primary functions are to preside over the Supreme Court in its public sessions when the court is hearing arguments and during its private conferences when it is discussing and deciding cases. He serves as chairman in the court and has authority to assign the writing of opinions in cases where he is a member of the majority; otherwise his powers are the same as those of any other Supreme Court justice. The chief justice customarily administers the oath of office to the president and vice-president at the time of their inauguration. The chief justice is also the presiding officer of the Judicial Conference of the United States, an assembly of judges representing all the federal courts that reviews and investigates problems relating to the administration of justice in those courts.

When the office is occupied by a person of extraordinary intellectual capacity and dynamic personality, as was the case with John Marshall, the chief justice may exert a great influence on the court's work. When the occupant of the centre chair is a lesser figure, as has often been the case, he is likely to be overshadowed by other members of the court.

The title of chief justice is also usually accorded the presiding judicial officer within any multijudge court, as well as to the highest judicial officer within a state of the United States. Since 1860, the title of lord chief justice of England has been given to the officer presiding over the Queen's Bench division of the High Court of Justice. *See* lord chief justice.

chief justice of England, lord: *see* lord chief justice.

chief rabbinate, in Judaism, a supreme religious authority whose decisions bind all those under its jurisdiction. The prototype of the chief rabbinate was the Great Sanhedrin of Jerusalem, which, until the destruction of the Second Temple in AD 70, issued legislation and interpreted Jewish Law for all the Jewish people. The Patriarchate functioned with Roman support until about 425, since which Jewry has had no central authority. Various Jewish communities, however, have seen the practical advantages of having a chief rabbi even though, technically speaking, the religious authority of all rabbis is equal. The need, moreover, for some kind of national Jewish authority has often been recognized by both Jews and governments to protect Jewish interests and facilitate relations between non-Jewish governments and large Jewish populations. Sometimes Jews resented appointments by secular authorities when the choice seemed to have been made with a desire to manipulate the Jewish community.

The most important chief rabbinate today is that in Israel. It has two chief rabbis, one representing the Sephardic (Spanish-rite) community, the other the Ashkenazi (Germanrite) Jews. Its chief responsibility, first granted in 1921 under British rule, is to handle all cases of personal status (marriage, divorce). This task was greatly complicated when large numbers of Diaspora Jews migrated to Israel after 1948. Since they had lived in foreign lands for many generations, it was not clear that they had observed rabbinic laws regarding marriage and divorce. Their right, therefore, to marry any Jew of their choice was called into question. In 1964 all such Jews were, as a group, recognized as true Jews, but the chief rabbinate still retained the right to decide the legitimacy of individual marriages.

In England the office of rabbi of the United Synagogue of Great Britain has come to be recognized as equivalent to that of a chief rabbi for that country. French Jewry operates under a system of consistories devised by Napoleon in 1807, but the *grand rabbin* is no longer under government control. Germany followed the pattern of France to some extent, but without a central authority.

Chiemsee, also called BAYRISCHES MEER, lake, Bavaria *Land* (state), southeastern Germany. It lies 1,699 feet (518 m) above sea level, between the Inn (to which it drains through the Alz) and Salzach rivers. The largest lake in Bavaria, it is 9 miles (15 km) long and 5 miles (8 km) wide, has an area of 32 square miles (82 square km), and contains three islands, Herreninsel, Fraueninsel, and Krautinsel. The lake's shores are flat on the north and south and flanked by undulating hills to the east and west. The waters are clear and well stocked with trout and carp, but fishing is strictly regulated. The Herreninsel, the seat of a bishopric from 1215 to 1805, has a Benedictine monastery (founded 764, dissolved 1803) and is the site of a Bavarian royal castle modeled on the palace at Versailles. A former Benedic-

tine convent (766–1803) is on the Fraueninsel. The lake has a steamer service.

chien, Pinyin JIAN, type of Chinese bronze vessel produced during the late Chou dynasty (*c.* 600–221 BC). It is a large, deep bowl with a heavy rim meant to contain food or water.

The *chien,* which has a simple silhouette, is supported upon a narrow ring base; there are two or four ring handles that freely hang from slightly modeled, monster mask (*t'ao-t'ieh*)



Ceremonial bronze *chien,* Eastern Chou dynasty (770–221 BC); in the Minneapolis Institute of Arts
By courtesy of the Minneapolis Institute of Arts

bosses. The decoration of the *chien,* characteristic of the late Chou period in which the vessel is exclusively found, consists of either densely patterned decorative designs or representations of hunts and similar activities—the broad surfaces being used in ways similar to those on the contemporary *hu.*

To make the best use of the Britannica, consult the INDEX *first*

Ch'ien-lung, Pinyin QIAN-LONG, temple name (*miao-hao*) KAO-TSUNG, posthumous name (*shih*) CH'UN TI, original name HUNG-LI (b. Sept. 25, 1711, China—d. Feb. 7, 1799, Peking), fourth emperor of the Ch'ing (Manchu) dynasty, whose reign (1735–96) was one of the longest in Chinese history. He conducted a series of military campaigns that eliminated the Turk and Mongol threats to northeastern China (1755–60), enlarged his empire by creating the New Province (modern Sinkiang), and reinforced Chinese authority in the south and east.

Youth and education. On Oct. 7, 1735, on the eve of the death of the Yung-cheng emperor (reigned 1723–35), Hung-li was declared the heir apparent. In fact, in keeping with the wish of his grandfather, the K'ang-hsi emperor (reigned 1661–1722), Hung-li had been secretly designated Yung-cheng's successor shortly after the latter had ascended the throne despite the fact that Hung-li was the fifth-born son (he was, however, the eldest surviving son when he was actually named heir apparent). K'ang-hsi had noticed the outstanding qualities of his grandson and had decided to do his best to prepare him for his future task. Hung-li was given a carefully planned education, including the teachings of the eminent scholar Fu-min. He then was initiated into affairs of state and, in 1733, was made a prince of the first degree. He ascended the throne on Oct. 18, 1735, at the age of 24 (25 according to the Chinese system), and was to rule under the regnal title of Ch'ien-lung for more than 60 years.

Appearance and character. Nearly six feet tall, Ch'ien-lung was of slender build, with an upright bearing that he kept even in old age. His vigorous constitution and love of the outdoors were widely admired. In private life, Ch'ien-lung was deeply attached to his first wife, the empress Hsiao-hsien, whom he had married in 1727 and by whom he had (in 1730) a son whom he wished to see his successor but who died in 1738. His second wife, Ula Nara, was elevated to the dignity of empress in 1750, but in 1765 she renounced living at the court and retired to a monastery, doubtless because of a disagreement with the emperor. Ch'ien-lung had 17 sons and 10 daughters by his concubines.

Dynastic achievements. In the 18th century, a considerable expansion of arable lands, a rapidly growing population, and good administration brought the Ch'ing dynasty to its highest degree of power. Under Ch'ien-lung, China reached its widest limits. In the northeast, decisive results were achieved by successive military expeditions in 1755–60. Campaigns against the turbulent Turkish and Mongolian populations eliminated the danger of invasion that had always threatened the Chinese empire and culminated in the creation of the New Province (Hsin-chiang, modern Sinkiang, in northwest China), which enlarged the empire by approximately 600,000 square miles (1,600,000 square km). In the south, campaigns were less successful, but Chinese authority was nonetheless reinforced by them. An anti-Chinese revolt at Lhasa, Tibet, was easily put down in 1752, and Ch'ien-lung tightened his grip on a Tibet where real power passed from the Dalai Lama to two Chinese high commissioners. This brought an end to incursions on the Tibetan frontiers by Gurkhas from Nepal (1790–92), who now agreed to pay regular tribute to Peking. Campaigns against native tribes in rebellion from the west of Yünnan (the southwest corner of China) in 1748, then against Myanmar (Burmese) tribes in 1769, ended in failure, but new expeditions finally crushed the Yünnan rebels in 1776. Myanmar (Burma) itself, weakened by internal conflicts and by struggles with Siam (Thailand), agreed in 1788 to pay tribute to Peking. In Annam (Vietnam), where rival factions were in dispute, the Chinese armies intervened in 1788–89, at first victoriously but later suffering heavy defeats. The new ruler of Hanoi was nevertheless willing to recognize that his kingdom was a tributary state. In the east, a serious rebellion on the island of Taiwan was crushed in 1787. The enormous cost of these expeditions seriously depleted the Chinese treasury's once healthy finances.

Still more serious was the bad management, the extravagance, and the corruption that marked the last two decades of Ch'ien-lung's reign and weakened the empire for some time to come. Ch'ien-lung was 65 years old when he noticed a young officer, Ho-shen, whom he was to make the most powerful person in the empire. In a few years, Ho-shen was given considerable responsibilities, and his son married the emperor's favourite daughter. Under Ho-shen, who was intelligent but thirsty for power and wealth and completely without scruples, nepotism and corruption reached such a point, especially during Ch'ien-lung's last years, that the dynasty was permanently harmed.



Ch'ien-lung, colour on silk, detail, 19th century; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, Rogers Fund, 1942

Ch'ien-lung maintained blind confidence in his favourite. The Chia-ch'ing emperor, who succeeded Ch'ien-lung, had to wait for the old emperor's death before he could have Ho-shen arrested, relieve him of all his responsibilities, order the confiscation of his property, and grant him the favour of a suicide by reason of his blood ties with the imperial family.

Contributions to the arts. The role of Ch'ien-lung in the arts and letters of his time was probably a considerable one. Since it was customary to credit to the emperor many of the works produced in his reign by a variety of artists, it is impossible to determine the extent of Ch'ien-lung's personal works, but it is clear that he wrote both prose and poetry and practiced calligraphy and painting.

Of greater significance is Ch'ien-lung's sponsorship of a compilation of Chinese Classics. In 1772 Ch'ien-lung ordered that a choice be made of the most important texts in the four traditional divisions of Chinese learning—classical works, historical works, philosophical works, and belles lettres. The *Ssu-ku ch'üan-shu* ("Complete Library in the Four Branches of Literature") involved the scrutiny of entire libraries, both imperial and private, and was carried on for 10 years under the direction of the scholars Chi yün and Lu Hsi-hsiung, the emperor himself intervening on several occasions in the choice of texts. Seven handwritten series of the 36,275 volumes of the *Ssu-ku ch'üan-shu* were distributed, between 1782 and 1787, among the principal imperial palaces (Peking, Jehol, Mukden, and Yüan-ming Yüan) or were placed in libraries open only to scholars. The descriptive catalog of *Ssu-ku ch'üan-shu* remains an essential bibliographic guide for the study of classical Chinese literature.

But this positive contribution to Chinese literature was combined with harsh censorship. In 1774 Ch'ien-lung ordered the expurgation or destruction of all seditious books—that is, all those containing anti-Manchu declarations or allusions. As the examinations of the works took place, an index was drawn up, and, between 1774 and 1788, provincial governors received renewed orders to have the public or private libraries in their provinces checked. It has been estimated that about 2,600 titles were ordered to be destroyed. Nevertheless, several hundred works were preserved because there happened to be a copy in a Japanese or Korean library or in the library of some influential Manchu. The *Ssu-ku ch'üan-shu* itself was revised on several points after its completion, at the expense of the compilers, after the emperor had discovered in it some texts that he considered seditious.

The flowering of the arts that had occurred under the K'ang-hsi and Yung-cheng emperors continued with Ch'ien-lung. Architecture, painting, porcelain, and particularly jade and ivory work flourished with a final brilliance, for later Chinese artisans produced only for export.

Like his grandfather, Ch'ien-lung protected artists. He granted a reprieve to the excellent calligrapher Chang Chao, who was in prison awaiting execution (1736), and entrusted him with important functions. He was particularly appreciative of the painting talents of certain European missionaries who lived at the

court, such as Castiglione and Jean-Denis Attiret. He also admired the knowledge and skill of the Jesuit fathers who constructed various machines and mechanical devices, though he regarded the latter as no more than a source of intellectual satisfaction and a means of creating amusing objects. Ch'ien-lung devoted great attention to the beautification of the Yüan-Ming Yüan near Peking. He was to reside there more and more often, and he considered the ensemble formed by its numerous pavilions, lakes, and gardens as the Imperial residence par excellence. He increased the estate and erected new buildings. At his request, several Jesuit missionaries built residences and gardens in a modified Italian style (Baroque and Rococo—roughly corresponding with the 17th- and 18th-century architecture—but with Chinese roofs) around fountains like those of Versailles in France.

Relations with the West. Ch'ien-lung maintained China's traditional attitude to the outside world. The excellent personal relationships that he enjoyed with the Jesuits residing in Peking did nothing to modify the Imperial reserve regarding Roman Catholicism. Roman Catholic preaching remained officially forbidden after the "Rites Controversy"—a quarrel over the compatibility of ancestor worship with Roman Catholicism—that pitted the pope's legate against the K'ang-hsi emperor at the beginning of the 18th century. Although the work of the missionaries continued to be tolerated in the provinces, it frequently met with strong hostility from the local authorities, and the total number of congregations declined greatly. The British authorities later tried in vain to widen commercial contacts with China, but these remained confined to the port of Canton. A mission extraordinary led by Lord Macartney was received by the emperor in September of 1793, but the demands it presented were rejected.

Abdication. After having reigned for 60 years, Ch'ien-lung, out of respect for K'ang-hsi, whose reign had lasted 61 years, announced on Oct. 15, 1795, that he was designating his fifth son, Yung-yen, to succeed him. On Feb. 9, 1796, the Chinese new year, the new reign took the title of Chia-ch'ing, but the customs of the years of the Ch'ien-lung reign were upheld in the palace until the death of the old emperor. He had, in fact, held real power until this time, which makes his actual reign the longest in all Chinese history. His tomb, located to the northeast of Peking, is called Yü-ling. (Ro.Pe.)

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Chien ware, Chinese (Wade-Giles) CHIEN YAO, (Pinyin) JIAN YAO, also called (in Japan) TEMMOKU WARE, temmoku also spelled TENMOKU, dark brown or blackish Chinese stoneware made for domestic use chiefly during the Sung dynasty (960–1279) and into the early 14th century. Chien ware was made in Fukien province, first in kilns at Chien-an and later at Chien-yang.

The clay used for Chien ware was of a very hard, coarse grain. The inside and about two-thirds of the outside is covered with a thick, very dark glaze (coloured with iron oxide) that usually stops short of the outer base in a thick



Chien ware with an "oil spot" glaze, Sung dynasty (AD 960–1279); in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

welt; the glaze also tended to pool thickly on the inside of the vessel. Within its limited palette (in which a purplish or bluish black or reddish brown predominates), Chien ware has a range of variations. The most prized glazes exhibit characteristic streaking of hare's fur, the mottling of partridge markings, or silvery spotting resembling oil spots.

Teabowls are by far the most common, though not the only, form of Chien ware that survives. Used by Ch'an (Zen) Buddhist monks in the Fukien region, the highly esteemed teabowls were carried back to Japan by Japanese monks who had visited China to study Ch'an Buddhism. Until the late 16th century, Chien ware, or *temmoku* ware, was the type of teabowl preferred for the highly ritualized Japanese tea ceremony.

Chien-wen, Pinyin JIANWEN (reign name, or *nien-hao*), personal name (*hsing-ming*) CHU YÜN-WEN, posthumous name (*shih*) HUI-TI (b. Dec. 5, 1377, China—d. July 13, 1402?, Nanking), second emperor of the Ming dynasty (1368–1644), under whose reign a civil war nearly destroyed the newly founded dynasty.

Succeeding to the throne in 1398, Chien-wen continued the efforts of his predecessor to erase the Mongol legacies of the previous Yüan dynasty (1206–1368) and to encourage the cultural, intellectual, and technological advances for which the Ming dynasty was to become noted. He met his downfall when he tried to reassert central control over several princedoms within the empire that were ruled by his uncles. This effort provoked a rebellion by his uncle the prince of Yen, whose troops overwhelmed the capital in 1402 and established him as the Yung-lo emperor (reigned 1402–24); the defeated Chien-wen vanished at the time his palace was burned. He was presumed to have died in the fire, but legend recounts that he survived and lived for nearly 40 more years as a wandering monk.

Chiengmai (Thailand): *see* Chiang Mai.

Chiengrai (Thailand): *see* Chiang Rai.

Chiesa, Giacomo della (pope): *see* Benedict XV.

Chieti, city, capital of Chieti *provincia*, Abruzzi *regione*, central Italy, on a hill overlooking the Pescara River, south of Pescara. It originated as Teate, chief town of the Marrucini (an ancient Italic tribe), and was taken by the Romans in 305 BC. Destroyed by the barbarians and rebuilt by Theodoric the Ostrogoth king in the 6th century, it was successively a Lombard stronghold, a Norman county, and a possession of the Hohenstaufens, the Angevin dynasty (house of Anjou), the house of Aragon, and the Caracciolo. Its ancient name was applied to the religious order of the Theatines, founded in 1524 to combat Lutheranism and to reform morality. Roman monuments include the ruins of a theatre and of three small temples and the octagonal Church of Santa Maria del Tricalle, built on the site of the pagan temple of Diana Trivia. The 11th-century cathedral, frequently rebuilt, has a Gothic bell tower (1335–1498). Chieti contains the National Museum of Archaeology, the Institute of Art, a theological university, and a provincial library and picture gallery.

The city is divided into the old town on the hill and a rapidly developing industrial and commercial area (Chieti–Scalo) in the valley, where there are branches of several national industries including textile, cellulose, sugar, wire, and tobacco factories. Pop. (1988 est.) mun., 56,051.

Chifeng (China): *see* Ch'ih-feng.

chiffchaff (*Phylloscopus collybita*), warbler (family Sylviidae, order Passeriformes) of western Eurasia, named for its song. This greenish brown bird, 11 cm (4.5 inches) long, with pale



Chiffchaff (*Phylloscopus collybita*)

H. Reinhard—Bruce Coleman Inc./EB Inc

eye stripe, restlessly hunts insects in trees and makes a domed nest near the ground.

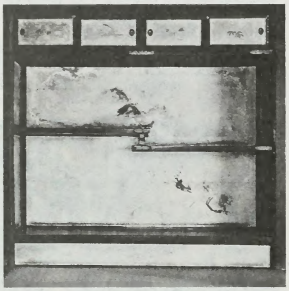
Chifley, Joseph Benedict (b. Sept. 22, 1885, Bathurst, New South Wales [Australia]—d. June 13, 1951, Canberra, A.C.T.), statesman, prime minister of Australia from 1945 to 1949, and leader of the Australian Labor Party (1945–51). His ministry was noted for banking reform and expansion of social services and immigration, aiding the country's growth in the postwar period.

Having been a railway driver as a young man, Chifley worked for a rail-workers' union in New South Wales. He then served in Parliament (1928–31) and, failing reelection, engaged in many public activities. His participation on the royal commission on banking (1935–37) shaped his later financial policies.

When the Labor Party regained control of the government under John Curtin in 1941, Chifley became federal treasurer and imposed strict wartime control over the economy, including expansion of federal taxing powers. He succeeded Curtin in 1945 and soon sponsored legislation governing the interrelations of state and private banks and the federal government. His government also nationalized Qantas (the Australian international airline), and established Trans-Australia Airlines (the government-owned domestic airline). Among other accomplishments of his government were public-health and labour-arbitration bills, agricultural and industrial development, and the founding of the Australian National University in Canberra as a centre for postgraduate research.

In 1948–49 Chifley altered Australia's traditional hostility toward Asian nations by siding with the Indonesians against the Dutch in the Netherlands East Indies (now Indonesia). His moderate attitude toward the Australian Communist Party and his unsuccessful attempt to nationalize private banks led to his defeat in the elections of 1949. He continued as leader of the Labor opposition in Parliament until his death.

chigai-dana, in Japanese architecture, shelves built into a wall, a feature of the *shoin* style of domestic architecture, which first appeared during the Kamakura period (1192–1333). What was previously a freestanding bookcase for scrolls and other objects became, with the *chigai-dana,* a built-in wall storage area, a companion bay to the *toko-no-ma* (alcove for the display of art objects), which is sometimes open and sometimes closed with sliding



Chigai-dana in the reception room of the middle *shoin,* Katsura Imperial Villa, Kyōto

Tatsuzo Sato. Kyoto: photograph, The Museum of Modern Art, New York City

doors. The word *chigai-dana* (*chigai,* "different"; *dana,* "shelf") suggests how the shelves are hung: two or more are always arranged in a staggered manner, usually with a continuous shelf above.

Chigasaki, city, Kanagawa *ken* (prefecture), Honshu, Japan. Originally a small post town, it developed in the late 19th century as a fashionable suburb of the Tokyo-Yokohama Metropolitan Area. In the northern rural area, garden agriculture (especially strawberries and chrysanthemums) thrives. The city centre is the location of several industries producing electric equipment, chinaware, and processed foods. Pop. (1988 est.) 196,487.

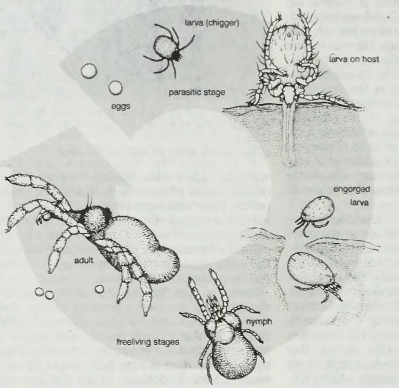
chigger, also called SCRUB MITE, HARVEST MITE, BÊTE ROUGE, or CHIGGER MITE, the larva of any of the 10,000 species of the invertebrate suborder Prostigmata of the subclass Acarina (sometimes Acari, or Acarida). The name is also erroneously applied to an insect better known as the chigoe, jigger, or jigger flea.

Chiggers range in length from 0.1 to 16 mm (0.004 to 0.6 inch). The body armour is thin and discontinuous. Certain species have eyes, others have none. Spiracles, or breathing pores, when present, are at the base of the first pair of appendages or elsewhere on the front part of the body.

Some species are terrestrial in habit, others live in fresh or marine water. Some are predacious, others are scavengers, parasites, or plant feeders. Various chiggers are pests of man, either as parasites or as carriers of disease. Attacks of chiggers often result in a dermatitis accompanied by intense itching.

In North America the common chigger that attacks humans is *Eutrombicula alfreddugèsi* (also called *Trombicula irritans*). This species occurs from the Atlantic coast to the Midwest and southward to Mexico. The tiny larvae easily penetrate clothing. Once on the skin surface, they attach themselves and inject a fluid that digests tissue and causes severe itching. The surrounding tissue hardens, forming a tube.

After feeding, the larva drops to the ground and sheds its skin, first becoming a nymph, then an adult. These stages are not parasitic on vertebrates but feed on plant materials and perhaps on other arthropods. The eggs are laid by the adult singly on the ground or on the leaves or stems of low-growing plants.



Simplified life cycle of a trombiculid; the chigger is its larval stage

Adapted from (all except larva on host) R.B. Loomis in E.R. Noble *et al. Parasitology: The Biology of Animal Parasites,* copyright © 1989 Lea & Febiger; (larva on host) Vitzthum in A. Kaestner, *Invertebrate Zoology,* vol. II, Interscience Publishers, copyright © 1968 by John Wiley & Sons, Inc., all rights reserved

Other species of chiggers that were formerly considered to be members of *Trombicula* but usually are now classified as separate genera include *Eutrombicula splendens* and *E. batatus* of North America. In Europe *Neotrombicula autumnalis* attacks not only humans but also cattle, dogs, horses, and cats. In the Orient certain species of *Leptotrombidium* carry the disease known as scrub typhus.

Chigi FAMILY, a Sienese family that rose from banking in the 13th century to princely rank in papal Rome and in the Holy Roman Empire in the 17th century.

The first member of the family to win more than local eminence was Agostino Chigi, "il Magnifico" (*c.* 1465–1520), a merchant prince who, as a banker in Rome, developed one of the richest business houses in Europe, lending money to popes, administering church revenue, and spending lavishly on display and the patronage of artists and writers. It was he who built the palace and gardens later known as the Farnesina, decorated by Raphael.

Another member of the family who contributed much to its rise to prominence was Fabio Chigi, who was elected pope as Alexander VII in 1655. As pope he created his nephew Agostino (distinct from "il Magnifico") successively Prince of Farnese (1658), Prince of Campagnano (1661), and Duke of Ariccia (1662); the Holy Roman emperor Leopold I also made Agostino a prince of the empire (1659). After Alexander's death this Roman branch of the Chigi family continued to prosper in the service of the papacy. In 1852, on the extinction of the Albani family, with whom they had intermarried in 1735, they added that name to their own, becoming known as the Chigi-Albani.

As cardinal and then as pope, Fabio Chigi was mainly responsible for gathering the Biblioteca Chigiana, a rich collection of manuscripts and books, now incorporated in the Vatican Library.

Chigi, Fabio: *see* Alexander VII *under* Alexander (Papacy).

Chignecto Isthmus, narrow neck of land in the centre of the Maritime Provinces of Canada, connecting Nova Scotia with New Brunswick and the Canadian mainland, between Northumberland Strait (leading to the Gulf of St. Lawrence) and Chignecto Bay, a northern extension of the Bay of Fundy. Its name is descriptive, being Micmac Indian for "great swampy area." It is 15 miles (24 km) wide at its narrowest point, just north of Amherst, N.S. The isthmus, first settled in 1672, served as a strategic point in the struggles between the British and French for control of the region. Several forts, including Lawrence, Gaspereaux (Monckton), and Beausèjour (now a national historic park), were built on its shores. Since 1822 a number of plans for cutting a canal across it have been surveyed, though none had been put into effect by the 1990s.

Chigwell, town in the Epping Forest district, county of Essex, England, on the River Roding on the northeastern perimeter of the metropolitan area of London. It includes the communities of Buckhurst Hill and Loughton and parts of Epping and Hainault forests.

Chigwell was mentioned as Cingheuuella in Domesday Book (1086), the record of the land survey ordered by William I the Conqueror, and was described by Charles Dickens in his novel *Barnaby Rudge* (1841). The Bank of England printing works is in Loughton, but the area is primarily residential. Pop. (1981) 9,866.

Ch'ih-feng, Pinyin CHIFENG, Pinyin (Mongolian) ULANHAD, town, southeastern Inner Mongolia autonomous *ch'ü* (region), China. It lies on the upper reaches of the Yingchin River, a western tributary of the Liao-ha River. The name, meaning "red mountain," refers to the red-coloured peak overlooking the town from the northeast.

From early times Ch'ih-feng has been a key point of communication between the Chinese and their northern neighbours. In the period of invasion and disunion (3rd to 6th century AD), it was a stronghold of Hsien-pei tribal power. Under the T'ang dynasty (618–907) it was a centre for the Khitans, a people of Hsien-pei descent. Under the Ming dynasty (1368–1644) it was controlled by the Do-yen Wei, and in early Manchu times (17th century) it was in the territory of the Left and Right banners (local administrative units) of the Ongüt Mongols. In 1729, after many Chinese (*e.g.,* from Shantung, Hopeh, and Shansi provinces) had settled in the area, the subprefecture of Ulaan Hada was set up to control them; it became a county-level town in 1773,

was raised to a prefecture in 1907, and became a county seat again in 1913.

Ch'ih-feng was never walled and was laid out on a spacious plan with solid brick buildings. It has rail links via Chien-p'ing, 75 miles (120 km) south to the main line from Peking to Shen-yang (Mukden); it is also the centre of a road network leading north into the Greater Khingan Mountains, into the interior plains of Inner Mongolia, westward to Kalgan (Hopeh), and southwestward to Ch'eng-te and thence to Peking. The town serves as a collecting and shipping point for the pastoral products of the Mongols, which include meat, hides, furs, and cattle. There are some local coal deposits. Much of the surrounding land is under cultivation.

Ch'ih-feng is an area rich in archaeological remains, and important prehistoric (Neolithic and Bronze Age) sites have been discovered nearby. Pop. (1988 est.) 915,616.

Chih-i, Pinyin ZHIYI, also called CHIH-K'AI (b. 538, Hunan province, China—d. 597, Mount T'ien-t'ai, Chekiang province), Buddhist monk, founder of the eclectic T'ien-t'ai (Japanese: Tendai) Buddhist sect, which was named for Chih-i's monastery on Mount T'ien-t'ai in Chekiang, China. His name is frequently but erroneously given as Chih-k'ai.

Orphaned at 17, Chih-i turned to monastic life and was a disciple of the great Buddhist master Hui-ssu from 560 to 567. From his first visit to Nanking (567) until his death, Chih-i was intimately associated with the imperial government, first with the Ch'en dynasty in southern China and then with the Sui dynasty, which eventually reunified the country.

Confronted with the many divergent varieties of Buddhist thought that existed in his time, Chih-i exhibited skill at compromise and classification. He regarded all the varieties of Buddhist doctrine as true and assumed they had all been present in the mind of Śākyamuni (the historical Buddha) from the time of his enlightenment. According to Chih-i, the Buddha unfolded his teachings gradually in five periods, taking into account the capacity of his listeners: as they became more enlightened, they could absorb progressively more profound doctrines. In the fifth and final period the Buddha preached the *Saddharma-puṇḍarika-sūtra* (*Lotus Sutra*), which Chih-i helped establish as the most popular scripture of east Asia.

He criticized both those who indulged in a purely intellectualized Buddhism and those who in reaction practiced a religion without a theological base. For him, study and contemplation were both indispensable for religious enlightenment. His sect, which claimed more than 5 million adherents in Japan in the late 20th century, was the leading sect in China in the 8th and 9th centuries.

Chih-k'ai (Buddhist monk): *see* Chih-i.

Chih Nü, Pinyin ZHI NÜ, in Chinese mythology, the heavenly weaving maiden who used clouds to spin seamless robes of brocade for her father, the Jade Emperor (Yü Ti). Granted permission to visit the earth, Chih Nü fell in love with Niu Lang, the cowherd, and was married to him. For a long time Chih Nü was so deeply in love that she had no thoughts of heaven. Finally she returned to her heavenly home where her husband joined her. The emperor, irate that his daughter had neglected her weaving for so long, placed the lovers on opposite sides of the impassable Milky Way. Only once a year, on the seventh day of the seventh lunar month, are they allowed to meet. On that day magpies fly to the Milky Way to form a bridge so that the longing lovers can cross over to renew mutual protestations of their undying love for each other. Their happy tears often cause rain on earth. In some parts of China an annual festival allows lovers to meet in honour of these astral deities. Chih Nü belongs to the constellation Lyra, Niu Lang to Aquila.

Chihli, Gulf of (Yellow Sea): *see* Po Hai.

Chihuahua, state, northern Mexico. The state is bounded on the north and northeast by the United States (New Mexico and Texas), on the east by Coahuila, on the south by Durango, and on the west by the states of Sinaloa and Sonora.



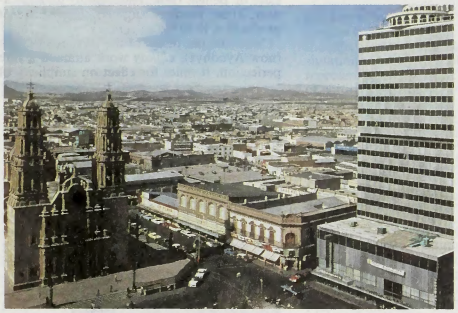
Sinforosa Canyon in the Tarahumac Mountains, part of the Sierra Madre Occidental in Chihuahua state, Mexico

Walter Aguiar—EB Inc.

Chihuahua is Mexico's largest state (94,571 square miles [244,938 square km]) and is for the most part an elevated plain that slopes gently toward the Rio Grande (Río Bravo del Norte). Western Chihuahua, however, is broken by the Sierra Madre Occidental and its spurs, which form high, fertile valleys. The elevated plateaus and valleys have heavy rainfall, but over most of the state there is less than 20 inches (500 mm) annually. An impermeable clay substratum prevents much of the rain's absorption by the soil, so what little rain does fall is carried along the bare land surface in torrents. The state's Barranca de Cobre (Copper Canyon) resembles the Grand Canyon in scale (it reaches as much as 4,600 feet [1,400 m] in depth) but is almost inaccessible. The only river of consequence is the Conchos, which flows north and northeast into the Rio Grande.

In Spanish colonial times, Chihuahua, along with Durango, formed part of Nueva Vizcaya province. It was not separated from Durango until after Mexico's independence was achieved (1823). Indian influence in the state is now slight, and the fierce Apache tribes that once roamed the area are almost extinct. The people of Chihuahua have been active in most of the revolutionary outbreaks in Mexico during the 19th and early 20th centuries.

Scarcity of water has been a serious obstacle to agricultural development in the state outside the districts where irrigation is practicable. Livestock raising is an important industry in the mountainous districts of the west, where there is excellent pasturage for much of the year. Irrigated cotton farming and meat-packing were developed in the 1950s. The state's principal industry is the mining of iron, lead, zinc, gold, silver, copper, and other minerals. Chihuahua, the state capital, is linked by railroad, highway, and air to cities in central Mexico and the United States. Other important cities in the state are Hidalgo del Parral and Juárez, which lies across the Rio Grande from El Paso, Texas. Pop. (1988 est.) 2,238,300.



Chihuahua city, Mex., and its cathedral (left) on the Plaza de la Constitución

Walter Aguiar—EB Inc.

Chihuahua, city, capital of Chihuahua state, northern Mexico. The city stands at 4,692 feet (1,430 m) above sea level in a valley of the Sierra Madre Occidental. Originally settled in the 16th century and officially founded in 1709, Chihuahua was a prosperous mining centre during the colonial era. It was twice captured by U.S. forces during the war between Mexico and the United States (1846–48). Now the centre of a cattle-raising area, the city contains the Autonomous University of Chihuahua (1954) and many noteworthy public buildings, including the Church of San Francisco, one of the best specimens of 18th-century architecture in Mexico. In the plaza is a monument to Mexican independence leader Miguel Hidalgo y Costilla and his companions of the 1810 revolution, who were executed there. Chihuahua can be reached by air, highway, and railroad. Pop. (1980) 385,603.

Chihuahua, smallest recognized dog breed, named for the Mexican state of Chihuahua, where it was first noted in the mid-19th century. The Chihuahua is thought to have been derived from the Techichi, a small, mute dog kept by the Toltec people of Mexico as long ago as the 9th century AD. Typically a saucy-looking, alert dog that is sturdier than its small build would suggest, the Chihuahua

stands about 13 cm (5 inches) and weighs 0.5 to 2.7 kg (1 to 6 pounds). It has a rounded head, large, erect ears, prominent eyes, and a



Chihuahua
Sally Anne Thompson—EB Inc

compact body. The coat is variable in colour and may be either smooth and glossy or long and soft.

Chikamatsu Monzaemon, original name SUGIMORI NOBUMORI (b. 1653, Echizen [now in Fukui prefecture], Japan—d. Jan. 6, 1725, Ōsaka), Japanese playwright, widely regarded as the greatest Japanese dramatist. He is credited with more than 100 plays, most of which were written for the bunraku (puppet theatre). He was the first author of bunraku plays to



Chikamatsu, detail of a contemporary copy of an 18th-century hanging scroll; in the Tsubouchi Memorial Theatre Museum, Waseda University, Tokyo
Tsubouchi Memorial Theatre Museum, Waseda University, Tokyo

write works that not only gave the puppet operator the opportunity to display his skill but also were of considerable literary merit. His works remained popular into the late 20th century.

Chikamatsu was born into a samurai family, but his father apparently abandoned his feudal duties sometime between 1664 and 1670, moving the family to Kyōto. While there, Chikamatsu was attached to the court aristocracy. The origin of his connection to the theatre is unknown. *Yotsugi Soga* (1683; "The Soga Heir"), a bunraku play, is the first play that can be definitely attributed to Chikamatsu. The following year he wrote a kabuki play, and by 1693 he was writing plays almost exclusively for live theatre. In 1703 he reestablished an earlier connection with the bunraku chanter Gidayū Takemoto, moving in 1705 from Kyōto to Ōsaka, to be nearer to Gidayū's puppet theatre, Takemotoza; he remained a writer for Takemotoza until his death.

Chikamatsu's works fall into two main categories: historical romances and domestic tragedies. Modern critics generally prefer the latter plays because they are more realistic and closer to Western conceptions of drama. Some of Chikamatsu's views on the art of the puppet theatre have been preserved in *Naniwa miyage,* a work written by a friend in 1738. There Chikamatsu declared, "Art is something which lies in the slender margin between the real and the unreal," and he endeavoured accordingly in his own works to steer between the fantastic nonsense that had been the rule in the puppet theatre and the facile realism that was coming into vogue.

The characters that people Chikamatsu's domestic tragedies are merchants, housewives, thieves, prostitutes, and all the other great variety of people who lived in the Ōsaka of his day. Most of the domestic tragedies were based on actual incidents, such as the then-popular trend of double suicide of lovers. *Sonezaki shinjū* (1703; *The Love Suicides at Sonezaki*), for example, was written within a fortnight of an actual double suicide. The haste of composition is not at all apparent even in this first example of his double-suicide plays, the archetype of his other domestic tragedies.

Chikamatsu's most popular work was *Kokusenya kassen* (1715; *The Battles of Coxinga*), a historical melodrama that is based loosely on events in the life of the Chinese-Japanese adventurer who attempted to restore the Ming dynasty in China. Another famous work is *Shinjū ten no Amijima* (1720; *Double Suicide at Amijima*), which is still frequently performed. Despite Chikamatsu's eminence, however, the decline in popularity of bunraku has meant that most of his plays have become unfamiliar to the theatre-going public, except in the abridgments and considerably revised versions used in Kabuki theatre, on film, and elsewhere.

chikan work, Hindi CHIKANKĀRĪ, delicate, fine Indian embroidery done in white cotton threads on plain muslin. The ancient history of this style is uncertain, but it is known that in the 18th century it was introduced from the state of Bengal (now Bangladesh) into Lucknow, Uttar Pradesh, still the chief centre of production in the 20th century.

Under the patronage of the nawabs of Oudh (now Ayodhyā), *chikan* work attained a rare perfection. It relies for effect on simplicity of



Detail of a *chikan*-work garment from Uttar Pradesh, 19th century; in the State Museum, Lucknow, India
P. Chandra

design, the motifs being limited in number and the excellence of the work being judged by the minuteness and evenness of the embroidery. The number of stitches is also limited; the most common are the darn stitch, the inverted satin stitch, the elongated satin stitch, network, and appliqué work. The art was in danger of dying out, but a revived demand in the second half of the 20th century contributed to its renewed vitality.

Chikmagalūr, town, southwestern Karnātaka state, southern India. The town serves as a major centre for coffee processing and trading. Fertilizer is treated there for use in the local coffee, cardamom, and pepper estates. The surrounding region has a natural wealth of forested highlands (mostly the Western Ghāts) that are sources of teak and provide shelter for extensive coffee plantations. Lacquer ware and rattan products are the principal local handicrafts. Pop. (1981) 60,582.

Chilachap (Indonesia): *see* Cilacap.

Chilam Balam, Books of, group of documents written in Yucatec Maya with Spanish characters during the 17th and 18th centuries. A principal source of knowledge of ancient Mayan custom, they contain myth, prophecy, medical lore, calendrical information, and historical chronicles. Although originally there were probably many documents, only a few remain. Those of Chumayel, Tizimín, and Maní (towns where they were written) are particularly important for Mayan history. *Chilam balam* means "secrets of the soothsayers."

chilblain, also called PERNIO, or ERYTHEMA PERNIO, an inflammatory swelling of the skin of the hands or feet, resulting from exposure to cold. Tissue damage is less severe with chilblains than with frostbite, where the skin is actually frozen. Red, itching papules and patches of eroded tissue appear on the skin, which is cold and clammy to the touch; severe chilblains may blister and swell. The condition is aggravated by warmth, and sudden rewarming is not recommended. The preferred treatment is to elevate the affected part and allow it to warm gradually at room temperature.

Child, Charles Manning (b. Feb. 2, 1869, Ypsilanti, Mich., U.S.—d. Dec. 19, 1954, Palo Alto, Calif.), American zoologist who developed the axial gradient theory of regeneration and development, a physiological explanation of the ordered re-creation of animal parts following an injury.

While at the University of Chicago, where he spent his academic life (1895–1934), Child experimented extensively with invertebrates such as planarian flatworms and freshwater hydras, which show a remarkable ability to regenerate themselves from small fragments. He observed that characteristic parts, such as a head or a tail, usually grew from that portion of the fragment where the same part had previously been joined, a phenomenon known as polarity. On the basis of his experiments, Child advanced a theory of antero-posterior dominance, stating that physiological activity in a multicellular organism increases along its axis from bottom to top (or tail to head), and that this gradient of activity in a tissue fragment determines the position of structures growing from it. He felt that the gradient was caused by the action of a chemical factor on cell functions.

Among his publications are *Individuality in Organisms* (1915) and *Patterns and Problems of Development* (1941).

Child, Francis J(ames) (b. Feb. 1, 1825, Boston, Mass., U.S.—d. Sept. 11, 1896, Boston), American scholar and educator important for his systematic study, collecting, and cataloging of folk ballads.

Child graduated from Harvard University in 1846, and later, after studying in Europe, he

succeeded Edward T. Channing in 1851 as Boylston professor of rhetoric, oratory, and elocution and in 1876 became professor of English at Harvard. Child studied English drama and Germanic philology, the latter at Berlin and Göttingen during a leave of absence (1849–51). He edited the poetic works of Edmund Spenser, 5 vol. (1855), and published an important treatise on Geoffrey Chaucer in the *Memoirs of the American Academy of Arts and Sciences* for 1863.

His largest undertaking grew out of an original collection of *English and Scottish Ballads*, 8 vol. (1857–58). Child accumulated in the Harvard library one of the largest folklore collections in existence, studied manuscript rather than printed versions of old ballads, and investigated songs and stories in other languages that were related to the English and Scottish ballads. His final collection was published as *The English and Scottish Popular Ballads*, first in 10 parts (1882–98) and then in 5 quarto volumes, containing 305 ballads. Few significant additions have been made since, and Child's collection remains the authoritative treasury.

Child, Sir John, BARONET (d. Feb. 4, 1690, Bombay, India), first person to be placed in control of all the English East India Company's trading establishments in India. He served there as deputy governor of Bombay (1679–81) and president of Surat (1682–90). He was made a baronet in 1684.

Apparently Child was sent to India as a child to live with an uncle employed there by the company. In 1672 he married a daughter of Captain John Shaxton, who was the commander of the English garrison at Bombay. Two years later he was implicated in the mutiny of his father-in-law's troops but was restored to favour through the influence of his brother, Sir Josiah Child, the powerful governor of the company in London. Like Sir Josiah, he was utterly unscrupulous and had a passion for intrigue. His autocratic behaviour as president of Surat led to Captain Richard Keigwin's unsuccessful rebellion in Bombay (1683). Following orders from London, Child became involved in war with the Mughal emperor Aurangzeb, whose troops captured Surat and forced Child to make peace. One of the peace terms required Child to leave India, but he died while the matter was still pending.

Child, Sir Josiah, 1ST BARONET (b. 1630, London, Eng.—d. June 22, 1699, London?), English merchant, economist, and governor of the East India Company.

The son of a London merchant, Child amassed a comfortable fortune as supplier of food to the navy under the Commonwealth. He also became a considerable stockholder in the East India Company. His speeches and writings supporting the East India Company's claims to political power and its right to restrict any competition with its trade brought him to the notice of the other shareholders. He became a director of the company in 1677, and he subsequently became deputy governor and then governor (1681–83, 1686–88) of the East India Company. For a time he was virtually the sole decision maker of the company, and he directed its policy as if it were his own private business. He was often and openly accused of using the company to aggrandize his social, economic, and political position. He received his baronetcy in 1678.

Child made some important contributions to economics, especially *Brief Observations Concerning Trade and the Interest of Money* (1668) and *A New Discourse of Trade* (1668, 1690). He viewed Dutch prosperity as deriving in part from a low-interest-rate policy and in part from a relatively liberal trade policy, and he advocated similar policies for the English. He had the mercantilist partiality for a numerous population and propounded a scheme for the relief and employment of the poor. He also advocated the reservation by the mother country of the sole right of trade with its colonies.

Child, Julia, *née* MCWILLIAMS (b. Aug. 15, 1912, Pasadena, Calif., U.S.), American cooking expert, author, and television personality noted for her promotion of traditional French cuisine.

The daughter of a prosperous financier and consultant, Child graduated from Smith College, Northampton, Mass. (B.A., 1934), and worked occasionally in advertising. During World War II, from 1941 to 1945, she worked in Ceylon (Sri Lanka) and China for the Office of Strategic Services (OSS, the forerunner of the CIA), where she met Paul Cushing Child, whom she married in 1945. During the Childs' six-year postwar stay in Paris, she attended the Cordon Bleu cooking school for six months and studied privately with master chef Max Bugnard. She and two French friends, Simone Beck and Louisette Bertholle, in 1951 founded L'École des Trois Gourmandes ("The School of the Three Gourmands") and later wrote the best-selling cookbook *Mastering the Art of French Cooking*, 2 vol. (1961, 1970).

The Childs settled in Cambridge, Mass., in 1961. From Boston's public television station she then initiated the immensely popular cookery series *The French Chef* (1962/63–1973), followed by the 13-part *Julia Child and Company* (1978–79), *Julia Child and More Company* (1980), and *Dinner at Julia's* (1983). Her books included *The French Chef Cookbook* (1968), *From Julia Child's Kitchen* (1975), and *The Way to Cook* (1989).

Child, Lydia Maria (Francis) (b. Feb. 11, 1802, Medford, Mass., U.S.—d. Oct. 20, 1880, Wayland, Mass.), American author of antislavery works that had great influence in her time.



Lydia Child

By courtesy of the Library of Congress, Washington, D.C.

In the 1820s, Child taught, wrote historical novels, and founded a periodical for children, *Juvenile Miscellany* (1826). After meeting the abolitionist William Lloyd Garrison in 1831, she devoted her life to abolitionism. Child's best-known work, *An Appeal in Favor of that Class of Americans Called Africans* (1833), related the history of slavery and denounced the inequality of education and employment for blacks; it was the first such work published in book form. As a result, Child was ostracized socially and her magazine failed in 1834. The book succeeded, however, in inducing many people to join the abolitionist movement.

Child's further abolitionist efforts included editing the *National Anti-Slavery Standard* (1841–43) and later transcribing the recollections of slaves who had been freed. In addition, her home was part of the Underground Railroad that aided escaping slaves.

Child's other work included once-popular volumes of advice for women, such as *The Frugal Housewife* (1829), and books on behalf of the American Indian. Although Child tended to overlook facts that did not support her theses, her writing is clear and forceful.

child abuse, also called CRUELTY TO CHILDREN, the willful and unjustifiable infliction of pain and suffering on children. The term can denote the use of inordinate physical violence; unjustifiable verbal abuse; the failure to furnish proper shelter, nourishment, medical treatment, or emotional support; incest; other cases of sexual molestation or rape; and the making of child pornography. Frequently described by the medical profession as the "battered-child syndrome," abusive treatment of children is almost universally proscribed by criminal statutes. Child abuse can have serious future consequences for the victims involved. Delays in physical growth, impaired language and cognitive abilities, and problems in personality development, learning, and behaviour are common following instances of child abuse or neglect.

One of the earliest national laws to protect children from cruel treatment was adopted in Great Britain in 1884, at which time the National Society for the Prevention of Cruelty to Children was organized. Similar societies were subsequently organized in other countries. In the United States, the first state to legislate protection for children was New York in 1875. The New York law served as a model for other states, all of which now have statutes designating child abuse as a criminal offense. In 1974 a National Center on Child Abuse and Neglect was established by an act of the U.S. Congress.

Child abuse is a widespread though drastically underreported phenomenon. In the United States, for instance, estimates of abuse or neglect by parents or guardians range from about 1 out of every 100 children to more than 1 out of every 7. At least 500,000 children are physically abused in the United States each year; many more are emotionally abused and neglected. Incest and child sexual molestation are particularly underreported. Even though widely prevalent, child abuse is usually overlooked by family, friends, and health professionals. Prejudice, anxiety, and shame, not lack of information, seem to be the major reasons for this failure to recognize private forms of violence, a form of tacit denial that leads to their perpetuation.

Cruelty to children can have many causes, but several major ones stand out. Abusive patterns of behaviour on the part of parents can be thought of as maladaptive responses to stressful situations and feelings of powerlessness. They represent adults' warped efforts to master out-of-control situations or to regain psychological equilibrium through imposing their will and powers of control on their own defenseless children. Recent psychiatric and pediatric research has found that a high proportion of parents guilty of abusive and inhumane treatment of their children were physically and mentally maltreated themselves as children. Typically overdisciplined and deprived of parental love in their infancy, these parents repeat the pattern with their own children, often in the belief that they are legitimately exercising their parental right to punish a child.

With proper social and psychotherapeutic intervention, most child abusers can be helped. Many emotionally troubled abusers are relieved to be found out, and they readily respond to the therapeutic help they receive. Legal remedies for child abuse range from incarceration of the offender to the removal of the abused child from the custody of parents or others guilty of committing the crime.

child development, the growth of perceptual, emotional, intellectual, and behavioral capabilities and functioning during childhood. The term childhood denotes that period in the human lifespan from the acquisition of language at one or two years to the onset of adolescence at 12 or 13 years.

A brief treatment of child development fol-

lows. For full treatment, *see* MACROPAEDIA: Behaviour, The Development of Human. The physical growth of children is treated in Growth and Development, Biological.

The end of infancy and the onset of childhood are marked by the emergence of speech at one to two years of age. Children make enormous progress in language acquisition in their second year and demonstrate a continually growing vocabulary, an increasing use of words in combinations, and a dawning understanding of the rules of grammar and syntax. By their third year children tend to use sentences containing five or even six words, and by the fourth year they can converse in adult-like sentences. Five- and six-year-olds demonstrate a mastery of complex rules of grammar and meaning.

Early childhood (two to seven years) is also the time in which children learn to use symbolic thought and language to manipulate their environment. They learn to perform various mental operations using symbols, concepts, and ideas to transform information they gather about the world around them. The beginnings of logic, involving the classification of ideas and an understanding of time and number, emerge in later childhood (7 to 12 years). Children's memory capacity also advances continually during childhood and underpins many other cognitive advances they make at that time. As both short-term and long-term memory improve, children demonstrate an increasing speed of recall and can search their memory for information more quickly and efficiently.

Young children's growing awareness of their own emotional states, characteristics, and abilities leads to empathy—*i.e.,* the ability to appreciate the feelings and perspectives of others. Empathy and other forms of social awareness are in turn important in the development of a moral sense. The basis of morality in children may be said to progress from a simple fear of punishment and pain to a concern for maintaining the approval of one's parents. Another important aspect of children's emotional development is the formation of their self-concept, or identity—*i.e.,* their sense of who they are and what their relation to other people is. Sex-role identity, based on gender, is probably the most important category of self-awareness and usually appears by the age of three.

The onset of the physical and emotional changes of puberty and the acquisition of the logical processes of adults mark the end of childhood and the start of adolescence.

child labour, employment of children of less than a specified legal age. In Europe, North America, Australia, and New Zealand, children of less than 15 rarely work except in commercial agriculture, because of the effective enforcement of laws passed in the first half of the 20th century. In the United States, for example, the Fair Labor Standards Act of 1938 set the minimum age at 14 for employment outside of school hours in nonmanufacturing jobs, at 16 for employment during school hours in interstate commerce, and at 18 for occupations called hazardous by the secretary of labor. In less industrially developed countries, on the other hand, millions of children—some as young as seven—still toil in quarries, mines, factories, fields, and service enterprises. They make up more than 10 percent of the labour force in some countries in the Middle East and from 2 to 10 percent in much of Latin America and some parts of Asia. Few, if any, laws govern their employment or the conditions under which work is performed. Restrictive legislation is rendered impractical by family poverty and lack of schools.

The movement to regulate child labour began in Great Britain at the close of the 18th century, when the rapid development of large-scale manufacturing had resulted in the exploitation of very young children in mining and industrial work. The first law, in 1802, which was aimed at controlling the apprenticing of pauper children to cotton-mill owners, was ineffective because it did not provide for enforcement. In 1833 the Factory Act did provide a system of factory inspection.

Organized international efforts began with the first International Labour Conference in Berlin in 1890. Although agreement on standards was not reached at that time, similar conferences and other international moves followed. In 1900 the International Association for Labour Legislation was established at Basel, Switz., with branches in at least 16 countries, to promote child labour provisions as part of other international labour legislation. A report published by the International Labour Organisation (ILO) of the United Nations in 1960 on law and practice among more than 70 member nations showed serious gaps in protection afforded young workers in non-industrial employments, including agriculture and handicrafts.

child psychiatry, branch of medicine that is concerned with the study and treatment of the mental, emotional, and behavioral disorders of childhood. Child psychiatry has been recognized as a division of the field of psychiatry and neurology since the mid-1920s. By about the mid-1950s the American Board of Psychiatry and Neurology officially had recognized the field and defined training and certification requirements for this subspecialty. Subdivisions within the field include infant psychiatry and adolescent psychiatry.

Because the child is living through active and critical phases of development, the approach to the diagnosis and treatment of children's mental and emotional disturbances is necessarily different from that employed with adults. Personality is being molded and changed as the child grows, and so it is essential that the child psychiatrist have extensive knowledge of the developmental stages of personality.

Although many of the general principles relating to the therapy of adult psychological disorders apply to child psychiatry, a major distinction is that the child psychiatrist must obtain much critical information on the child's behaviour from the adults who have been in frequent or close contact with the child—parents, pediatrician, psychologist, teacher, or social workers.

For the most part, child psychiatry is concerned with the study and treatment of behaviour disorders and emotional problems that affect children. The emotional maladjustments of children frequently are characterized by anxiety reactions. They may include habit disorders—such as nail-biting, thumb-sucking, bed-wetting, and temper tantrums—and conduct disorders—such as extreme aggressiveness, lying, stealing, destructiveness, fighting, fire setting, cruelty, and running away from home. Among infants, deprivation of mothering or problems in the infant's relationship with the mother may lead to withdrawn behaviour, continuous crying, inability to eat, insomnia, and physical or mental retardation or both. In the last half of the 20th century, child abuse and neglect have been seen as a significant factor in childhood disorders.

As in the treatment of adult patients, psychiatric treatment of children requires determination of any genetic, constitutional, or physical factors that have contributed to the disturbance. It is also essential that the parent-child relationship be assessed for its contribution to the disturbed behaviour. Where parental actions are disruptive or disturbing—as, for example, in relationships coloured by alcoholism, hostility, cruelty, neglect, overprotection of the child, or excessive ambitions for and expectations of the child—it is common to find behaviour disorders in the children involved. The existence of neurotic, psychotic, or psychopathic conditions in the parents often contributes to a faulty parent-child relationship. The death or loss of a parent may also have a lasting effect on a child's emotional growth. Another source of personality problems may be the child's relationship with brothers and sisters. Child psychiatry usually involves some form of family therapy.

School experiences also can create personality problems. Many children exhibit conduct and learning disturbances because they are emotionally, temperamentally, or intellectually unable to learn. Children with perceptual difficulties such as dyslexia, for example, may fail to learn to read or to develop reading skills appropriate to their age level. As a consequence, they often become frustrated and anxious over their failure to meet the standards of their family and their class.

Most therapeutic techniques used with adults are also employed with children, as well as more specialized methods such as play therapy. In the latter, play activities are used as the primary basis for communication between the child and the psychotherapist. Play activities enable children to express their feelings, thoughts, wishes, and fears more freely and easily than they are able to do through purely verbal communication.

child psychology, also called CHILD DEVELOPMENT, the study of the psychological processes of children, specifically, how these processes differ from those of adults, how they develop from birth to the end of adolescence, and how and why they differ from one child to the next. The topic is sometimes subsumed with infancy, adulthood, and aging under the category of developmental psychology.

As a scientific discipline with a firm empirical basis, child study is of comparatively recent origin. It was initiated in 1840, when Charles Darwin began a record of the growth and development of one of his own children, collecting the data much as if he were studying some strange species. A similar, more elaborate study was published by the German psychophysiologist W.T. Preyer (*Die Seele des Kindes* [1882; *The Mind of the Child*]) that set the fashion for a series of others. In 1891 the American educational psychologist G. Stanley Hall established a periodical, the *Pedagogical Seminary,* devoted to child psychology and pedagogy. During the early 20th century, the development of intelligence tests and the establishment of child guidance clinics further defined the field of child psychology.

A number of notable 20th-century psychologists—among them Sigmund Freud, Melanie Klein, and Freud's daughter, Anna Freud—dealt with child development chiefly from the psychoanalytic point of view. Perhaps the greatest direct influence on modern child psychology was Jean Piaget of Switzerland. By means of direct observation and interaction, Piaget developed a theory based on the systematic study of the acquisition of understanding in children. He described the various stages of learning in childhood and characterized the child's perception of himself and the world at each stage.

The data of child psychology are gathered from a variety of sources. Observations by relatives, teachers, and other adults, as well as the psychologist's direct observation of and interviews with a child (or children), provide a significant amount of material. In some cases a one-way window or mirror is used so that children are free to interact with their environment or others without awareness that they are being watched. Projective tests, personality and intelligence tests, and experimental methods have also proved useful in understanding child development.

Despite attempts to unify the various theories of child development, the field remains dynamic, developing as human understanding of physiology and psychology changes.

child welfare, services and institutions concerned with the physical, social, and psychological well-being of children, particularly children suffering from the effects of poverty or lacking normal parental care and supervision. In the Western world, and particularly in the larger cities, child welfare includes a range of highly specialized services that go far beyond physical survival and deal with such problems as personality development, vocational guidance, and use of leisure time. In less-developed countries and in the aftermath of war and disaster, child welfare services may apply only the essential measures to keep children alive, such as emergency feeding, shelter, and simple public health precautions. The general standard of living, the level of education, and the financial resources of the country are among the factors that determine child welfare standards.

childbed fever: *see* puerperal fever.

childbirth: *see* parturition.

childbirth, natural: *see* natural childbirth.

Childe, V(ere) Gordon (b. April 14, 1892, Sydney—d. Oct. 19, 1957, Mount Victoria, N.S.W., Australia), Australian-born British historian whose study of European prehistory in the 2nd and 3rd millennia BC sought to evaluate the relationship between Europe and the Middle East and to examine the structure and character of the preliterate cultures of the Western world in antiquity. His insistence on an international approach founded a tradition of prehistoric studies.



Childe
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Childe was professor of prehistoric archaeology at the University of Edinburgh (1927–46) and then director of the Institute of Archaeology, University of London, until 1956. In many publications he presented a synthesis of knowledge covering a vast and complex field in an authoritative and unique manner. His works include *The Dawn of European Civilization* (1925; 6th ed., 1957) and *The Danube in Prehistory* (1929), a classic of European prehistory. His books aimed at a general readership include *Man Makes Himself* (1936), an exposition of the parallel evolution of society and technology, and *What Happened in History* (1942), an introduction to prehistoric archaeology.

Childebert, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Childebert I** (b. *c.* 498?—d. Dec. 23, 558, Paris), Merovingian king of Paris from 511, who helped to incorporate Burgundy into the Frankish realm.

Childebert was a son of Clovis I and Clotilda. He received lands in northwestern France, stretching from the Somme down to Brittany, in the partition of his father's kingdom in 511; to these he added part of the kingdom of Orléans in the 520s (by the murder of his brother Chlodomer's young heirs), part of the kingdom of Burgundy in 534 (by conquest, with his brother Chlotar I), and Provence in 537 (by treaty). After a campaign in 531 against the Visigoths, who still held the coastal strip between the Rhône and the Pyrenees, he invaded Spain itself in 542 in alliance with Chlotar; although the expedition had no great success, he did bring back with him the tunic of the martyred St. Vincent, housing this in a new foundation at Paris that came to be called Saint-Germain-des-Prés. Childebert left no sons, and his lands were taken over by Chlotar on his death.

• **Childebert II** (b. 570—d. December 595), Merovingian king of the eastern Frankish kingdom of Austrasia and later also king of Burgundy.

Still very young on the death of his father, Sigebert I, in 575, Childebert was dominated at times by his mother, Brunhild, who was hostile to his uncle, King Chilperic of Soissons. The intervention in 575 of a second uncle, Guntram of Burgundy, to protect Childebert's southern lands against Chilperic was followed two years later by Guntram's adoption of his young nephew as his heir. The Austrasian–Burgundian alliance was briefly broken in 581, when Chilperic too adopted Childebert, but Guntram bought off Childebert by the cession of territory.

After Chilperic's death in 584, Childebert, now of age, purged the Austrasian nobility and, in ostensible alliance with the Byzantine emperor, embarked on a series of unsuccessful campaigns against the Lombards of Italy. Settling his differences with Guntram, who again recognized him as heir, he duly took over Burgundy on his uncle's death in 592. Free of Guntram's restraining hand, he immediately attacked Chilperic's young son and successor, Chlotar II, but was defeated. He was succeeded by his two young sons, Theodebert II and Theodoric II.

• **Childebert III** (b. *c.* 683—d. 711), son of Theodoric II and, from 695, puppet king of the Franks. He was totally dominated by Pepin II, the Austrasian mayor of the palace and Charlemagne's great-grandfather.

Childeric, French CHILDÉRIC, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Childeric I** (d. 481/482), king of the Salian Franks, one of the first of the Merovingians and the father of Clovis I.

The Salian Franks, in treaty with the Roman Empire, had settled in Belgica Secunda, between the Meuse and Somme rivers, making their capital at Tournai. Childeric's role as a barbarian ally of the Romans was important. He helped the Roman military commander Aegidius to repel the Visigoths near Orléans (463); at the request of Aegidius' successor, Count Paulus, he attacked the Visigoths again in 469. Soon afterward he cleared Anglo-Saxon pirates from the district southwest of Orléans around Angers. Childeric's tomb at Tournai was discovered in 1653.

• **Childeric II** (b. 649—d. between Sept. 10 and Nov. 15, 675, Chelles, Fr.), Merovingian king of Austrasia and briefly of all the Frankish lands.

The second son of Clovis II, Childeric became king of Austrasia in 662 on the death of Childebert the Adopted, a usurper and the son of Grimoald. He reigned under the joint control of Himnechildis, the mother of Dagobert II, whose right to the throne Childebert had usurped, and of Wulfoald, mayor of the palace. When Childeric's older brother Chlotar III, king of Neustria and of Burgundy, died in 673, the Neustrian mayor of the palace, Ebroïn, tried to introduce Childeric's younger brother, Theodoric III, as Chlotar's successor. But the Neustrian magnates, whom Ebroïn had not consulted about the succession, appealed to Wulfoald and Childeric II and swiftly deposed Theodoric. Childeric thus became master of Neustria and Burgundy as well as of Austrasia.

Childeric was the last Merovingian to attempt to exercise authority, but he lacked political ability. A party hostile to Austrasian rule developed in Neustria, and Childeric was assassinated.

• **Childeric III** (d. 755), the last Merovingian king.

Effective power in France had long been wielded by the Carolingian mayors of the palace, but the revolt that followed the death of Charles Martel in 741 made it wise for his sons Carloman and Pepin III the Short, in 743, to place Childeric III, a Merovingian of questionable legitimacy, on the Frankish throne, so that they could dissemble their authority behind his name. Carloman entered a monastery in 747, and, when Pepin felt sufficiently secure to have himself elected king of the Franks (751), Childeric was deposed and confined in the monastery of Sithiu, near Saint-Omer.

Childermas: *see* Holy Innocents, Feast of the.

Childers, Erskine H(amilton) (b. Dec. 11, 1905, London—d. Nov. 17, 1974, Dublin), Irish statesman and fourth president of the Irish Republic (1973–74). He was the second Protestant to hold the office (the first being Douglas Hyde, 1938–45).

Childers was given the same Christian name as his father, Robert Erskine, who became a leading figure in the struggle for Irish independence, was minister for publicity in the Republican government of 1919, and was executed on Nov. 24, 1922. The son was educated in England and read history at Trinity College, Cambridge. He returned to Ireland in 1932 and became advertising manager of the *Irish Press,* the newly founded newspaper owned by the De Valera family. Following his political debut in 1938, he became a junior minister in 1944 and was later minister for posts and telegraphs (1951–54), of lands, forestry, and fisheries (1957–59), and of transport and power (1959–69). Childers was minister for health and deputy leader of the Fianna Fáil party from 1969.

He supported Prime Minister Jack Lynch's condemnation of the violence in Northern Ireland and Lynch's advocacy of a European role for the Irish Republic within the European Economic Community. After his election as president in 1973, Childers was not able to realize his hope of making the presidency a platform for noncontroversial pronouncements and intellectual debate.

Childers, Hugh Culling Eardley (b. June 25, 1827, London—d. Jan. 29, 1896, London), politician in Australia and later in Great Britain. He was a prominent member of the British Liberal Party and a fervent supporter of William Ewart Gladstone, in whose first three ministries he held high offices.

After studying at Wadham College, Oxford, and Trinity College, Cambridge, Childers immigrated to Australia in 1850, entered the civil service, and in 1856 became a Cabinet member in the newly created parliamentary government of the state of Victoria. Returning to London in 1857 as agent general for Victoria, Childers soon was involved in British politics and business.

Elected a Liberal member of Parliament in 1860, he became financial secretary to the Treasury (1865–66), where his ability impressed Gladstone. In Gladstone's first ministry Childers was first lord of the Admiralty

(1868–71) and chancellor of the duchy of Lancaster (1872–73). He returned to office with Gladstone in 1880, serving as secretary for war (to 1882) and then as chancellor of the Exchequer. His budgets were well received until 1885, when proposals for increased taxation contributed to the fall of a divided and unpopular government.

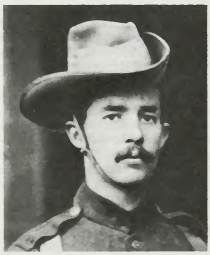


Hugh Childers, detail of an oil painting by Emily Childers (his daughter), 1891; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

In the 1885 election Childers lost his seat in Parliament because of his advocacy of Irish Home Rule, but he was elected for another constituency in 1886 and was appointed home secretary in Gladstone's brief third ministry (February–July 1886). Childers retired from Parliament in 1892.

Childers, Robert Erskine (b. June 25, 1870, London, Eng.—d. Nov. 24, 1922, Beggar's Bush, County Dublin, Ire.), writer and Irish nationalist agitator, executed because of his support for the republican cause in the civil war that followed the establishment of the Irish Free State.



Robert Erskine Childers, *c.* 1900

BBC Hulton Picture Library

A first cousin of the English politician Hugh Childers, he was a clerk in the House of Commons from 1895 to 1910, except for a period of service in the South African War. He resigned this position to devote himself to the cause of Irish Home Rule. In July 1914, at Howth, north of Dublin, he landed from his own yacht a cargo of rifles that he had purchased in Germany for the Irish revolutionary volunteers.

Despite his position on British rule in Ireland, Childers served the British in World War I as an intelligence and aerial-reconnaissance officer. But by the end of the war he supported a wholly independent Irish republic. In 1921 he was elected to the Dáil Éireann (Irish Assembly) as a Sinn Féin deputy from County Wicklow and became the Dáil's minister of propaganda. Later that year he was secretary to the Irish delegation to the Anglo-Irish treaty conference. Opposing the concessions that the Irish leaders Arthur Griffith and Michael Collins made to the British in signing the treaty (Dec. 6, 1921), Childers joined the Irish Republican Army (IRA), which resorted to civil war. Captured by Free State forces, Childers was court-martialed in Dublin on a charge of unauthorized possession of a revolver and was shot by a firing squad.

Childers was the author of *The Riddle of the Sands* (1903), a popular spy story involving an imaginary German raid on England.

childhood, period of the human lifespan between infancy and adolescence, extending from ages 1–2 to 12–13. *See* child development.

childhood diseases and disorders, any illness, impairment, or abnormal condition that affects primarily infants and children.

A brief treatment of childhood diseases follows. For full treatment, *see* MACROPAEDIA: Childhood Diseases and Disorders.

There are a number of infectious illnesses that strike primarily during childhood. These include such familiar contagious diseases as chicken pox, measles, mumps, and German measles (rubella). These diseases impart long-term immunity, which is why they are infrequent among adults, who have often had them as children. Infectious diseases remain a leading cause of infant and child mortality in developing countries. This circumstance stems from poor nutrition, insufficient hygiene, insanitary water supplies, sparse immunization programs, and a shortage of medical facilities.

Congenital disorders—*i.e.,* those that are present at birth—affect a small percentage of infants. Severe congenital disorders, such as inborn errors of metabolism (*e.g.,* Tay-Sachs disease) and gross defects of the heart, nervous system, immune system, or digestive tract, frequently are fatal within the first year or two of life. Other congenital disorders, including Down syndrome, clubfoot, and cleft palate, can lead to lifelong disabilities of varying degrees.

Respiratory diseases peculiar to childhood include infections of the tonsils and adenoids, croup, whooping cough, allergic rhinitis, asthma, and respiratory distress syndrome, also called hyaline membrane disease. Most childhood diseases of the cardiovascular system are the result of congenital malformations of the heart and its major vessels, or of rheumatic heart disease. Childhood disorders of the blood and blood-forming tissues include Rh disease, hereditary anemias, hemophilia, and leukemia.

A number of congenital defects, such as anencephaly, hydrocephaly, and spina bifida, affect the nervous system. The endocrine (hormone-producing) system is also subject to various diseases during childhood. Underactivity of the thyroid gland can lead to cretinism. The failure of the pancreas to secrete sufficient amounts of the hormone insulin results in diabetes mellitus. Other endocrine disorders of childhood include pituitary gigantism, dwarfism, and precocious puberty.

Children are particularly sensitive to dietary deficiencies, because the rapidly growing body of a child has high nutrient requirements. A diet that provides too few calories will lead to general malnutrition. A diet with sufficient caloric content but still deficient in protein content produces kwashiorkor. These two disorders are major health problems in many developing countries. Other deficiency diseases stem from the lack of a specific micronutrient (vitamin or mineral). For example, anemia due to iron deficiency is common in infants and young children.

Accidents rank as a major cause of childhood death and disability in developed countries. Road-traffic accidents are the most common problem, but the accidental ingestion of poisons, along with falls, burns, and other mishaps in the home, also account for substantial numbers of childhood injuries and deaths.

Child abuse and neglect have become increasingly recognized as important pediatric concerns. Children may be abused not only physically but emotionally and sexually as well. Emotional disorders are particularly prevalent during adolescence, as the individual struggles with the social and sexual changes that accompany the passage from childhood to adulthood.

children's company, any of a number of troupes of boy actors whose performances enjoyed great popularity in Elizabethan England. The young actors were drawn primarily from choir schools attached to the great chapels and cathedrals, where they received musical training and were taught to perform in religious dramas and classical Latin plays. By the time of Henry VIII, groups such as the Children of the Chapel and the Children of Paul's were often called upon to present plays and to take part in ceremonies and pageants at court. During the reign of Queen Elizabeth I, these groups were formed into highly professional companies, usually consisting of from 8 to 12 boys, who gave public performances outside the court. The choirmasters of the companies functioned as managers, directors, writers of music and plays, and designers of masques and pageants, in addition to their regular duties of training the boys to sing and act.

In the late 16th and early 17th centuries, the boys' companies were so popular that they posed a serious threat to the professional men's companies. William Shakespeare has Hamlet refer scornfully to the child actors as "little eyases," or nestling birds, that "are now the fashion." Children acted in the first Blackfriars Theatre (*c.* 1576–80), and in 1600 a syndicate representing the Children of the Chapel acquired a lease on the second Blackfriars Theatre, where the boys performed many important plays, including those of John Marston and Ben Jonson. By about 1610 the children's companies had seriously declined in popularity, aided perhaps by the companies' indulgence in political criticism.

children's court (law): *see* juvenile court.

Children's Crusade, a religious movement in Europe during the summer of 1212 in which thousands of children set out to conquer the Holy Land from the Muslims by love instead of by force. The movement ended in disaster, but the religious fervour it excited helped to initiate the Fifth Crusade (1218).

The first group of children was led by a French shepherd boy named Stephen, from Cloyes-sur-le-Loir, a town near Vendôme, who had a vision in which Jesus appeared to him disguised as a pilgrim and gave him a letter for the French king. On his way to deliver the letter, Stephen attracted hundreds of followers, some of whom decided to go to the Holy Land. An estimated 30,000 made their way to Marseille, where they fell victim to disreputable merchants who shipped them to slave markets in North Africa.

A 10-year-old boy named Nicholas, from Cologne, led a second group. He preached the Children's Crusade in the Rhineland, attracting an estimated 20,000 children. After crossing the Alps into Italy, they split into groups: some were dispersed among various Lombard towns; others continued on to Genoa, where they were refused transport across the Mediterranean. A few then traveled to Rome, where Innocent III (pope from 1198 to 1216) took pity on them and released them from their crusade vows. The fate of their leader, Nicholas, is unknown, but many of these chil-

dren, like the French group, were sold in the East as slaves.

children's game, any of the amusements and pastimes of children that may involve spontaneous, unstructured activity, based mostly on fantasy and imagination, or organized games with set rules. Many games are derived from everyday life and reflect the culture from which they developed.

Some children's games have been played for centuries. Swings existed on the island of Crete in 1600 BC, and jacks, or knucklebones, a game that involves tossing and then catching five or more jackstones, was played in ancient Greece. Both blindman's buff and a chase game, in which one team chases another team depending on the toss of a coin or disk, date from 2,000 years ago. As social attitudes changed, some games became less popular, while others, especially those that involved violence toward animals, eventually disappeared. A few children's games became more structured and often lost their entertainment value.

Technological innovations have greatly influenced the history of children's games. The discovery of rubber, for example, led to the creation of new types of balls, which in turn increased the number and frequency of ball games played. These changes were accompanied by new cultural and trade ties with other societies, and, as a result, different toys (*e.g.*, the kite from China) were introduced. Video and computer technology has also spawned a new generation of electronic games.

Children learn to play primarily from their parents or other adults. Play often provides a training ground from which a child learns to develop skills that will be useful later in life. Although modern sports tend to have fixed rules, children generally prefer games that require less-specialized equipment, preparation, and playing area. Hopscotch, leapfrog, and marbles are particularly popular games, as are the various improvised games that involve running, chasing, and catching. Many games—primarily guessing games, quizzes, and games that test physical coordination—are played by children and adults together.

Manufactured games were originally used as a method of instruction beginning in the 17th century. The later development of geographic games, in which countries were cut out of maps and children attempted to put them back correctly, led to the creation of the jigsaw puzzle, and other entertainment forms shortly followed. Many 19th-century games are still distributed, including pachisi and snakes-and-ladders. Monopoly, developed in 1933, has become one of the most popular board games of all time.

children's house, Italian CASA DEI BAMBINI, preschool for children between ages three and six established by Maria Montessori (*q.v.*).

Having developed a method for teaching retarded children, Montessori wanted to apply it to those without learning disabilities. In 1906 she was offered rooms in an apartment building in the slum-ridden San Lorenzo district of Rome. This building had been intended as a model residence for poor families but was in disrepair because of vandalism by residents' unattended children. She accepted the offer, named the rooms Casa dei Bambini, and collected toys, building blocks, and games. When the school was opened in 1907, about 60 children attended. With minimal supervision, they found the challenge of building and fitting to be more fun than their previous rampages. A second Casa was opened in San Lorenzo a few months later, and one in Milan in 1908. Switzerland's Italian-speaking canton of Ticino designated its public preschools as children's houses and ordered them to follow Montessori methods. Similar schools were also founded in Vienna and Geneva.

Although many children's houses and other Montessori schools were closed by the Italian Fascist government in 1934 after Montessori objected to a government decree, new schools were opened in 1947 after the end of World War II.

children's literature, the body of written works and accompanying illustrations produced in order to entertain or instruct young people. The genre encompasses a wide range of works, including acknowledged classics of world literature, picture books and easy-to-read stories written exclusively for children, and fairy tales, lullabies, fables, folk songs, and other primarily orally transmitted materials.

A brief treatment of children's literature follows. For full treatment, *see* MACROPAEDIA: Literature, The Art of.

Children's literature is a comparatively recent phenomenon, having emerged as a distinct and independent form only in the second half of the 18th century. Its late development may be traced to both economic and social factors. Before modern times children were widely regarded as simply diminutive or miniature adults, and a literature shaped to their unique needs and level of understanding was not thought to be necessary. Also, before the invention of printing, the making of books was simply too expensive and time-consuming to be used for any purpose involving children other than instructing them. Finally, it was only with the attainment of literacy by large numbers of people and the spread of mass education that there formed a market large enough to economically justify the creation and distribution of original works written specifically for young people.

One of the first printed works of children's literature was the Moravian educator Comenius' *Orbis Sensualim Pictus* (1658; "The World of Pictures"), a teaching device that was also the first picture book for children. It embodied a novel insight: children's reading should be of a special order because children are different from adults in many respects. One of the earliest and most enduring classics of children's literature was Charles Perrault's fairy-tale collection entitled *Contes de ma mère l'oye* (1697), which was translated into English in 1729 as *Tales of Mother Goose.* Among its classic stories are "Cinderella," "Little Red Riding Hood," "The Sleeping Beauty," and "Puss in Boots." An English work considered to be the first novel written specifically for children, *The History of Little Goody Two-Shoes,* appeared in 1765. Among the most important early works for children in the Germanic languages was Jacob and Wilhelm Grimm's folk-tale collection *Kinder- und Hausmarchen* (1812–22), which was translated into English as *Grimm's Fairy Tales.* Their stories include "Rumpelstiltskin," "Hansel and Gretel," and "Snow White and the Seven Dwarfs." In the 1830s and '40s the Danish writer Hans Christian Andersen wrote such fairy tales as "The Ugly Duckling" and "The Princess and the Pea."

From these striking beginnings children's literature blossomed in the 19th century, particularly in western Europe and the United States, into a rich and complex genre serving children of all ages, from toddlers to adolescents. Among the more famous 19th-century works are *Alice's Adventures in Wonderland* (1865) by Lewis Carroll, *Treasure Island* (1883) by Robert Louis Stevenson, and *The Adventures of Tom Sawyer* (1876) by Mark Twain. Illustrations became a major part of children's books in the 19th century and were used, as they are now, to interest children in the stories and to help them visualize the characters and the action. The first modern picture book for children was *The Tale of Peter Rabbit* (1901) by Beatrix Potter.

In the 20th century the attainment of near-universal literacy in the developed nations guaranteed an audience of young readers numbering in the tens of millions. This century also witnessed major changes in both the marketing and content of children's books. The production of cheap hardcover and paperback books, the spread of children's bookshops, improvement of library services, the growth of serious attempts at reviewing children's books, and sophisticated marketing techniques have all combined to give children and adults greater access to, and information about, children's literature. The old moral tales have evolved into subtly didactic stories advocating racial and class understanding. Children's literature now embraces a child's imaginative world and daily environment, as well as certain ideas and sentiments characteristic of it. The population of this world is made up not only of children themselves but also of animated objects, plants, and grammatical and mathematical abstractions; toys, dolls, and puppets; real and chimerical animals; miniature or magnified humans; supernatural and fantasy figures; creatures of fairy tale, myth, and legend; and adults as seen through the child's eyes.

Among the best-known authors of children's literature in the 20th century are Edward Stratemeyer, Theodor Geisel (Dr. Seuss), and Laura Ingalls Wilder of the United States; A.A. Milne and Kenneth Grahame of Great Britain; Jean de Brunhoff of France; and Erich Kästner of Germany. In the present day, children's literature almost rivals the diversity of popular adult literature, with books for young readers produced in such genres as science fiction, adventure, detective stories, animal stories, historical fiction, and stories dealing with social issues. Nonfiction genres such as biographies, histories, and encyclopaedias also have been written with a younger audience in mind.

Chile, officially REPUBLIC OF CHILE, Spanish REPÚBLICA DE CHILE, country situated along the western seaboard of South America, stretching northward from the continent's southern tip in Patagonia for 2,700 miles (4,350 km). The country averages only about 110 miles (177 km) from east to west. Chile's western boundary is its 3,317-mile (5,337-kilometre) Pacific coastline. It shares the rest of its boundary with three countries: Peru on



Chile

the north, Bolivia on the northeast, and Argentina (including Tierra del Fuego) on the east. The capital is Santiago. Area 292,135 square miles (756,626 square km). Pop. (1993 est.) 13,542,000.

A brief treatment of Chile follows. For full treatment, *see* MACROPAEDIA: Chile.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Chile has three major physiographic features from east to west: the Andes Mountains (Cordillera de los Andes), the intermediate depression (Pampa Central), and the coastal ranges (Cordillera Costera). These parallel regions run almost perfectly north-south for nearly the entire length of the country. From north to south the Andes Mountains can be further divided into three sections: one is a wide, arid plateau, stretching southward from the Bolivian border to latitude 27° S; south of this are the narrower central Andean highlands, which extend southward to 42° S and often reach heights of 16,500 to 19,500 feet (5,000 to 6,000 m), with Ojos del Salado, the country's highest peak, rising to 22,615 feet (6,893 m); and finally, the southern Andes, with their many lakes and fjords, occupy the remainder of the country. The southern Andes still experience volcanic activity, and Chile has suffered several major earthquakes during modern times; Santiago itself was destroyed in 1647, and tens of thousands of people have been killed by quakes in the 20th century. The intermediate depression, or longitudinal valley, between the Andes and the coastal ranges begins in the country's Atacama Desert (one of the driest and most desolate in the world) in the northern provinces, continues southward, often interrupted by intrusions from the mountains, to include the densely populated plains areas, such as Chile's Central Valley, and submerges beneath the Corcovado Gulf near latitude 43° S. The coastal mountain chain, which is lower than the great Andean system to the east, bounds the central valleys on the west and, in the country's midsection, makes access to the sea difficult. At 43° S, the central depression slopes southward into the sea; there too the coastal ranges submerge, becoming a complex of islands off Chile's southwestern coast.

Because of Chile's elongated shape and the fact that its rivers flow down to the west out of the Andes and across both the intermediate depression and the coastal ranges, the rivers are relatively short (100 to 300 miles [160 to 480 km] in length). The Bío-Bío River in south-central Chile is one of the country's more important rivers, in part because it forms the only major transverse valley through the coastal mountain ranges.

The climate of most of northern and central Chile is predominantly temperate, even Mediterranean in parts. Although average temperatures drop about 7° F (4° C) for every southward 10° change in latitude, average precipitation is a better guide for climatic differentiation. In the northern desert area (north of latitude 30° S), there is little or no precipitation: from latitudes 30° to 40° S (central Chile), precipitation averages from 12 to 14 inches (305 to 355 mm) per year, most of it occurring during winter (May-August). Southern Chile has high annual rates of precipitation, with Valdivia (about 40° S) receiving more than 90 inches (2,300 mm) and the islands of western Patagonia getting more than 160 inches (4,100 mm).

Less than one-tenth of Chile's land area is considered arable, almost all of it located in central Chile (between latitudes 30° and 42° S); about one-sixth is in permanent pasture (supporting substantial herds of cattle and sheep); and slightly more than one-tenth is forested. (Valdivia *provincia,* straddling the 40th parallel, has rich rain forests and provides most of the nation's timber products.) Much of the remaining part of the country is wasteland—desert and largely uninhabitable highlands. Chile's wildlife includes the alpaca, vicuna, llama, puma, Andean huemul (a type of deer), and the Andean cat.

Chile has the world's largest reserves of copper (about one-fifth of total supplies) and the second largest of lithium (after Bolivia). Besides having significant reserves of other minerals, including iron ore, gold, and silver, Chile is estimated to have one-fifth of the world's molybdenum. It also has moderate reserves of petroleum and natural gas (much of it located in the extreme southern *provincia* of Magallanes) and substantial reserves of coal.

The people. The indigenous peoples who lived in Chile before the Spanish colonization included the Diaguita, Picunche, Mapuche (or Araucanian), Huilliche, Pehunche, and Cunco Indians. Spanish colonists arrived during the 16th and 17th centuries, followed by Basques in the 18th century. A relatively homogenous, primarily mestizo population has developed with a strong cultural unity. The only significant minority consists of the Mapuche peoples of the area around Temuco.

More than 90 percent of all Chileans live between Copiapo on the north and Puerto Montt on the south, and within the intermediate depression instead of in the less hospitable mountain areas.

Chile's population is increasing at a moderate rate for a developing country, though at one of the lowest rates in Latin America. Since immigration is negligible, this growth must be attributed to internal factors, such as a relatively high birth rate and a low death rate. The Chilean population is basically young, with almost one-third of the people under 15 years of age. More than four-fifths of the total population is urban. Santiago, the national metropolis, overshadows all other Chilean cities in size.

The economy. Chile has a mixed private and state owned, partially developed free market economy that is based mainly on services and mining and manufacturing. Since the mid-1980s, the gross national product (GNP) has been growing faster than the population, and the GNP per capita is above average for Latin America. The GNP originates principally from finance, insurance, real estate, public administration, defense, restaurants, hotels, and other services (about one-third of the total); mining and manufacturing (more than one-fourth); and wholesale and retail trade (one-sixth).

Agriculture in Chile is hindered by the small amount of arable land and does not provide adequate food supplies for the entire population. Irrigated lands are mostly located in the semiarid Norte Chico region in the northern part of the country. Cereals are the principal crops grown; wheat is dominant, followed by corn (maize), rice, and oats. Other important crops include sugar beets, grapes (for the wine-making industry), potatoes, barley, apples, tomatoes, and dry beans. The principal livestock are sheep, cattle (of which one-fifth are dairy cattle), and pigs. Forests produce roundwood, mostly for industrial purposes. Chile has good fishing grounds along its long coastline owing to the presence of the cold, nutrient-rich Peru (Humboldt) Current. The total annual catch, almost all marine, represents one of the world's largest. Chilean pilchard (sardines) constitute about half of the total catch.

Besides producing significant amounts of petroleum, natural gas, coal, and iron ore, Chile is the world's largest producer of copper and one of the world's largest producers of both molybdenum and iodine. Gold, silver, manganese, zinc, lead, selenium, limestone, hydraulic lime, and natural crude nitrates are also extracted.

The principal manufactures are cement, cellulose, fish meal, wheat flour, blister and refined copper, crude steel, pig iron, tires, raw sugar, newsprint, beer, glass sheets, and cigarettes. Woven cotton, pressed fibre panels, fluorescent tubes, pens, bicycles, assembled automobiles and trucks, television and radio receivers, refrigerators, electrical meters, and electric accumulators are also produced.

More than three-fourths of the country's electricity is produced by hydroelectric power plants, while the remaining share is generated by thermal plants.

Following the overthrow of the socialist government of Salvador Allende in 1973, the military junta returned most of the industries his government had nationalized (except in the mining sector) to private ownership. Large agricultural estates were also returned to their original owners, a free market economy reinstituted, foreign investment encouraged, and import tariffs reduced. These free market policies revived Chile's faltering economy, although the country was hampered by periodic recessions and rising unemployment and by a burdensome foreign debt.

The railway system is about 90 percent state owned and operated. Less than 15 percent of the total road network is paved. Chile has some inland waterways and 10 major Pacific ports. There are two international airports, near Arica and near Santiago, and numerous domestic airports with paved runways.

Chile's exports consist primarily of unrefined copper ores and refined copper (two-fifths of total exports), followed by industrial products, fruits and vegetables, paper and paper products, and chemical and petroleum products. The principal importers of Chilean products are the United States, Japan, Germany, and Brazil. Chile's imports, in value, are somewhat lower than exports, resulting in a positive trade balance. The main imports include mechanical and electrical equipment, mineral products, chemicals, textiles, transport equipment, metal and metal goods, and synthetic plastic rubber. The United States is the principal exporter to Chile, followed by Japan, Brazil, and Germany.

Government and social conditions. Chile is a South American republic governed since 1990 by an elected president. The judiciary is headed by a Supreme Court whose members are appointed by the president. The bicameral National Congress consists of a lower house of 120 members elected to four-year terms and an upper house of 47 members, of which 38 are elected to eight-year terms, 5 are appointed by the president and Supreme Court, and 4 are commanders in chief of the branches of the armed forces.

The social security system in Chile has been steadily expanded by successive governments, and in 1981 the management of social security was transferred to the private sector. The program provides benefits for old age, maternity, disability, and sickness. The government has increased per capita spending on health and reorganized the National Health Service to provide local, decentralized health units. Improved health conditions have helped raise life expectancy to the highest level in South America: 68 years for men and 75 years for women. Chile's infant mortality rate, moreover, has declined sharply since the 1960s to one of the lowest levels in all of Latin America. There is an acute housing shortage, however, in Chilean urban areas. Rural migrants unable to find housing often squeeze into squatter villages (*callampa*) located on the fringes of cities.

Chile is one of the most well-educated countries in South America; its adult literacy rate is about 95 percent. Primary education is free and compulsory for children between 6 and 13 years. Chile has numerous universities, some of which are renowned throughout Latin America. Under the military government the news media in Chile were monitored and regulated by the government, although mild criticism of governmental actions by some publications and private radio stations was permitted.

In the creative arts, Chile boasts such universally known poets as Gabriela Mistral and Pablo Neruda (both winners of the Nobel Prize for Literature); concert musicians such as

Claudio Arrau; and painters such as Roberto Matta Echaurren.

History. Little is known of pre-Spanish Chile. The Araucano Indians, when found by the Spanish in the 16th century, were nomads residing primarily south of the Bío-Bío River and dominating the other tribes there. The Spaniards were unable to subdue them despite campaigns against them that continued through the 19th century. Spanish penetration into Chile began in 1536 under the leadership of Diego de Almagro and, later, Pedro de Valdivia, who founded Santiago in 1541. Agriculture, based on huge estates, was the major economic activity and was instrumental in creating a class of wealthy landowners.

The movement toward Chilean independence was spurred by France's invasion of Spain in 1808. A provisional government was set up in Santiago in 1810; Spain reasserted its authority in 1814, but the patriot leader Bernardo O'Higgins escaped to Argentina and with the military leadership of José de San Martín returned to defeat the Spaniards at Chacabuco in 1817. O'Higgins was proclaimed head of state, and independence was formally announced one year later on February 12.

Until 1861 Chile was ruled by a constitutionally supported oligarchy of landholders. Subsequently, the government passed into the hands of the Liberal Party; the authority of the Roman Catholic church was curtailed, and the country was opened to European political and intellectual currents. A war with Bolivia and Peru (1879–83) expanded Chilean territory by the conquest of former provinces from both nations.

In the course of the 19th century, the old landed oligarchy continued to exert a dominant influence on the nation's political system. By the early 20th century, however, urbanization and industrialization had begun to create new, urban, middle-class constituencies in Chile. As a result, new political parties such as the Radicals, Socialists, and Christian Democrats were formed in the ensuing decades. This continuing peaceful political evolution resulted in a succession of democratically elected governments, though there was some political turmoil and instability in the 1920s and early '30s. Presidents belonging to the Radical Party governed Chile throughout the period from 1938 to 1952. A centrist Christian Democratic government that came into power in 1964 instituted reforms that introduced more of the country's poor into the political process. In 1969 the Socialist and Communist parties, along with some left-wing Radicals and Christian Democrats, formed a coalition that won a plurality in the presidential election of 1970. Their candidate, Salvador Allende, became the first avowed Marxist to be elected chief of state in a Latin-American country.

Allende expropriated the U.S.-owned copper mines in Chile and pursued other socialist policies. Within two years Chile's economy began experiencing serious problems that were exacerbated by a U.S.-led boycott of investment capital. Many middle-class Chileans turned against Allende's government, and in 1973 a military coup led by the army commander, Augusto Pinochet, overthrew Allende and established a military junta. Pinochet instituted strict free market policies and harshly suppressed all internal opposition to the military government's rule. A new constitution was approved in 1980, and Pinochet, as head of the junta, was returned to the presidency. A national referendum in October 1988 rejected a further eight years of Pinochet's presidency, and elections held late in 1989 returned the country to civilian rule.

Chile pine: *see* monkey puzzle tree.

Chile Rise, submarine ridge of the Pacific Ocean, trending southeast from Easter Island toward Chile after branching from the Albatross Cordillera (East Pacific Rise). Shallow earthquakes are common to this feature; using the epicentre locations of these earthquakes, the existence of the ridge in the vicinity was predicted before depth soundings confirmed it. Highly irregular relief, formed by troughs and asymmetrical ridges, characterizes this ridge. The Chile Basin lies between the Chile Rise and the mainland of South America.

Chile saltpetre, sodium nitrate, a deliquescent crystalline sodium salt that is found chiefly in northern Chile (*see* sodium).

Chilean cedar (species *Austrocedrus chilensis*), ornamental and timber evergreen conifer, the only species of the genus *Austrocedrus,* of the cypress family (Cupressaceae). It is native to southern South America. The Chilean cedar may grow up to 24 m (about 80 feet) tall, but it is usually much shorter. Its durable, fragrant wood is used locally for carpentry. The hardy tree is cultivated as an ornamental in Great Britain.

Consult the INDEX *first*

Chilembwe, John (b. *c.* 1860–71—d. Feb. 3, 1915, Blantyre district, Nyasaland [now Malaŵi]), Western-educated Nyasaland missionary who led an abortive, largely symbolic, uprising against British rule in 1915 and is seen as a forerunner and martyr of Malaŵi nationalism. He was one of the first Africans to speak of Nyasaland at a time when the vast majority of his fellow subjects cared only for tribal identification.

His first prolonged experience with Europeans was from 1892 to 1895 as the servant and helper of an egalitarian fundamentalist missionary, Joseph Booth. Though proud and independent-minded, Chilembwe was eager to learn from whites and to believe the best of them. In 1897 Booth took him to the United States, where Chilembwe received a degree from a black theological college. When he returned to Nyasaland in 1900, he founded his Providence Industrial Mission to educate and instill discipline and pride in the Nyasa people of the district around Blantyre.

His revolt is thought to have been rooted in his growing disgust with the wanton cruelty of white rule, especially on white estates that had African tenants and wage earners. A more immediate cause was British use of Nyasa soldiers against the Germans in east Africa at the outbreak of World War I. When no reply was forthcoming to his written protest against conscription, he and a few followers decided on an admittedly suicidal blow. They attacked a notoriously brutal estate, killing several managers and displaying the severed head of one of them in Chilembwe's church. Chilembwe's instructions not to harm women and children were strictly followed. Lacking support from other districts, the revolt quickly collapsed, and Chilembwe was shot by African police.

chili pepper, usually small, very hotly pungent fruit of a species of *Capsicum,* used to make chili powder and to flavour barbecue, hot curry, and other spicy sauces. *See* pepper.

Chilia rug: *see* Baku rug.

Chililabombwe, formerly BANCROFT, mining town, north-central Zambia, eastern Africa, just south of the international frontier with Zaire. It lies at 4,459 feet (1,360 m) in Zambia's rich highland copper belt. Chililabombwe is the northern terminus of the Zambian rail line serving the copper country. Its main copper mine, the Bancroft Mine, was opened in 1957. Pop. (1988 est.) 81,803.

Chilka Lake, lagoon in eastern Orissa state, eastern India, separated from the Bay of Bengal by a narrow spit. One of India's largest lakes, it is 40 miles (65 km) long, 5–13 miles (8–20 km) wide, and about 6 feet (2 m) deep. The Daya and Bhārgavi rivers feed the lake except during the dry months from December to June, when saline ocean water enters through a small passage. Chilka was once a bay of the ocean until silted up by strong monsoon tides. Dotted with islands, it offers good hunting, boating, and fishing. There are fisheries and salt pans around its shores.

Chilkat weaving, narrowly, the robes, or blankets, woven by the Chilkat, northernmost of the Pacific Coast Indians of North America. The Chilkat comprise a family within the Tlingit language group and make their home on the Alaskan coast between Cape Fox and Yakutat Bay. More generally, the term "Chilkat weaving" applies to any garment woven by these Indians. Although the Chilkat are not the only Indians who make this type of robe, they are the ones who have woven the majority of robes in the period since the original contact with European cultures and have created the finest quality and design.

The Chilkat robe, when laid out flat, is approximately rectangular in shape, except for its long bottom side, which is V-shaped; fringe decorates the bottom and sides. Twine made from cedar bark forms the warp (vertical threads), and mountain goat or mountain sheep wool forms the weft (horizontal interlacing threads), a weave probably borrowed from the Tsimshian Indians. The colours—usually white, yellow, black, and blue or green—come from natural dyes.

The designs on the earliest Chilkat robes were painted, but for the last two centuries they have been woven into the fabric by women of the tribes, following designs painted on boards by the men. As in many Indian tribes, only men are permitted to create designs depicting living creatures, while women may develop abstract geometric patterns. But the seemingly abstract designs with which these robes are decorated are actually highly conventionalized depictions of real animals or spirits symbolically associated with the tribe to which the owner of the robe belongs. As in almost all of their art, the Indians of the Northwest Coast attempt to portray a three-dimensional object on a two-dimensional surface by presenting all of the different perspectives of the object. For example, progressing from left to right on a Chilkat robe would be a panel depicting the left profile of a whale, then a panel containing a head-on view, and finally a panel showing the right profile. Above this tripartite representation there might be an X-ray depiction of the inside of the whale. The artist clearly indicates which animal he has woven into the robe by using certain key features, such as a long snout for a wolf or a short snout for a bear.

The Chilkat also weave knee-length shirts that are similar in design to the robe. Leggings and dance aprons are also made, sometimes by employing commercial yarns and fringing them with fur.

Chillán, capital of Ñuble *provincia,* Bío-Bío *región,* central Chile, lying in the fertile Central Valley. Founded in 1580 on what is now the site of Chillán Viejo (birthplace of the Chilean liberator Bernardo O'Higgins), the town was moved in 1835 to the north and rebuilt after destruction by earthquake. Chillán experienced such disasters several times, most heavily in 1939, when the death toll in the area reached 28,000. The town is now the commercial centre for the surrounding agricultural region, the products of which include wine grapes, fruits, grains, vegetables, and livestock. Processing industries include shoe factories, flour mills, and lumberyards. Chillán is also a transporta-



The cathedral at Chillán, Chile
Peter L. Gould

tion hub on the Pan-American Highway and the main north-south railroad line. Pop. (1992 prelim.) 145,972.

chillawong, bird, a type of currawong (*q.v.*).

Chillicothe, city, seat (1839) of Livingston county, northern Missouri, U.S. It lies near the Grand River, 70 miles (113 km) northeast of Kansas City. Settled about 1830, it was laid out in 1837 and named for Chillicothe, Ohio. When the Hannibal and St. Joseph Railroad came through in 1846, Chillicothe developed as a trade centre for a farming, livestock-raising, and dairying region. Its manufactures include filters for farm and road machinery, gloves, and mobile homes.

Chillicothe is the site of the State Training School for Girls (1888) and a vocational technical school (1967). The birthplace, at nearby Laclede, of General John J. Pershing, commander of U.S. forces in World War I, is preserved as a state historic site; to the south is Pershing State Park. Fountain Grove and Swan Lake Migratory waterfowl reserves are to the southeast of the city. Sloan's Liniment, a well-known preparation purported to bring muscular relief to man and beast, was first compounded by Earl and Foreman Sloan while they operated a livery stable in Chillicothe (1870–72). Inc. 1869. Pop. (1990) 8,804.

Chillicothe, city, seat (1798) of Ross county, south-central Ohio, U.S. The city lies along the Scioto River and Paint Creek, 46 miles (74 km) south of Columbus. It is overlooked (northeast) by Mount Logan, which is depicted on the official state seal. It was first settled (1796) by Virginians led by Nathaniel Massie, and its name was derived from a Shawnee word meaning "principal town." Chillicothe served as capital of the Northwest Territory (1800–03), was incorporated as a city in 1802, and was twice the state capital (1803–10; 1812–16). The first state constitution was written there. Some of the state's best preserved prehistoric Indian burial mounds are in the vicinity, including the Hopewell Culture National Historical Park (formerly the Mound City Group National Monument). The Ross County Historical Society Museum (housing Indian and pioneer relics) is in the city. The Adena State Memorial (a stone mansion built in 1805–07) is nearby. The *Chillicothe Gazette* (1800), the oldest continuously published newspaper in Ohio, is housed in a replica of the first statehouse and maintains a museum of printing.

The city's commercial activity, which is based mainly on the distribution of local farm produce, increased with the construction of the Ohio and Erie Canal (1831) and the Marietta and Cincinnati (now Baltimore and Ohio) Railroad (1852). Papermaking, a leading industry, began in 1812. A branch campus (1946) of Ohio University is in Chillicothe. Pop. (1991 est.) 22,108.

Chillida, Eduardo, in full EDUARDO CHILLIDA JUANTEGUI (b. Jan. 10, 1924, San Sebastián, Spain), Spanish sculptor who achieved international recognition with works displayed at the 1958 Venice Biennale. His sculpture is characterized by his craftsman's respect for materials, both in his small iron pieces and in his later, monumental works in granite.

After studying architecture at the University of Madrid from 1942 to 1947, Chillida turned to sculpturing in clay and plaster. Moving to Paris in 1948, he began to work in iron. Three years later he returned to Spain to settle in Hernani in the Basque region, which remained his home. After producing works primarily in iron for 10 years, including four iron doors for the basilica of Aranzazù (1954), he turned in 1960 to large sculptures in granite. His first one-man show was in Madrid in 1954; afterward he had shows in Duisburg, Houston, New York City, Munich, and other cities. Chillida was awarded the sculpture prize at the Venice Biennale in 1958, the Kandinsky Prize in 1960, the Carnegie International Prize in 1964, and the Andrew Mellon Prize in 1979.

Chillida preferred to work with elemental forms, pared down to satisfy his essentially ascetic vision. His iron sculpture is marked by the contrast between the solidity of the iron and the openness of the design. His later granite works are also marked by their contrasting relationships, in particular the architectonic relationship of the large stone masses. Unlike most modern sculpture, his work is the product of direct contact with his materials, through forging metal or carving stone. Coming from a long tradition of Spanish metalworkers and stone-carvers, he retained a craftsman's feeling for his materials.

Chilliwack, district municipality, southwestern British Columbia, Canada. It lies along the Fraser River near the mouth of the Chilliwack River, 55 miles (89 km) east of Vancouver. It is the trading centre of an agricultural, dairying (especially milk), cattle-raising, and lumbering area. Canning and freezing fruits and vegetables are the chief industries. Nearby are the Harrison Hot Springs resort and the Royal Canadian School of Military Engineering and Canadian Military Engineers Museum with special displays from the Zulu and South African wars. Chilliwack is a Salish Indian term probably meaning "valley of many streams." Founded by miners returning from the Cariboo gold rush of the 1860s, the settlement was incorporated as the municipality of Chilliwhack in 1873. In 1908 the municipality split into Chilliwack city and Chilliwhack township. The two were reunited in 1980 as the newly created municipal district of Chilliwack. Pop. (1991) municipal district, 49,531; metropolitan area, 60,251.

Chiloé Island, Spanish ISLA GRANDE DE CHILOÉ, largest island of Chiloé *provincia* in Los Lagos *región,* southern Chile. It has an area of 3,241 square miles (8,394 square km). The island is a sunken extension of Chile's coastal mountain range, from which it is separated by the Chacao Straits. The nearest of the myriad islands and archipelagoes to its south are the Guaitecas Islands, which lie across the Guafo Gulf. To the east, 30 miles (48 km) across the Corcovado Gulf, is mainland Palena province; to the west is the Pacific Ocean. Situated in an area of heavy rainfall and heavily forested inland with evergreens, the island is little developed. Spaniards captured it from Indians in 1567 and controlled it until 1826, making it the last foothold in Chile of royalist forces during the wars for independence. Most of the province's inhabitants live on the island, especially in Ancud and in the oldest city and provincial capital, Castro (founded 1567). They are engaged in agriculture (potatoes, grains), livestock raising (sheep, cattle), fishing, and lumbering. Roads connect Ancud and Castro, both of which are ports. Pop. (1982 prelim.) 67,821.

Chilpancingo, in full CHILPANCINGO DE LOS BRAVOS, city, capital of Guerrero *estado* ("state"), south-central Mexico. Chilpancingo lies along the Huacapa (or Petaquillas) River, which descends through the inland flanks of the Sierra Madre del Sur.

Chilpancingo ("Place of the Wasps") was founded in 1591 and gained prominence as the site of the first Mexican congress, convoked in 1813 by José María Morelos y Pavón. Bravos was added to its name in honour of its native sons and heroes of the revolution, Nicolás, Leonardo, and Victor Bravo. Battles were fought at Chilpancingo in both the wars for independence from Spain and the Mexican Revolution of the early 20th century.

In addition to its administrative functions, Chilpancingo is an economic centre. Corn (maize), sugarcane, and bananas are the principal products of the surrounding area, but livestock raising and lumbering are also important. The city's industries include the production of mescal (an alcoholic beverage) and straw items. The Autonomous University of Guerrero was established in Chilpancingo in 1960. The city is on the Mexico City–Acapulco expressway and has an airfield. Pop. (1990 prelim.) mun., 136,243.

Chilpancingo, Congress of (September–November 1813), meeting held at Chilpancingo, in present Guerrero state, Mex., that declared the independence of Mexico from Spain and drafted a constitution, which received final approval (Oct. 22, 1814) at the Congress of Apatzingán. José María Morelos y Pavón, who called the congress at Chilpancingo, had assumed leadership of the Mexican independence movement after the execution of its initiator, Miguel Hidalgo y Costilla, in July 1811. The constitution provided for, among other things, a republican form of government and the abolition of slavery and of social and legal disabilities imposed on the lower classes. Before the new government could take effect, however, the royalist forces crushed the revolutionaries; Morelos was tried and shot on Dec. 22, 1815. Five years later, independence was achieved, but social inequities and monarchy (the latter only until 1823) were preserved by the so-called Plan of Iguala, the blueprint for the new government issued by Agustín de Iturbide in 1821.

Chilperic, French CHILPÉRIC, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Chilperic I** (b. *c.* 539—d. September or October 584, Chelles, France), Merovingian king of Soissons whom Gregory of Tours, a contemporary, called the Nero and the Herod of his age.

Son of Chlotar I by Aregund, Chilperic shared with his three half brothers (sons of Ingund, Aregund's sister) in the partition that followed their father's death in 561, receiving the poorest region, the kingdom of Soissons. To this was added, however, the best part of Charibert's lands on the latter's death in 567 or 568, so that Chilperic's kingdom corresponded in large part to that later known as Neustria. In 568 he repudiated his wives in order to marry Galswintha, sister of the Visigothic princess, Brunhild, who had herself recently married his half brother, Sigebert I; but he soon had Galswintha murdered and immediately married Fredegund, an earlier mistress. The consequences of this crime constitute virtually the only clearly discernible thread in the tangled skein of Frankish history over the next four decades, as first Sigebert, whose relations with Chilperic had in fact been bad from the start, and then his descendants, incited by Brunhild, sought revenge for Galswintha's murder upon the persons of Chilperic, Fredegund, and their family.

Saved from apparent disaster by the assassination of Sigebert I in 575, Chilperic was prevented from seizing the lands of the dead king's young heir, Childebert II, by the action of Guntram, his third half brother and the king of Burgundy. Although Chilperic succeeded in forming an alliance with Childebert against Guntram by recognizing the young king as his heir (581), this was short-lived; in 583 Childebert and Guntram again came to terms. A year later Chilperic fell victim to an unknown assassin, leaving a four-month-old son, Chlotar II.

Ambitious, brutal, and debauched, Chilperic nevertheless had pretensions to being a man of learning; he wrote poor poetry, became involved in theological matters, and ordered four letters to be added to the alphabet. Regarding the church as a major rival to his wealth, he treated the bishops with hostility and contempt; at the same time, he had a reputation for injustice toward his subjects at large and imposed heavy taxes.

• **Chilperic II** (b. *c.* 675—d. 721, Soissons, Fr.), king of Neustria and, briefly, of all the Frankish lands.

As the alleged son of Childeric II, Chilperic was taken from a monastery (where he was living under the religious name of Daniel) and made king of Neustria in 715. Utterly subservient to Ragenfrid, mayor of the palace, who was attempting to throw off Austrasian control, Chilperic fled to Aquitaine in 719 after being defeated by Charles Martel, Austrasian mayor of the palace at Amblève in the Ardennes (716) and Viney, south of Cambrai (717). In 719, however, the weakling king of Austrasia, Chlotar IV, died, and Charles Martel, needing a Merovingian to lend legality to his power, restored Chilperic, who then became king of all the Frankish lands.

Chiltern, district, county of Buckinghamshire, England, extending over a relatively small central portion of the Chiltern Hills. With an area of 78 sq mi (201 sq km), it comprises the neighbouring towns of Amersham and Chesham with the district offices in the former. Modern residential development about these valley towns, situated within 30 mi (48 km) of central London, has enlarged and almost fused the urban area across the intervening chalk upland by Chesham Bois. Pop. (1984 est.) 91,800.

Chiltern Hills, range of chalk hills in England, extending some 70 mi (115 km) southwest to northeast through parts of Oxfordshire, Buckinghamshire, Hertfordshire, and Bedfordshire, forming a well-marked escarpment to the northwest and a gentle southeast slope to the River Thames. Considerable areas are now cared for by the National Trust and are popular tourist attractions. The greatest elevation is Coombe Hill (852 ft [260 m]) near Wendover. The dense beechwoods, which still cover the western portions, once formed the raw materials of the traditional furniture industry of High Wycombe. Several passes through the Chiltern Hills are used by roads and railways converging on London.

Chilwa, Lake, also called LAKE SHIRWA, Portuguese CHIRUA, lake in southeastern Malaŵi. It lies in a depression between the Shire Highlands (west) and the Mozambique border (east) that extends north-northeast from the foot of the Mulanje Mountains through Lake Chiuta to the Lugenda Valley in Mozambique. The Chilwa basin-plain is broken by a few hill formations (including Chisi Island and Mpyupyu Hill) and exhibits five terrace levels formed by shrinkage of the lake.

Originally filling the entire depression, the lake has dropped in recent times; it was 30 ft (9 m) deeper and much larger when David Livingstone arrived there in April 1859. With a maximum depth of 10 ft, the lake now covers an area of 1,000 sq mi (2,600 sq km), half of which is covered by swamp and mixed savanna vegetation. It forms an endoreic (inflowing) drainage system for the western Mulanje Mountains, the Chilwa-Phalombe Plain, and the Zomba and Chikala mountains. The main rivers flowing toward the lake—the Sombani, Palombe, and Likangala—all have perennial sources but run dry because of evaporation and seepage as they cross the lacustrine sands and silts of their lower reaches. The lake level fluctuates 2–3 ft with the seasons, and its waters are increasingly saline away from the swampy shores. The lake margins are cultivated with rice during the dry season, and commercial fishing is important.

Chim: *see* Seymour, David.

chimaera, also spelled CHIMERA, also called GHOST SHARK, any of numerous cartilaginous fishes related to sharks and rays in the class Chondrichthyes but separated from them as the subclass (or sometimes class) Holocephali. Like sharks and rays, chimaeras have cartilaginous skeletons, and the males possess external reproductive organs (claspers) derived from the pelvic fins and used to introduce sperm into the body of the female. Unlike sharks and rays, chimaeras have a single external gill



Elephant chimaera (*Callorhinchus callorhinchus*)
Painting by Richard Ellis

opening, covered by a flap as in the bony fishes, on each side of the body. Male chimaeras, unique among fishes, also possess a supplemental clasping organ, the tentaculum, on the forehead and in front of each pelvic fin.

Chimaeras are tapered fishes with large pectoral and pelvic fins, large eyes, and two dorsal fins, the first preceded by a sharp spine. They have slender tails, from which the name ratfish, applied to some, has been derived. There are about 28 species of chimaeras, ranging in length from about 60 to 200 centimetres (24 to 80 inches) and in colour from silvery to blackish. The species are placed in three families: Chimaeridae (including the species called rabbit fish), characterized by a rounded or cone-shaped snout; Callorhinchidae (elephant fishes), with an unusual, hoe-shaped, flexible snout; and Rhinochimaeridae (long-nosed chimaeras), with an extended, pointed snout.

Found in temperate to cold waters of all oceans, chimaeras range from rivers, estuaries, and coastal waters to oceanic depths of 2,500 metres (8,200 feet) or more. They are weak swimmers and are delicate when caught, dying quickly out of water. Their food consists of small fishes and invertebrates. Females lay large, elongated eggs protected by horny coverings. Chimaeras are edible and are sold as food in some areas. Their liver oil provides a useful lubricant for guns and fine instruments.

Chimaltenango, department, southwestern Guatemala, occupying an area of 764 sq mi (1,979 sq km). Its more elevated regions are inhabited by Maya Indians, who grow corn (maize), beans, and wheat. The lower areas—below 5,000 ft (1,500 m)—are divided into private estates that cultivate coffee and sugarcane and pasture cattle and hogs. Although no railroads serve the department, the highlands are crossed by the Pan-American Highway, which links Chimaltenango (*q.v.*), the departmental capital, with Guatemala City. The department suffered major damage in the earthquake of February 1976; there were nearly 14,000 deaths, and nearly all of the buildings in the area were damaged. Pop. (1984 est.) 276,186.

Chimaltenango, capital, Chimaltenango department, southwestern Guatemala, 30 mi (48 km) from Guatemala City, in the central highlands at an altitude of 5,860 ft (1,786 m) above sea level. Founded in 1526 just south of an old Mayan fortress, it is a market centre for the surrounding Indian villages. The inhabitants raise grains, sugarcane, and livestock. The special qualities of the local clay make the town a centre for brickmaking. A colonial church, built in 1854 on the Continental Divide, has a fountain half of whose waters flow to the Atlantic and half to the Pacific. Pop. (1981) 14,967.

Chimborazo, province, central highland Ecuador, with an area of 2,338 sq mi (6,056 sq km). In the northwest is Mt. Chimborazo, the highest peak of the Ecuadorian Andes (20,702 ft [6,310 m]). Much of the province is in the zone of the *páramos* (high mountain grasslands below the snow line). Most of the population is concentrated in the two intermontane basins of Riobamba and Alausí.

At the higher altitudes the land is used mainly for grazing sheep; in the basins dairy cattle are pastured. Crops include cereals, potatoes, fruit, and fibre plants. The large sulfur deposits of the province are only slightly exploited. Industry (largely textile manufacture and food processing) is concentrated in the provincial capital, Riobamba (*q.v.*), and the towns of Guano and Alausí. Economic development assistance in the province is provided by the Andean Mission, the National Irrigation Agency, and the Roman Catholic Church.

Both the Guayaquil–Quito railway and the Pan-American Highway cross the province from north to south. Pop. (1982) 316,948.

Chimborazo, mountain peak, Chimborazo province, central Ecuador, in the Cordillera (mountains) Occidental of the Andes. Rising to 20,702 ft (6,310 m), it is the highest peak of Ecuador and was long mistakenly thought to be the highest mountain of the Andes. An inactive volcano with many craters, it is heavily glaciated. From about 15,400 ft, the mountain is capped with eternal snow. Many attempts were made to climb Chimborazo in the 18th and 19th centuries; the first to reach the summit was the British mountaineer Edward Whymper, who climbed the peak twice



Chimborazo in the Ecuadorian Andes
Loren McIntyre—Audio Visual Production

in 1880. The geographer and traveler Alexander von Humboldt reached 18,893 ft in 1802.

Chimbote, capital of Santa province in Ancash department of north central Peru. It has one of the few natural harbours (Bahía de Chimbote) on Peru's coast, 9 mi (15 km) south of the mouth of the Santa River. Chimbote was a small fishing village (established

in 1822, given town status in 1895) until the mid-20th century, when a steel mill and fish-meal factories were constructed. It then became one of the fastest-growing cities in Peru. Principal exports include fish meal, fish oil, bulk minerals, machine parts, and cast iron. Chimbote is also the shipping centre for sugarcane, cotton, and rice from the Santa valley. Coke, machinery, and iron ore (from Marcona) are imported. The city is on the Pan-American Highway and has an airport. Largely destroyed by an earthquake in 1970, Chimbote was reconstructed as a model city in the 1970s. Pop. (1990 est.) 296,600.

chime, any of several sets of tuned percussion instruments. Most frequently "chime" refers to the bell chime (*q.v.*), but it also denotes tubular bells (*q.v.*), or orchestral bells; the stone chimes (*q.v.*), or lithophone; drum chimes, sets of tuned drums found in Myanmar (Burma) and Thailand; and gong (*q.v.*) chimes, the sets of tuned gongs used in the gamelan orchestras of Southeast Asia.

Chimera, in Greek mythology, a fire-breathing female monster resembling a lion in the forepart, a goat in the middle, and a dragon behind. She devastated Caria and Lycia until she was slain by Bellerophon. In art the Chimera is usually represented as a lion with a goat's head in the middle of its back. The word is now used generally to denote a fantastic idea or figment of the imagination.



Chimera, interior of a black-figure cup, 7th century BC
Deutsche Fotothek

Chimera, or *chimère,* in architecture, is a term loosely used for any grotesque, fantastic, or imaginary beast used in decoration.

chimera, also spelled CHIMAERA, in botany, a plant or plant part that is a mixture of two or more genetically different types of cells.

A chimera may be a "graft hybrid," a bud that in plant grafting appears at the junction of the scion and stock and contains tissues of both plants. Although such chimeras appeared adventitiously in times past, they were first seriously studied by the German botanist Hans Winkler in 1907. In his first experiments, black nightshade (*Solanum nigrum*) was grafted on tomato (*Solanum lycopersicum*), and at the nexus all the shoots were either of nightshade or of tomato except one; this, arising at the junction of the two tissues, had the characters of nightshade on one side and tomato on the other. Winkler called this shoot a chimera, because it was partly of one species and partly of another. In further experiments he gave certain of his graft hybrids special names. Another botanist, Erwin Baur, later provided evidence that two plants to which Winkler had given special names were built up of a core of tomato with a skin of nightshade one and two cell layers thick, respectively, and two others of a core of nightshade with skins of tomato one and two cell layers thick. Thus in a chimera the components maintain their identity but are arranged in a definite pattern at the growing point.

Chimeras may also arise by a mutation in cells of a growing region. The new kind of tissue may be conspicuously different from the old (as when it is colourless instead of being green), but far more commonly the difference is evident only on special investigation, as when the number of chromosomes is altered.

chimera (fish): *see* chimaera.

Chimkent, also spelled ČIMKENT, city, south-central Kazakhstan. It lies in the valley of the Sayram River in the foothills of the Ugam Range at an elevation of 1,680 feet (512 m).

Originally a settlement on the caravan route from Central Asia to China, Chimkent dates back at least to the 12th century and was more than once destroyed by nomad attacks. After becoming part of the khanate of Kokand in the early 19th century, it was captured by the Russians in 1864. A pharmaceutical (santonin) works was constructed there in 1885.

Chimkent's population increased twelvefold from 1926 to 1970. It is now the third largest city in Kazakhstan and a major industrial and cultural centre, as well as an important railway junction. The city has large lead, automatic-press, and cement works, with a chemical industry (processing phosphates from Karatau) and food and light industries. Chimkent also has teacher-training, technological, and cultural institutes, cement and Karakul-breeding research institutes, and Kazakh and Russian theatres. An old Asiatic quarter still remains. Pop. (1991 est.) 438,800.

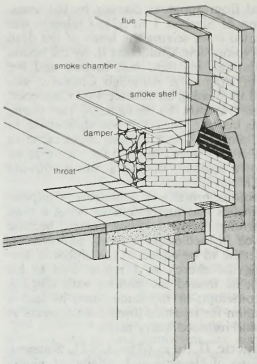
Chimki (Russia): *see* Khimki.

Chimmesyan (people): *see* Tsimshian.

chimney, structure designed to carry off smoke from a fireplace or furnace. A chimney also induces and maintains a draft that provides air to the fire.

In western Europe before the 12th century, heating fires were almost invariably placed in the middle of a room, and chimneys were therefore rare. Most of the characteristic forms of modern chimneys originated in northern Europe, when masonry techniques were developed that allowed the construction of a hearth along a wall with a fireproof backstop and flue. Some medieval chimney stacks were tubular, and some had ingenious conical caps with hooded side vents to shield against rain. During the 15th and 16th centuries, tall chimneys elaborately decorated with carvings, niches, and inlays formed an important part of the architectural ensemble. As housing grew more commodious and many rooms in a single dwelling were equipped with fireplaces, flues were grouped to carry smoke to a central chimney of masonry. In English housing of this time, each flue emerging at the roof line was treated as a separate columnar structure with base, cap, and polygonal shaft, generally of elaborately shaped bricks. Chimneys of the 17th and 18th centuries tended to be rectangular and to have projecting top courses that formed protective caps. In North America a massive chimney of this type became the central feature of the colonial New England farmhouse. As coal was introduced for domestic heating, chimney construction became the subject of serious study, and in the late 18th century Sir Benjamin Thompson established the definitive forms and proper relationships of the chimney's essential parts.

An ordinary domestic chimney consists of three parts: the throat, the smoke chamber, and the flue. The throat is the opening immediately above the fire; it usually narrows to a few inches in width just below the damper, a door that can be closed when the furnace or fireplace is not in use. Above the damper is the smoke chamber. At the bottom of the smoke



Isometric drawing of a fireplace and chimney
By courtesy of University of Illinois Small Homes Council-Building Research Council

chamber is a smoke shelf formed by setting back the masonry at the top of the throat to the line of the back wall of the flue; its function is to deflect downdrafts that might otherwise blow smoke out into the room. The smoke chamber narrows uniformly toward the top; it slows down drafts and acts as a reservoir for smoke trapped in the chimney by gusts across the chimney top. The flue, the main length of the chimney, is usually of masonry, often brick, and metal-lined. Vertical flues perform best, though a bend is sometimes included to reduce rain splash; bends are also necessary when several flues are united in a common outlet.

Industrial chimneys are usually free-standing single flues with cylindrical cores of firebrick and outer jackets of steel, brick, or reinforced concrete, often with an insulating air space between to allow for differential expansion. Because the taller the chimney, the better the draft, some industrial chimneys are more than 300 feet (91.5 m) in height.

chimneypiece, originally, a hood, projecting from the wall over a grate, built to catch the



Gothic Revival chimneypiece in Stolzenfels, a castle near Koblenz, Ger., designed by Karl Friedrich Schinkel, 1836; detail of a watercolour by Carl Anton Graeb, 1847
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smoke and direct it up to the chimney flue. It came to mean any decorative development of the same type or for the same purpose—*e.g.*, a mantel, or mantelpiece.

Like the modern chimney itself, the chimneypiece was essentially a northern medieval development. Its early hood form is seen at Rochester Castle, England (12th century). Later, the spaces under the ends of the hood were made solid, so that the fireplace became a rectangular opening, and in some cases the fireplace was recessed into the wall. Late medieval fireplaces were of great size and richness—as, for example, the triple fireplace in the great hall of the Palais des Comtes at Poitiers, France.

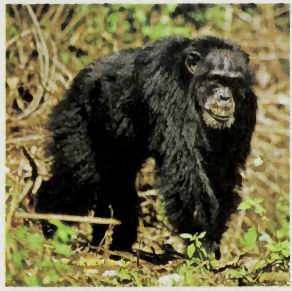
During the Renaissance, fireplace openings were decorated with columns, pilasters, and entablatures, and occasionally the front of the wall or hood above the overmantel was enriched. North Italian palaces have examples of great delicacy. In France the fireplaces at the châteaus of Blois, Chambord, and Fontainebleau are known for their artistry. The chimneypiece of the Baroque and Rococo periods was usually smaller, with rich decoration, and was commonly characterized by elaborate overmantel treatments. Chimneypieces were less numerous in Germany because of the use of porcelain stoves there.

Chimoio, formerly VILA PERY, city, south-central, Mozambique. Centrally located, it is also a commercial and industrial centre. The Chicamba Real hydroelectric-power plant on the nearby Revuè River provides power for the city's cotton, steel, and saw mills and for the manufacture of coarse textiles and processing of other agricultural and mineral products. Chimoio is connected by road and railway southeast to the port of Beira. Pop. (1991 est.) 108,818.

chimpanzee, byname CHIMP, species of great ape (family Pongidae) that inhabits the tropical rain forests and woodland savannas of equatorial Africa from The Gambia in the west to Lake Albert, Lake Victoria, and northwestern Tanzania in the east. Chimpanzees are classified taxonomically into one species and three subspecies within the genus *Pan*. Generally recognized forms include the tschego (*Pan troglodytes troglodytes*), known as the common chimpanzee in continental Europe; the masked chimpanzee (*P. troglodytes verus*), known as the common chimpanzee in Great Britain; and the eastern, or long-haired, chimpanzee (*P. troglodytes schweinfurthii*). The so-called pygmy chimpanzee, or bonobo (*q.v.*), is a separate species (*P. paniscus*). Genetic analysis indicates that the chimpanzee is humanity's closest living relative.

Individuals vary considerably in size and appearance, but chimpanzees usually stand approximately 1–1.7 m (3–5.5 feet) tall when erect and weigh about 35–60 kg (55–130 pounds). Males tend to be larger and more robust than females. Chimpanzees are covered by a coat of brown or black hair, but their faces are bare. The body and facial skin of mature chimpanzees is dark in colour, but the faces of younger animals may be pinkish or whitish.

Chimpanzees spend time both in the trees and on the ground. In the trees, where most feeding takes place, they use both hands and feet in moving about or they swing by their arms (brachiate) from branch to branch. Movement over any significant distance usually takes place on the ground, where, though they may walk erect, chimpanzees more often walk on all fours, leaning on the knuckles of their hands. They are active during the day, and at night they usually sleep in the trees in nests they build of branches and leaves. The chimpanzee diet is primarily vegetarian and consists mostly of fruits, berries, leaves, and seeds. Termites and ants are eaten, and chimpanzees occasionally stalk and kill young baboons and bush pigs. Wild chimpanzees have been observed poking twigs, grass, or other objects into ant and termite nests, withdrawing the tool, and eating the insects that cling to it. They can also use sticks as tools in other ways, and they have been observed using leaves to soak up drinking water or to clean themselves. Younger animals apparently acquire these tool-using behaviours from older animals.



Masked, or common, chimpanzee (*Pan troglodytes verus*)
Helmut Albrecht—Bruce Coleman Ltd.

Chimpanzees are lively animals with more extroverted dispositions than either gorillas or orangutans. They are gregarious and live in loose and flexible groups known as "communities" that are based on associations between adult males in a home range, or territory. A community has 15–80 members and consists of several subgroups of varying size and unstable composition. The dominance hierarchy that exists among male chimpanzees is unusually fluid, and individuals associate with each other and join and leave different subgroups with complete freedom. Female chimpanzees spend most of their time with their young or with other females. The relations between different communities tend to be hostile; intruders on a group's home range may be attacked, and members of one community have been known to destroy a smaller neighbouring community by driving away or killing its members.

Adult chimpanzees regularly groom each other's fur to remove external parasites, a behaviour that reinforces the social bonds between them. Chimpanzees communicate by facial expressions, gestures, and a large array of vocalizations, including screams, hoots, grunts, and roars. Males display excitement by standing erect, stamping or swaying, and letting out a chorus of screams.

The female chimpanzee bears a single young at any time of year after a gestation period of about 230 days. The newborn weighs about 1.8 kg (4 pounds), is almost helpless, and clings to the fur of the mother's belly when she is in motion. From about 6 months to 2 years, the youngster rides on the mother's back. Weaning takes place at about 5 years, and females begin to reproduce at 13–15 years of age. The life expectancy is about 50 years under favourable conditions. Chimpanzees' numbers in the wild have been gradually reduced by hunting, by the destruction of their habitat from logging or farming, and by commercial exportation for use in zoos and research laboratories. They are now listed as endangered in the Red Data Book.

Chimpanzees are highly intelligent and are able to solve many kinds of problems posed to them by human trainers and experimenters. Chimpanzees' intelligence, responsiveness, and exuberance make them ideal nonhuman subjects for psychological, medical, and biological experiments. Young chimpanzees can become very attached to their human trainers, and their expressions of feeling resemble those of humans more closely than any other animal. A number of researchers have taught chimpanzees to use sign language or languages based on the display of tokens or pictorial symbols. The implications of these language studies have been contested, however. Critics charge that the apes have not acquired true language in the sense of understanding "words" as abstract symbols that can be combined in meaningful new ways. Other investigators maintain that more recent language training has resulted in the chimpanzees' acquiring a true recognition of "words" as abstractions that can be applied in novel contexts.

Chimú, South American Indians who maintained the largest and most important political system in Peru before the Inca (*q.v.*).

The distinctive pottery of the Chimú aids in dating Andean civilization in the late periods along the north coast of Peru. They expanded by conquest from Piura to Paramonga and Casma in the south. Their state apparently began to take shape in the first half of the 14th century AD, at a time of great increase in population. The Chimú constructed cities and developed large-scale irrigation systems. In 1465–70, however, they were conquered by the Inca under Pachacuti Inca Yupanqui and his son Topa Inca Yupanqui. The Inca absorbed much of the Chimú high culture, including their political organization, irrigation systems, and road engineering, into their own imperial organization.

Chimú culture was based on agriculture, aided by immense works of irrigation engineering. They did excellent work in textiles and in gold, silver, and copper. Pottery types tended to be standardized, with quantity production, made in molds, and generally of a plain black ware. The Chimú language, known as Yunca (Yunga), Mochica, or Moche, now extinct, was very different and probably entirely distinct from that of the Inca.

The Chimú culture flourished in what is sometimes described as the Urbanist, or City-builder, phase of Peruvian cultural development, estimated as lasting the two to four centuries preceding AD 1450. There seems to have been much social stratification from peasant to nobility, and probably all the basic elements of the contemporary Inca civilization were present on a slightly smaller scale.

The Chimú capital, Chan Chan (*q.v.*), on the northern seacoast of Peru not far from Trujillo, is now utterly deserted and uninhabitable for lack of water, but it is one of the world's most notable archaeological sites, with 6 to 10 square miles (16 to 26 square km) of rectangular blocks and streets, great walls, reservoirs, and pyramid temples, all built of adobe mud. Its population must have numbered many thousands.

Chimú, Early (South America): *see* Moche.

Chin, group of tribes of Mongol origin, occupying the southernmost part of the mountain ranges separating Myanmar (Burma) from India. Their history from the 17th to the late 19th century was a long sequence of tribal wars and feuds. The first British expedition into the Chin Hills in 1889 was soon followed by annexation, and British administration ended raids by the Chin on the plains of Myanmar.

Chin villages, often of several hundred houses, were traditionally self-contained units, some ruled by councils of elders, others by headmen. There were also hereditary chiefs who exercised political control over large areas and received tribute from cultivators of the soil.

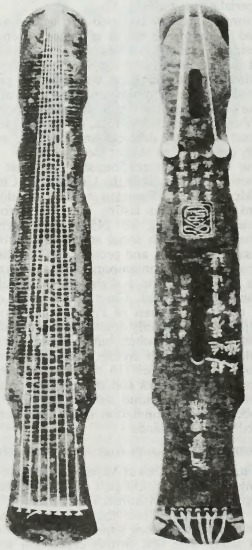
Agriculture is the basis of the Chin economy; land is cultivated in rotation, consecutive cultivation for several years being followed by reversion to forest. Rice, millet, and corn (maize) are the main crops. Domestic animals, kept mainly for meat, are not milked or used for traction. Chief among them is the mithan, a domesticated breed of the Indian wild ox.

Prowess in hunting has religious significance for the Chin; the slayer of much game is believed to enjoy high rank in afterlife. Status in life, and presumably in afterlife, is achieved by providing feasts.

The Chin have much in common with the Kuki, Lushai, and Lakher peoples and speak related Tibeto-Burman languages. They practice polygyny and trace their descent through the paternal line; young people are expected to marry outside the paternal clan.

Traditional religion comprises a belief in numerous deities and spirits, which may be propitiated by offerings and sacrifices. Christian missions have made many converts. The tribes have retained their identity, however, and outside influence has remained limited.

ch'in, also spelled CHYN, OR LA CHIN, musical instrument, a Chinese board zither with seven strings, dating from before 1100 BC. The body is often lacquered and is inlaid with 13 small disks that indicate pitch positions, primarily on the upper melodic string. The silk strings are stretched over a soundboard that is narrow and slightly convex; the concave underside of the soundboard is closed by a flat base, which in most cases has four small feet.



Ch'in, front and back
By courtesy of Chinese Classical Music Association

The instrument's notation indicates pitches as well as special hand movements. Both plucked and stopped strings and their harmonics are used, and only the bare fingers are used on the strings. This ancient instrument has always been treasured as a symbol of culture by Chinese intellectuals and Confucianists and is often seen in pictures of sages viewing some scenic beauty. It is closely related to the Japanese koto and the Korean *kum.* A similar but slightly smaller companion instrument is the *shê.*

Ch'in ———: for rulers of the Ch'in dynasty, *see under* individual names.

Ch'in DYNASTY, also spelled KIN, Pinyin QIN (221–206 BC), dynasty that established the first great Chinese empire. The Ch'in, from which the name China is derived, established the approximate boundaries and basic administrative system that all subsequent Chinese dynasties were to follow for the next 2,000 years.

This dynasty was originated by the state of Ch'in, one of the many small feudal states into which China was divided between 771 and 221 BC. Occupying the strategic Wei River valley in the extreme northwestern area of the country, the Ch'in was one of the least Sinicized of these small states and one of the most martial. Between the middle of the 3rd and the end of the 2nd century BC, the rulers of Ch'in began to centralize state power, creating a rigid system of laws that were applicable throughout the country and dividing the state into a series of commanderies and prefectures ruled by officials appointed by the central government. Under these changes, Ch'in slowly began to conquer its surrounding states, emerging into a major power in China.

Finally, in 247 BC, the boy king Chao Cheng came to the throne. He, together with his minister Li Ssu, completed the Ch'in conquests and in 221 created the Ch'in empire; Chao Cheng proclaimed himself Ch'in Shih huang-ti ("First Sovereign Emperor of Ch'in"). To rule this vast territory, the Ch'in instituted a rigid, authoritarian government; they standardized the writing system, standardized the measurements of length and weight and the width of highways, abolished all feudal privileges, built the Great Wall, and in 213, to halt subversive thought, ordered all books burned, except those on such utilitarian subjects as medicine.

These harsh methods, combined with the huge tax levies needed to pay for their construction projects and wars, took their toll, and rebellion erupted after Shih huang-ti's death in 210 BC. In 206 the dynasty was overthrown and replaced by the Han dynasty (206 BC–AD 220).

While it lasted, the Ch'in dynasty left two architectural monuments of massive proportions, one the Great Wall of China, which actually connected sections of a number of existing short walls, and the other a great palace for the first emperor, which contained a hall of state some 1,500 feet (450 m) square. Its most important artistic contribution may have been the simplification and standardization of the emerging Chinese language. Little survives of Ch'in painting, but it generally emulated the late Chou. Silhouettes drawn on funerary slabs depict feasts and beasts (mythical and actual) and historic scenes. The Ch'in, however, did not last long enough to stamp out literature and learning effectively, and much of the rich legacy of the Shang dynasty managed to pass on to the successor Han, under which the arts thrived greatly.

Chin DYNASTY, Pinyin JIN, Chinese dynasty that comprises two distinct phases—the Western Chin, ruling China from AD 265 to 317, and the Eastern Chin, which ruled China from AD 317 to 420. The Eastern Chin is considered one of the Six Dynasties (*q.v.*).

In AD 265 a Ssu-ma prince, Ssu-ma Yen, deposed the last of the Ts'ao emperors and established the Western Chin dynasty. Ssu-ma Yen, known as Wu-ti, appears to have been an able and energetic monarch. His court established one of China's earliest legal codes (268). After he overthrew the ruler of Wu (280), China was reunited under one monarch. Wu-ti held most of his domains together, and such was his fame that he may have received envoys from as far away as the Roman Orient. Buddhist philosophy, art, and architecture influenced this dynasty's culture.

After Wu-ti's death (290), his successors proved incompetent, plunging the empire into much civil strife. The country was divided among the family, with regional princes behaving as autonomous satraps. Particularly after 300, regicides and abdications were common. As the empire crumbled into decay, it followed the pattern of decline of previous dynasties. Society was feudalistic, essentially controlled by great landowning families, each with hordes of serfs and their private armies. The Hsiung-nu and other northern nomad groups took advantage of the central government's instability to attack the frontier. In 311 the Hsiung-nu sacked the Chin capital of Lo-yang, killing the Chin emperor. The Chin government reorganized under a new emperor in the ancient capital of Ch'ang-an, but this proved only a temporary respite from foreign invasions. In 316 the Chin emperor, a grandson of Wu-ti, surrendered to a chief of the Hsiung-nu, abdicated, and was later put to death.

The capture and destruction of the Chin capitals sent shock waves throughout the Chinese world. For more than two centuries after Chin's collapse, China was divided into two different societies, northern and southern, with a proliferation of would-be dynasties.

A prince of the Ssu-ma family established a court at Nanking in 317, and this dynasty became known as the Eastern Chin, one of the so-called Six Dynasties. Much of the population of this kingdom consisted of refugees from the north who had fled the barbarian invasions. The Eastern Chin was racked by revolts, court intrigues, and wars with the northern states. Nor did it have any more success than the Western Chin in controlling the power of huge landowners.

But whatever the political difficulties, the Nanking court was producing a society of some cultural brilliance. Buddhism exerted a strong influence in this dynasty. It is generally agreed that China's first great genius in painting was Ku K'ai-chih (344–406?), who embellished the Eastern Chin court at Nanking. He is praised as a portraitist and the master of the brushstroke line. Another luminary at this court was Wang Hsi-chih (321–79), the greatest early master of grass script. His son, Wang Hsien-chih, is considered second only to his father in this art.

The Eastern Chin dynasty was ably served by its generals, which proved both its salvation and its undoing. The kingdom was able to resist attacks in the north, and in 347 it reconquered Szechwan. Huan Wen, the general responsible for this victory, deposed the reigning emperor and put a puppet ruler on the throne, but both the new ruler and the general died soon after. In 383 the Eastern Chin turned back invading armies of the northern nomads at the battle of Fei River. An uprising led by disaffected landowners started in 400. While the revolt was crushed (402), it led to increasing powers being granted to army leaders. The dynasty followed up the military successes by pushing northwestward (415–417), thereby regaining access to Central Asian trade routes. But the kingdom, weakened by court intrigues, was ripe for a military coup. The first usurper was Huan Hsüan, who was soon overthrown by Liu Yü, a general whose victorious campaigns against the northern kingdoms had won him great popularity. Liu Yü had the reigning emperor killed and set up a puppet ruler, whom he also had killed, finally setting himself on the throne and founding the short-lived Sung (Southern Sung, or Liu-Sung) dynasty.

Chin DYNASTY, Pinyin JIN, also called JUCHEN DYNASTY, Juchen also spelled JURCHEN, Wade-Giles romanization JU-CHEN, Pinyin RUZHEN, Mongolian JÜRCHED, or JÜRCHID (1115–1234), dynasty that ruled an empire formed by the Tungus Juchen (or Jurchen) tribes of Manchuria. The empire covered much of Inner Asia and all of North China.

Originally subjects of the Liao, an Inner Asian dynasty created in the 10th century by the Khitan tribes, the Juchen, with the aid of the Chinese Sung dynasty, threw off the rule of their overlords and established their own dynasty between 1115 and 1122. They then turned to attack the Sung dynasty and drove it south of the Huai River. Like the Liao they set up a dual-administration system: a Chinese-style bureaucracy to rule over the southern part of their conquests and a tribal state to control the nomadic tribes of Inner Asia. Their capital was at Hui-ning until 1152 and thereafter at Ta-hsing. The major part of their realm was in China proper, but the Juchen were very conscious of preserving their ethnic identity. To this end, they continued to use their own alphabet and speech and banned Chinese clothing and customs from their armies—although they had chosen the Chinese name of Chin for their dynasty. Their fierce warrior ways gradually disappeared, however, and the dynasty was finally destroyed in 1234, when it was caught in the middle of a newly concluded alliance between the Mongols on the north and the Sung on the south.

chin cactus, any of about 60 species of the genus *Gymnocalycium,* family Cactaceae, native to South America and named for the chinlike protuberance below each spine-bearing areole (special bud) on the ribs. Many natural and cultivated varieties are available, the most outstanding of which is *G. mihanovichii* 'Hibotan,' a glowing red, which must be grown grafted onto a normal cactus because it lacks chlorophyll and cannot synthesize its own food. Varieties of other colours also have been developed and are seen in the florist trade.



Chin cactus (*Gymnocalycium mihanovichii*)
Alfieri from the Natural History Photographic Agency

The plants are globose to cylindrical; flowers are most often white or cream, with shades of pink, yellow, or red in some species and varieties. Some authorities include *Weingartia* and *Neowerdermannia* in the genus *Gymnocalycium.*

Chin-chou, also spelled CHINCHOW, Pinyin JINZHOU, city in western Liaoning *sheng* (province), China. It is strategically situated at the northern end of the narrow coastal plain between the Sung Mountains and the sea.

A Chinese administration was first established there under the Han dynasty (206 BC–AD 220) in the 2nd century BC, when it became a county under the name T'u-ho. Under the Sui (581–618) and T'ang (618–907) dynasties, it formed the eastern border of Ying-chou, falling into the hands of the Khitan people at the end of the 9th century. Under the Liao dynasty (947–1125), founded by the Khitan, it first received the name Chin-chou, while the prefectural seat was called Yung-lo. The Liao policy of settling Chinese peasants in the area was discontinued under the Mongols (1279–1368). At the beginning of the Ming dynasty (1368–1644), two important military colonies and guard posts were set up in this area, which came under the jurisdiction of the military governor of Liao-tung. At the end of the Ming period, Chin-chou was one of the principal obstacles to the advance of the Manchu forces, and it was taken in 1642 only after a lengthy siege. At the beginning of the Ch'ing dynasty (1644–1911/12), founded by the Manchus, it formed part of Kuang-ning prefecture, but it became independent as Chin-chou prefecture in 1665. In 1913 it became a county town, Chin. When Manchukuo, the Japanese puppet regime, was established in Manchuria, it was the capital of Chin-chou province from 1934 until 1945.

The city was already walled under the Han, but it was refortified in 1391, 1476, and again in 1504. In the early part of the 20th century, however, the population had already begun to spread out into the surrounding countryside. With the coming of railways, the city's importance was greatly increased. The Peking–Shenyang (Mukden) line passed through Chinchou, and later other lines were built, connecting it with Fu-hsin to the northeast and Ch'eng-te in Hopeh province to the west. It then became an important transportation and textile-manufacturing centre as well as an agricultural market. In the late 1920s the Chinese government, in an effort to take away the trade of Lü-ta (Dairen), which was dominated by the Japanese, attempted to open up a new port at Hu-lu-tao, on the coast south of Chinchou. The port was still incomplete, however, when the Japanese seized Manchuria in 1931. Under Japanese rule, Hu-lu-tao became a coal export port. The Japanese also discovered molybdenum in the area and constructed a refinery at Hu-lu-tao in 1941–42, but the mines were wrecked by communist forces in 1947.

Chin-chou was traditionally a market centre for local agricultural and pastoral products, with many small industries based on agriculture. There were also plants making cement, bricks and tiles, and ceramics. Since 1949 the city, together with Chin-hsi to the south, has been increasingly industrialized. A large engineering industry produces mining and electrical equipment, a papermaking plant has been brought into production, and the older light industries have been greatly expanded. There is a thermal generating plant using coal from Fu-hsin and Pei-p'iao. The population almost trebled during the first decade of communist rule. Pop. (1990) 569,518.

Chin-chou, also spelled KINCHOW, or CHINCHOW, formerly CHIN-HSIEN, Pinyin JINZHOU, or JINXIAN, Japanese KINSHU, town in southern Liaoning *sheng* (province), China. It is situated on Chin-chou Bay, a part of the Gulf of Chihli, and on the neck of the Liaotung Peninsula immediately above Lü-ta (Dairen). Chin-chou is an important transportation centre, where the rail and highway routes from Lü-ta to Shen-yang (Mukden) and to Tan-tung converge. One of the most ancient towns in Manchuria (now known as the Northeast), it was the principal administrative and commercial centre of the Liaotung Peninsula before the 20th century. The meteoric rise of nearby Lü-ta, however, formerly a fishing village, led to its decline. It remains a local market town and has in recent years developed industrially as a satellite of Lü-ta, having large textile mills, a large paper plant, and heavy-machine manufacturing works. Pop. (mid-1970s est.) 50,000–100,000.

Chin Hills, mountainous region in northwestern Myanmar (Burma), extending along the Assam (India) border and forming the central and widest part of a mountain arc that stretches northward from the Arakan Mountains to the Pātkai Range. They vary from 7,000 to 10,000 feet (2,100 to 3,000 m) and reach a high point in Mount Victoria (10,150 feet [3,100 m]). Demarcated by the Myittha River on the east and the headstreams of the Kaladan River on the west, the Chin Hills comprise a tangle of forested hill ranges that are broken by deep, narrow gorges, with humid valley bottoms and cooler ridges. Above 3,000 feet (900 m), the tropical forest gives way to oak and pine and, above 7,000 feet (2,100 m), to rhododendron. Slash-and-burn, or shifting, agriculture is practiced on the hillside woods in which the population is concentrated. Clearings are abandoned after two or three years of cultivation to become covered with a useless tangle of bamboo. Jowar millet is the main crop. Corn (maize) is grown in the north of the region, and in the south rice is grown on lower slopes that are terraced with felled timber.

The arc of the Arakan Mountains, Chin Hills, and the Pātkai Range exemplifies the north-south trend line of Indochina, which has hindered east-west movement and facilitated the populating of the region by Mongoloid peoples from the north. The Chin peoples belong to the southern Mongoloid racial group and are linguistically a branch of the Tibeto-Burmans. The Chin Hills constitute a frontier zone between Myanmar and Indian cultures, and the local tribes remained independent of the British until the end of the 19th century, when the area was occupied to prevent raids on Myanmar's plains. The Chin special division was created by the Myanmar constitution of 1947 and Chin state by the constitution of 1974.

Ch'in Ho (China): *see* Ch'in River.

Chin-hsien (China): *see* Chin-chou.

Chin-hua, also spelled KINHWA, Pinyin JINHUA, city, central Chekiang *sheng* (province), China. Chin-hua is the natural centre of the eastern half of the Chin-hua and Ch'ü Basin, being situated at the junction of two of the tributaries of the Ch'ien-t'ang River—the Chin-hua River and the Wuyi River. It is also a junction on the railway from Hang-chou to Nan-ch'ang in Kiangsi, where the main line is joined to a branch line running northwest to Lan-hsi and beyond.

From the 2nd century BC the place was a county subordinated to K'uai-chi (now called Shao-hsing). Its name was changed to Chinhua in 598. Under the T'ang dynasty (618–907) it became the seat of Wu prefecture. From the 14th century it became the superior prefecture of Chin-hua. It reverted to county status in 1912.

The present city was rebuilt and walled in 1352. Traditionally, it has been a prosperous commercial centre of a rich rice-producing area and a collecting centre for agricultural and forestry products. Before World War II there developed a large trade in bamboo, timber, various types of vegetable and tree oils, and wine and hams. The area became famous for its special breeds of black hogs. The city has rice-polishing, wine-brewing, oil-extracting, and various food-processing plants and ham-curing factories. There are minor engineering and textile works. Pop. (1990) 144,280.

Ch'in-huang-tao, Pinyin QINHUANGDAO, seaport city lying in the east of Hopeh *sheng* (province), China, on the Liao-tung Gulf. Ch'in-huang-tao is situated at the eastern extremity of the Hopeh Plain before the plain's narrowing at the coast at Shan-hai-kuan, approximately 12 miles (20 km) to the northeast. The city's immediate hinter-

land is a narrow and not particularly fertile part of the Hopeh Plain, backed by barren mountains. Although it has the only ice-free harbour in Hopeh, Ch'in-huang-tao was only a minor fishing village until the end of the 19th century. Its growth resulted from the development of the K'ai-luan coal mines, some 75 miles (120 km) to the southwest at T'ang-shan in the early 1880s.

By the end of the 19th century, much of the production of these mines was exported to other Chinese coastal cities, even as far away as Canton. At first the coal was shipped through T'ang-ku, the outport of Tientsin, an inconvenient route, since ships had to be loaded by lighter and the port was icebound in winter. By 1894 the rail link from Tientsin to Shan-hai-kuan had been completed, and it was decided to build a modern port at Ch'in-huang-tao, linking it with a short railway to T'ang-ho on the main line. The government also encouraged the development to provide a winter sea-mail service for Tientsin and Peking. In 1899–1900 the K'ai-p'ing Mining Company began construction of the new port. The work was incomplete when the Boxer Rebellion of 1900 broke out. The T'ang-shan area was occupied by Russian troops and Ch'in-huang-tao by an international force. The Chinese mine administration was replaced by a British-based company, which completed the harbour and its rail link in 1901. Within two years almost all K'ai-luan coal was exported through the port rather than through Tientsin. The export trade expanded not only to coastal ports in China but also to the major ports of eastern Asia.

Although the town remained almost a monopoly of the British company, it was opened to trade as a treaty port in 1901 and developed a secondary role as a winter port for trade with Tientsin and with Ying-k'ou (Newchwang), now in Liaoning province, when these ports were closed by ice. Between World Wars I and II, its trade grew rapidly, partly as the production of coal, coke, and cement at T'ang-shan increased and partly as it became a major port of entry for Japanese goods into North China, both for legitimate trade and smuggling. It also began to develop its own industry, particularly glass manufacture. The British installed the largest glassworks in China there in the 1930s, and it has remained a major centre of the glass industry.

From 1949 Ch'in-huang-tao continued to grow rapidly. Its population more than doubled in the first decade of communist rule. It remains a coal port, exporting to Japan and Pakistan, and has piers for handling crude oil and freight. Its trade has become more varied, however, as T'ang-shan's industry has been diversified. In 1984 Ch'in-huang-tao was designated one of China's "open" cities in the open-door policy inviting foreign investment. Ch'in-huang-tao also exports considerable quantities of peanuts (groundnuts) and soybeans and has grown into a fishing port of consequence. The beautiful coastal district to the southwest has been a summer resort since the early 20th century. Pop. (1989 est.) 341,500.

Ch'in Ling Mountains (China): *see* Tsinling Mountains.

Chin-ling pa-chia (Chinese artists): *see* Eight Masters of Nanking.

Chin-men Tao (Taiwan): *see* Quemoy Island.

chin-pi shan-shui, Pinyin JINBI SHANSHUI, English GOLD-BLUEGREEN LANDSCAPE, also called CH'ING-LÜ-PAI, English GREEN, BLUE, WHITE, style of Chinese landscape painting during the Sui (581–618) and T'ang (618–907) dynasties. It was also employed by some conservative artists of later centuries.

In this style, a rich decorative effect was achieved by the application of mineral colours to a fine line drawing. Among the early masters of *chin-pi shan-shui* were Chan Tzu-ch'ien and Li Ssu-hsün and his son Li Chao-tao, to whom the painting "Ming Huang's Journey to Shu" is sometimes attributed.

Chin p'ing mei (Chinese: "Gold Plum Vase"), first realistic social novel to appear in China. It is the work of an unknown author of the Ming dynasty, and its earliest extant version is dated 1617. Two English versions were published in 1939 under the titles *The Golden Lotus* and *Chin P'ing Mei: The Adventurous History of Hsi Men and His Six Wives.*

The first Chinese novel not derived from popular legend and historical event, *Chin p'ing mei* describes in naturalistic detail the life of the family of a well-to-do businessman, Ch'ing Hsi-men, who has acquired his wealth largely through dishonest means and devotes himself to the pursuit of carnal pleasure and heavy drinking. To these ends he acquires six wives and numerous maidservants. Hsi-men and his fifth wife, Golden Lotus, whom he has acquired by poisoning her first husband, nearly succeed in corrupting the entire household. The first wife, however, remains virtuous and in the end bears a son who becomes a Buddhist monk to atone for his father's sins. The debauchery of Hsi-men is related in vivid detail, leading many readers to dismiss the novel as pornography. Others, however, regard the erotic passages as central to the author's moral purpose of exposing the vanity of pleasure. Despite unofficial censorship because of this eroticism, *Chin p'ing mei* became one of China's most popular novels.

Ch'in River, Chinese (Wade-Giles) CH'IN HO, or (Pinyin) QIN HE, river rising in the T'ai-yüeh Shan (mountains) of Shansi *sheng* (province), China. It flows south through the plateau past Ch'in-yüan and near Yang-ch'eng, through the southwest spur of the T'ai-hang Shan, and onto the plain of northern Honan province, where it swings southeastward to join the Huang Ho at Wu-chih.

The Ch'in River's lower course has a very low gradient, so that the heavy silt load carried down from the plateau by the current has caused extensive flooding since ancient times. In 609, with the construction of the Yung-chi Canal from the area of Wu-chih northeast across the North China Plain to the area of Peking, the waters of the Ch'in were diverted into the canal. The canal, however, fell into disuse at the end of the 8th century. In 1951–52 the Jen-min Sheng-li ("People's Victory") Canal was constructed, connecting Wu-chih with the Wei Ho, thus reopening the waterway of 609 and providing an outlet for floodwaters at the junction of the Ch'in and the Huang Ho. The total length of the Ch'in River is about 150 miles (240 km).

Chin-sha River, Chinese (Wade-Giles) CHIN-SHA CHIANG, or (Pinyin) JINSHA JIANG, conventional KINSHA KIANG, westernmost of the major headwater streams of the Yangtze River, China. Its headwaters rise in the Wu-lan Shan (mountains) and K'u-k'u-shih-li Shan in western Tsinghai province, to the south of the Kunlun Mountains, and on the northern slope of the T'ang-ku-la Shan on the border of the Tibetan Autonomous Region. The three principal headwaters, the Ch'u-ma-erh River, Mu-lu-wu-su River, and A-k'o-ta-mu River, join to form the T'ung-t'ien River, which flows southeast to Chih-men-ta near the frontier between Tibet and Szechwan province. As the Chin-sha River it then flows south in a deep gorge parallel to the similar gorges of the Upper Mekong and Upper Salween rivers, from which it is separated by the Ning-ching Shan. It forms the western border of Szechwan for some 250 miles (400 km) and then flows into Yunnan province. After a large, 200-mile- (320-kilometre-) long loop to the north of Ta-li-pai-tsu Autonomous Prefecture, the Chin-sha River swings northeast, forming the Szechwan-Yunnan provincial boundary until it joins the Min Chiang at I-pin (Szechwan) to form the Yangtze. The upper course of the river falls about 14 feet (4 m) per mile. Below Pa-t'ang (Szechwan) the gradient gradually decreases to about 8 feet (2.5 m) a mile, but the Chin-sha is quite unnavigable and in its upper course through the gorges is more of an obstacle than an aid to communication.

Chin-shih, Pinyin JINSHI, market town in northwestern Hunan *sheng* (province), China. It stands on the north bank of the Li River some distance above its discharge into the Tung-t'ing Lake system, at the head of navigation for medium-sized ships. While Li-hsien, some miles to the west, has become the chief administrative centre of the Li River basin, Chin-shih has developed as its commercial counterpart. An unwalled economic centre with a large settlement of people from Shansi province engaged in its trade, it is the principal collecting centre for grain and cotton from the surrounding plain and for hemp, timber, tung oil, and tea from the upper Li River valley. It has a large oil-extraction plant, rice mills, and some small-scale cotton-textile plants, as well as factories producing farm tools and other products. Pop. (1989 est.) 76,900.

Ch'in tomb, Pinyin QIN, major Chinese archaeological site near the ancient capital city of Ch'ang-an, Shensi *sheng* (province), China, now near the modern city of Sian (Xian). It is the burial place of the first sovereign emperor, Shih Huang-ti of Ch'in, who unified the empire, began construction of the Great Wall of China, and prepared for death by constructing a 20-square-mile (50-square-kilometre) funerary compound, the treasures of which only began to come to light some 2,100 years after his death. In March 1974 a work brigade of farmers drilling a well discovered a subterranean chamber that archaeologists later found contained an army of more than 6,000



Terra-cotta figures of Ch'in Tomb in Sian, Shensi *sheng* (province), China
Richard Melloul—Sygma

life-size terra-cotta soldiers and horses (no two alike and thus possibly modeled from life), along with real chariots; iron farm implements; bronze and leather bridles; objects of silk, linen, jade, and bone; and such weapons as bows and arrows, spears, and swords, cast from an unusual 13-element alloy, which are still shiny and sharp today. The clay figures, once brightly painted with mineral colours, were grouped into a specific military formation—a configuration of vanguard bowmen and crossbowmen, outer files of archers, groups of infantrymen and charioteers, and an armoured rear guard—that followed the military prescriptions of the time. Three nearby chambers—one holding more than 1,400 ceramic figures representing a smaller, complementary force of chariots and cavalrymen, one with 68 members of what probably represents an elite command unit, and one that is empty—have also been excavated. These four so-called Sian (Xian) digs have been covered with protective roofing and, even as the archaeologists' work proceeded, served as the unique in situ Museum of Ch'in Figures.

The buried pottery bodyguard faces east, poised for battle, about three-quarters of a mile from the outer wall of the tomb proper, guarding it from Ch'in's chief former adversaries, who had come from that direction. To the west of the mausoleum another site has revealed the earliest and largest bronzes ever found in China—several half-size chariots with awnings, each carrying a magistrate and drawn by four horses with gold and silver head ornaments. In other satellite pits a subterranean stable filled with horse skeletons, a generals' graveyard, 70 individual burial sites, and other artifacts have been found.

The tomb itself, as yet unexcavated but believed to be intact, lies within an inner wall and beneath a four-sided pyramid mound that was originally landscaped to appear as a low, wooded mountain. The interior is reputedly a vast underground palace that took about 700,000 conscripted workmen more than 36 years to complete. The historian Ssu-ma Ch'ien (*c.* 145–*c.* 85 BC) wrote:

> The labourers dug through three subterranean streams, which they sealed off with bronze to construct the burial chamber. They built models of palaces, pavilions, and offices and filled the tomb with fine vessels, precious stones, and rarities. Artisans were ordered to install mechanically triggered crossbows set to shoot any intruder. With quicksilver the various waterways of the empire, the Yangtze and Yellow rivers, and even the great ocean itself were created and made to flow and circulate mechanically. With shining pearls the heavenly constellations were depicted above, and with figures of birds in gold and silver and of pine trees carved of jade the earth was laid out below. Lamps were fueled with whale oil so that they might burn forever.

After a decade of work on the site, archaeologists anticipated that it would take many more years, perhaps several generations, to unearth the remainder of the treasure of the entire Ch'in tomb complex.

Consult the INDEX *first*

Ch'in-tsung, Pinyin QIN ZONG (temple name, or *miao-hao*), personal name (*hsing-ming*) CHAO HUAN, or CHAO TAN (b. 1100, China—d. 1160, China), last emperor (reigned 1125/26–1127) of the Northern Sung dynasty.

Ch'in-tsung became emperor when his father, Hui-tsung (reigned 1100–1125/26), abdicated in the face of an invasion by the Juchen tribes. The invasion was halted when the Chinese agreed to a large cession of territory and a huge indemnity, but the Juchen renewed their attack two years later, capturing the capital and taking Ch'in-tsung and his father prisoner. Ch'in-tsung's brother Kao-tsung (reigned 1127–1162/63) escaped to South China and founded the Southern Sung dynasty (1127–1279). Ch'in-tsung remained a prisoner of the Juchen until his death.

Ch'in-wang-t'ao (China): *see* Ch'in-huang-tao.

China, officially PEOPLE'S REPUBLIC OF CHINA, Wade-Giles romanization CHUNG-HUA, or CHUNG-HUA JEN-MIN KUNG-HO-KUO, Pinyin ZHONGHUA, or ZHONGHUA RENMIN GONGHEGUO, country of East Asia, third largest in the world, covering an area of 3,696,100 square miles (9,572,900 square km), stretching about 3,100 miles (5,000 km) from east to west and 3,400 miles (5,500 km) from north to south. The capital is Peking (Beijing). Its 12,400-mile (20,000-kilometre) land frontier is shared with Hong Kong, Vietnam, Laos, and Myanmar (Burma) to the south; India, Bhutan, Nepal, Pakistan, and Afghanistan to the southwest; Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia, and Russia to the north; and North Korea extending southward from the Northeast (Manchuria). Its 8,700-mile (14,000-kilometre) coastline (facing generally southeastward) is encircled from north to south by the Yellow Sea, the East China Sea, the Taiwan Strait (separating it, by about 100 miles [160 km], from Taiwan), and the South China Sea. Since 1949 the Nationalist government on Taiwan has continued to claim jurisdiction over the China mainland, whereas the government of the People's Republic of China on the mainland has claimed jurisdiction over Taiwan; both governments are in agreement that the island is the 23rd province of China. The population of the People's Republic of China (excluding Taiwan) in 1991 was estimated to be 1,149,667,000.



China

A brief treatment of China follows. For full treatment, *see* MACROPAEDIA: China.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. China has three major topographic regions. The southwestern region contains the Tibetan Plateau, averaging well over 13,000 feet (4,060 m) above sea level, and other, less dramatic highlands, dropping off in steps (escarpments) eastward and southward. The northwestern region is generally also a highland region but is marked with extensive basin areas. The eastern region contains virtually all of the country's low-lying areas and, except for scattered highlands, seldom rises to more than 1,500 feet (450 m) above sea level.

The central portion of the Tibetan Plateau in the southwestern region, averaging more than 16,000 feet (5,000 m), is aptly called "the Roof of the World." Higher yet are the enclosing border ranges: the Kunlun Mountains to the north and the Himalayas to the south have several peaks reaching between 23,000 and 26,000 feet (7,000 and 8,000 m) above sea level; the world's highest, Mount Everest, situated on the China–Nepal border in the Himalayas, rises to 29,028 feet (8,848 m).

The northwestern region stretches from Afghanistan in the west, along China's northern border with Mongolia, to the Northeast (Manchurian) Plain in the northeast. Its most varied topography lies to the west (northward from the Tibetan Plateau). The Tien Shan ("Heavenly Mountains," parallel ranges that average between 13,000 and 15,000 feet [4,000 and 4,500 m]) separates China's two major interior basins: the Tarim Basin to the south occupies approximately 215,000 square miles (550,000 square km) and contains the Takla Makan Desert (one of the world's most barren); and the smaller Dzungarian Basin is formed northeastward by the Altai Mountains. The Mongolian Plateau, which extends along Mongolia's southern border, comprises the easternmost part of the region and contains the southernmost extension of the Gobi Desert.

The lowlands of the eastern region include, to the north, the Northeast and the North China plains, which have a combined area of about 270,000 square miles (700,000 square km) and are the country's two largest lowland areas. Lying to the south is the Szechwan Basin, which covers some 75,000 square miles (200,000 square km) along the upper Yangtze River and joins northeastward with the more uneven plains of the middle and lower Yangtze. The Pearl River, or Canton, Delta, the only extensive lowland along the southeastern coastal plains, accounts for much of the country's remaining lowland area. Interspersed from north to south throughout the eastern region are such highlands as the Ch'ang-pai Mountains (a series of ranges north of the Korean Peninsula), the Loess Plateau (an area of loess-clad hills), the Tsinling Mountains (a high mountain range, reaching heights of 13,000 feet [4,000 m]), and the Southeast Mountains (reaching 5,000 to 6,000 feet [1,500 to 1,800 m]). Much of northern China lies in a major earthquake zone. On July 28, 1976, a major tremor struck the city of Tangshan (90 miles [145 km] east of Peking); estimates for the number of people killed ranged from 250,000 to 665,000. The lowland floodplains experience widespread flooding; in 1959 floods in northern China left 2,000,000 people dead.

The smallest of China's three major watersheds, situated in the southwest, provides the headwaters for the Brahmaputra, Salween, and Irrawaddy (some of the Indian Ocean's major rivers). China's interior basins in the northwest, forming the second largest watershed, cover about 30 percent of the country but account for less than 5 percent of total runoff; the Tarim River, culminating in Lop Nor (a lake in the eastern part of the Tarim Basin), is the only major river. The eastern Pacific watershed, draining nearly 85 percent of the country's runoff from three-fifths of its land area, dominates China's hydrology. The eastern region is separated into two parts by the divide between the Huang Ho (Yellow River) to the north and the Yangtze River (Ch'ang Chiang) to the south. The discharge rate of southeastern China's Yangtze River is the world's fourth largest, and its drainage area is the world's ninth largest. China's hydroelectric potential is estimated to be the largest in the world.

The climate southeastward of the Yangtze–Huang Ho divide is quite distinctive from the rest of China, generally warmer and wetter. Because that divide coincides roughly with the 32° F (0° C) isotherm, average January temperatures range from 32° F (0° C) at the divide to 72° F (22° C) along the southern coast. Average annual precipitation generally exceeds 30 inches (762 mm) in the south (more than 80 inches falling near the coast) and decreases northward from the divide, ranging between 10 and 30 inches throughout the Northeast and North China plains. Frost-free peri-

Major Chinese dynasties

Note: Before 221 BC and the beginning of the Ch'in dynasty, the rulers were generally known by the title of *wang*, or "king." From the Ch'in onward, the usual title was *huang-ti*, "emperor"—usually shortened to *ti*—although many temporary rulers, usurpers, regents, and would-be emperors were better known by the title of *wang* or, at times, *kung* or *hou* (usually translated, respectively, as "duke" and "marquess").

The emperors often had more than one name and title. First, an emperor had his personal name—consisting of his family's surname (*hsing*) and his own given name (*ming*). Thus, the first Ming emperor's personal name was Chu Yüan-chang—Chu being the surname and Yüan-chang the given name.

Second, the emperor might have a posthumous name (*shih*), containing up to two dozen adjectives and perhaps changing when applied to different phases of his reign. In practice, only the first word (as in the T'ang period) or the last word (as in the Ming and Ch'ing periods) was used, joined with the word *ti* (or *huang-ti*). Thus, the first Ming emperor had two *shih* names, one 20 characters and the other 16 characters long; both ended with the character *kao* and were abbreviated to Kao-ti. In the table, long versions are omitted, and the short versions are included only for the Ming and Ch'ing. In other dynasties, if there is but one short *shih*, that *shih* is given.

Third, most emperors also had a posthumous "temple name" (*miao-hao*), consisting of two parts—an adjective and either *tsu* (for "founder") or *tsung* (for "ancestor"). Thus, the founder of the Ming dynasty was known as T'ai-tsu; frequently he is designated as Ming T'ai-tsu to distinguish him from other dynastic emperors with identical temple names. For the Shang dynasty, the "temple name" refers to the names used in records of ancestral sacrifice in the oracle-bone inscriptions of the period.

Finally, an emperor might have a year name (*nien-hao*), usually rendered in English as "reign name," or "era name." Before the time of the Ming dynasty, the emperor was often given to changing his reign name frequently to describe different phases of his reign; he might even change his *nien-hao* yearly. During the Ming and Ch'ing dynasties, each emperor took but one reign name and is generally, in fact, most popularly known by that name. In the table, reign names in this sanse are given only for these latter dynasties. The *nien-hao* must also be distinguished from the "reign name" of the emperors in the Hsia and Shang dynasties. For the Hsia dynasty there are no contemporary records. For the Shang dynasty, the "reign name" is that name by which the kings are referred to in standard literary sources. These sources often append the title Ti, or -ti (emperor), to the name.

The name by which each ruler is best known is indicated in italics.

The first of the mythical emperors of China was Fu Hsi; his birth is said to have occurred in the 29th century BC. The second, Shen Nung, is said to have been born in the 28th century BC. Huang-ti, the third of the ancient mythological rulers, completes the Three Sovereigns era. He also is usually considered to be the first of the legendary Five Emperors (*c.* 27th to 22nd century BC). The other figures in this era are Chuan-hsü, Ti-k'u, Yao, and Shun. The latter two are much praised by Confucius. The first (quasi-legendary) dynasty, the Hsia, was founded by Yü, said to have been a minister of Shun. The king list before the Shang is of uncertain historicity, and there is no consensus among scholars concerning reign dates before 841 BC.

personal name	reign name	other names
Hsia Dynasty		
Wen-ming	*Yü*	
	Ch'i	Hui
	T'ai-k'ang (Ta-k'ang)	
	Hsiang	Hsiang-an
	Shao-k'ang	
	Chu	
	Huai (Hui)	Fen
	Wang (Mang)	Huang
	Hsieh	
	Pu-chiang	Chiang
	Chiung	Kao-yang
	Chin (Ch'in)	Yin-chia
	K'ung-chia	
	Hao (Kao)	
	Fa	Hou-ching, or Fa-hui
Lü-kuei	*Chieh*	

personal name, or native (*e.g.*, Mongol) name	reign name	temple name, or *miao-hao*
Shang, or Yin, Dynasty		
Tzu Lü	(Ch'eng) *T'ang*, or T'ien I	Ta I
	T'ai Ting[1]	Ta Ting
Tzu Sheng	*Wai Ping*	Pu Ping
Tzu Yung	*Chung Jen*	Nan Jen[2]
Tzu Chih	*T'ai Chia*	Ta Chia
Tzu Hsüan	*Wo Ting*	Ch'iang Ting[2]
Tzu Pien	*T'ai* (or Hsiao) *Keng*	Ta Keng
Tzu Kao	*Hsiao Chia*	Hsiao Chia
Tzu Tien	*Yung Chi*	Lü Chi
Tzu Mi	*T'ai Wu*	Ta (or Tsu) Wu
Tzu Chuang	*Chung Ting*	Chung (or San-tsu) Ting
Tzu Fa	*Wai Jen*	Pu Jen
Tzu Cheng	*Ho Tan Chia*	Ch'ien Chia
Tzu Teng	*Tsu I*	(Chung-tsung or Kao) Tsu I, or Hsia I
Tzu Tan	*Tsu Hsin*	Tsu Hsin
Tzu Yü	*Wo* (or K'ai) *Chia*	Ch'iang Chia
Tzu Hsin	*Tsu Ting*	Tsu (or Hsiao or Ssu-tsu) Ting
Tzu Keng	*Nan Keng*	Nan (or Tsu) Keng
Tzu Ho	*Yang Chia*	Hsiang Chia
Tzu Hsün	*P'an Keng*	Pan (or San-tsu) Keng
Tzu Sung	*Hsiao Hsin*	Hsiao (or Er-tsu) Hsin
Tzu Lien	*Hsiao I*	Hsiao (Tsu or Hou-tsu)
Tzu Chao	*Wu Ting*, or Kao-tsung	Wu (or Hou-tsu) Ting
	Hsiao Chi[1]	Tsu, or Chung Chi
Tzu Yao	*Tsu Keng*	Tsu Keng
Tzu Tsai	*Tsu* (or Ti) *Chia*	Tsu (or Ti) Chia
Tzu Hsien	*Lin* (or Fang) *Hsin*	San-tsu Hsin
Tzu Hsiao	Keng Ting	*K'ang* (or Keng-tsu) *Ting*
Tzu Chü	*Wu I*	Wu (Tsu) I
Tzu T'o	*Wen* (or T'ai) *Ting*	Wen (Wu) Ting
Tzu Hsien	*Ti I*[3]	
Tzu Chou (or Shou)	*Ti Hsin*	

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
Chou Dynasty[4]			
Hsi (Western) Chou			
Chi Fa	*Wu-wang*		
Chi Sung, or Chi Yung	*Ch'eng-wang*		
Chi Chao	*K'ang-wang*		
Chi Hsia	*Chao-wang*		
Chi Man	*Mu-wang*		
Chi I-hu	*Kung-wang*		
Chi Chien	*I-wang*		
Chi Pi-fang, or Chi Fang	*Hsiao-wang*		
Chi Hsieh	*I-wang*		
Chi Hu	*Li-wang*		
	Kung-ho (regent?)		841–827 BC
Chi Ching	*Hsüan-wang*		827–781
Chi Kung-nieh	*Yu-wang*		781–771
Tung (Eastern) Chou: Ch'un-ch'iu (Spring and Autumn Period)			770–476 BC
Chi I-chia	*P'ing-wang*[5]		770–719
Chi Lin	*Huan-wang*		719–696
Chi T'o, or Chi T'a	*Chuang-wang*		696–681
Chi Hu-ch'i, or Chi Hu	*Hsi-wang*		681–676
Chi Lang, or Chi Liang, or Chi Wu-liang	*Hui-wang*		676–651
Chi Cheng	*Hsiang-wang*		651–618
Chi Jen-ch'en, or Chi Chü, or Chi Wang-ch'en	*Ch'ing-wang*		618–612
Chi Pan	*K'uang-wang*		612–606
Chi Yü	*Ting-wang*		606–585
Chi I	*Chien-wang*		585–571
Chi Hsieh-hsin, or Chi Ta-hsin	*Ling-wang*		571–544
Chi Kuei, or Chi I	*Ching-wang*		544–519
Chi Kai	*Ching-wang*		519–476
Tung (Eastern) Chou: Chan-kuo (Warring States Period)			475–256/255 BC
Chi Jen, or Chi Ch'ih	*Yüan-wang*		475–468
Chi Chai	*Chen-ting wang*, or Ting-wang		468–440
Chi Wei	*K'ao-wang*, or K'ao-che wang		440–425
Chi Wu	*Wei-lieh wang*		425–401
Chi Chiao, or Chi Tan, or Chi Mang	*An-wang*, or Yüan-an wang		401–375
Chi Hsi	*Lieh-wang*, or I-lieh wang		375–368
Chi Pien	*Hsien-wang*, or Hsien-sheng wang		368–320
Chi Ting	*Shen-ching wang*		320–314
Chi Yen, or Chi Tan	*Nan-wang*, or Yin-wang, or Jan-wang		314–256/255
Ch'in Dynasty[6] (Capital at Hsien-yang)			221–206 BC
Chao Cheng	*Shih huang-ti*		221–210/209
Chao Hu-hai	*Erh-shih ti*		210/209–207
Chao Tzu-ying	*Ch'in-wang*		207–206
Han Dynasty			206 BC–AD 220
Hsi (Western) Han (Capital at Ch'ang-an)			206 BC–AD 25
Liu Pang, or Liu Chi	Kao huang-ti	(Han) *Kao-tsu*	206–195
Liu Ying	*Hui-ti*		195–188
Lü O-hsü, or Lü Chih	*Kao-hou*, or Lü-hou, or Lü-shih (empress regent)		188–180/179
Liu Heng	*Wen-ti*		180/179–157/156
Liu Ch'i	*Ching-ti*		157/156–141/140
Liu Ch'e	*Wu-ti*		141/140–87/86
Liu Fu, or Liu Fu-ling	*Chao-ti*		87/86–74/73
Liu Hsün, or Liu Ping-chi	*Hsüan-ti*		74/73–48

[1]This ruler is usually included in the royal genealogy even though he did not actually reign. [2]This identification is not certain. [3]Owing perhaps to the end of the dynasty in the following reign, Ti I is not mentioned with certainty in the ancestor sacrifices recorded in Shang oracle-bone inscriptions. [4]The traditional date for the beginning of the Chou dynasty is 1122 BC; the latest (proposed) date is 1027 BC. Many scholars favour a date between these two extremes, roughly 1050 BC. [5]During P'ing-wang's reign his younger brother Yü-chen was set up on the throne as a rival from 770 to 760 BC, with the posthumous name of Hsi-wang. [6]The Ch'in dynasty ruled in its core territory from about 255 BC, long before it assumed the imperial title in 221 BC. Shih huang-ti ascended the throne in the state of Ch'in in 247 BC and, after annexing rival states during the Warring States Period, proclaimed the formation of his empire in 221.

Major Chinese dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
Hsi (Western) Han (continued)			
Liu Shih	*Yüan-ti*		48–33/32
Liu Ao	*Ch'eng-ti*		33/32–7/6
Liu Hsin	*Ai-ti*		7/6–1
Liu K'an	*P'ing-ti*		1 BC–AD 6
Liu Ying			6–25
Hsin, or Hsin-Wang			AD 9–25
Wang Mang	Chia huang-ti, or She huang-ti		9–23
Liu Keng-shih, or Liu Hsüan	Huai-yang wang		23–25
Tung (Eastern) Han (Capital at Lo-yang)			25–220
Liu Hsiu	*Kuang-wu ti*	(Tung-Han) Shih-tsu	25–57/58
Liu Chuang	*Ming-ti*	(Tung-Han) Hsien-tsung	57/58–75/76
Liu Ta	*Chang-ti*	(Tung-Han) Su-tsung	75/76–88
Liu Chao	*Ho-ti*	(Tung-Han) Mu-tsung	88–105/106
Liu Lung	*Shang-ti*		105/106
Liu Yu	*An-ti*	(Tung-Han) Kung-tsung	106–125
Liu I	*Shao-ti,* or Pei-hsiang hou		125
Liu Pao	*Shun-ti*	(Tung-Han) Ching-tsung	125–144/145
Liu Ping	*Ch'ung-ti*		144/145–145
Liu Tsuan	*Chih-ti*		145–146
Liu Chih	*Huan-ti*	(Tung-Han) Wei-tsung	146–168
Liu Hung	*Ling-ti*		168–189
Liu Pien	*Shao-ti,* or Hung-nung wang		189
Liu Hsieh	*Hsien-ti*		189–220
Six Dynasties Period[7]			220–589
San-kuo (Three Kingdoms)			220–280
Shu-Han (Capital at Ch'eng-tu)			221–263/264
Liu Pei	Chao-lieh ti, or Hsien-chu		221–223
Liu Shan	*Hou-chu,* or Ssu-kung		223–263/264
Wei (Capital at Lo-yang)			220–265/266
Ts'ao P'ei	Wen-ti		220–226
Ts'ao Jui	*Ming-ti*		226–239
Ts'ao Fang	*Ch'i-wang,* or Shao-ti		239–254
Ts'ao Mao	*Kao-kuei hsiang-kung*		254–260
Ts'ao Huan	*Yüan-ti,* or Ch'en-liu wang		260–265/266
Wu (Capital at Chien-yeh)			222–280
Sun Ch'üan	Ta-ti, or T'ai-ti, or Wu-chu		222–252 [8]
Sun Liang	*Hui-chi wang,* or Hou-kuan hou, or Fei-ti		252–258
Sun Hsiu	*Ching-ti*		258–264
Sun Hao, or Sun P'eng-tsu	*Mo-ti,* or Kuei-ming hou, or Wu-cheng ti		264–280
Chin Dynasty			265–420
Hsi (Western) Chin (Capital at Lo-yang, 265–311, and Ch'ang-an, 311–316)			265–316/317
Ssu-ma Yen	*Wu-ti*	(Hsi-Chin) Shih-tsu	265–290
Ssu-ma Chung	*Hui-ti*		290–306/307
Ssu-ma Chih	*Huai-ti*		306/307–311
Ssu-ma Yeh	*Min-ti*		313–316/317
Tung (Eastern) Chin (Capital at Chien-k'ang)			317–420
Ssu-ma Jui	*Yüan-ti*	(Tung-Chin) Chung-tsung	317–322/323
Ssu-ma Shao	*Ming-ti*	(Tung-Chin) Su-tsung	322/323–325
Ssu-ma Yen	*Ch'eng-ti*	(Tung-Chin) Hsien-tsung	325–342
Ssu-ma Yo	*K'ang-ti*		342–344
Ssu-ma T'an	*Mu-ti*	(Tung-Chin) Hsiao-tsung	344–361
Ssu-ma P'ei	*Ai-ti*		361–365
Ssu-ma I	*Fei-ti,* or Hai-hsi kung		365–371/372
Ssu-ma Yü	*Chien-wen ti*	(Tung-Chin) T'ai-tsung	371/372–372
Ssu-ma Yao	*Hsiao-wu ti*		372–396
Ssu-ma Te-tsung	*An-ti*		396–418/419
Ssu-ma Te-wen	*Kung-ti*		418/419–420
Nan-ch'ao (Southern Dynasties)			420–589
Liu-Sung (Capital at Chien-k'ang)			420–479
Liu Chi-nu	*Wu-ti*	(Ch'ien-Sung) Kao-tsu	420–422
Liu I-fu	*Shao-ti,* or Ying-yang wang		422–424
Liu I-lung	*Wen-ti,* or Ching-ti	(Ch'ien-Sung) T'ai-tsu, or Chung-tsung	424–453
Liu Chün	*Hsiao-wu ti*	(Ch'ien-Sung) Shih-tsu	453–464
Liu Tzu-yeh	*Ch'ien* (Former) *Fei-ti*		464–465/466
Liu Yü	*Ming-ti*	(Ch'ien-Sung) T'ai-tsung	465/466–472
Liu Yü	*Hou* (Later) *Fei-ti,* or Ts'ang-wu wang		472–477
Liu Chun	*Shun-ti*		477–479
Nan (Southern) Ch'i (Capital at Chien-k'ang)			479–502
Hsiao Tao-ch'eng, or Hsiao Tou-chiang	*Kao-ti*	(Nan-Ch'i) T'ai-tsu	479–482

[7] The Six Dynasties Period—the interregnum between the great empires of Han and Sui-T'ang—was a confused period with many pretenders, both Chinese and "barbarian," vying for the old Han throne. The name (an imprecise but popular one) derives from the six successive dynasties that had their capital at Nanking (then known as Chien-k'ang or Chien-yeh) from 222 to 589. As the table indicates, the period saw the rise and fall of at least 29 significant dynasties in all. [8] Sun Ch'üan began his reign in 222 but did not assume the imperial title until 229.

Major Chinese dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
Nan (Southern) Ch'i (continued)			
Hsiao Tse, or Hsiao Lung-erh	*Wu-ti*	(Nan-Ch'i) Shih-tsu	482–493
Hsiao Chao-yeh, or Hsiao Fa-shen	*Yü-lin wang*, or Fei-ti		493–494
Hsiao Chao-wen	*Hai-ling kung-wang*, or Fei-ti		494
Hsiao Luan, or Hsiao Hsüan-tu	*Ming-ti*	(Nan-Ch'i) Kao-tsung	494–498
Hsiao Pao-chüan, or Hsiao Ming-hsien	*Tung-hun hou*, or Fei-ti		498–501
Hsiao Pao-jung	*Ho-ti*		501–502
Nan (Southern) Liang (Capital at Chien-k'ang)			502–557
Hsiao Yen	*Wu-ti*	(Nan-Liang) Kao-tsu	502–549
Hsiao Kang	*Chien-wen ti*, or Ming-ti	(Nan-Liang) T'ai-tsung, or Kao-tsung	549–551
Hsiao Tung	*Yü-chang wang*		551–552
Hsiao Chi	*Wu-ling wang*		552
Hsiao I	*Yüan-ti*	(Nan-Liang) Shih-tsu	552–555
Hsiao Fang-chih	*Ching-ti*, or Chiang-yin wang		555–557
Nan (Southern) Ch'en (Capital at Chien-k'ang)			557–589
Ch'en Pa-hsien	*Wu-ti*	(Nan-Ch'en) Kao-tsu	557–559
Ch'en Ch'ien	*Wen-ti*	(Nan-Ch'en) Shih-tsu	559–566
Ch'en Po-tsung	*Fei-ti*, or Lin-hai wang		566–568
Ch'en Hsü	*Hsüan-ti*	(Nan-Ch'en) Kao-tsung	569–582
Ch'en Shu-pao	*Hou-chu*		582–589
Pei-ch'ao (Northern Dynasties)			386–581
Wei (Capital at Ta-t'ung, 398–494, and Lo-yang, 495–535)			386–534/535
T'o-pa Kuei	*Tao-wu ti*, or Hsüan-wu ti	(Wei) T'ai-tsu, or Lieh-tsu	386–409 [9]
T'o-pa Ssu	*Ming-yüan ti*	(Wei) T'ai-tsung	409–423
T'o-pa Tao	*T'ai-wu ti*	(Wei) Shih-tsu	423–452
T'o-pa Yü	*Nan-an wang*, or Yin		452
T'o-pa Chün	*Wen-ch'eng ti*	(Wei) Kao-tsung	452–465
T'o-pa Hung	*Hsien-wen ti*	(Wei) Hsien-tsu	465–471
T'o-pa Hung, or Yüan Hung [10]	*Hsiao-wen ti*	(Wei) Kao-tsu	471–499
Yüan K'o	*Hsüan-wu ti*	(Wei) Shih-tsung	499–515
Yüan Hsü	*Hsiao-ming ti*	(Wei) Su-tsung	515–528
Yüan Tzu-yu	*Hsiao-chuang ti*, or Wu-huai ti	(Wei) Ching-tsung	528–530/531
Yüan Yeh	*Tung-hai wang*, or Ch'ang-kuang wang		530/531–531
Yüan Kung	*Chieh-min ti*, or Ch'ien Fei-ti, or Chieh-wen ti		531–532
Yüan Lang	*An-ting wang*, or Hou Fei-ti		531–532
Yüan Hsiu	*Hsiao-wu ti*, or Ch'u-ti		532–534/535
Tung (Eastern) Wei (Capital at Yeh)			534–550
Yüan Shan-chien	*Hsiao-ching ti*, or Chung-shan wang		534–550
Hsi (Western) Wei (Capital at Ch'ang-an)			535–556/557
Yüan Pao-chü	*Wen-ti*		535–551
Yüan Ch'in	*Fei-ti*		551–554
Yüan Kuo	*Kung-ti*		554–556/557
Pei (Northern) Ch'i (Capital at Yeh)			550–577
Kao Yang	*Wen-hsüan ti*	(Pei-Ch'i) Hsien-tsu, or Wei-tsung	550–559/560
Kao Yin	*Fei-ti*		559/560–560
Kao Yen	*Li-chao ti*, or Hsiao-chao ti		560–561
Kao Chan	*Wu-ch'eng ti*	(Pei-Ch'i) Shih-tsu	561–565
Kao Wei	*Hou-chu*, or Wen-kung		565–577
Kao Heng	*Yu-chu*, or Wen-kuo kung		577
Pei (Northern) Chou (Capital at Ch'ang-an)			557–581
Yü Chüeh, or T'o-lo-ni	*Hsiao-min ti*		557
Yü-wen Yü, or T'ung-wan-t'u	*Ming-ti*	(Pei-Chou) Shih-tsung	557–560/561
Yü-wen Yung, or Mi-lo-t'u	*Wu-ti*	(Pei-Chou) Kao-tsu	560/561–578/579
Yü-wen Yün, or Ch'ien-po	*Hsüan-ti*		578/579–579
Yü-wen Yen, or Yu-wen Shan	*Ching-ti*		579–581
Shih-liu kuo (Sixteen Kingdoms)			303–439
Ch'eng-Han, or Shu (Capital at Pi-ch'eng)			303–347
Li T'e	*Ching-ti*	(Ch'eng-Han) Shih-tsu	303
Li Liu	*Ch'in-wen wang*		303
Li Hsiung	*Wu-ti*, or Ch'eng-tu wang	(Ch'eng-Han) T'ai-tsung	303–334
Li Pan			334
Li Ch'i	*Yu-kung*		334–338
Li Shou	*Chao-wen ti*	(Ch'eng-Han) Chung-tsung	338–343
Li Shih			343–347
Pei (Northern) Han, or Ch'ien (Former) Chao (Capital at Ch'ang-an)			304–329
Liu Yüan	*Kuang-wen ti*, or Han-wang	(Ch'ien-Chao) Kao-tsu	304–310
Liu Ts'ung, or Liu Tsai	(Ch'ien-Chao) Lieh-tsung		310–318
Liu Ts'an	Yin		318
Liu Yao			318–329
Ch'ien (Former) Liang (Capital at Ku-tsang)			317–376
Chang Shih	*Yüan*, or Chao-kung		317–320
Chang Mao	*Ch'eng*		320–324

[9] T'o-pa Kuei was heir to the throne when his grandfather died in 377; the state was governed by a regency until 386, when he became king (*wang*). He was proclaimed emperor in 399. [10] Hsiao-wen ti changed the family name from T'o-pa to Yüan in 496.

Major Chinese dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
Ch'ien (Former) Liang (continued)			
Chang Chün	*Chung-ch'eng kung*, or Wen-kung		324–346
Chang Ch'ung-hua	*Ching-lieh*, or Chao-kung, or Huan-kung		346–353
Chang Tso			353–355
Chang Hsüan-ching	*Ching-tao kung*, or Ch'ung-kung		355–363
Chang T'ien-hsi, or Chang Tu-huo			363–376
Hou (Later) Chao (Capital at Hsiang-kuo, 319–335, and Yeh, 335–352)			319–352
Shih Le	*Chao-wang*	(Hou-Chao) Kao-tsu	319–333
Shih Hung	*Hai-yang wang*		333–334
Shih Hu		(Hou-Chao) T'ai-tsu	334/335–349
Shih Shih			349
Shih Tsun			349
Shih Chien			349–350
Shih Chih			350–351
Shih Min, or Liang	Wu-tao t'ien-wang		352
Ch'ien (Former) Yen (Capital at Chung-shan, 348–353, and Yeh, 353–370)			337–370
Mu-jung Kuang			337–348
Mu-jung Chün	*Ching-chao ti*	(Ch'ien-Yen) Lieh-tsu	348–360
Mu-jung Wei	*Yu-ti*		360–370
Ch'ien (Former) Ch'in (Capital at Ch'ang-an)			351–395
Fu Chien	*Ming-ti*	(Ch'ien-Ch'in) Kao-tsu, or Shih-tsung	351–355
Fu Sheng	*Li-wang*		355–357
Fu Chien, or Fu Wen-yü	*Hsüan-chao ti*	(Ch'ien-Ch'in) Shih-tsu	357–385
Fu P'ei	*Ai-p'ing*		385–386
Fu Teng	*Kao-ti*	(Ch'ien-Ch'in) T'ai-tsung	386–394
Fu Ch'ung			394–395
Hou (Later) Yen (Capital at Chung-shan)			386–407
Mu-jung Ch'ui	*Ch'eng-wu*	(Hou-Yen) Shih-tsu	386–396
Mu-jung Pao	*Hui-min*	(Hou-Yen) Lieh-tsung	396–398/399
Mu-jung Sheng	*Chao-wu*	(Hou-Yen) Chung-tsung	398/399–401
Mu-jung Hsi	*Chao-wen*		401–407
Hou (Later) Ch'in (Capital at Ch'ang-an)			384–417
Yao Ch'ang	*Wu-chao ti*	(Hou-Ch'in) T'ai-tsu	384–394
Yao Hsing	*Wen-huan ti*	(Hou-Ch'in) Kao-tsu	394–416
Yao Hung	*Hou-chu*		416–417
Hsi (Western) Ch'in (Various capitals)			385–431
Ch'i-fu Kuo-jen	*Hsüan-lieh wang*	(Hsi-Ch'in) Lieh-tsu	385–388
Ch'i-fu Ch'ien-kuei	*Wu-yüan wang*	(Hsi-Ch'in) Kao-tsu	388–400
			409–412
Ch'i-fu Chih-p'an	*Wen-chao wang*	(Hsi-Ch'in) T'ai-tsu	412–428
Ch'i-fu Mu-mo			428–431
Hou (Later) Liang (Capital at Ku-tsang)			386–403/404
Lü Kuang	*I-wu*	(Hou-Liang) T'ai-tsu	386–400
Lü Shao	*Yin-wang*		399/400
Lü Tsuan			399/400–401
Lü Lung			401–403/404
Nan (Southern) Liang (Capital at Lo-tu, 397–399 and 402–415, and Hsi-p'ing, 399–402)			397–414
T'u-fa Wu-ku	*Wu-wang*	(Nan-Liang) Lieh-tsu	397–399
T'u-fa Li-lu-ku	*K'ang-wang*		399–402
T'u-fa Nu-t'an	*Ching-wang*		402–404
			408–414
Pei (Northern) Liang (Capital at Chang-i, 401–412, and Ku-tsang, 412–439)			401–439
Chü-ch'ü Meng-hsün	*Wu-hsüan wang*		401–433
Chü-ch'ü Mao-ch'ien, or Chü-ch'ü Mu-chien	*Ai-wang*		433–439
Nan (Southern) Yen (Capital at Kuang-ku)			398–410
Mu-jung Te	*Hsien-wu ti*	(Nan-Yen) Shih-tsung	398–405
Mu-jung Ch'ao	*Chao-wen ti*		405–410
Hsi (Western) Liang (Capital at Tun-huang, 400–405, and Chiu-ch'uan, 405–423)			400–421
Li Kao	*Wu-chao wang*	(Hsi-Liang) T'ai-tsu	400–417
Li Hsin	*Hou-chu*		417–420
Li Hsün			420–421
Hsia (Capital at Ch'ang-an)			407–431
Ho-lien Po-po, or T'ieh-fu Po-po	*Wu-lieh ti*	(Hsia) Shih-tsu	407–425
Ho-lien Ch'ang			425–428
Ho-lien Ting			428–431
Pei (Northern) Yen (Capital at Ch'ang-li)			407–436
Kao Yün			407–409
Feng Pa		(Pei-Yen) T'ai-tsu	409–430
Feng Hung	Chao-ch'eng		430–436
Sui Dynasty (Capital at Ch'ang-an)			581–618
Yang Chien	*Wen-ti*	(Sui) Kao-tsu	581–604
Yang Kuang, or Yang Ying	*Yang-ti*		604–617
Yang Yu	*Kung-ti*		617–618

Major Chinese dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
T'ang Dynasty (Capital at Ch'ang-an)			618–907
Li Yüan		(T'ang) *Kao-tsu*	618–626
Li Shih-min		(T'ang) *T'ai-tsung*	626–649
Li Chih		(T'ang) *Kao-tsung*	649–683
Li Hsien, or Li Che		(T'ang) *Chung-tsung* (1st time)	683/684–684
Li Tan		(T'ang) *Jui-tsung* (1st time)	684–690
Wu Chao	*Wu-hou* (empress)		690–705
		(T'ang) *Chung-tsung* (2nd time)	705–710
		(T'ang) *Jui-tsung* (2nd time)	710–712
Li Lung-chi	Ming-huang, or Wu-huang	(T'ang) *Hsüan-tsung*	712–756
Li Heng		(T'ang) *Su-tsung*	756–762
Li Yü		(T'ang) *Tai-tsung*	762–779/780
Li K'uo		(T'ang) *Te-tsung*	779/780–805
Li Sung		(T'ang) *Shun-tsung*	805
Li Ch'un		(T'ang) *Hsien-tsung*	805/806–820
Li Heng		(T'ang) *Mu-tsung*	820–824
Li Chan		(T'ang) *Ching-tsung*	824–826/827
Li Ang		(T'ang) *Wen-tsung*	826/827–840
Li Yen		(T'ang) *Wu-tsung*	840–846
Li Shen		(T'ang) *Hsüan-tsung*	846–859
Li Ts'ui		(T'ang) *I-tsung*	859–873
Li Huan		(T'ang) *Hsi-tsung*	873–888
Li Yeh		(T'ang) *Chao-tsung*	888–904
Li Chu	*Ai-ti*	(T'ang) Ching-tsung	904–907
Five Dynasties and Ten Kingdoms Period[11]			907–960
Wu-tai (Five Dynasties)			
Hou (Later) Liang (Capital at Pien)			907–923
Chu Wen, or Chu Huang, or Chu Ch'üan-chung		(Hou-Liang) T'ai-tsu	907–912
Chu Yu-kuei			912–913
Chu Yu-chen, or Chu T'ien	Mo-ti		913–923
Hou (Later) T'ang (Capital at Lo-yang)			923–936/937
Li Ts'un-hsü, or Li Ya-tzu		(Hou-T'ang) *Chuang-tsung*	923–926
Li Tan, or Li Ssu-yüan		(Hou-T'ang) *Ming-tsung*	926–933
Li Ts'ung-hou, or Li P'u-sa-nu	*Min-ti*		933–934
Li Ts'ung-k'o	*Mo-ti*, or Fei-ti		934–936/937
Hou (Later) Chin (Capital at Lo-yang, 936, and Pien, 937–946)			936–946/947
Shih Ching-t'ang		(Hou-Chin) *Kao-tsu*	936–942
Shih Chung-kuei	*Ch'u-ti*, or Shao-ti		942–946/947
Hou (Later) Han (Capital at Pien-chou)			947–950/951
Liu Chih-yüan, or Liu Kao		(Hou-Han) *Kao-tsu*	947–948
Liu Ch'eng-yu	*Yin-ti*		948–950/951
Hou (Later) Chou (Capital at Pien-chou)			951–960
Kuo Wei		(Hou-Chou) *T'ai-tsu*	951–954
Kuo Jung		(Hou-Chou) *Shih-tsung*	954–959
Kuo Tsung-hsün	*Kung-ti*		959–960
Shih-kuo (Ten Kingdoms)			
Wu (Capital at Yang-chou)			902–937
Yang Hsing-mi	*Hsiao-wu ti*	(Wu) T'ai-tsu	902–905
Yang Wu	*Ching-ti*	(Wu) Lieh-tsung	905–908
Yang Wei, or Yang Ying, or Yang Lung-yen	*Hui-ti*, or Hsüan-ti	(Wu) Kao-tsu	908–920
Yang P'u	*Jui-ti*		920–937
Nan (Southern) T'ang (Capital at Chin-ling)			937–975/976
Li Pien, or Hsü Chih-kao		(Nan-T'ang) *Lieh-tsu*	937–943
Li Ching, or Li Ching-t'ung, or Li Ying		(Nan-T'ang) *Yüan-tsung*	943–961
Li Yü, or Li Ts'ung-chia	*Hou-chu*, or Wu-wang		961–975/976
Nan (Southern) P'ing (Capital at Ching-chou)			924/925–963
Kao Chi-hsing, or Kao Chi-ch'ang	*Wu-hsin wang*		924/925–928/929
Kao Ts'ung-hui	*Wen-hsien wang*		928/929–948
Kao Pao-jung	*Cheng-i wang*		948–960
Kao Pao-hsü			960–962
Kao Chi-ch'ung			962–963
Ch'u (Capital at Ch'ang-sha)			927–951
Ma Yin	*Wu-mu*		927–930/931
Ma Hsi-sheng	*Heng-yang wang*		930/931–932
Ma Hsi-fan	*Wen-chao wang*		932–947
Ma Hsi-kuang			947–950
Ma Hsi-o			950–951
Ch'ien (Former) Shu (Capital at Ch'eng-tu)			907–925
Wang Chien		(Ch'ien-Shu) *Kao-tsu*	907–918
Wang Yen, or Wang Tsung-yen	*Shun-cheng kung*		918–925

[11] Between the fall of the T'ang dynasty (907) and the rise of the Sung dynasty (960) there developed a period of political upheaval in which there arose 5 short-lived, would-be dynasties in the north and 10 independent kingdoms, mainly in the south.

Major Chinese dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	years of reign
Hou (Later) Shu (Capital at Ch'eng-tu)			934–965
Meng Chih-hsiang		(Hou-Shu) *Kao-tsu*	934
Meng Ch'ang, or Meng Jen-tsan	*Ch'u-wang*		934–965
Min (Capital at Ch'ang-lo)			909–945/946
Wang Shen-chih		(Min) *T'ai-tsu*	909–925
Wang Yen-han			925/926–926/927
Wang Lin, or Wang Yen-chün	Hui-ti	(Min) *T'ai-tsung*	926/927–934/935
Wang Ch'ang, or Wang Chi-p'eng		(Min) *K'ang-tsung*	935–938/939
Wang Hsi, or Wang Yen-hsi		(Min) *Ching-tsung*	938/939–943
Wang Yen-cheng			943–945/946
Pei (Northern) Han (Capital at P'ing-yang)			951–979
Liu Min, or Lieu Ch'ung		(Pei-Han) *Shih-tsu*	951–954/955
Liu Ch'eng-chün	Hsiao-ho	(Pei-Han) *Jui-tsung*	954/955–968
Liu Chi-en			968
Liu Chi-yüan	Ying-wu		968–979
Nan (Southern) Han (Capital at Kuang-chou)			917–971
Liu Yen, or Liu Chih	T'ien-huang ta-ti	(Nan-Han) *Kao-tsu*	917–942
Liu Pin, or Liu Hung-tu			942–943
Liu Sheng, or Liu Hung-hsi		(Nan-Han) *Chung-tsung*	943–958
Liu Ch'ang, or Liu Chi-hsing	Nan-Yüeh wang		958–971
Wu-Yüeh (Capital at Hang-chou)			907–978
Ch'ien Ch'iu, or Ch'ien Liu	Wu-su	(Wu-Yüeh) *T'ai-tsu*	907–932
Ch'ien Yüan-kuan	Wen-mu, or Chuang-mu	(Wu-Yüeh) *Shih-tsung*	932–941
Ch'ien Hung-tso	Chung-hsien	(Wu-Yüeh) *Ch'eng-tsung*	941–947
Ch'ien Hung-tsung	Chung-hsün, or Chung-jang		947–948
Ch'ien Hung-shu	Chung-i		948–978
Sung Period			
Sung Dynasty			960–1279
Pei (Northern) Sung (Capital at Pien)			960–1127
Chao K'uang-yin		(Sung) *T'ai-tsu*	960–976
Chao Huang, or Chao Kuei, or Chao K'uang-i		(Sung) *T'ai-tsung*	976–997/998
Chao Heng, or Chao Te-ch'ang		(Sung) *Chen-tsung*	997/998–1022/23
Chao Chen, or Chao Shou-i		(Sung) *Jen-tsung*	1022/23–1063/64
Chao Shu, or Chao Tsung-shih		(Sung) *Ying-tsung*	1063/64–1067/68
Chao Hsü		(Sung) *Shen-tsung*	1067/68–1085/86
Chao Hsü		(Sung) *Che-tsung*	1085/86–1100
Chao Chi		(Sung) *Hui-tsung*	1100–1125/26
Chao Huan, or Chao Tan		(Sung) *Ch'in-tsung*	1125/26–1127
Nan (Southern) Sung (Capital at Lin-an)			1127–1279
Chao Kou		(Sung) *Kao-tsung*	1127–1162/63
Chao Shen, or Chao Po-ts'ung		(Sung) *Hsiao-tsung*	1162/63–1189/90
Chao Tun		(Sung) *Kuang-tsung*	1189/90–1194/95
Chao K'uo		(Sung) *Ning-tsung*	1194/95–1224/25
Chao Yün, or Chao Chün		(Sung) *Li-tsung*	1224/25–1264/65
Chao Ch'i, or Chao Meng-ch'i		(Sung) *Tu-tsung*	1264/65–1274
Chao Hsien		(Sung) *Kung-tsung*	1274–76
Chao Shih		(Sung) *Tuan-tsung*	1276–78
Chao Ping			1278–79
Liao, or Khitan, Dynasty[12] (Main capital at Lin-huang)			907–1125
A-pao-chi, or Yeh-lü Cho-li-chih, or Yeh-lü I	Ta-sheng ti	(Liao) T'ai-tsu	907–926
Te-kuang, or Yeh-lü Chi	Ssu-sheng ti	(Liao) T'ai-tsung	926–947
Yeh-lü Yüan, or Yeh-lü Juan	T'ien-shou ti	(Liao) *Shih-tsung*	947–951
Yeh-lü Kung, or Yeh-lü Ying, or Yeh-lü Ching	T'ien-shun ti	(Liao) *Mu-tsung*	951–968/969
Yeh-lü Hsien, or Yeh-lü Ming-chi	Hsiao-ch'eng ti	(Liao) *Ching-tsung*	968/969–982
Yeh-lü Lung-hsü	T'ien-fu ti	(Liao) *Sheng-tsung*	982/983–1031
Yeh-lü Tsung-chen	Wen-ch'eng ti	(Liao) *Hsing-tsung*	1031–55
Yeh-lü Hung-chi	T'ien-fu ti	(Liao) *Tao-tsung*	1055–1100/01
Yeh-lü Yen-hsi	*T'ien-tso ti,* or Yü-wang		1101–25
Hsi (Western) Liao, or Karakitai, Dynasty (Capital at Balasagun)			1124/25–1211
Yeh-lü Ta-shih		(Hsi-Liao) *Te-tsung*	1124/25–1143
T'a-pu-yen	*Kan-t'ien huang-hou* (empress regent)		1143–50
Yeh-lü I-lieh		(Hsi-Liao) *Jen-tsung*	1150–63
P'u-su-wan	*Ch'eng-t'ien t'ai-hou* (empress regent)		1163–77
Yeh-lü Chih-lu-ku	*Mo-chu*		1177–1211
Hsi (Western) Hsia, or Tangut, Kingdom (Capital at Hsing-ch'ing)			1038–1227
Chao Nang-hsiao, or Chao Yüan-hao	Wu-lieh ti	(Hsi-Hsia) *Ching-tsung*	1038–48[13]
Chao Liang-tsu	Chao-ying ti	(Hsi-Hsia) *I-tsung*	1048/49–1067/68
Chao Ping-ch'ang	K'ang-ching ti	(Hsi-Hsia) *Hui-tsung*	1067/68–1086
Chao Ch'ien-shun	Sheng-wen ti	(Hsi-Hsia) *Ch'ung-tsung*	1086–1139/40
Chao Jen-hsiao	Sheng-te ti	(Hsi-Hsia) *Jen-tsung*	1139/40–1193/94
Chao Ch'un-yu	Chao-chien ti	(Hsi-Hsia) *Huan-tsung*	1193/94–1206
Chao An-ch'üan	Ching-mu ti	(Hsi-Hsia) *Hsiang-tsung*	1206–11

[12] The Khitan dynasty was named the Liao in 947.

[13] Ching-tsung, ruling from 1032, was proclaimed emperor in 1038.

Major Chinese Dynasties (continued)

personal name, or native (*e.g.*, Mongol) name	posthumous name, or *shih*	temple name, or *miao-hao*	reign name, or *nien-hao*	years of reign
Hsi (Western) Hsia, or Tangut, Kingdom (continued)				
Chao Tsun-hsü	Ying-wen ti	(Hsi-Hsia) *Shen-tsung*		1211–23
Chao Te-wang		(Hsi-Hsia) *Hsien-tsung*		1223–26
Chao Hsien	*Mo-chu*			1226–27
Chin, or Juchen, Dynasty (Capital at Hui-ning, 1115–52, and Ta-hsing, 1152–1234)				1115–1234
A-ku-ta, or Wan-yen Min		(Chin) T'ai-tsu		1115–23[14]
Wu-ch'i-mai, or Wan-yen Sheng		(Chin) T'ai-tsung		1123–35
Wan-yen Tan, or Ha-la		(Chin) *Hsi-tsung*, or Min-tsung		1135–1149/50
Wan-yen Liang, or Ti-ku-nai	*Hai-ling wang*			1149/50–1161
Wan-yen Yung, or Wu-lu		(Chin) *Shih-tsung*		1161–1189/90
Wan-yen Ching		(Chin) *Chang-tsung*		1189/90–1208
Wan-yen Yün-chi, or Wan-yen Yung-chi	*Wei-shao wang*			1208–13
Wan-yen Hsün, or Wu-tu-pu		(Chin) *Hsüan-tsung*		1213–1223/24
Wan-yen Shou-hsü, or Wan-yen Shou-li, or Ning-chia-su		(Chin) *Ai-tsung*		1223/24–1234
Yüan, or Mongol, Dynasty[15] (Capital at Karakorum, 1206–60, Shang-tu, 1260–67, and Ta-tu, 1267–1368)				1206–1368
Genghis Khan, or Temüjin	Sheng-wu ti	(Yüan) T'ai-tsu		1206–27
Tolui (regent)	Chiang-hsiang ti	(Yüan) Jui-tsung or Ying-wu ti		1227–29
Ögödei Khan	Ying-wen ti	(Yüan) T'ai-tsung		1229–41
Töregene Khatun, or Nimacar (empress regent)	Lu huang-hou			1242–46
Güyük Khan	Chien-p'ing ti	(Yüan) Ting-tsung		1246–48
Ogul Gaimysh (empress regent)				1248–51
Möngke Khan, or Mangu Khan	Huan-su ti	(Yüan) Hsien-tsung		1251–59
Kublai Khan, or Setsen		(Yüan) Shih-tsu		1260–94
Temür, or Öljeitü		(Yüan) Ch'eng-tsung		1295–1307
Khaishan, or Gülük		(Yüan) Wu-tsung		1307–11
Buyantu, or Ayurparibhadra		(Yüan) Jen-tsung		1311–20
Sudhipala, or Gegen		(Yüan) Ying-tsung		1320–23
Yesen-temür	T'ai-ting ti, or Chih-p'ing ti			1323–28
Asikipa	T'ien-shun ti			1328
Tog-temür, or Jijagatu (1st time)		(Yüan) Wen-tsung		1328–29
Kushala, or Qutuqtu		(Yüan) Ming-tsung		1329
Tog-temür (2nd time)				1329–32
Irenjibal		(Yüan) Ning-tsung		1332
Togon-temür	Shun-ti			1333–68
Ming Dynasty (Capital at Nanking, 1368–1421, and Peking, 1421–1644)				1368–1644
Chu Yüan-chang	Kao-ti	(Ming) T'ai-tsu	*Hung-wu*	1368–98
Chu Yün-wen	Hui-ti		*Chien-wen*	1398–1402
Chu Ti	Wen-ti	(Ming) Ch'eng-tsu, or T'ai-tsung	*Yung-lo*	1402–24
Chu Kao-chih	Chao-ti	(Ming) Jen-tsung	*Hung-hsi*	1424–25
Chu Chan-chi	Chang-ti	(Ming) Hsüan-tsung	*Hsüan-te*	1425–35
Chu Ch'i-chen (1st time)	Jui-ti	(Ming) Ying-tsung	*Cheng-t'ung*	1435–49
Chu Ch'i-yü	Ch'eng-li wang		*Ching-t'ai*	1449–57
Chu Ch'i-chen (2nd time)			*T'ien-shun*	1457–64
Chu Chien-shen	Ch'un-ti	(Ming) Hsien-tsung	*Ch'eng-hua*	1464–87
Chu Yu-t'ang	Ching-ti	(Ming) Hsiao-tsung	*Hung-chih*	1487–1505
Chu Hou-chao	I-ti	(Ming) Wu-tsung	*Cheng-te*	1505–21
Chu Hou-tsung	Su-ti	(Ming) Shih-tsung	*Chia-ching*	1521–66
Chu Tsai-hou	Chuang-ti	(Ming) Mu-tsung	*Lung-ch'ing*	1566–72
Chu I-chün	Hsien-ti	(Ming) Shen-tsung	*Wan-li*	1572–1620
Chu Ch'ang-lo	Cheng-ti	(Ming) Kuang-tsung	*T'ai-ch'ang*	1620
Chu Yu-chiao	Che-ti	(Ming) Hsi-tsung	*T'ien-chi*	1620–27
Chu Yu-chien	Chuang-lieh-min	(Ming) Ssu-tsung, or I-tsung	*Ch'ung-chen*	1627–44
Ch'ing, or Manchu, Dynasty (Capital at Peking)				1644–1911/12
Fu-lin[16]	Chang-ti	(Ch'ing) Shih-tsu	*Shun-chih*	1644–61
Hsüan-yeh	Jen-ti	(Ch'ing) Sheng-tsu	*K'ang-hsi*	1661–1722
Yin-chen	Hsien-ti	(Ch'ing) Shih-tsung	*Yung-cheng*	1722–35
Hung-li	Ch'un-ti	(Ch'ing) Kao-tsung	*Ch'ien-lung*	1735–96
Yung-yen	Jui-ti	(Ch'ing) Jen-tsung	*Chia-ch'ing*	1796–1820
Min-ning	Ch'eng-ti	(Ch'ing) Hsüan-tsung	*Tao-kuang*	1820–50
I-chu	Hsien-ti	(Ch'ing) Wen-tsung	*Hsien-feng*	1850–61
Tsai-ch'un	I-ti	(Ch'ing) Mu-tsung	*T'ung-chih*	1861–75
Tsai-t'ien (empress dowager Tz'u-hsi was regent 1875–89 and 1898–1908)	Ching-ti	(Ch'ing) Te-tsung	*Kuang-hsü*	1875–1908
P'u-i[17]			Hsüan-t'ung	1908–1911/12

[14] A-ku-ta, ruling from 1113, was proclaimed emperor in 1115. [15] The Yüan dynasty was not so named until the reign of Kublai Khan, in 1271. Some authorities would assert that the dynasty did not begin until that date or, at least, until 1260, the year of Kublai Khan's accession. [16] The family name of the Ch'ing emperors was Ai-hsin-chüeh-lo, of Manchu origin. It has customarily not been joined with the given name. [17] P'u-i, the last emperor of China, acquired no temple name. His imperial regime was overthrown in the revolution of 1911, but he did not formally abdicate until Feb. 12, 1912. Thus his dynasty, the Ch'ing, is variously said to have ended in 1911 or 1912. P'u-i himself, from 1932 to 1945, was puppet ruler of Manchukuo (Manchuria) under the control of the Japanese; he was "chief executive" from 1932 to 1934 and "emperor" from 1934 to 1945 under the reign title of K'ang-te.

ods also vary north and south of the divide, lasting 240 to 365 days southward, 100 to 240 days northward, and as few as 45 days in the Tibetan highlands. Summers are hot in the southeast and northwest, the basins and lowlands averaging between 75° and 85° F (24° and 29° C); warm in the northeast, between 60° and 75° F (16° and 24° C); and cool in the southwest, between 40° and 50° F (4° and 10° C).

China's arable land is little more than one-tenth of its total land area; but because extended frost-free periods in the southeast allow double-cropping, the crop area harvested is about one and a half times arable land area. Reforestation programs during the 1970s apparently succeeded in increasing forest areas to about one-seventh of China's land area. Practically all types of natural vegetation indigenous to the Northern Hemisphere can be found in China. The vegetation ranges from boreal taiga to tropical rain forest and from barren tundra and desert to mangrove swamps. In terms of predominant vegetation, China may be divided diagonally from southwest to northeast into a dry northwestern half marked by grassland deserts and a humid southeastern half that supports woodlands. The vegetation of the tropical area, which adjoins the humid southeast, is closely related to that of Southeast Asia.

China's metal reserves include more than 40 percent of the world's tungsten, about 25 percent of the world's tin, more than 7 percent of the world's lead, more than 3.5 percent of the world's iron ore, about 2 percent of the world's copper, and substantial deposits of zinc, antimony, chromium, and cobalt among others. In the early 1990s, its fossil-fuel resources included 3 percent of the world's total proven petroleum reserves, 1 percent of its reserves of natural gas, and about 45 percent of the world's total recoverable coal reserves.

The people. China is a multinational country, with a large number of ethnic and linguistic groups, but the Han, or ethnic Chinese, form the great homogeneous mass (about 92 percent) of the population. Four major language families are represented in China—the Sino-Tibetan, Altaic, Indo-European, and Austroasiatic. Han Chinese is the most widely spoken language. Though unified by their tradition, the written characters of their language, and by many cultural traits, the Han speak several mutually unintelligible dialects and display marked regional differences. The most important Han Chinese dialect is Mandarin. Most ethnic minorities live in the western half of the country, with scattered numbers in the north and southwest as well.

China contains more than one-fifth of the world's entire human population. The population is quite unevenly distributed, however, with the great majority living in the easternmost one-third of the country. The most densely populated areas are the alluvial plains on which intensive agriculture is centred. The extensive western regions are sparsely populated, with large areas of desert and mountainous terrain that are virtually uninhabited. Despite rapid industrialization and urbanization, most of China's people still live in villages in the countryside; only about one-fourth of the total population is urban.

China's huge population must subsist on a relatively limited area of agricultural land, raising the ever-present possibility of an inadequate food supply. In a major attempt to limit future population growth, the government in the 1970s initiated a strict family-planning program that rewards couples who have only one child and penalizes those who have more than two. Each one-child family is given preference in housing, medical care, and other social-welfare services. The social pressures connected with carrying the one-child policy are somewhat coercive, but China's population growth is now unusually low for a developing country. Even so, more than one-fourth of its population is less than 15 years of age.

The economy. The Chinese economy has been in a state of transition since the late 1970s as it has moved from a Soviet-type system, with central planning, state-run industries, and collectivized agriculture, toward one relying on individual and cooperative farms and a mixture of state-owned, cooperative, and private enterprises in manufacturing and services. The government's priorities have shifted toward encouraging the growth of light, consumer-goods industries and away from metallurgical and machine-building industries. These policies proved highly successful and gave China one of the highest economic growth rates in the world in the 1980s and early '90s. The gross national product per capita remains relatively low, however. Manufacturing and agriculture are the main components of the gross domestic product (GDP).

Agriculture and forestry account for more than one-fourth of the GDP and employ about three-fifths of the labour force. Irrigation is used on half of the arable land, but mechanization and the use of chemical fertilizers are uneven. China is the world's largest producer of rice, wheat, sweet potatoes, tobacco, and cotton. Rice is the staple food of the southernmost one-third of the country. Rice and wheat vie for first place in central China, while in the north wheat is the dominant crop. Millet and kaoliang (a variety of grain sorghum) are grown mainly in the Northeast (Manchuria). China is also a major producer of corn (maize), soybeans, peanuts (groundnuts), potatoes, and sugarcane. Substantial quantities of sugar beets, cabbage, tomatoes, rapeseed, and barley are also grown. Pastures total about two-fifths of China's area, and cattle hides and wool are produced in large quantities. China is the world's leading producer of pigs, chickens, and eggs. Despite its substantial production of food, and sharply increased crops over the yields of the early 1980s, China remains a net importer of food. About one-third of the annual forestry harvest is for industrial use, but the rest is used for fuel, and China must import some of its lumber.

China is well endowed with mineral resources, the most important of which, coal, is found chiefly in the northern part of the country. China also has significant petroleum resources; it consumes most of its oil output but does export some crude oil and oil products. The major ores mined are iron ore, bauxite, copper, lead, and manganese. China is a world leader in the production of antimony and tungsten; and tin, barite, fluorspar, nickel, mercury, molybdenum, silver, and gold are produced in quantity. Important nonmetal minerals include salt, phosphates, gypsum, and magnesite.

China's manufacturing sector achieved spectacular growth late in the 20th century, largely owing to rapidly expanding light and consumer-goods industries. State-owned factories accounted for less than one-half of the country's total industrial output by the mid-1990s. Manufacturing accounts for two-fifths of the GDP and employs one-sixth of the nation's workforce. The principal manufactures include cement; refined petroleum products; crude steel; pig iron; rolled steel; cotton, woolen, silk, and synthetic textiles and clothing; vegetable oils; raw sugar; fertilizers and insecticides; plastics; metalworking machines; sewing machines; electrical transformers; batteries; television and radio receivers; trucks; tractors; bicycles; railway locomotives and rolling stock; electronics wares; and watches and cameras. Electric energy production was four-fifths thermal and one-fifth hydroelectric. Several nuclear power plants were under construction in the mid-1980s.

China's expanding transportation system has not kept pace with the rapid growth and modernization of the larger economy, and railroads, mostly using steam locomotives, still provide the major means of freight haulage. Coal has long been the principal railway cargo. The number of automobiles and trucks in China is increasing rapidly, and a rural road-building program has helped open up commercial routes to the country's villages to facilitate the transport of locally produced goods. An extensive system of inland waterways, totaling 68,000 miles (110,000 km) and located mostly in central and southern China, moves much of the country's freight. The Yangtze River is the most important artery in this waterway network. International airports are located at Shanghai, Canton, Peking, and several other cities, and domestic services cover all provinces and autonomous regions.

A rough balance of trade was achieved in the early and mid-1980s. China's principal imports include wheat, rolled steel, manufactured fertilizers, synthetic fibres, uncombed cotton, sugar, and synthetic polymers, mainly obtained from Hong Kong, Japan, the United States, Taiwan, and Germany. The principal exports are crude petroleum, garments, petroleum products, cotton cloth, coal, and canned food, imported principally by Hong Kong, Japan, and the United States.

Government and social conditions. China is a one-party republic. The Chinese Communist Party (CCP) dominates Chinese political life and society, controlling all major governmental institutions. Ultimate decision-making power within the CCP rests with the powerful seven-member Standing Committee of the Politburo, which is elected by the CCP's Central Committee. Many major party officials occupy high-level positions in government, thus enabling the CCP to keep control over the government at all levels of administration. China's constitution of 1982 vests all national legislative power in the hands of the National People's Congress (NPC), but actual policymaking and administrative authority reside in the CCP and in the State Council, which is the top executive government organ at the national level. The Standing Committee of the State Council consists of the premier, more than a dozen vice-premiers, and about 50 heads of ministries and commissions, who together exercise major day-to-day decision-making authority within the government.

Employed persons in state-run enterprises and in government and party organizations are eligible for work injury, sickness, and maternity benefits, as well as old age, disability, and survivor's pensions. Government policy has laid particular emphasis on providing medical service and undertaking sanitation measures in the countryside. Medical personnel in cities are encouraged to go into the country to serve people there; medical teams circulate regularly in rural areas. Among these are the so-called barefoot doctors, who are given intensive training for relatively short periods so that they may work in rural areas. Owing to this emphasis on medical care and sanitation, such diseases as cholera, plague, typhoid, and scarlet fever have been virtually eradicated. China's new health problems are hypertension and cancer, diseases usually associated with the most highly industrialized countries. China's life expectancy increased from about 60 years in 1970 to about 70 years in 1990.

The Chinese educational system, which stressed ideology and political instruction during the Cultural Revolution (1966–76), now encourages students to acquire scientific and technical knowledge and develop professional skills. Nearly all primary-school-age children attend school. In 1985 the Chinese government announced a program of reforms that included nine years of compulsory education

by 1995 for most of the country. Despite the new emphasis on education, only about 70 percent of the adult population is literate. The CCP controls the nation's television, radio, and press, using them to mobilize support for party policies.

History. The discovery of the remains of Peking man (*Homo erectus pekinensis*) in 1927, in a cave 30 miles (48 km) southwest of Peking, dates the advent of human settlement in China to about 350,000 years ago. The apparent cradle of Chinese civilization was the Huang Ho; excavations show that the first glimpses of what can be called Chinese culture are found in the present area of Honan, Shantung, and Shensi provinces.

The first dynasty for which there is definite historical material is the Shang, or Yin (18th–12th century BC). The Shang ruled over an area that extended west to Shensi, south to the Yangtze River, and north to southern Hopeh. Under the Shang the Chinese used a calendar, could write, and developed a high proficiency in bronze metallurgy.

The Chou, whose origins are unknown, were a subject people of the Shang but defeated them in 1111 and began a dynasty that lasted until 256/55 BC. This was a feudal period, and, from the 8th to the 3rd century, China was beset by wars between contending states. Confucius (551–479 BC) dates from this period; he elaborated the social concepts that would become normative for later Chinese civilization.

One of the vassal states of the Chou, the Ch'in, brought unification to China in 221. Shih Huang-ti called himself first sovereign emperor, abolished feudalism, and built the Great Wall. In later eras, the Ch'in boundaries were always considered to embrace the indivisible area of China proper. It is from this dynasty that the name China is derived.

However, the Ch'in dynasty did not last long. The Han assumed the throne in 206 BC and ruled until AD 220. The Han dynasty formed the first long-lasting regime that could successfully claim to be the sole governmental authority in China. The Han period witnessed a number of technological advances, including the development of paper.

A time of turbulence and fragmentation followed the fall of the Han in 220. Warlordism developed and north China fell prey to a number of non-Chinese invaders. Buddhism penetrated both north and south China at this time.

Reunification was achieved in 581 by the Sui dynasty. The Sui instituted important governmental reforms, but they could not survive their expensive and unsuccessful military ventures. In 618 the T'ang dynasty succeeded the Sui. The T'ang perfected the use of scholars chosen by examination as civil servants. When the T'ang declined, another period of fragmentation followed (907–960), marked by militarism and warfare.

The Sung dynasty restored peace and unity in 960 but were forced to move their capital to the south because of the Juchen invasions in the north. South of the Yangtze River, the Southern Sung dynasty lasted until 1279, when the Mongol (Yüan) domination began. The Mongols ruled a huge empire that stretched from the Yellow Sea to Central Asia and beyond, but they were never able to achieve a durable identification with Chinese civilian institutions. Their discrimination against the Chinese further alienated them, and they were overthrown in 1368 by the Ming. Under the despotic rule of the Ming dynasty, antiforeign feelings reached new levels, and, for all practical purposes, China closed itself off from the forces shaping the rest of the world. Private trade was prohibited and private voyaging forbidden.

Alien rule returned to China in 1644 when the Juchen tribes of Manchuria once again asserted themselves and began the Ch'ing, or Manchu, dynasty. The Ch'ing represented a synthesis of Manchu-Chinese civilization and expanded the nation's boundaries significantly, but an early decline in the strength of the dynasty and ever-increasing incursions by foreign commercial interests sealed the fate of the Manchus. The 19th century was a disaster for China. From the Opium War of 1839–42, to the Taiping Rebellion of 1851–64, to the Sino-Japanese War of 1894–95, the Manchus lost control of the country, which was left open to dismemberment by foreign powers.

The Ch'ing dynasty, China's last, fell in 1911 and a republic was proclaimed in 1912 under the leadership of Sun Yat-sen, but political betrayal and regional warlords soon left the republic in shreds. Sun's Nationalist Party (Kuomintang) attempted to reunite China. Under the military leadership of Sun's successor, Chiang Kai-shek, and with Communist participation and Soviet support, some national unification was achieved in the 1920s. Chiang then broke with the Communists, who withdrew to independent bases in the countryside and formed their own armies and administrations. Japan invaded Manchuria in 1931 and invaded North China proper in 1937. The Japanese occupation of most of northern and eastern China lasted until 1945.

In the meantime, the Communists had been gaining local peasant support after the Long March of 1934–35, during which Communist forces retreated 6,000 miles (9,700 km) into northern Shensi province. Mao Zedong had emerged as the undisputed leader of the Communist movement. The Communist army cooperated with Chiang's Nationalist forces and with the Allies against the Japanese during World War II, but, upon Japan's surrender, the Communists and Nationalists entered a final struggle for control of China. Civil war thus raged in the nation from 1946 to 1949, during which Chiang's Nationalist forces were routed and fled to Taiwan. On Oct. 1, 1949, the People's Republic of China was proclaimed by the Communists.

The Communists undertook large-scale land reforms (which were followed by collectivization), instituted ambitious educational and health programs, and nationalized the country's industries. Pragmatic policies of economic development alternated with more radical periods of revolutionary agitation and upheaval, notably the Great Leap Forward (1958–60) and the Cultural Revolution (1966–76), both of which were launched by Mao and other radicals within the Chinese Communist Party. The chaos and violence of the Cultural Revolution discredited the radicals, and, after Mao's death in 1976, his policies were repudiated by party moderates led by Deng Xiaoping. The government then undertook far-reaching economic reforms that lifted many government controls and partially restored private enterprise. China's ties with the West were renewed, and an ambitious family-planning program was instituted to slow the very rapid growth of the nation's population. As a result, living standards in China rose markedly from the late 1970s, and by the mid-1990s China's fast-growing economy had become the world's third largest (after the United States and Japan).

china, also called CHINAWARE, any of various fine ornamental and useful ceramic wares, usually made of porcelain. *See* porcelain; bone china; ironstone china.

China, Republic of: *see* Taiwan.

China 1, also called CHICOM 1, or PRC 1, first Earth satellite orbited by the People's Republic of China. It was launched on April 24, 1970, from the rocket facility at Shuang Cheng Tsu. By placing the satellite into Earth orbit, China became the fifth nation to accomplish this feat. Little is known about China 1. It weighed approximately 173 kg (381 pounds) and carried a radio transmitter that broadcast a patriotic anthem.

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China aster, also called ANNUAL ASTER (*Callistephus chinensis*), herbaceous plant of the aster family (Asteraceae, also called Compositae), many cultivated varieties of which are longtime garden favourites. The native species from China is 75 cm (2.5 feet) tall, with white to violet flowers having yellow centres. The cultivated varieties vary in height from 20 cm to 1 m (8 inches to 3 feet) tall. The flower heads, up to 12 cm (about 5 inches) across, are often totally composed of petallike ray flowers; they range in colour from white and pale yellow to pink, rose, red, bluish, purple, and violet.

china clay: *see* kaolin.

China fir (*Cunninghamia lanceolata*), coniferous evergreen timber tree of the deciduous cypress family (Taxodiaceae), native to East Asia. The China fir may grow to a height of 50 m (160 feet), with a circumference of about 5.5 m (18 feet); it is covered with fragrant, reddish brown bark that is shed in long strips. The spreading branches, drooping at the ends, bear flattened, lance-shaped leaves about 6 cm (2 inches) long and 6 mm (0.2 inch) wide. The rounded cones, up to 5 cm long, have thick, spiny-tipped scales, with three seeds on each scale.

China green (dye): *see* malachite green.

China Sea, part of the western Pacific Ocean bordering the Asian mainland on the east-southeast.

A brief treatment of the China Sea follows. For full treatment, *see* MACROPAEDIA: Pacific Ocean.

The China Sea consists of two parts, the South China Sea (Wade-Giles and Pinyin, Nan Hai) and the East China Sea (Wade-Giles, Tung Hai; Pinyin, Dong Hai), which connect through the shallow Taiwan Strait between Taiwan and mainland China.

The South China Sea is bounded on the west by the Asian mainland, on the south by the eastern limit of the Gulf of Thailand and the east coast of the Malay Peninsula, and on the east by Borneo, the Philippines, and Taiwan. The northern boundary extends from the northernmost point of Taiwan to the coast of Fukien province, China. As the largest marginal sea of the western Pacific, it covers an area of about 848,400 square miles (2,197,300 square km) and has an average depth of 3,740 feet (1,140 m). The major topographic feature of the South China Sea is a deep rhombus-shaped basin in the eastern portion, with reef-studded shoal areas rising up steeply within the basin to the south and northwest. The deepest section, called the China Sea Basin, has a maximum depth of 16,452 feet (5,015 m). A broad, shallow shelf extends up to 150 miles (240 km) in width between the mainland and the northwestern side of the basin and includes the Gulf of Tonkin and Taiwan Strait. To the south, off southern Vietnam, the shelf narrows and connects with the Sundra Shelf, one of the largest sea shelves in the world, covering the area between Borneo, Sumatra, and Malaysia, including the southern portion of the South China Sea.

The major rivers draining into the sea are the tributaries forming the Pearl River delta between Hong Kong and Macau, the Hsi River, which enters near Macau, and the Red and Mekong rivers, which enter in Vietnam. Weather in the region is tropical and largely controlled by monsoon winds. Annual rainfall

varies from about 80 inches (2,000 mm) to as much as 160 inches around the southern basin; summer typhoons are frequent. Monsoons also control the sea-surface currents as well as the exchange of water between the South China Sea and adjacent bodies of water.

The East China Sea extends northeastward from the South China Sea and is bounded on the west by the Asian mainland and on the east by the Ryukyu Islands chain, Japan's southernmost main island of Kyushu, and Cheju Island, off South Korea. An imaginary east-west line connecting Cheju Island with the mainland of China separates the East China Sea from the Yellow Sea to its north. The East China Sea, with an area of 290,000 square miles (751,100 square km), is generally shallow, having an average depth of only 1,145 feet (349 m). The Okinawa Trough, its deepest section, extends alongside the Ryukyu Island chain and has a maximum depth of 8,912 feet (2,717 m). The western edge of the sea is a continuation of the shelf that extends from the South China Sea north to the Yellow Sea. The weather of the East China Sea is also dominated by the monsoon wind system. Warm, moist winds from the western Pacific bring a rainy summer season accompanied by typhoons, but in the winter the monsoons reverse and bring cold, dry air from the Asian continent in the northwest. The winds influence the water circulation of the Kuroshio (Japan Current), a northward-flowing branch of the warm North Equatorial Current that flows near Taiwan.

Both seas are heavily fished; tuna, mackerel, croaker, anchovy, shrimp, and shellfish constitute the main catch. Fish from the South China Sea provide as much as 50 percent of the animal protein consumed along the densely populated coast of Southeast Asia. Both seas also serve as major shipping routes. The South China Sea, with the Strait of Malacca, forms the main transport route between the Pacific and Indian oceans, and the East China Sea serves as the main shipping route from the South China Sea to Japanese and other North Pacific ports.

China tree: *see* goldenrain tree.

China wood oil: *see* tung oil.

chinampa, also called FLOATING GARDEN, small, stationary, artificial island built on a freshwater lake for agricultural purposes. "Chinampan" was the ancient name for the southwestern region of the Valley of Mexico, or the region of Xochimilco; and it was there that the technique was—and is yet—most widely used. It consists in building up a number of little islands, each averaging 6 to 10 m (19.7 to 32.8 feet) wide and 100 to 200 m (30.5 to 656.2 feet) long, using layers of vegetation, dirt, and mud. The technique contains its own irrigation from the moisture filtering in from the lake; fertilization is from the organic wastes in mud and aquatic life. It is an intensive and productive form of cultivation.

Chinandega, town, northwestern Nicaragua, in the Pacific coastal lowlands. Its central section was destroyed during a revolutionary outbreak in 1927, and the town was a scene of heavy fighting between Sandinista guerrillas and government troops in 1978–79, with serious damage to property. As a commercial and manufacturing centre, Chinandega processes a variety of crops—chiefly cotton, sugarcane, and bananas—from the agricultural hinterland and has sawmills, tanneries, and metalworks. Its manufactures include furniture, perfume, and toilet water. The Pacific Railway runs through Chinandega, and a branch line leads to the port of Corinto. Chinandega is linked by highway to León city and Managua, the national capital. Pop. (1985 est.) 67,792.

Chinantec, Middle American Indians of northwestern Oaxaca in southern Mexico. The area is mountainous and not easily accessible. The Chinantec, who numbered about 150,000 in the late 20th century, are agricultural, as are most Middle American Indians. Corn (maize) and beans, supplemented by cassava and yams, are the staple crops. Cultivation is by hand, with digging stick and hoe. Chicken,

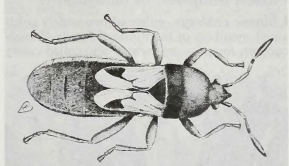


Two Chinantec Indian girls wearing elaborately braided hair
Donald Cordry

pork, and fish provide protein in the Chinantec diet. Wild fruit is gathered, although cultivated fruit is rare. Large, windowless, rectangular houses are built of vertically placed logs and thatch roofs. Native crafts are declining, but baskets and carrying bags are made; cloth for the *huipil* (long blouse or tunic for women) is woven where it is still worn. In some localities women wear the *huipil* woven in bright patterns, with or without an underskirt; the traditional costume for men is no longer worn.

The *compadrazgo,* or godparent rite, is practiced, bonding a child's parents to the chosen godparent by various rituals and obligations. The Chinantec practice Roman Catholicism with syncretistic additions; rain and crop-fertility rituals have disappeared.

chinch bug (*Blissus leucopterus*), important grain and corn pest belonging to the insect family Lygaeidae (order Heteroptera). Though a native of tropical America, the chinch bug has extended its range to include much of North America. It is a small bug, not more than 5 mm (0.2 inch) long. The adult is black with red legs; the white forewings have a black spot near the outer edge. In spring, adults that hibernated during the winter migrate from clumps of weeds to a wheat or other grain field. Each female then deposits about 300 to 500 cylindrical, yellow eggs on the roots, lower leaves, and stems of the grain. Reddish nymphs with a light band across the back



Chinch bug (*Blissus leucopterus*)
By courtesy of the U.S. Department of Agriculture

emerge from the eggs after one or two weeks and immediately begin to suck the plant's sap. They grow rapidly, becoming dark and molting five times in about 40 days. When the wheat becomes too hard to suck or when harvest begins, large numbers of chinch bugs migrate—by crawling or flying, depending on the stage of development—to another grain field in search of food and a place to deposit eggs for a second generation. In autumn the second-generation adults fly to clumps of grass or some other sheltered place and hibernate during the winter.

Control methods include the destruction of hibernating sites, controlled planting of cereal grains, and use of immune and resistant crops. Measures effective in small areas include spraying and trapping the migrating bugs in chemical barriers. Since chinch bugs prefer sunshine, planting shade crops, such as cowpeas or soybeans, creates an unfavourable environment. Wet weather promotes the growth of a fungus that kills them.

The hairy chinch bug (*Blissus hirtus*) does not migrate. This short-winged insect, sometimes a lawn pest, is controlled by fertilizing, watering, and cutting grass. The false chinch bug (*Nysius ericae*) is brownish gray and resembles the chinch bug. It feeds on many plants but is rarely an important crop pest.

Chincha Islands, Spanish ISLAS DE CHINCHA, island group that is part of Los Libertadores-Wari *región,* Peru. Located in the Pacific Ocean 13 miles (21 km) off Peru's southwestern coast, the three small islands are situated to the northwest of Paracas Bay and west-northwest of the city of Pisco. They have extensive guano deposits, which have been exploited for fertilizer.

chinchilla, small South American rodent of the family Chinchillidae (order Rodentia),



Chinchilla (*Chinchilla laniger*)
Jane Burton—Bruce Coleman Ltd

long valued for its extremely fine-textured fur. Chinchillas look like long-tailed rabbits, but with smaller ears. They are about 35 cm (14 inches) long, including the tufted tail. The soft, valuable fur is pale gray with dusky overtones; a black streak runs the length of the tail, above and below. Depending on the authority, chinchillas may be considered a single species, *Chinchilla laniger,* or two species, the long-tailed (*C. laniger*) and the short-tailed (*C. brevicaudata*).

Chinchillas live in loose communities in arid, rocky regions of the Chilean and Bolivian Andes. They live in burrows or rock crevices and are active above ground in the morning and late afternoon. At the least alarm they scamper to their burrows, only to emerge a few moments later. They eat seeds, fruit, grain, herbs, and moss. Usually two litters, each of two young, are produced yearly; the gestation period is about 110 days.

Once hunted almost to extinction, chinchillas are still scarce in the wild. They are raised commercially. Almost all of the chinchillas in captivity are descended from a few animals introduced into the United States in 1923. For mountain chinchilla, *see* viscacha.

chinchilla rat, any of several species of small ratlike rodents that constitute the genus *Abrocoma* in the family Abrocomidae (order Ro-

dentia), and which are sometimes known as chinchillones, or rat chinchillas. It is found in rocky, often inaccessible areas of the Andes of South America and lives, apparently in small colonies, in tunnels or among rock crevices. It is vegetarian and able to climb trees. The chinchilla rat is 15 to 25 cm (6 to 10 inches) long, excluding the ratlike tail. Distinguishing features include a pointed head, large eyes and ears, and soft, chinchilla-like fur that is grayish above and paler on the belly, feet, and tail.

Chindwin River, main tributary of the Irrawaddy River, northern Myanmar (Burma). The Chindwin is formed in the Pātkai and Kumon ranges of the Indo-Myanmar border by a network of headstreams including the Tanai, Tawan, and Taron. Called Ningthi by the Manipuris of India, it drains northwest through the Hukawng valley and then begins its 520-mile (840-kilometre) main course. The Chindwin generally flows southward through the Nāga Hills and past the towns of Singkaling Hkamti, Homalin, Thaungdut, Mawlaik, Kalewa, and Monywa. Below the Hukawng valley, falls and reefs interrupt it at several places. At Haka, goods must be transferred from large boats to canoes.

The Uyu and the Myittha are the main tributaries of the system, which drains approximately 44,000 square miles (114,000 square km). During part of the rainy season (June–November), the Chindwin is navigable by river steamer for more than 400 miles (640 km) upstream to Singkaling Hkamti. It joins the Irrawaddy River near Myingyan. The Chindwin's outlets into the Irrawaddy are interrupted by a succession of long, low, partially populated islands. According to tradition, the most southerly of these outlets is an artificial channel cut by one of the kings of Pagan. Choked up for many centuries, it was reopened by an exceptional flood of 1824.

Chinese art, the painting, calligraphy, architecture, pottery, sculpture, bronzes, jade carving, and other fine or decorative art forms produced in China over the centuries.

A brief treatment of Chinese art follows. The arts in China are treated in a number of articles in the MACROPAEDIA. For a unified treatment of Chinese fine and decorative arts, *see* East Asian Arts. For individual treatments of Chinese pottery, metalwork, and lacquerware, *see* Decorative Arts and Furnishings. For a treatment of Chinese calligraphy, *see* Writing.

Chinese art traditions are the oldest continuous ones in the world, stretching back 7,000 years or more in some media. Delicately potted wares and sophisticated jade carvings were being produced by the late Neolithic Period (*c.* 3000–1500 BC). During the Shang dynasty (18th–12th century BC) the art of Chinese writing developed and techniques of bronze casting became quite advanced. The earliest extant Chinese paintings date from the Chou dynasty (11th century–255 BC), and the origins of the distinctive bracketing system that characterizes Chinese architecture also appeared at this time.

Calligraphy, the art of painting Chinese characters with a brush, is one of the oldest and most fundamental forms of Chinese art. Chinese painters have used essentially the same materials as calligraphers—brush, ink, and sheets made of silk or paper—and their works are judged by the same criteria, namely the vitality and expressiveness of the brushstrokes and the harmonious rhythm of the composition. Painting in China is thus essentially a linear art whose practitioners strive less to convey a sense of reality and suggest three-dimensional mass than to transmit to paper an awareness of the inner life and wholeness of things by means of the quality of the brushwork. The aesthetics of painting and calligraphy have significantly influenced the other arts in China. In the motifs that adorn ritual bronzes, in the flow of drapery over the surface of Buddhist sculpture, and in the decoration of lacquerware, pottery, and cloisonné enamel, it is the rhythmic movement of the line that largely determines the form and gives to Chinese art its remarkable harmony and unity of style.

Chinese painting is at once more abstract and more efficient (in terms of brushstrokes) than is Western painting. Landscapes have been the most popular theme, but portraits and figural compositions are common, and small objects—a bird, a flower, a fish, or bamboo—are also depicted. In all such genres, Chinese artists have traditionally sought to express both inner harmony and harmony with the natural surroundings. Most Chinese painting is executed in ink monochrome with a pointed-tipped brush. The silk or paper surface allows no erasure or correction, so the painter must know beforehand what he intends to paint. The execution demands confidence, speed, and a technical mastery of brushstrokes that is acquired only by long practice.

Traditional Chinese buildings are made of timber and have a post and lintel frame (vertical columns topped by a horizontal beam) that defines the planes of enclosing walls. The columns support a system of interlocked brackets upon which a massive, steeply sloping, tiled roof is set. The heavy overhang of the roof is carried by sloping, cantilevered rafters that rest on the brackets. Swept-up eaves at their corners impart a distinctive curve to the roofs of Chinese buildings. The domination of the roof allows little variation in the form of the individual building, but its sweeping expanse imparts a restful serenity to the structure.

Works of sculpture in China have usually been created not as art objects in themselves but for a specific ceremonial, religious, or funerary purpose. The most important sculptures are large-scale works in stone or wood of Buddhist deities.

The principal decorative arts in China are pottery, jade carving, metalwork, lacquerware, furniture design, and textiles. True pottery glazes were developed in China before the end of the 2nd millennium BC, and porcelain was developed by the 6th century AD, more than 1,000 years before its discovery in Europe. Perhaps nowhere in the world has pottery assumed such importance as in China, and the influence of the country's porcelain on later European pottery has been profound. Bronze casting, while not so ancient as that of the Middle East, reached by 1000 BC a perfection of beauty and craftsmanship not matched in the ancient Western world. In terms of style, these crafts share with sculpture a debt to pictorial art and an aesthetic based on the rhythmic movement of line.

Chinese bellflower: *see* balloonflower.

Chinese cabbage, either of two widely cultivated members of the mustard family (Brassicaceae). *Brassica pekinensis,* also called celery cabbage, forms a tight head of crinkled light green leaves. One type, Michihli, or Tientsin, forms slender cylindrical heads about 45 cm (18 inches) tall. It has long been grown in the United States as a salad vegetable. Napa is similar, but its heads are shorter and thicker, 30 cm (12 inches) tall. *Brassica chinensis,* also called Chinese mustard, or bok choy, has glossy dark green leaves and thick, crisp white stalks in a loose head. Its yellow-flowering centre is especially prized. All Chinese cabbages are delicate and crisp, qualities that enable them to combine with a wide variety of foods. Kimchi, the universal Korean pickle, is often made with Chinese cabbage.



Chinese cabbage (*Brassica chinensis*)
Shunji Watari

Chinese calendar, dating system used concurrently with the Gregorian (Western) calendar in China and Taiwan and in neighbouring countries (*e.g.,* Japan). The Chinese calendar is basically lunar, its year consisting of 12 months of alternately 29 and 30 days, equal to 354 days, or approximately 12 full lunar cycles. Intercalary months have been inserted to keep the calendar year in step with the solar year of about 365 days. Months are referred to by number within a year and sometimes also by a series of 12 animal names that from ancient times have been attached to years and to hours of the day. These names in order are rat, ox, tiger, hare, dragon, snake, horse, sheep, monkey, fowl, dog, and pig. The Chinese year beginning in 1984 was the Year of the Rat.

Chinese chess, Chinese (Wade-Giles) HSIANG-CH'I, or (Pinyin) XIANGQI, strategy board game played in China from about AD 700. In Chinese chess the pieces represent artillery and fortresses, elephants, cavalry, infantry, and chariots. Each player has 16 pieces; the names of corresponding pieces of the opponent's armies are in some cases different. The two halves of the chessboard, each of which is eight squares by four, are separated from each other by a space one square wide, which represents the Yellow River.

The game differs from the Western game of chess in that the pieces are moved on intersections of lines rather than on squares. This pattern was familiar to the Chinese from the game of go, which was well known before chess arrived from India. Another major difference is that the pieces are in the form of flat disks, similar to checkers, and are designated by names written on them in red or blue.

Chinese cinnamon (spice): *see* cassia.

Chinese civil service, the administrative system of the traditional Chinese government, the members of which were selected by a competitive examination. The Chinese civil-service system gave the Chinese empire stability for more than 2,000 years and provided one of the major outlets for social mobility in Chinese society. It later served as a model for the civil-service systems that developed in other Asian and Western countries.

The Ch'in dynasty (221–206 BC) established the first centralized Chinese bureaucratic empire and thus created the need for an administrative system based on talent to staff it. Recruitment into the Ch'in bureaucracy was based on recommendations by local officials. This system was initially adopted by the succeeding Han dynasty (206 BC–AD 220), but in 124 BC, under the reign of the Han emperor Wu-ti, an imperial university was established to train and test officials in the techniques of Confucian government.

The Sui dynasty (581–618) adopted this Han examination system and applied it in a much more systematic way as a method of official recruitment. They also introduced the rule that officials of a prefecture must be appointees of the central government rather than local aristocrats and that the local militia was to be subject to officials of the central government. The T'ang dynasty (618–907) created a system

of local schools where scholars could pursue their studies. Those desiring to enter the upper levels of the bureaucracy then competed in the *chin-shih* exams, which tested a candidate's knowledge of the Confucian Classics. This system gradually became the major method of recruitment into the bureaucracy; by the end of the T'ang dynasty, the old aristocracy was destroyed, and its power was taken by the scholar-gentry, who staffed the bureaucracy. This nonhereditary elite would eventually become known to the West as "mandarins," in reference to Mandarin, the dialect of Chinese they employed.

The civil-service system expanded to what many consider its highest point during the Sung dynasty (960–1279). Public schools were established throughout the country to help the talented but indigent, business contact was barred among officials related by blood or marriage, relatives of the imperial family were not permitted to hold high positions, and promotions were based on a merit system in which a person who nominated another for advancement was deemed totally responsible for that person's conduct.

Almost all Sung officials in the higher levels of the bureaucracy were recruited by passing the *chin-shih* degree, and the examinations became regularly established affairs. After 1065 they were held every three years, but only for those who first passed qualifying tests on the local level.

Under the Ming dynasty (1368–1644), the civil-service system reached its final form, and the succeeding Ch'ing dynasty (1644–1911/12) copied the Ming system virtually intact. During this period no man was allowed to serve in his home district, and officials were rotated in their jobs every three years. The recruitment exam was divided into three stages: the *hsiu-ts'ai* ("cultivated talent"), or bachelor's degree, held on the local-prefecture level; *chü-jen* ("recommended man"), given at the prefectural capital; and the *chin-shih*, held at Peking. Although only the passage of the *chin-shih* made one eligible for high office, passage of the other degrees gave one certain privileges, such as exemption from labour service and corporal punishment, government stipends, and admission to upper-gentry status (*chü-jen*).

Elaborate precautions were taken to prevent cheating, different districts in the country were given quotas for recruitment into the service to prevent the dominance of any one region, and the testing matter was limited to the Nine Classics of Confucianism. The examination became so stylized that the set form for an examination paper came to be the famous "eight-legged essay" (*pa-ku wen-chang*), which had eight main headings, used not more than 700 characters, and dealt with topics according to a certain set manner. It had no relation to the candidate's ability to govern and was often criticized for setting a command of style above thought.

The examination system was finally abolished in 1905 by the Ch'ing dynasty in the midst of modernization attempts. The whole civil-service system as it had previously existed was overthrown along with the dynasty in 1911/12.

Chinese Communist Party (CCP), also called COMMUNIST PARTY OF CHINA (CPC), Pinyin ZHONGGUO GONGCHAN DANG, Wade-Giles CHUNG-KUO KUNG-CH'AN TANG, political party and revolutionary movement that was founded in 1921 by revolutionaries such as Li Dazhao and Chen Duxiu who came out of the May Fourth Movement and who turned to Marxism after the victory of the Bolshevik Revolution (1917) in Russia. In the turmoil of 1920s China, CCP members such as Mao Zedong, Liu Shaoqi, and Li Lisan began organizing labour unions in the cities. The CCP joined with the Nationalist Party, or Kuomintang, in 1924, and the alliance proved enormously successful at first. But after liberating Shanghai, the Nationalists under Chiang Kai-shek turned violently on the CCP and drove it underground in 1927.

Many of the CCP cadres, such as Mao's, then abandoned their revolutionary activities among China's urban proletariat and went to the countryside, where they were so successful in winning peasant support that in 1931 the Chinese Soviet Republic was set up in southern China with a population of 10,000,000. But this was destroyed by the military campaigns of the Nationalists, and Mao and the remnants of his forces escaped in the "Long March" (1934–35) to Yen-an in northern China. It was during this march that Mao achieved the leadership position in the CCP that he held until his death in 1976. Other important leaders who supported him in this period were Zhou Enlai and Zhu De.

In 1936 in the "Sian Incident," Chiang Kai-shek was forced to call off his military campaigns against the CCP and instead enter a United Front with it against the Japanese invaders. While Chiang Kai-shek's Nationalist forces basically sat out the war in Chungking, the CCP tremendously expanded its strength by fighting the Japanese invaders of China. By the end of the war it controlled base areas of 100,000,000 people and had an experienced army and a workable political program of alliance between peasants, workers, the middle class, and small capitalists.

When the civil war recommenced in 1946, the CCP's land-reform program increased its peasant support while Nationalist ineptitude and demoralization cost it what little support it had. Decisively defeated, remnants of the Nationalists fled to Taiwan while the CCP and its allies founded the People's Republic of China in 1949.

After 1949 the life of the CCP was taken up with serious disagreements over the course of the country's development. At first the CCP adopted the Soviet model for development and closely allied itself with the Soviet Union. But the CCP and the Communist Party of the Soviet Union (CPSU) soon found themselves increasingly at odds over foreign policy and ideology, and, as the 1950s ended, the CCP and CPSU broke their close ties with each other. Internally the CCP attempted to hasten China's industrial development with bold but basically unsuccessful programs such as the "Great Leap Forward."

In 1966 Mao, who remained in serious disagreement with several other CCP leaders over the course of China's future economic and social development, launched the Cultural Revolution, and there followed a period of turbulent struggles between the CCP's radical wing under Mao and the more pragmatic wing led by Liu Shaoqi and Deng Xiaoping. Liu, Deng, and several other pragmatist leaders fell from power during the Cultural Revolution. An uneasy truce between radicals and pragmatists held from 1971 until 1976, when Zhou Enlai and Mao himself died. Almost immediately the radical group known as the Gang of Four, including Mao's widow, were arrested; and soon afterward the frequently purged and frequently rehabilitated Deng Xiaoping reappeared and assumed paramount power. The Cultural Revolution was formally ended, and the program of the "Four Modernizations" (of industry, agriculture, science/technology, and defense) was adopted. Restrictions on art and education were relaxed, and revolutionary ideology was deemphasized. After Mao's death Hua Guofeng was party chairman until 1981, when Deng's protege Hu Yaobang took over the post. Hu was replaced by another Deng protege, Zhao Ziyang, in 1987.

With approximately 40,000,000 members, the CCP is the largest political party in the world. It is a monolithic, monopolistic party that dominates the political life of China. The CCP is not mentioned in China's current constitution (1982). Nonetheless, the CCP is the sole policy-making body in China, and it sees that the central, provincial, and local organs of government carry out those policies.

The CCP's structure is as follows. Once every five years or so, a National Party Congress of more than 1,500 delegates meets in plenary session to elect a Central Committee of about 200 full members, which in turn meets about once a year. The Central Committee elects a Political Bureau of about 20 full members; this body is the ruling leadership of the CCP. The Political Bureau's Standing Committee of about six or seven of its most authoritative members is the highest leadership in the CCP and the country as a whole. In practice, power flows from the top down in the CCP; the members of each smaller (and more powerful) organizational body (*e.g.*, the Political Bureau) covertly determine the membership of the next larger body (*e.g.*, the Central Committee).

The CCP's Secretariat is responsible for the day-to-day administrative affairs of the CCP. The general secretary of the Secretariat is formally the highest-ranking official of the party. The CCP has a commission for detecting and punishing abuses of office by party members, and it also has a commission by which it retains control over China's armed forces. The CCP has basic-level party organizations in cities, towns, villages, neighbourhoods, major workplaces, schools, and so on. The main publications of the CCP are the daily newspaper *Renmin Ribao* ("People's Daily") and the monthly theoretical journal *Hongqi* ("Red Flag").

Where the same name may denote a person, place, or thing, the articles will be found in that order

Chinese Eastern Railway, railroad constructed in Manchuria by Russia in the late 19th century. The privileges for the line were obtained from China in the wake of the Sino-Japanese War (1894–95) as part of a secret alliance (1896) between Russia and China. Two years later Russia extracted from China a further agreement to allow an extension of the railroad to Port Arthur and Dairen on the Yellow Sea, but this South Manchurian Railway was transferred to Japan after the defeat of Russia in the Russo-Japanese War (1904–05).

Planned as an extension of the Russian Trans-Siberian Railroad, the Chinese Eastern Railway was Russia's shortest route to the warm-water port of Vladivostok on the Sea of Japan. In 1924, when the post-Revolutionary Soviet government renounced Russian imperialist territorial claims in China, it nevertheless retained control of the railway. Three years later, the Chinese seized the line, but they were forced to restore it in 1929. In 1935 the Soviet Union sold the railway to the newly formed Japanese puppet state of Manchukuo.

At the end of World War II, Chiang Kai-shek's Nationalist government negotiated the Sino-Soviet Treaty of Aug. 14, 1945, in which the Soviet Union agreed to nonsupport of the Communists in the Chinese civil war, receiving, in return, partnership in the Chinese Eastern Railway for a 30-year period. In 1953, however, the Soviet Union returned its share of the railway to the People's Republic of China.

Chinese History, Museum of, Chinese (Wade-Giles) CHUNG-KUO LI-SHIH PO-WU KUAN, (Pinyin) ZHONGGUO LISHI BOWUGUAN, in Peking, one of the two important museums in a large building on the east side of

T'ien-an Men (Tienanmen) Square, opened in 1961. The Museum of Chinese History, which shares its building with the Revolutionary Museum, covers the history of China from its earliest beginnings up until the Opium War of 1840 in three sections: primitive society, slave society, and feudal society. Subjects are illustrated through the use of exhibits, models, and pictures. The museum contains a vast array of artifacts ranging from replicas of bones of Peking Man to scientific instruments brought to China by missionaries in the 18th and 19th centuries. Many hundreds of decorative objects, including bronzes, pottery, lacquerware, jade, and textiles, are displayed.

Chinese ink: *see* India ink.

Chinese insect wax: *see* Chinese wax.

Chinese jade, any of the carved-jade objects produced in China from the Neolithic Period (*c.* 3000–1500 BC) onward. The Chinese regarded carved-jade objects as intrinsically valuable, and they metaphorically equated jade with human virtues because of its hardness, durability, and (moral) beauty.



Neolithic Chinese jade
(Top) Blade with mask (30.5 × 7.1 × 1.1 cm), (centre) hoe blade (20.6 × 6.1 × 0.9 cm), and (bottom) Shang blade (length 32.4 cm); in the Art Institute of Chicago

The Art Institute of Chicago, Edward and Louise B. Sonnenchein Collection. (top) Sonnenchein 375. 1950.517; (centre) Sonnenchein 965. 1950.213 and (bottom) 1950.319. photograph © 1990 The Art Institute of Chicago. all rights reserved

Jade has been used in virtually all periods of Chinese history and generally accords with the style of decorative art characteristic of each period. Thus, the earliest jades, of the Neolithic Period, are quite simple and unornamented; those of the Shang (18th–12th century BC), Chou (1111–255 BC), and Han (206 BC–AD 220) dynasties are increasingly embellished with animal and other decorative motifs characteristic of those times; in later periods ancient jade shapes, shapes derived from bronze vessels, and motifs of painting were used, essentially to demonstrate the craftsman's extraordinary technical facility.

Jade objects of early ages (Neolithic through Chou) fall into five categories: small decorative and functional ornaments such as beads, pendants, and belt hooks; weapons and related equipment meant more for ceremonial than for practical use; independent sculptural forms (especially of real and mythological animals), perhaps used as talismans; small objects of probably emblematic value, including the *huan* (a braceletlike disk with a large hole), the *huang* (a flat, half-ring pendant), the *han* (ornaments, often carved in the shape of a cicada, to be placed in the mouth of the dead), and the *chang* and *kuei* (flat, bladelike tablets that served as official insignia of the owner); and many examples of larger objects—such as the *ts'ung* (a hollow cylinder or truncated cone) and the *pi* (a flat disk with a hole in its centre)—with certain essential shapes that have invited much speculation as to value and function.

Chinese languages, also called SINITIC, Chinese HAN, the principal language group of eastern Asia, belonging to the Sino-Tibetan language family. Chinese exists in a number of varieties that are popularly called dialects but that are usually classified as separate languages by scholars. More people speak a variety of Chinese as a native language than any other language in the world, and Modern Standard Chinese is one of the five official languages of the United Nations.

A brief treatment of Chinese languages follows. For full treatment, *see* MACROPAEDIA: Languages of the World.

When spoken, the languages of Chinese are mutually unintelligible; they differ to about the same extent as the modern Romance languages. Most of the differences among them occur in pronunciation and vocabulary; there are few grammatical differences. These languages include Mandarin in the northern, central, and western parts of China; Wu, Northern and Southern Min, Kan, Hakka, and Hsiang; and Cantonese (Yüeh) in the southeastern part of the country.

All the Chinese languages share a common literary language (wen-yen), written in characters and based on a common body of literature. This literary language has no single standard of pronunciation; a speaker of a language reads texts according to the rules of pronunciation of his own language. Before 1917 the wen-yen was used for almost all writing; since that date it has become increasingly acceptable to write in the vernacular style (pai-hua) instead, and the old literary language appears to be dying out.

In the early 1900s a program for the unification of the national language, which is based on Mandarin speech, was launched; this resulted in Modern Standard Chinese. In 1956 a new system of romanization called Pinyin (*q.v.*), based on the pronunciation of the characters in the Peking language, was devised as an educational instrument to help in the spread of the modern standard language; this system, which has begun to replace the Wade-Giles romanization system once prevalent in English-speaking countries, was adopted in 1958, and its use expanded more or less steadily until 1979, when its adoption was formally reiterated.

Some scholars divide the history of the Chinese languages into Proto-Sinitic (Proto-Chinese) (until 500 BC), Archaic (Old) Chinese (8th to 3rd century BC), Ancient (Middle) Chinese (through 907), and Modern Chinese (from about the 10th century to modern times). The Proto-Sinitic period is the period of the most ancient inscriptions and poetry; most loanwords in Chinese were borrowed after that period. The works of Confucius and Mencius mark the beginning of the Archaic Chinese period. Modern knowledge of the sounds of Chinese during the Ancient Chinese period is derived from a pronouncing dictionary of the language of the Ancient period published in AD 601 by the scholar Lu Fa-yen and also from the works of the scholar-official Ssu-ma Kuang, published in the 11th century.

The sound system of Chinese is marked by its use of tones to indicate differences of meaning between words or syllables that are otherwise identical in sound (*i.e.,* have the same consonants and vowels). Modern Standard Chinese has four tones, while the more archaic Cantonese language uses six tones, as did Ancient Chinese. Chinese words often have only one syllable, although modern Chinese makes greater use of compounds than did the earlier language. In Chinese compound words, few prefixes or infixes occur, but there are a great number of suffixes. Few words end in a consonant, except in such archaic dialects as Cantonese. A Chinese word is invariable in form (*i.e.,* it has no inflectional markers or markers to indicate parts of speech) and, within the range allowed by its intrinsic meaning, can serve as any part of speech. Because there is no word inflection in the language, there is a fixed word order. Person and number are expressed in the pronoun rather than in the verb. Chinese has no definite article ("the"), although the word for "one" and the demonstrative adjective are sometimes used as articles in the language today. Adjectives, which are probably of verbal origin, are not inflected for degree of comparison and may be used as adverbs without any change of form.

Chinese law, the law that evolved in China over millennia from earliest times, virtually uninfluenced by foreign jurisprudence until the 20th century, when Western—especially, Western socialist—law was introduced.

The oldest complete Chinese law code extant, that of the T'ang dynasty (the work of a commission of jurists in AD 653), represented the culmination of a long period of systemization and social development. The Chinese legal system incorporated elements of contradictory social philosophies of very early China—principally Confucianism and Legalism (or Fa-chia). Both arose as responses to the disorder of the Warring States period (5th to 3rd century BC), the former emphasizing traditional moral teaching (*li*), the latter advocating the introduction of legally stipulated punishments and rewards (*fa*).

The Confucian ideology contained the idea of social harmony based on ordered relationships and a hierarchy of classes and persons. According to Confucianism, it was the duty of rulers and superiors to educate their subjects or subordinates in benevolent and righteous conduct that would be appropriate to particular personal relations and concrete situations and that would be expressed in proper etiquette and reinforced by rituals. Punishment might serve as a deterrent but would generally be reserved for those persons hard to educate or too obtuse to behave properly. Abstract concepts and generalizations were uncongenial to Confucianists; hence also was the idea of law. As against this, the Legalist, or Fa-chia, school advocated uniform objective standards that would be published for all to know and that would not require special gifts of character to understand or to apply; most important, these standards would be enforced by a system of defined rewards and punishments. Such standards or laws would serve the ruler as an instrument of control over his subjects. Whereas Confucianists saw punishment only as an extension of education, the Legalists opposed any cult of benevolence as softening and corrupting. Over the centuries, this opposition between conflicting principles continued.

The Ch'in dynasty (221–206 BC) had leaned toward the Legalist theory as an effective means for strengthening the state and unifying the empire, but the harshness of Ch'in methods made the law unpopular, thus reopening the way to Confucian influence. The dominant political orthodoxy during the succeeding Han dynasty accepted law as a system of punishments but introduced such Confucian ideas as variability according to status and circumstances. The official legal system thus accommodated the Confucianist view that was reluctant to concede law an important position in the state and the more realistic Legalist view that the harsh penal apparatus that had been inherited was useful for dealing with unruly

elements and enforcing morality. What the conflicting philosophies had in common were these principles: punishments were necessary as deterrents; inequality and hierarchy were socially desirable; trade was not significant enough to be provided for in law; and moral prescriptions or legal commands, backed by sanctions, would automatically achieve the intended results (this last suggests the failure to see the significance of legal procedures or to wish to improve or develop them). These features were enshrined in the Chinese system. In practice, legal prescriptions served more as models or ideals to be aimed at than as minimum enforcible standards or ways of adjusting conflicting interests.

The conception of the emperor's divine role in the universe also had its effect on law. The emperor and his representatives were considered responsible to Heaven for any disturbance in the earthly sphere, and, thus, whenever a disturbance did occur, punishment was considered, in effect, a means of restoring the cosmic equilibrium. The very occurrence of a legal case was deemed a disturbance, and thus a sentence of punishment was almost always the outcome. Furthermore, in general, law was understood as a system of punishments applied by officials to people who deserved them, and no distinction ever developed between civil and criminal liability. The law as such took no account of the claims that private persons or groups might wish to make on one another unless a disturbance occurred, when action would be brought to redress that disturbance.

The development of a unified empire brought everyone under one law, but the law recognized the principle of inequality by dividing the people into three ranks below the emperor—the privileged, the commoners, the unfree. It also recognized the gradations of the kinship hierarchy. Officials, whether active or honourably retired, enjoyed certain privileged exemptions with regard to government levies and legal actions; the higher their rank, the more numerous and extensive their privileges. In all cases involving injury, severity of punishment varied according to the relative status of the person concerned; an injury to a person of higher rank or senior in the kinship hierarchy carried a more serious penalty than injury to an equal or inferior (or no penalty at all if the injury was viewed as a legitimate exercise of discipline).

All citizens had an obligation to denounce wrongdoers to the magistrate's office of the local prefecture (*hsien*), an office that on certain days of the month served as the court to which individuals first brought their complaints or questions. It was the magistrate's duty to investigate all cases reported within the area of his jurisdiction, to apprehend suspects, and to bring them to justice—that is, to investigate and study the facts and decide under what section of the penal code the case should be entered and what punishment would be appropriate for the accused and any other persons concerned. (Cases involving persons related to the local magistrate had to be transferred to a magistrate of an adjacent jurisdiction.) If there was no section of the code exactly covering the case, the magistrate could resort to analogies suggesting relevant principles of some kind. A catchall section, "Things which ought not to be done," closed any loopholes otherwise left in the code. No appeal was possible to a principle suggested by the precedent of an earlier case, though previous decisions were included in revisions of the code for reference purposes.

Time limits for dealing with cases were specified, but there were virtually no restrictions on the methods that a magistrate might use either in his investigation or in eliciting a confession of guilt, which was required before conviction. Thus it was not unusual for accused persons to be beaten in court or sometimes even tortured. If a plaint proved to be unfounded, an unjustified accuser was liable to suffer the punishment that would have been meted out to the accused if convicted, and the magistrate himself was liable to administrative sanctions for any errors that he committed in applying the code. Most Chinese in consequence were very reluctant to become involved in court proceedings, and magistrates themselves were advised, in unofficial handbooks, to be cautious in accepting cases and to counsel parties to try to reconcile their differences without resort to the court.

Apart from certain categories of persons—such as women, juveniles, the aged, and those entitled to privileges—accused persons were not allowed to be represented in court. Consequently, no profession of defense lawyers, advocates, or counsel developed in China. Excluding those who received fees for writing petitions on behalf of others, the only persons specialized in legal work quasi-professionally were magistrates' legal secretaries. These specialists passed on their expertise to the disciples whom they accepted for training and whom they then recommended to a magistrate for employment as personal legal secretaries. Magistrates depended greatly on the knowledge and experience of these men to save them from errors, and some men could acquire considerable reputation for skill in this work and were relatively well paid. Some secretaries later became magistrates themselves by passing the regular official examinations for entry into the civil service.

Cases were referred upward through a hierarchy of courts roughly corresponding to the state's administrative hierarchy. (Although minor punishments could be administered locally, all cases requiring punishment more serious than beating with a bamboo had to be referred to higher authority according to the gravity of the case. Unsatisfied individuals might also appeal to higher courts.) A slight procedural difference was made between cases requiring a ruling concerning personal affairs (marriage, property inheritance, and so on) and those involving prosecution for crimes—a difference not quite the same as the Western distinction between "civil" and "criminal." At the provincial level, cases of the "personal" category were referred to the provincial treasurer's office and went no further, whereas those of the "criminal" category went to the provincial judicial commissioner. Cases beyond the competence of these offices and all cases judged by analogy were referred to the Department of Punishments at the capital, and cases serious enough to merit the death penalty were referred to a court composed of the three chief legal bodies at the capital for a recommendation that was then referred to the emperor himself for final decision. The final decision might be deferred two years, which offered an accused person a chance of surviving until amnesty or final acquittal—if he survived the rigours of Chinese jails.

Stemming from a distinct philosophical tradition and unique historical experience, Chinese law retained its own special character until the 20th century. Moreover, China's achievements in law as in other cultural matters strongly influenced neighbouring lands in the Far East. The bordering region of Korea, for instance, was colonized by China for four centuries (1st century BC to 3rd century AD), and the ensuing cultural similarities have been compared with Roman influence on Britain. Certain Korean kingdoms drew up law codes on the Chinese model as part of a deliberate program of Sinicization. In Japan, too, during the 7th century AD, Chinese political institutions were introduced, and laws on the T'ang model were compiled, including a penal code, administrative statues, and supplementary regulations. Chinese influence revived in Japan in later centuries, and commentary based on the Ming Code was invoked by feudal lords in codifying the law of their domains; both code and cases were cited even when the substance of these decisions was clearly Japanese. The influence of Confucianism, strong in Tokugawa Japan (1603–1867), undoubtedly led the Japanese to prefer mediation to litigation in interpersonal disputes.

Consult the INDEX *first*

Chinese literature, the body of works written in Chinese, including lyric poetry, historical and didactic writing, drama and various forms of fiction. It has the longest continuous history of any literature in the world (more than 3,000 years).

A brief account of Chinese literature follows. For full treatment, *see* MACROPAEDIA: Chinese Literature.

Marshall McLuhan's phrase "the medium is the message" has dramatic validity when applied to the Chinese language. Because of its reliance on pictograms, or characters, Chinese has remained relatively unchanged across an area of geography and a period of time that in the West saw the evolution of several hundred languages. Although the language as spoken did evolve regional dialects, the speakers nonetheless wrote the same characters.

Because pronunciation of characters is non-syllabic, many characters sound the same but have different meanings. To reduce confusion in the spoken language, syllabic tones evolved. This tonal feature made the relationship between music and literature, particularly poetry and drama, extremely close from the beginning. Chinese poetry was originally sung to music, but when over long periods of time the scores were lost it was chanted rather than read. Most Chinese drama is operatic.

The inherent succinctness of pictograms also influenced the characteristic compactness of Chinese poetry, which has been likened to the telegram. Chinese poets always stressed the lyrical heights of joy or depths of sorrow. In contrast to most other national literatures, no lengthy epics or long narrative poems exist.

The visual appeal and architectural possibilities of the language led to two important, though somewhat negative, developments. First, mastery of the meaning and physical formation of about 1,000 pictograms is not enough to express oneself in more than a rudimentary fashion. Although the spoken language was vital and understood by millions, the vast majority of people outside cities remained illiterate. Second, a strong tendency to value form over content was institutionalized. From 1487 to 1901 all successful candidates in official civil-service examinations had to master a literary form that required a specified appearance. Ideas and feelings were somewhat at the mercy of this neat architectural scheme.

The earliest inscriptions (1384 BC) of Chinese characters found on bones and shells are, by Western standards, miraculously similar in meaning and syntax to later usage. Many references to songs and music were found. Around the time of Confucius (500 BC) the *Shih Ching*, the first anthology of poetry, appeared including temple, court, and folk songs. The *Shih Ching* was one of the Five Classics, which included the *I Ching*, later popular among Western diviners. China's first poet known by name was Ch'ü Yüan (*c.* 300 BC). "On Encountering Sorrow," considered his most important poem, combines politics and disappointed love with imaginary travels in heavenly realms.

In Chinese mythology heaven and earth were

originally mutually accessible to men and gods. Ch'ih Yu, a lesser god, tried to enlist human help in overthrowing Shang Ti, the chief god. After the rebellion was put down, a barrier was set up between heaven and earth that human beings could not cross. Great numbers, however, of minor gods and mythological animals (dragons, magic pigs, and monkeys) could cross the barrier and intercede for people. In literature, questing heroes are often accompanied by magical animals. Every village, bridge, family, and house had a patron with access to heaven. The theme of the benevolent go-between permeates Chinese literature.

The first Chinese prose works were collections of the thoughts of philosophers, the *Analects of Confucius,* the *Lao-Tzu,* or *Tao-te Ching,* and the *Mencius*. In 240 BC the first well-ordered full-length book appeared, *Lü-shih Ch'un Ch'iu* by Lü Pu-wei, a collection of 60 essays summarizing several philosophies and collecting folklore of various regions. In 225 BC the Yüeh Fu, or Music Bureau, was officially established to collect and preserve lyrics and musical scores of court and temple ceremonies, as well as folksongs and ballads. These were used as inspiration by writers. The institution was reactivated at various times down through the centuries.

From AD 220 Chinese culture strove to assimilate foreign elements from India and various invading northern tribes at the same time as it preserved its valued traditions. Frequent political disunity added to the drive to establish a literary orthodoxy. This tendency led to literary antiquarianism and a split between official literature and folklore. The best writers of these centuries made efforts to use the common spoken language, but a vital balance was reached and maintained from 600 to 960, the golden age of Chinese literature. So many forms and styles were current during this time that writers enjoyed a greater measure of freedom. Tu Fu, China's greatest poet, writing about the year 775, combined keen observation of political and social forces with strong moral stature and consummate mastery of all verse forms.

Following centuries witnessed the ascendance of literary factions squabbling over rules. Most of the work that was produced was exquisite imitation of past models. During the Manchu invasion and rule (1644–1911/12), literary craftsmanship remained excellent but real creativity was rare. The best novel of the time and the first Chinese novel with a tragic ending was Ts'ao Chan's *Dream of the Red Chamber,* considered by some to be among the world's finest novels. After the Opium War (1842) much talent and effort went into translating Western literature.

After the establishment of republican China, Hu Shih, who had studied in the United States, proposed a new national literature written in the living language of the people. Subsequent political events, however, particularly the Communist revolution, resulted in the imposition of strict political controls over literary creation in China.

Chinese music, a traditional form of East Asian music that also embraces Korean and Japanese national forms. Chinese music is one of the oldest and most highly developed of all known musical systems.

A brief treatment of Chinese music follows. For full treatment, *see* MACROPAEDIA: East Asian Arts.

The earliest documented music-making activities of China involved the use of wind and percussion instruments including the globular clay ocarina (*hsün*), panpipe (*p'ai-hsiao*), mouth organ (*sheng*), stone chime (*ch'ing*), drum (*ku*), bell chime (*chung*), and percussion idiophones (*chu* and *wu*). The earliest *hsüns* unearthed, dating from about 5000 BC, have tone sequences based primarily on a minor-third system. Later Chinese musical compositions have utilized a comprehensive system of harmonies commonly known as the *chi, shang, yü, chüeh,* and *kung* harmonies.

The rich variety of Chinese music today can be classified as vocal, balladic, dance, theatrical, or instrumental. Vocal music is characterized by a close fusion of melodic progression, the Chinese language, and an economic use of musical idioms. Balladic music involves literary creativity fully supported by musical expressiveness; and dance music is characterized by polyrhythmic tempos and large instrumental ensembles.

Three systems of theatrical music that developed during the Ming dynasty (1368–1644) survive today in the myriad regional styles of theatre in China—the *i-yang ch'iang,* the *k'un-ch'ü,* and the clapper opera (*pang-tzu ch'iang*). From the perspective of the accompaniment, the *i-yang ch'iang* system seldom uses extensive wind or string instrumentation, the *k'un-ch'ü* system uses mainly wind instrumentation, and the clapper opera system uses mainly string instrumentation. All three utilize extensive percussion accompaniment. The formal design of theatrical music is usually structured by combining independent tunes into a suite or by rhythmically extending a set of primary melodies.

Chinese musical instruments are classified according to their major acoustical material and by virtue of how they are played. They are constructed primarily of metal, stone, clay, leather, silk, wood, gourd, and bamboo and are categorized as being wind, percussion, plucked, or bowed.

Chinese orchestration is based on the use of silk (*szu*), bamboo (*chu*), reeded wind (*ch'ui*), and percussion (*ta*) tonal components. Tonal and rhythmic interest preside over melodic and harmonic interest in orchestral interpretations. The meticulous use of tonal and rhythmic interest is evident throughout the Chinese instrumental repertoire.

Chinese painting, the paintings produced by the Chinese civilization. *See* Chinese art.

Chinese parasol tree (*Firmiana simplex*), tree of the cacao, or chocolate, family (Sterculiaceae) of the order Malvales, native to Asia. It grows to a height of 12 m (40 feet). It has alternate, deciduous leaves up to 30 cm (12 inches) across and small greenish white flowers that are borne in clusters. It is grown as an ornamental in warm regions of North America.

Chinese philosophy, the thought of Chinese culture, from earliest times to the present. The keynote in Chinese philosophy is humanism: man and his society have occupied, if not monopolized, the attention of Chinese philosophers throughout the ages. Ethical and political discussions have overshadowed any metaphysical speculation. It must quickly be added, however, that this humanism does not imply any indifference to a supreme power or to Nature. Instead, the general conclusion represented in Chinese philosophy is that of the unity of man and Heaven. This spirit of synthesis has characterized the entire history of Chinese philosophy.

Roots of Chinese humanism. During the transition from the Shang dynasty (18th–12th century BC) to the Chou dynasty, China was changing from a tribal to a feudal society and from the Bronze Age to the Iron Age. A new economy and a new society required new tools and new talents. The Shang people had prayed to their ancestors for the solution of their problems, but the Chou people turned to man, though they honoured their ancestors no less than the Shang people did. Prayers for rain, for example, gradually gave place to irrigation. Man was in the ascendency. The Shang people had believed in Ti, the tribal "Lord," who was the greatest ancestor and the supreme deity who protected them in battles, sanctioned their undertakings, and sent them rewards and punishments. During the Chou, however, Ti was gradually supplanted by Heaven (T'ien) as the supreme spiritual reality. Its anthropomorphic (or man-patterned) character decreased, and its wishes were now expressed not in unpredictable whims but in the Mandate of Heaven (T'ien Ming). This mandate was absolute and constant, beyond man's control. In time, however, as man grew in importance, it was felt that rewards and punishments depended on man's virtue, for "Heaven is always kind to the virtuous." Thus, man's virtue became the determining factor; man could now control his own destiny (*ming*). Religious sacrifices continued to play a great role in the lives of the people; the meaning of sacrifice, however, was changing from a magical to an ethical one—that is, from ways to placate spiritual beings to pure expressions of reverence. It was in this atmosphere that the so-called Hundred Schools of thought emerged (6th–3rd century BC).

All of the Hundred Schools arose in response to practical conditions. Their philosophers were either government officials or scholars, traveling from one feudal state to another and offering ideas for social reform. Expressing their ideas in conversations, official documents, or short treatises, they set the pattern for later philosophers.

The existential character of Chinese philosophy has created the erroneous impression, however, that it is purely ethical and social and devoid of metaphysics. Though seemingly random and unsystematic, the philosophy of every school was the result of years of serious thinking and formed a coherent and logical whole. It was in each instance built on definite concepts about man and Heaven, whether the latter was interpreted as the Supreme Being or simply as Nature.

Periods of development of Chinese philosophy. Historically, Chinese philosophy has gone through four periods: (1) the classical, (2) the Neo-Taoist and Buddhist, (3) the Neo-Confucian, and (4) the modern. In the classical period (6th–3rd century BC), the chief concepts were Tao ("the Way"), *te* ("virtue"), *jen* ("humanity," "love"), *i* ("righteousness"), *t'ien* ("heaven"), and *yin-yang* (cosmic elements of tranquility and activity, or weakness and strength, respectively). Every school had its own Way, but the Way of Confucius (551–479 BC) and that of another traditional sage, Lao-tzu (6th century BC), were the most prominent. To Confucius, Tao is the Way of man, the Way of ancient sage-kings, and the Way of virtue. To Lao-tzu, however, Tao is the Way of nature. His concept was so unique that his school later came to be called the Taoist school. For all schools, Tao possesses the two aspects of *yin* and *yang,* the Tao endowed in man is his virtue, and the greatest virtues, especially for the Confucianists, are *jen* and *i*. Clearly, some concepts are ethical and others metaphysical.

In the Neo-Taoist and Buddhist period (3rd–9th century AD), there was a radical turn to strictly metaphysical concepts. Going beyond Lao-tzu's characterization of Tao as Nonbeing, the Neo-Taoists concentrated on the question of whether Ultimate Reality is Being or Nonbeing and whether the principle (*li*) underlying a thing was universal or particular. Under their influence, early Chinese Buddhist philosophers directed their attention chiefly to Being and Nonbeing. Subsequently, Buddhist schools introduced from India were divided into corresponding categories, viz., schools of Being and schools of Nonbeing. The question of universality and particularity, or of one and many, led to the development of truly Chinese Buddhist schools, whose concern was the relationship between principle, which combines

all things as one, and facts, which differentiate things into the many.

In the Neo-Confucian period (11th–19th century), the influence of Buddhism and Taoism prompted Confucianism to find metaphysical and epistemological foundations for its ethics. Two basic concepts of Neo-Confucianism are nature and principle—nature, especially human nature, because Confucianism was still primarily concerned with man, and principle because the Neo-Confucianists rejected the Buddhist void and Taoist Nonbeing as negative and mystical, substituting their own metaphysical principle, *li* ("law," "reason"), the positive, concrete, and rational laws that form the universe and that are always good. According to Neo-Confucianism's greatest proponent, Chu Hsi (1130–1200), *li* is the essence that makes things what they are. Human nature is the *li* that is universal among all people. Coupled to this universal essence is *ch'i* ("air," "breath"), the particular material force that makes each person unique. *Ch'i* obscures human nature and its inherent goodness; therefore, metaphysical speculation, or inquiry into the laws of human nature and of the universe, is for the Neo-Confucianist the path of ethical conduct.

It is interesting to note that these three periods represent a dialectical movement: the classical period was concerned chiefly with mundane problems; the Neo-Taoist and Buddhist period was concerned with the transcendent; and the Neo-Confucian period was a synthesis of the two.

The modern period (20th century), on the other hand, does not seem to conform to any previous pattern. Twentieth-century Chinese philosophy went from westernization, through a reconstruction of traditional philosophy, to the triumph of Marxism. In the second and third decades, the works of Darwin, Spencer, and others were translated, and the doctrines of Haeckel, Kropotkin, Nietzsche, Schopenhauer, Bergson, Eucken, Descartes, and James, in addition to Plato, Kant, and Hegel, were introduced, each with his special advocates. Later, Whitehead, Royce, Carnap, and others were promoted by earnest if small groups. This movement revealed to the Chinese new philosophical vistas in metaphysics, logic, and epistemology (theory of knowledge). The general tone was scientific, positivistic, and pragmatic. Of all Western systems, the most influential was Pragmatism, introduced and promoted by Hu Shih (1891–1962), leader of the intellectual revolution of 1917. In the "polemic of science versus life" in the 1920s, leading Chinese intellectuals debated the question as to whether or not science could form the basis of a philosophy of life. The debate served to question the supremacy of Western philosophy, which, as understood by the Chinese, was regarded as essentially scientific as opposed to metaphysical.

In contemporary China, Marxism is the official philosophy. Marxist thought had been growing in China since the mid-1920s, and by the time of the establishment of the People's Republic in 1949, it had gone through Leninism to Maoism. The official ideology does not prohibit the study of traditional Chinese philosophy but has subjected it to critical evaluation and severe criticism. From 1957 on, many debates were carried on and many books and journals published. One topic of debate centred on the nature of the history of Chinese philosophy. Though there was no unanimity of opinion, the "correct" viewpoint was that the history of Chinese philosophy is but a part of the world history of philosophy and as such is a history of the struggle between Materialism and Idealism. The conflict between the theories of the original good and evil character of human nature, the opposition between principle and material force, the contradiction between Being and Nonbeing, and the conflict between names and actuality were given as evidence of this continuous struggle. As such, the history of Chinese philosophy is but the development of Marxism–Leninism in Chinese history. That part of China's philosophical heritage that is Materialistic and possesses a class nature must be continued and promoted.

Chinese Phonetic Alphabet: *see* Pinyin romanization.

Chinese Pidgin English, modified form of English developed in the 17th century for use as a trade language or lingua franca between the British and the Chinese. Chinese Pidgin got its start in Canton, China, after the British established their first trading post there in 1664. Because the British found Chinese an extremely difficult language to learn and because the Chinese held the English in low esteem and therefore disdained to learn their language, Pidgin English was developed by the English and adapted by the Chinese for business purposes. (The term Pidgin is commonly said to be a corruption of the English word business.) It continued in use until about the end of the 19th century, when Pidgin came to be looked upon by the Chinese as humiliating (because English speakers considered it ridiculous) and so preferred to learn standard English instead. After World War II, Hong Kong was the only place in which Chinese Pidgin was used at all.

Chinese Pidgin English is based on a vocabulary of about 700 English words, with a small number of words from other sources. Grammar and syntax are simple and positional; that is, grammatical categories are indicated by the position of words in the sentence rather than by inflectional endings, prepositions, or the like (*e.g.*, in English "John loves Mary" is distinguished from "Mary loves John" by the position of the words in the sentences). Typical sentences in Chinese Pidgin are *Hab gat lening kum daun* "There is rain coming down"; *Tumolo mai no kan kum* "Tomorrow I can't come"; and *Mai no hab kachi basket* "I didn't bring a basket."

Chinese Revolution (1911–12), nationalist revolt that overthrew the Ch'ing, or Manchu, dynasty in 1912 and created a republic.

Ever since their conquest of China in the 17th century, most of the Manchus had lived in comparative idleness, supposedly a standing army of occupation but in reality inefficient pensionaries. All through the 19th century the dynasty had been declining, and upon the death of the Empress Dowager (1908) it lost its last able leader. In 1911 the Emperor was an infant, and the regency was incompetent to guide the nation. The unsuccessful contests with foreign powers had shaken not only the dynasty but the entire machinery of government.

The chain of events immediately leading to the revolution began when an agreement was signed (April 5, 1911) with a four-power group of foreign bankers for the construction of lines on the Hukwang Railway in central China. The Peking government decided to take over from a local company a line in Szechwan, on which construction had been barely begun, and to apply part of the loan to its completion. The sum offered did not meet the demands of the stockholders, and in September 1911 the dissatisfaction boiled over into open revolt. On October 10, in consequence of the uncovering of a plot in Hankow that had little or no connection with the Szechwan episode, a mutiny broke out among the troops in Wuch'ang, and this is regarded as the formal beginning of the revolution. The mutineers soon captured the Wu-ch'ang mint and arsenal, and city after city declared against the Manchus. The regent, panic-stricken, granted the assembly's demand for the immediate adoption of a constitution and urged a former viceroy, Yüan Shih-k'ai, to come out of retirement and save the dynasty. In November he was made premier.

Had Yüan acted vigorously he might have suppressed the uprising and so have delayed the inevitable. He dallied, however, and by the end of the year 14 provinces had declared against the Manchus. In several cities Manchu garrisons had been massacred, the regent had been forced out of office, a provisional republican government had been set up at Nanking, and the archrevolutionist Sun Yat-sen had returned from abroad and had been elected president.

In December Yüan agreed to an armistice and entered upon negotiations with the republicans. On Feb. 12, 1912, the boy emperor was made to abdicate the throne in a proclamation that transferred the government to the people's representatives, declared that the constitution should thenceforth be republican, and gave Yüan Shih-k'ai full powers to organize a provisional government. The Nanking authorities agreed that the Emperor was to retain his title for life and to receive a large pension. To unify the country, Sun Yat-sen resigned the presidency, and Yüan was chosen in his place. Li Yüan-hung, who had come into prominence in Wu-ch'ang in the initial stages of the rebellion, was elected vice president. A provisional constitution was promulgated in March 1912 by the Nanking parliament, and in April the government was transferred to Peking.

The republic, established with such startling rapidity and comparative ease, was destined in the succeeding decades to witness the progressive collapse of national unity and orderly government.

Chinese Rites Controversy, a 17th–18th-century argument originating in China among Roman Catholic missionaries about whether the ceremonies honouring Confucius and family ancestors were so tainted with superstition as to be incompatible with Christian belief. The Jesuits believed that they probably were not and that they could be tolerated within certain limits; the Dominicans and Franciscans took the opposite view and carried the issue to Rome. In 1645 the Congregation for the Propagation of the Faith, on the basis of a brief submitted by the Dominicans, condemned the rites. After considering the arguments of the Jesuits, however, the same congregation lifted the ban in 1656.

The continuing controversy involved leading universities in Europe, was considered by eight popes and by the K'ang-hsi emperor, and led to repeated intervention by the offices of the Holy See. By the end of the 17th century, many Dominicans and Franciscans had come to share the Jesuits' opinion, but Rome disagreed. In a decree of 1704, reinforced by a bull in 1715, Clement XI banned the rites. Benedict XIV in 1742 reaffirmed the prohibition and forbade further debate.

Almost two centuries later the Holy See reexamined the question. A decree of Dec. 8, 1939, authorized Christians to take part in ceremonies honouring Confucius and to observe the ancestral rites. The second Vatican Council (1962–65) proclaimed the principle of admitting native ceremonies into the liturgy of the church whenever possible.

Chinese shadows (puppetry): *see* ombres chinoises.

Chinese water deer (*Hydropotes inermis*), Oriental deer, family Cervidae (order Artiodactyla), native to China and Korea. It frequents marshes, fields, and mountainsides, generally alone. When alarmed, it bounds away like a rabbit. About 50 centimetres (20 inches) tall at the shoulder, it has a coarse, thick coat which is yellowish brown above, white below. The



Chinese water deer (*Hydropotes inermis*) with fawn
P. Morris—W.C.I.

male lacks antlers but has long, curved upper canine teeth that protrude from the mouth.

Chinese watermelon: *see* wax gourd.

Chinese wax, also called CHINESE INSECT WAX, or INSECT WAX, white or yellowish-white crystalline wax resembling spermaceti but harder, more friable, and with a higher melting point; it is deposited on the branches of certain trees by the scale insect *Ceroplastes ceriferus,* common in China and India, or a related scale insect, *Ericerus pe-la,* of China and Japan. The insects and their secretions are harvested and boiled with water to extract the raw wax. The insect bodies, which settle to the bottom, are used as food for swine.

Chinese wax is used chiefly for making candles and polishes and as a sizing for paper. In China the wax has been employed medicinally. Taken internally, it has been used as a remedy for hoarseness, pain, worms, nervousness, and to aid the mending of broken bones. Externally, it has been used as an ointment for treatment of wounds.

Chinese writing system, basically logographic writing system using symbols of pictorial origin to represent words of the Chinese language. Dictionaries of Chinese record as many as 40,000 distinct symbols (usually called characters), but a corpus of about 10,000 (those used by Chinese telegraphers, who represent them by 4-unit code groups) is sufficient for practically all purposes. Knowledge of at least 2,000 characters is necessary to be functionally literate in Chinese. Particular words in most cases are represented either by one symbol intended to express the meaning of the word or by a combination of symbols.

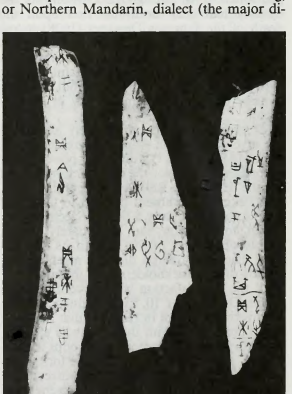
The Chinese writing system apparently began to develop in the early 2nd millennium BC. The earliest known inscriptions, each of which contains between 10 and 60 characters incised on pieces of bone and tortoiseshell that were used for oracular divination, date from the Shang (or Yin) dynasty (18th–12th century). Later stages in the development of Chinese writing include the *ku-wen* ("ancient figures") found in inscriptions from the late Shang dynasty (*c.* 1123) and the early years of the Chou dynasty that followed. The major script of the Chou dynasty, which ruled from 1111 to 225 BC, was the *ta chuan* ("great seal"), also called the *Chou wen* ("Chou script"). By the end of the Chou dynasty the *ta chuan* had degenerated to some extent; it was replaced *c.* 213 BC (during the Ch'in dynasty, which ruled from 221 to 206 BC) by the *hsiao chuan* ("lesser seal"). During this period the writing brush was invented, and the characters acquired a more modern appearance; from this basically modern script (called *li shu* or *li tzu*), many different styles, or "hands," have developed.

The Chinese traditionally divide the characters into six types (called *liu shu,* "six scripts"), the most common of which is *hsing sheng,* the type of character that combines a semantic element (called a radical) with a phonetic element intended to remind the reader of the pronunciation of the word. The phonetic element is usually a contracted form of another character with the same pronunciation as that of the word intended. For example, the character for *k'o* "river" is composed of the radical *shui* "water" plus the phonetic *ko,* the meaning of which ("fruit") is irrelevant; the combined "water-*ko*" symbol suggests the word *k'o* meaning "river." Seventy-five percent of all Chinese characters are of this type.

The other types of characters are *hsiang hsing,* characters that were originally pictographs (these have a semantic element originally expressed by a picture, such as the character for *t'ien* "field," which represents a field by means of a square divided into quarters); *chih shih,* characters intended to be symbolic of logical or abstract terms (*e.g., erh,* "two," is indicated by two horizontal lines); *hui i,* characters formed by a combination of elements thought to be logically associated (*e.g.,* the symbols for "man" and "word" are combined to represent the word meaning "true, sincere, truth"); *chuan chu,* modifications or distortions of characters to form new characters, usually of somewhat related meaning (*e.g.,* the character for *shan* "mountain" turned sideways means *fou* "tableland"); and *chia chieh,* characters borrowed from (or sometimes originally mistaken for) others, usually words of different meaning but similar pronunciation (*e.g.,* the character for *tsu* "foot" is used for *tsu* "to be sufficient").

Chinese characters are arranged in dictionaries according to the radicals of which they are composed or with which they are traditionally associated. The 214 radicals are arranged in modern dictionaries according to the number of pen strokes used in writing them.

Phonetic scripts for the language have been invented, based both on Chinese characters and on the Latin alphabet, and are now widely used. In an attempt to standardize the spelling of Chinese in Roman languages, the Chinese government adopted the Pinyin (*q.v.*) system of transliteration in 1958. This system is based on the phonetic transliteration of the Peking, or Northern Mandarin, dialect (the major dialect in China) and is gradually replacing the Wade–Giles system (*q.v.*) established in the 19th century.



Oracle bone inscriptions from the village of Hsiao-t'un, Shang dynasty, 14th or 12th century BC
By courtesy of the Syndics of the University Library, Cambridge, Cambridgeshire

Chinese yew (*Taxus celebica*), a large, ornamental evergreen shrub or tree of the yew family (Taxaceae), widespread in China at elevations up to 900 metres (3,000 feet). The tree is up to 14 m (46 ft) tall and wide and bushy when cultivated. The leaves are up to 4 centimetres (1½ inches) long—broader than those of most other yews—and often end in a very small, sharp point. The underside of each leaf has two broad yellow stripes and is densely covered with minute projections.

Ch'ing ———: for rulers of the Ch'ing dynasty, *see under* individual names.

Ch'ing DYNASTY, Pinyin QING, also called MANCHU DYNASTY (1644–1911/12), the last of the Imperial dynasties of China. Under the Ch'ing the territory of the empire grew to treble its size under the Ming dynasty, the population grew from 150,000,000 to 450,000,000, many of the non-Chinese minorities within the empire were Sinicized, and an integrated national economy was established.

The Ch'ing dynasty was first established in 1636 by the Manchus to designate their regime in Manchuria (Northeast Provinces). In 1644 the Chinese capital at Peking was captured by the bandit leader Li Tzu-ch'eng, and desperate Ming dynasty officials called on the Manchus for aid. The Manchus took advantage of the opportunity to seize the capital and establish their own dynasty in China. By adopting the Ming form of government and continuing to employ Ming officials, the Manchus pacified the Chinese poulation. To guarantee Manchu control over the administration, however, the Ch'ing made certain that half the higher level officials were Manchus. Chinese military leaders who surrendered were given ranks of nobility, and troops were organized into the Lü-ying, or Army of the Green Standard, which was garrisoned throughout the country to guard against local rebellions. The regular Manchu Banner System troops, or Ch'i-ping, were kept at the capital and in a few selected strategic spots throughout the country.

Under the emperor K'ang-hsi (reigned 1661–1722) the Manchus forced the Russians to abandon their fort at Albazin, located along the Manchurian border on the Amur River. In 1689 a treaty was concluded with Russia at Nerchinsk demarcating the northern extent of the Manchurian boundary at the Argun River. Over the next 40 years the Dzungar Mongols were defeated, and the empire was extended to include Outer Mongolia, Tibet, Dzungaria, Turkistan, and Nepal. Under the two emperors Yung-cheng (reigned 1722–35) and Ch'ien-lung (reigned 1735–96) commerce continued to thrive, handicraft industries prospered, and Roman Catholic missionaries were tolerated and employed as astronomers and artists. In addition, painting, printmaking, and porcelain manufacture flourished, and scientific methods of philology were developed. But subsequent rulers were unable to meet the problems caused by increased population pressure and concentration of land ownership. The Manchu armies deteriorated, and popular unrest, aggravated by severe floods and famine, resulted in the Taiping (1850–64) and Nien (1853–68) rebellions. Efforts at modernization and westernization met opposition from conservative officials, and bureaucratic inefficiency and corruption became widespread. The first Opium War (1839–42), the Anglo-French War (1856–58), the Sino-Japanese War (1894–95), and the Boxer Rebellion (1900) all resulted in defeats for China and the granting of major concessions to Western powers. By 1900 revolutionary groups had begun to form throughout the country. The Oct. 10, 1911, Republican Revolution led to the abdication of the boy emperor Hsüan-

t'ung (better known as P'u-i) and the transfer of authority to the provisional government under Yüan Shih-k'ai.

The efforts of the Manchu rulers, from the beginning of their rule, to become assimilated into Chinese culture bred strongly conservative, Confucian political and cultural attitudes in official society and stimulated a great period of collecting, cataloging, and commenting upon the traditions of the past. Decorative crafts declined to increasingly repetitive designs, although techniques, notably in jade carving, reached a high level. Much architecture survives; although it is often grandly conceived, it tends to an inert massiveness with overwrought ornamentation. The two major visual-art forms of the period were painting and porcelain.

Despite the prevailing attitude of conservatism, many Ch'ing-dynasty artists were both individualistic and innovative. Based largely on the dicta of a late Ming-dynasty artist-critic, Tung Ch'i-ch'ang, Ch'ing painters are classified as "individualist" masters (such as Tao-chi and Chu Ta) and "orthodox" masters (such as the Six Masters of the early Ch'ing period). In addition, there are "schools" of painting (though painters so classified share more a common location than a single style), such as the Four Masters of Anhwei, the Eight Eccentrics of Yang-chou, and the Eight Masters of Nanking. The attitude shared by most artists, in spite of obvious differences, was a strong preference for "literati painting" (*wen-jen-hua*), which emphasized personal expression above all.

Ch'ing porcelain displays a high technical mastery even to the almost total obliteration of any mark of the potter's hand. Among the innovations of the period was the development of coloured glazes such as copper red, called "blown red" (*ch'in hung*) by the Chinese and "oxblood" (*sang-de-boeuf*) by the French, and two classes of painted porcelain ware, known in Europe as *famille verte* and *famille rose,* from their predominant green and rose colours.

The literature of the Ch'ing dynasty resembled that of the preceding Ming period in that much of it focused on classical forms. The Manchu conducted a literary inquisition in the 18th century to root out subversive writings, and many suspect works were destroyed and their authors jailed, exiled, or killed. Novels in the vernacular—tales of romance and adventure—developed substantially. After Chinese ports were opened in the mid-19th century, translation of foreign works into Chinese increased dramatically.

In music, the most notable development of the dynasty probably was the development of *ching-hsi,* or Peking opera, over several decades at the end of the 18th century. It was an amalgam of several regional music-theatre traditions that employed significantly increased instrumental accompaniment, adding to flute, plucked lute, and clappers, several drums, a double-reed wind instrument, cymbals, and gongs, one of which is designed so as to rise quickly in pitch when struck, giving a "sliding" tonal effect that is a familiar characteristic of the genre. Peking opera—whose roots are actually in many regions but not in Peking—uses fewer melodies than do other forms but repeats them with different lyrics. It is thought to have gained stature because of patronage by Tz'u-hsi (the empress dowager), but it had long been enormously popular with commoners.

Ch'ing-chiang, also called (locally) CHANG-SHU-CHEN, Pinyin QINGJIANG, or ZHANG-SHUZHEN, city in northern Kiangsi *sheng* (province), China. It lies along the Kan River, some 47 miles (75 km) southwest of Nan-ch'ang. Ch'ing-chiang is situated on the rail route from Nan-ch'ang to Ch'ang-sha in Hunan province, where the line to the west leaves the road and river route up the Kan River valley. Goods from southern Kiangsi are transshipped at Ch'ing-chiang from junks and road to these rail lines. The surrounding area produces much timber and grain, and tungsten is also mined. Pop. (mid-1980s) 10,000–50,000.

Ch'ing-chiang (city, China): *see* Huai-yin.

Ch'ing Hai (lake, China): *see* Koko Nor.

Ching Hao, Pinyin JING HAO, also called HUNG-KU-TZU (fl. 910–950, Ch'in-shui, Honan province, China), important landscape painter and essayist of the Five Dynasties (907–960) period.

In his art Ching Hao followed the court painters of the T'ang dynasty (618–907) in emphasizing the singular grandeur of the landscape. He spent much of his life in retirement as a farmer in the T'ai-hang Mountains of Shansi province. Not even reliable copies of his work survive, but he is considered to have been one of the precursors of the school of monumental landscape painting that came to maturity in the Northern Sung period. An essay attributed to him, *Pi-fa chi* ("Record of Brush Methods"), sets out the aims, ideals, and methods of the classical landscape painter at one with nature. It had considerable influence on the aesthetics of landscape painting in the Sung dynasty and later. Ching Hao's Northern landscape style, which used bold compositions and crisply drawn lines to depict precipitous mountain crags, contrasted with the softer and more atmospheric effects favoured by artists in southern China.

Ching Hao is said to have been the teacher of Kuan T'ung, who was in turn followed by another famous master, Li Ch'eng. But for all three artists there is little certain information, and few paintings are definitely attributable to them.

ching-hsi (Chinese: "opera of the capital"), English PEKING OPERA, popular Chinese theatrical form that developed in the mid-19th century. It incorporated elements of *k'un-chü,* the traditional opera that had predominated since the 14th century. Sung in Mandarin, the dialect of Peking and of the traditional elite, the *ching-hsi* musical verse plays came to be performed throughout China, although most provinces and many major cities developed their own operatic variants using local dialect.

Ching-hsi is highly conventionalized. The attitudes of individual characters are encoded in traditional steps, postures, and arm movements. Acrobatic movements are frequently used to suggest violent action. Accompaniment is provided by a small orchestra of stringed and wind instruments, wooden clappers, and a small drum. Interludes of spoken narration permit singers to rest periodically during the characteristically lengthy performances.

Since the 1970s, several *ching-hsi* troupes have performed in the West.



A *ching-hsi* troupe performing a scene from "The Real and the Fake Sun Wukong"

© Wu Gang/Liaison International

Ching-hung, also called (locally) YÜN-CHING-HUNG, Pinyin JINGHONG, or YUNJINGHONG, town in southwestern Yunnan *sheng* (province), China. The town is located on the borders of Myanmar (Burma) and Laos. Formerly known as Ching-lan, it is situated in a rich basin on the west bank of the Mekong River. The town was of minor significance before 1953, but the construction of the highway from the provincial capital, K'un-ming, and a less oppressive policy toward the local Tai peoples under the communist administration since 1949 have made it an important commercial centre for the remote mountains of the extreme southern section of the province. Routes lead from Ching-hung south into Laos and southwest into Myanmar. Various small industries process the cotton, grain, sugar, and oilseeds produced locally. There are also woodworking plants and brick- and tile works. Pop. (mid-1980s est.) fewer than 10,000.

Consult the INDEX *first*

Ch'ing-liu tang, Pinyin QINGLIU DANG, English PURIFICATION CLIQUE, group of conservative Chinese officials who advocated a return to traditional Confucian moral principles in the late 19th and early 20th centuries. The movement was a reaction against the increasing demands for concessions in China by Western powers. Consisting mainly of young scholars who wrote brilliantly on commemorative themes and were well connected with the centres of power, the Ch'ing-liu tang maintained that weapons were not important if one had proper courage and virtue. As a result, they succeeded in halting the efforts of the "self-strengtheners," who had begun to introduce Western weapons and technology into China.

The Ch'ing-liu party emerged into power during the Ili crisis (1871–81), a dispute over Ili, a territory bordering on Russian Turkistan that is now in the Uygur Autonomous Region of Sinkiang. Using the excuse of a Muslim rebellion in the area, the Russians occupied Ili, but when confronted with Chinese military force, they signed the Treaty of St. Petersburg (Feb. 24, 1881), under which they returned the area to China. Encouraged by this success, the Ch'ing-liu party insisted that a similar militancy be employed against the French, who were encroaching on what is now Vietnam, at the time China's largest tributary state in the south. Efforts to appease France were abandoned, and China became embroiled in the Sino-French War (1883–85). But the resulting military setbacks caused the Ch'ing-liu to fall from power. The only member of the clique who continued to be influential after the war was the famous viceroy Chang Chih-tung, who later became an advocate of partial Westernization.

Ching-t'ai, Pinyin JINGTAI (reign name [*nien-hao*]), personal name (*hsing-ming*) CHU CH'I-YÜ, posthumous name (*shih*) CHING-TI, or CH'ENG-LI WANG (b. 1428, China—d. 1457, China), seventh emperor of the Ming dynasty after his brother, the emperor Cheng-t'ung, was captured while leading the imperial forces against the Mongol leader Esen in 1449. When Esen tried to take advantage of his victory and attack the capital at Peking, Ching-t'ai's defense minister, Yü Ch'ien, drove Esen's forces

back into Mongolia. In 1450 Esen released the abducted former emperor.

Although his brother returned to China, Ching-t'ai continued to reign. He caused much resentment by setting up his own son, rather than his nephew, as heir apparent. Partly because of this indiscretion, when he grew ill and lay dying in 1457 his brother, with the aid of a group of palace eunuchs, reascended the throne and disposed of the dying Ching-t'ai.

Ch'ing-tao (China): *see* Tsingtao.

Ching-te-chen, formerly FOU-LIANG, Pinyin JINGDEZHEN, or FULIANG, city in northeastern Kiangsi *sheng* (province), China. Situated on the south bank of the Ch'ang River, it was originally a market town called Ch'ang-nan-chen, or T'ao-yang-chen, and received its present name in 1004–07, when Ching-te was the title of the reigning emperor. Throughout the centuries it was administratively subordinate to Fou-liang county, but in 1916 the seat of the county was transferred to Ching-te-chen, which later became a prefecture-level municipality.

In China the name Ching-te-chen is virtually synonymous with ceramics. As early as the 6th century AD, the city is said to have produced fine ware for official use and is known to have continued producing excellent ware during the T'ang dynasty (618–907). Its most productive period, however, began during the Sung dynasty (960–1279) and especially in the later Sung period (after 1128), when many ceramics workers from the north arrived in the city as refugees from the Chin invasion. In the late 12th century great quantities of porcelain were exported from the area. Under the Ming dynasty (1368–1644), Ching-te-chen began producing high-quality ware on a vast scale for the use of the imperial household and the government in general. Throughout the Ming period Ching-te-chen, rather than an imperial factory, was the centre of procurement on behalf of the government. The ceramics industry flourished during this period, producing wares of superlative quality, except during the years 1506–21, when production was disrupted by local disorders, and from 1567 to 1572, when government orders ceased for reasons of economy.

During the Ch'ing dynasty (1644–1911/12), the town suffered terrible destruction at the time of the rebellion of Wu San-kuei in 1675. Immediately afterward, though, the government founded a vast government ceramics factory there, and for the first time it was possible to speak of the "imperial kilns." Under three great directors—Tsang Ying-hsüan (1682–1700), Nien Hsi-yao (1726–36), and T'ang Ying (1736–56)—ceramics production reached a peak of perfection, although in subsequent years the quality of the work declined. During the Taiping Rebellion (1850–64), fighting in the surrounding area wrecked most of the kilns.

During the early part of the 20th century the industry was at a low ebb, both artistically and economically. By 1949 the population of the city had dropped to about one-third of what it had been at its peak in the 18th century. During the 1950s the ceramics industry was reorganized in the form of cooperative associations and resumed production on a larger scale than ever before. Practically the entire population of the city is engaged in the ceramics industry or connected concerns. Besides domestic porcelain, the city also makes a wide range of other ceramic products. Pop. (1990 est.) 281,183.

Ching-ti, Pinyin JINGDI (posthumous name, or *shih*), personal name (*hsing-ming*) LIU CH'I (d. 141 BC, China), fifth emperor of the Han dynasty, during whose reign (157–141 BC) an attempt was made to limit the power of the great feudal princes, who had been enfeoffed in separate kingdoms during the tolerant rule of Ching-ti's father, Wen-ti (reigned 180–157).

In 154 the feudal princes reacted against attempts to curtail their power. The resulting Revolt of the Seven Kingdoms was crushed; the lords were thereafter denied the right to appoint the ministers for their fiefs, and their domains were divided among their sons. This move consolidated the power of the central government and prepared the way for the glorious reign of Ching-ti's son, the famous Wu-ti (reigned 141–87).

Ching-ti (Chinese emperors): *see* Ching-t'ai; Kuang-hsü.

ching-t'ien (China): *see* well-field system.

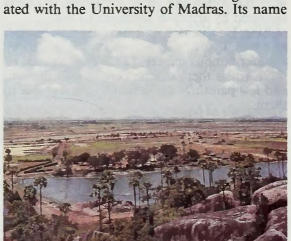
Ch'ing-tsang Plateau: *see* Tibet, Plateau of.

Ching Tsung (Chinese emperor): *see* Li Yüan-hao.

Chinggis Khan, Chinggis also spelled CHINGIS (Mongol ruler): *see* Genghis Khan.

Chingleput, city, northeastern Tamil Nādu state, southeastern India. It is located about 35 miles (56 km) south-southwest of the city of Madras.

Lying along the Pālār River, Chingleput is a railway junction and serves as the commercial centre for the northern Coromandel Coast. It has a medical school and other colleges affiliated with the University of Madras. Its name



An oasis on the sandy plain near Mahābalipuram, southeast of Chingleput, Tamil Nādu, India
B.S. Oza—Tom Stack & Associates

means "town of red lotuses." Chingleput dates from the early Cōḷa dynasty of the 2nd century BC. The most prominent building in the city is a fort that was built by the Vijayanagars (ruled 1336–1565). About 1640 the city fell to the Muslim sultanate of Golconda, and it was captured by the English soldier Robert Clive in 1752.

The surrounding area is predominantly a rice-growing region, except for its sandy Indian Ocean coastline, on which extensive stands of casuarina trees have been planted. There are numerous historic sites and monuments in the area, including many Pallava temples at nearby Mahābalipuram. The area's easily invaded and fertile farmlands were successively conquered by Vijayanagar, Muslim, Marāṭhā, and British troops. It is now primarily important as a food-producing hinterland of Madras. Pop. (1991 prelim.) city, 53,784.

Chingola, municipality, north-central Zambia. It is situated approximately 5,000 feet (1,520 m) above sea level in densely wooded country, and it has road and rail connections to the towns of Kitwe, Mufulira, and Chililabombwe. Chingola was founded in 1943 and was declared a municipality in 1957. Closely associated with the neighbouring copper-mining centre of Nchanga, it is a civil and governmental township providing services to that mining community. Pop. (1990 prelim.) 167,954.

Chinhae, city, on Chinhae Bay, Kyŏngsangnam *do* (province), southern South Korea. Its picturesque natural harbour is protected by Kŏje Island and Kosŏng Peninsula. During the Russo-Japanese War (1904–05) the Japanese navy used it as a base of operation, and it has since been developed into a naval port. The headquarters of the South Korean navy and the South Korean Naval Academy are located there. Chinhae is connected with Pusan and Masan by rail and regular shipping lines. Because of its scenic beauty and its cherry blossoms, it has also developed as a tourist city. Industrial developments include fertilizer and thermoplastic resin plants constructed in the late 1960s. Pop. (1990 prelim.) 120,207.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Chinhoyi, formerly SINOIA, town, north-central Zimbabwe. It lies west of the Hunyani River and Falls and is located on highway and rail routes to the national capital, Harare (formerly Salisbury), and to Lusaka, Zambia. Chinhoyi is the centre of a productive agricultural area (tobacco, corn [maize], cattle) and a mining district (copper, mica). The town is also the gateway to the Chinhoyi (limestone) Caves, 5 miles (8 km) west. Named for a local chief, Chinhoyi acquired town status in 1946. Pop. (1982) 24,309.

Chinju, city, Kyŏngsang-nam *do* (province), southern South Korea. It is situated along the Nam River, a tributary of the Naktong River, west of Pusan. It was the centre of local administration beginning in the Three Kingdoms period (57 BC), under various names, and during 1895–1925 it was the capital of the province. Chinju is a transportation junction connecting the surrounding provinces and is the economic and cultural centre of the western counties of Kyŏngsang-nam province. Chinju Agricultural College is located there. It has developed rapidly with the completion of the Nam-ch'ŏn multipurpose dam in 1968. A national park encompassing Mount Chiri (6,283 feet [1,915 m]) and the surrounding area is northwest of the city. As an old city, Chinju has many historical remains. Pop. (1990 prelim.) 258,365.

chinkapin (tree): *see* chinquapin.

chinkin-bori (Japanese: "gold-inlay carving"), in Japanese lacquerwork, technique for decorating lacquer ware with patterns delineated



Interior of an ink-slab case with *tsubaki* plant designs done in *chinkin-bori*, 19th century, Tokugawa period; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

by thin lines of gold inlay. After the pattern has been incised into the lacquer surface with a fine chisel, raw lacquer is rubbed into the grooves as an adhesive for gold dust or gold leaf pressed into them.

The technique originated in China during the Sung period (960–1279). Examples at the Daitoku-ji in Kyōto and elsewhere indicate that large quantities of this kind of Chinese lacquer ware reached Japan in the Muromachi period (1338–1573), when Japanese artists began to adopt the technique. In the mid-18th century, a famous creator of *chinkin-bori* was Tate Junsuke, who lived in Wajima, Noto Province (now Ishikawa Prefecture); *chinkin-bori* has remained a specialty of Wajima lacquer ware.

Chinnamp'o (North Korea): *see* Namp'o.

Chinnereth, Lake of: *see* Galilee, Sea of.

chinoiserie, 17th- and 18th-century Western style of interior design, furniture, pottery, textiles, and garden design that represents fanciful European interpretations of Chinese styles. In the first decades of the 17th century, English and Italian and, later, other craftsmen began to draw freely on decorative forms found on cabinets, porcelain vessels, and embroideries imported from China. The earliest appearance of a major chinoiserie interior scheme was in Louis Le Vau's Trianon de porcelaine of 1670–71 (subsequently destroyed), built for Louis XIV at Versailles. The fad spread rapidly; indeed, no court residence, especially in Germany, was complete without its Chinese room, which was often, as it had been for Louis, the room for the prince's mistress (*e.g.*, Lackkabinett, Schloss Ludwigsburg, Württemberg, 1714–22). Chinoiserie, used mainly in conjunction with Baroque and Rococo styles, featured extensive gilding and lacquering; much use of blue-and-white (*e.g.,* Delftware); asymmetrical forms; disruptions of orthodox perspective; and Oriental figures and motifs. The style—with its lightness and asymmetry and the capriciousness of many of its motifs—also made itself felt in the fine arts, as in the paintings of the French artists Antoine Watteau and François Boucher.



Detail of a cabinet with chinoiserie decoration in gold and silver on a ground painted to imitate tortoiseshell, English, late 17th century; in the Victoria and Albert Museum, London

Crown copyright, Victoria and Albert Museum, London

The cult connected with the fad prepared Europe for the reception of greater informality in garden design. During the 18th century, pagodas and tea pavilions invaded European parks as gazebos. In England European ideas about Chinese philosophy were joined with English notions about the sublime, the romantic, and the "natural" to produce the English, or Anglo-Chinese, garden. The ill-informed tutelage of Sir William Temple (*On the Garden of Epicurus,* 1685) operated in England; whereas the later direction of Sir William Chambers (*Designs of Chinese Buildings . . .*, 1757), who had been in China, was more influential on the Continent.

Chinoiserie gradually waned during the 19th century, when the appeal of China and East Asia had to compete with other exotic tastes, such as the "Turkish," the Egyptian, the Gothic, and the Greek. It enjoyed a brief revival in interior design, however, in the 1930s.

Chinon, town, western France, Indre-et-Loire *département*. Centre region, on the banks of the Vienne River, south-southwest of Tours. It is famous for its medieval streets and a ruined château, where the first meeting between St. Joan of Arc and King Charles VII of France took place in 1429. A statue of the 16th-century French writer François Rabelais, who



The Château of Chinon, overlooking the Vienne River, France

Art Resource—EB Inc

was born in the vicinity in about 1494 and passed his childhood in the town, stands on the river embankment. The château, standing on a rocky height dominating the town, consists of three separate strongholds. To the east, the Fort- (or Château de) Saint-Georges, built by Henry II of England, has almost disappeared. The Château du Milieu (11th–15th centuries), which contains a museum of St. Joan of Arc, is separated by moats from Fort-Saint-Georges to the east and from the Château du Coudray to the west. The chief remains of the Château du Coudray are the Tour du Moulin (12th century) and two later towers. There are fine views from the château of the old town of Chinon and of the Vienne Valley. A good local wine is also produced. Pop. (1982) 6,030.

Chinook, Indians of the Northwest Pacific Coast of North America who lived along the lower Columbia River from its mouth to The Dalles, Ore., and spoke Chinookan languages. The Chinook were famous as traders, with connections stretching as far as the Great Plains. Their location facilitated contact with northern and southern coastal peoples, as well as with interior groups. The river was a rich source of salmon, the basis of the economy of the area, and many groups traded with the Chinook for dried fish. Other important trade items were slaves from California, Nootka canoes, and the highly valued dentalium shells. Chinook Jargon, the trade language of the Northwest Coast, was a combination of Chinook with Nootka and other Indian, English, and French terms. The jargon may have originated in aboriginal times; it was used from California to Alaska after contact with American and British fur traders.



"Chinook Burial Grounds," oil painting by John Mix Stanley; in the Detroit Institute of Arts

By courtesy of the Detroit Institute of Arts, gift of Mrs. Blanche Hooker

The Chinook were first described by the U.S. explorers Lewis and Clark, who contacted them in 1805. Because white civilization severely disrupted Chinook culture, ultimately removing the people to reservations, most of the information about the Chinook is based on the records of early traders and explorers, together with what is known of neighbouring groups. The basic social unit was probably the local group consisting of close relatives, headed by the senior member. Chinook religion focussed on the first salmon rite, a ritual in which each group welcomed the annual salmon run. Another important religious rite was the individual spirit quest, an ordeal undertaken by all male and some female adolescents to acquire guardian spirits that would give them hunting, curing, or other powers, bring them good luck, or teach them songs and dances. Singing ceremonies were public demonstrations of these gifts. The Chinook also had potlatches (*q.v.*), which were ceremonial distributions of property.

chinook, warm, dry wind descending the eastern slopes of the Rocky Mountains, primarily

in winter. Winds of the same kind occur in other parts of the world and are known generally as foehns (*q.v.*).

Chinook salmon: *see* king salmon.

chinquapin, also spelled CHINKAPIN, any of several species of deciduous trees of the genus *Castanea* and evergreen trees and shrubs of the genus *Castanopsis,* both in the beech family (Fagaceae).

Chinquapins in *Castanea* differ from chestnuts, to which they are closely related, in having hairy leaves and twigs and single-seeded burs. The bush, or downy, chinquapin (*C. alnifolia*) of the southeastern United States and the Allegheny chinquapin (*C. pumila*) of the eastern and southwestern United States are shrubs or small trees. The Florida chinquapin, perhaps a variety of *C. alnifolia,* is a tall tree up to 14 m (46 feet) high; the Ozark chinquapin (*C. ozarkensis*), of the south-central United States, may grow to 19 m; and the Henry chinquapin (*C. henryi*), an ornamental and timber tree native to China, sometimes attains a height of 28 m.

The evergreen chinquapins include the golden, or giant, evergreen chinquapin (*Castanopsis chrysophylla*), also known as wild chestnut, or Castanopsis nut, native to western North America. It may be 45 m tall and has lance-shaped leaves about 15 cm (6 inches) long, coated beneath with golden-yellow scales. The bush, or Sierra evergreen, chinquapin (*Castanopsis sempervirens*) is a small, spreading mountain shrub of western North America. Both species have been referred to the genus *Chrysolepis* by some botanists.

Castanea pumila is the only economically important North American chinquapin; its nuts are consumed locally, and its durable



Single-seeded burs of the Allegheny chinquapin (*Castanea pumila*)
By courtesy of the U.S. Forest Service

wood is used for telephone poles, fence posts, and railroad ties.

The water chinquapin is an aquatic plant of the lotus family (*see* lotus). The chinquapin oak refers to *Quercus prinoides* and to *Q. muehlenbergii* (*see* white oak).

chinsō, also spelled CHINZŌ, in Japanese art, type of Buddhist portraiture developed especially by the Zen sect about 1200. *Chinsō* were official pictures of high ecclesiastics, usually posed seated in a chair and dressed in their official robes. These intimate portraits show great technical mastery and meticulous execution. Simple, sober colours give a highly refined harmony.

In Zen doctrine the portrait of a master was the most important type of painting. Zen monks sought illumination within their own spiritual experience, inspired by the teachings and deeds of their master, and when the



Chinsō of the priest Daigaku Zenji by an unknown Japanese painter, 1271, Kamakura period; in the Kenchō Temple, Kamakura, Japan
By courtesy of the Kenchōji, Kamakura

monks completed their studies, they received a "diploma" in the form of a portrait of their master, who usually wrote a symbolic poem in the upper part of the picture.

chintz, plainwoven, printed or solid-colour, glazed cotton fabric, frequently a highly glazed printed calico. Originally "chintz" (from the Hindi word meaning "spotted") was stained or painted calico produced in India. The modern fabric is commonly made in several colours on a light ground and used for decorative and apparel purposes. Unglazed chintz is known as cretonne.

Chioggia, town, Venezia *provincia,* Veneto *regione,* northern Italy. The town lies at the southern end of the Veneta Lagoon, 15 miles (24 km) south of the city of Venice, of which it is a suffragan diocese. Chioggia occupies several islands and is joined by a bridge to the mainland at the seaside resort of Sottomarina. Of Roman origin, the town was eventually destroyed by invading barbarians.

The later commune of Chioggia was long disputed between Venice and Genoa. The economic rivalry between those two great medieval maritime republics was resolved in favour of Venice by the Naval War of Chioggia (1378–81), so called from the decisive action that took place there. In this war, Genoa, after having defeated the Venetian army, sent



Fishermen repairing nets and oars in Chioggia, Italy
Bavaria-Verlag

a fleet into the Adriatic Sea. This fleet took Chioggia (1378) as a base from which to harass Venice but was then itself blockaded by the Venetian fleet. In 1380 the remnants of the Genoese fleet, decimated by hunger and hardship, surrendered to the Venetians. The war was formally ended in 1381 with the Peace of Turin.

Notable landmarks in Chioggia are the 11th-century cathedral (rebuilt in 1633–74), the Church of San Martino (1392), and the Church of San Domenico (14th century, renovated 18th century), all with valuable paintings.

Chioggia's main economic activity is fishing. The fishing port, one of the largest in Italy, also has shipyards and imports Istrian stone from Croatia and exports bricks and local herbs. Pop. (1993 est.) mun., 53,849.

Chios, Modern Greek KHÍOS, island, situated 5 miles (8 km) off the western coast of Turkey in the Aegean Sea, that with Psará and other islands makes up the *nomós* (department) of Khíos, Greece. Of volcanic and limestone origins, it is about 30 miles (50 km) long north-south and from 8 to 15 miles (13 to 24 km) wide, with an area of 321 square miles (831 square km). It is traversed north-south by mountains culminating in Mount Pelinaíon (4,255 feet [1,297 m] high). Khíos, the capital and port on the east coast, has a small, safe harbour.

Homer was reputed to have lived in Chios, which was the home of a school of bards, the Homerids (Homeridae). In the 8th century BC it became one of the seven cities of the Pan-Ionian League, and in the 6th and 5th centuries BC it had a renowned school of sculpture. In 546 Chios submitted to Cyrus I of Persia; but after the defeat of Persia, Chios joined the Delian League and remained an ally of Athens until 412, when it revolted. Athens ravaged Chios in reprisal, and in 378 Chios joined the Second Athenian League, only to revolt again in 354 BC and have its independence recognized. It was reputed to be one of the best-governed states in Greece, but in the 4th century BC it was racked by civil strife. The island's commerce, based on wine, flourished during the Roman and Byzantine period. Centuries later, after occupations by the Seljuq Turks (1089–92) and by the Venetians (1124–25, 1172, 1204–25), Chios was given in fief to the Genoese family of Zaccaria in 1261. In 1415 the Genoese became tributary to the Ottoman Turks; and in 1822, during the War of Greek Independence, many of the Christian inhabitants of Chios were massacred or sold into slavery by the Turks. The island was reunited with Greece after the Balkan Wars (1912–13).

Wine and gum mastic, traditional products of Chios, often contributed to its economic recovery after times of trouble. Mastic is collected from a wild shrub that grows in the south; it provides the flavour for *mastikha,* a Greek liqueur, and is used for chewing gum and a local white jam. Chios has no permanent watercourse, so the entire island, including the fertile plain of Kambos, requires irrigation. Nonetheless, citrus fruit, olives, and figs are grown; and lemons, oranges, and tangerines are exported. Antimony, calamine, and marble deposits are worked; and there is a tanning industry and much coastal trade. Pop. (1981) capital, 24,070; (1991) island, 47,901; (1991 prelim.) *nomós,* 52,691.

Chiozzotto (Venetian composer): *see* Croce, Giovanni.

chip, small wafer of semiconductor material that forms the base for an integrated circuit (*q.v.*).

Chipata, formerly FORT JAMESON, town, southeastern Zambia, near the Malawi frontier. It is an upland town, approximately 3,600 feet (1,100 m) above sea level. Tobacco is the major local cash crop; peanuts (ground-

nuts) are processed into oil products; cotton, corn (maize), and wheat are also grown. Formerly an administrative centre of the British South Africa Company, it was the capital of Northeastern Rhodesia, 1901–10. It has been a Roman Catholic episcopal see since 1959. Pop. (1980 prelim.) 32,291.

chipboard, cheap cardboard or paperboard used as backing for photographs or in making cartons and boxes where strength and appearance are not essential. Chipboard is made of mixed, unbleached paper stock in thicknesses from 0.016 to 0.040 inch (4 to 10 millimetres). One or both surfaces may be coated with manila paper to make folding cartons for cigarettes, cereal, and hardware. Manila-coated chipboard also may be impregnated with wax or paraffin for paper plates or lined with greaseproof paper for sausage and bacon cartons. Chipboard lined with newspaper stock is used for shirt boards and inexpensive boxes; lined with fancy paper, it is employed in candy and cosmetic boxes. In Britain chipboard refers to planks of pressurized wood clippings, usually veneered, used in furniture manufacture.

Chipewyan, the most numerous Athabascan-speaking Indian people in northern Canada, inhabiting a large triangular area with a base along the 1,000-mile-long Churchill River and an apex some 700 miles to the north; the land comprises boreal forests divided by stretches of barren ground. Split into many independent bands, the Chipewyan were nomads following the seasonal movement of the caribou, their chief source of food and of skins for clothing, tents, nets, and lines. Also sought were bison, musk-oxen, moose, smaller game, waterfowl, and fish.

Chipewyan culture was noted for its rather ruthless pattern of survival of the fittest. Strong men in each band overlorded the weak, pilfering their goods and seizing their women. Females were extremely abased, being married off in adolescence and living lives virtually as beasts of burden, pulling toboggans or carrying packs on their backs, and suffering from numerous restrictions. The weak and aged who could not keep up were left to die on the trail. Murder, however, was considered abhorrent and was rare. There was a general belief in visions, dreams, and guardian spirits, in the powers of medicine men to cure or cause disease, and in deliverance to a happier place after death.

When the Hudson's Bay Company established a fur-trading post at the mouth of the Churchill in 1717, the Chipewyan turned to hunting fur animals and acting as middlemen in the fur exchange with the Yellowknife and Dogrib farther west, often exacting huge profits. A smallpox epidemic in 1781, however, decimated the Chipewyan, and subsequent periods of disease and malnutrition and the decline of the fur trade have reduced their numbers to only about 5,000 in the late 20th century.

Chipman, John (b. April 25, 1897, Tallahassee, Fla., U.S.—d. May 14, 1983, Winchester, Mass.), American physical chemist and metallurgist who was instrumental in applying the principles of physical chemistry to constituents in liquid metals and to the chemical reactions between slag and liquid iron that are important in the production of pig iron and steel.

Chipman was educated at The University of the South and the University of California (Ph.D., 1926). While at the University of Michigan (1929–35), he began his study of the reaction between carbon in molten iron and oxygen-bearing gases. As a member of the faculty (1937–62) and head of the metallurgy department (1946–62) of the Massachusetts Institute of Technology (MIT), Cambridge, he continued and expanded his research on the physical chemistry of iron- and steelmaking. During World War II he was chief of the Metallurgy Section of the Manhattan Project at MIT and the University of Chicago.

chipmunk, also called GROUND SQUIRREL, any of several species of small, terrestrial rodents belonging to the squirrel family (Sciuridae). Two genera are known: *Tamias,* with one species, the eastern chipmunk (*T. striatus*), found in eastern North America; and *Eutamias,* with 16 species found in western North America and Central and eastern Asia. The eastern chipmunk is 14 to 19 centimetres (5½ to 7½ inches) long, excluding a bushy, 8- to 11-cm tail. It is reddish brown with five black stripes alternating with two brown and



Eastern chipmunk (*Tamias striatus*)
Ken Brate—Photo Researchers

two white stripes on its body. The western and Asiatic chipmunks are smaller and are marked with five black and four whitish alternating body stripes.

Chipmunks are active, diurnal burrow dwellers. They live primarily on the ground, but they can climb and can also swim well. Their call is a shrill chirring or chipping sound. They relish seeds, berries, and tender plants and sometimes eat flesh. Seeds are commonly stored underground for later use and are carried in the chipmunks' capacious cheek pouches. Chipmunks may sleep for extended periods in winter but do not enter the deep torpor of true hibernation. The female bears two to eight young in spring or summer after about a month's gestation; a second, usually smaller, litter is often produced in areas with long summers.

Chippendale, various styles of furniture fashionable in the third quarter of the 18th century and named after the English cabinetmaker Thomas Chippendale. The first style of furniture in England named after a cabinetmaker rather than a monarch, it became the most famous name in the history of English furniture at a time when such craftsmanship was at its zenith.

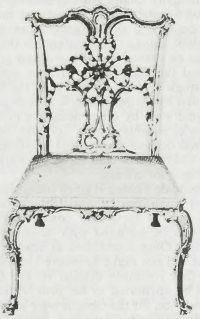
The descriptive term Chippendale is derived from a book of furniture designs, the first of its kind, that was published in 1754 in London and called *The Gentleman and Cabinet-Maker's Director.* The identity of the designers of the patterns in *The Director* is debatable in some instances, but Thomas Chippendale was clearly responsible for many of the best designs himself. The book was enthusiastically received everywhere, and furniture based on Chippendale's designs was crafted in England, on the Continent, and in the American Colonies.

Chippendale designs fall into three main styles: Gothic, Rococo (called modern in the pattern book), and Chinese. Chippendale showed unparalleled skill and taste in blending these disparate stylistic elements into harmonious and unified designs that are unsurpassed in their elegance and vitality. The term Chippendale specifically refers to English furniture of the 1750s and '60s made in a modified Rococo style.

Gothic Chippendale incorporated pointed arches and ogee (S-shaped) curves into the backs of chairs and, more successfully, in the glazing bars (wooden tracery holding the glass) and pediments of massive bookcases.

Rococo Chippendale was to some extent a reaction against the heavy formality of Baroque furniture design, typified by the work of William Kent who died in 1748. Many of the Rococo designs were French in origin, but Chippendale modified some of them for the less flamboyant English market; among these are his French chairs, based on Louis XV designs. Probably the best known Chippendale design is a broad-seated ribbonback chair, with a back rail in the form of a cupid's bow, and the pierced splat (centre support in the back) composed of carved interlacing ribbons. The most elaborate Rococo designs, carved and gilded, were those for mirror frames, girandoles, and console tables.

The Chinese Chippendale designs in *The Director* were applied to china cabinets, or china shelves, which had glazing bars in a fretwork design and a pagoda-style pediment. A similar fretwork was used for a gallery around the edges of "china tables," or tea tables, and for the backs and legs of chairs. Some pieces of Chinese Chippendale furniture, often intended for rooms decorated in chinoiserie, or Chinese style, were japanned, or coated with oriental-style lacquer.



Design for a ribbonback chair in the Rococo style from Thomas Chippendale, *The Gentleman and Cabinet-Maker's Director,* third edition, London, 1762
By courtesy of the Victoria and Albert Museum, London

Chippendale designs were simplified and adapted in the second half of the 18th century; two of these modified designs are country Chippendale and Irish Chippendale. Country Chippendale pieces were skilled adaptations, particularly of the renowned ribbonback chairs, by country craftsmen who could not cope with the intricate carving of Chippendale's designs. The woods used were normally indigenous rather than the imported mahogany used in the more fashionable furniture. Irish Chippendale, mahogany furniture crafted in Ireland, while bearing a superficial resemblance to Chippendale's designs, did not compare with their quality.

Chippendale, Thomas (baptized June 5, 1718, Otley, Yorkshire, Eng.—d. November 1779, London), one of the leading cabinetmakers of 18th-century England and one of the most perplexing figures in the history of furniture. His name is synonymous with the Anglicized Rococo style.

Nothing is known of Chippendale's early life

until his marriage to Catherine Redshaw in London in 1748. In 1753 he moved to St. Martin's Lane, where he maintained his showrooms, workshops, and home for the rest of his life. In 1754 he published his celebrated *Gentleman and Cabinet-Maker's Director;* this work was the most important collection of furniture designs theretofore published in England, illustrating almost every type of mid-18th-century domestic furniture. The first and second (1755) editions contained 160 plates, the third edition (published in weekly parts, 1759–62), 200; the designs largely were Chippendale's improvements on the fashionable furniture styles and designs of the time.

Chippendale was elected to the Society of Arts in 1759 but declined reelection in the following year. Meanwhile he had become a partner with James Rannie, apparently an upholsterer, who died in 1766. Chippendale continued the business alone until he took Thomas Haig, Rannie's former clerk, into partnership in 1771. Chippendale's first wife died in 1772, and he married Elizabeth Davis in 1777. He died of tuberculosis.

Although head of an important firm, Chippendale was not the greatest of all English furniture makers, and his exaggerated posthumous reputation is attributable largely to the *Director.* A 20th-century scholarly investigation revealed him as essentially a collector and extremely talented modifier of already existing styles, notably Rococo, which is characteristically used in Chippendale's many designs for mahogany chairs with intricately pierced slats and for elaborately carved case furniture. Other designs in the *Director* show the Rococo adaptations of Chinese and Gothic styles, some to be carved in softwood and gilded or japanned (an East Asian process, similar to lacquering). Though the plates in the *Director* are signed by Chippendale, it is now accepted that some were by other designers in the Rococo style, notably Henry Copland, who had published designs earlier, and Matthias Lock, whom Chippendale had hired to provide special designs for clients.

Chippendale's name is given indiscriminately to great quantities of mid-18th-century furniture; but, in fact, only comparatively few pieces can be assigned with certainty to his workshop. Once established as head of a large firm, he did not make furniture himself. Even pieces that resemble designs in the *Director* cannot be attributed to his firm without further evidence, for the designs were available to contemporary cabinetmakers, some of whose names appear in the original list of subscribers. Where a piece corresponds to a *Director* plate and where the original owner was a subscriber to the *Director* or is known to have employed Chippendale, a tentative attribution may be made, such as the extraordinary bedroom suite at Badminton House, Gloucestershire, now in the Victoria and Albert Museum, London. The American colonies borrowed heavily from the *Director.*

From the 1760s onward, influenced by the great English designer Robert Adam, Chippendale adopted the new Neoclassical style. Existing bills for work carried out by his firm at Nostell Priory and Harewood House, Yorkshire, during this final phase of his career identify the fine Neoclassical mahogany and marquetried satinwood furniture with which he supplied these houses and show that, as cabinetmakers and upholsterers, his firm undertook all branches of interior decoration. His cornice for a Venetian window, sofas, and dressing tables canopied with overdrapes are characteristic of the upholsterer's art in the mid-18th century. The superb satinwood and inlaid commodes (possibly designed by Thomas Chippendale II) and other furniture at Harewood House are masterpieces of the cabinetmaker's craft, upon which his reputation may safely rest.

Chippendale, Thomas, II (b. *c.* 1749—d. 1822), son of the cabinetmaker Thomas Chippendale, who succeeded his father as head of the family workshop.

Until the retirement of Thomas Haig in 1796, the firm traded under the title Chippendale and Haig. Though the business was declared bankrupt in 1804, the younger Chippendale continued operations at St. Martin's Lane and opened an additional shop in the Haymarket in 1814, which was removed to Jermyn Street in 1821. The firm continued to make high-quality furniture, undertaking such work as upholstery and paper hanging; they supplied fine Regency furniture to Harewood and to Stourhead House, Wiltshire. Like his father, he also was a member of the Society of Arts, exhibiting five pictures at the Royal Academy between 1784 and 1801.

Chippenham, town, North Wiltshire district, county of Wiltshire, England, on the Lower (Bristol) Avon. Chippenham was the site of a royal residence during the Dark Ages and appears in Domesday Book (1086) as a crown manor. St. Andrew's Church dates from the 12th century. From the 16th century the town was a woolen centre. The London-Bath road, a major English routeway, crosses the River Avon at Chippenham by a stone bridge of 22 arches. Milk distribution and processing now form the town's main industry; other activities include bacon curing, food processing, tanning, furniture making, and electrical and railway engineering. Pop. (1981) 20,821.

Chippewa (peoples): *see* Ojibwa.

Chippewa, Battle of (July 5, 1814), in the War of 1812, victory by U.S. forces that restored American military prestige but accomplished little else, largely because the expected naval support needed for a U.S. advance to the north and west failed to materialize.

At the beginning of July 1814, an American army of over 4,000 men under Generals Jacob Brown and Winfield Scott crossed the Niagara River and took Fort Erie. The Americans intended to push northward toward Lake Ontario and on to Burlington and York (modern Toronto). About 2,000 British regulars and Canadian militia from Fort George and along the lower Niagara, under General Phineas Riall, rushed southward to stem the U.S. advance. On July 5 Riall launched an attack at Chippewa upon the more numerous U.S. forces and was badly beaten. British casualties numbered 604; the Americans, 335.

Chiquimula, town, southeastern Guatemala. It lies along the San José River in the central highlands, 1,378 feet (424 m) above sea level. Founded during the colonial era, it has sustained much earthquake damage, particularly in 1765 and 1773. Ruins of its colonial church remain. Chiquimula is now a market centre for an agricultural hinterland. Pop. (1994 est.) 32,120.

Chirac, Jacques, in full JACQUES RENÉ CHIRAC (b. Nov. 29, 1932, Paris, France), politician who was twice prime minister (1974–76, 1986–88) of France and became the country's president in 1995.

The son of a bank employee, Chirac graduated from the Institut d'Études Politiques de Paris in 1954, served as an officer in Algeria (1956–57), and earned a graduate degree from the École Nationale d'Administration in 1959. He then became a civil servant and rose rapidly through the ranks, serving as a department head and a secretary of state before becoming minister for parliamentary relations in 1971–72 under Prime Minister Georges Pompidou. He was elected to the National Assembly as a Gaullist successively from 1967. After serving as minister for agriculture (1972–74) and of the interior (1974), Chirac was appointed prime minister by newly elected President Valéry Giscard d'Estaing in 1974. Resigning that office in 1976 because of personal and political disputes with Giscard, the ambitious and energetic Chirac reconstituted the Gaullist party known as the Union of Democrats for the Republic into a neo-Gaullist group, the Rally for the Republic (RPR), which was firmly under his control. Elected mayor of Paris successively from 1977, he continued to build up his political base among the several conservative parties of France. His first campaign for the presidency in 1981 split the conservative vote with Giscard d'Estaing and thereby allowed the Socialist candidate, François Mitterrand, to win. In parliamentary elections held in 1986, the coalition of right-wing parties won a slim majority of seats in the National Assembly, and Chirac was appointed prime minister by Mitterrand. This power-sharing arrangement between the two figures was the first of its kind in the history of the Fifth Republic, in which previously the president and the prime minister had always belonged to the same party or the same electoral coalition.

In this arrangement, known as cohabitation, Chirac as prime minister was responsible for domestic affairs while Mitterrand retained responsibility for foreign policy. Chirac's most important achievement while in office a second time was his administration's privatization of many major corporations that had been nationalized under Mitterrand. He also reduced payroll and other taxes in an effort to stimulate job creation in the private sector. As the candidate of the centre-right RPR, Chirac ran for the presidency against Mitterrand and was defeated in runoff elections in May 1988, whereupon he resigned the post of prime minister. Remaining mayor of Paris, he made his third run for the presidency in May 1995 and this time defeated the Socialist candidate, Lionel Jospin. Chirac named Alain Juppé as his prime minister.

Chirchik, also spelled ČIRČIK, industrial city, eastern Uzbekistan. It lies along the Chirchik River, 20 miles (30 km) northeast of Tashkent city. Chirchik was created in 1935 from several villages that developed with the construction of the Chirchik hydroelectric power station and a large electrochemical works producing nitrogenous fertilizers and related chemicals. Chirchik also produces ferroalloys, manufactures machinery for agriculture and the chemical and electrotechnical industries, and has a branch of the Tashkent Polytechnical Institute. Pop. (1991 est.) 158,400.

Chiricahua, one of the Apache Indian tribes of the southwestern United States and northern Mexico. Originally a nomadic people, they faced severe pressures in the second half of the 19th century from white migrants and an expansionist U.S. government and were forced onto reservations and other restricted sites, first on the Arizona–New Mexico border, then in Florida and Alabama, and finally in Oklahoma and south-central New Mexico. (*See also* Apache.) Originally numbering perhaps 2,500 persons, the Chiricahua had about 600 full-blooded descendants in the late 20th century.

The original Chiricahua were divided into three to five bands, which were in turn divided into local groups of 10 to 30 extended families occupying individual territories. The band, with its chief, was the only cohesive group, and no central tribal organization existed. (Such leaders as Cochise and Geronimo [*qq.v.*], famous for their bloody resistance to white domination, were local Chiricahua chiefs.) Each group depended upon hunting deer and other animals and gathering wild plant foods. Settlements—really encampments—were frequently shifted. Modern Chiricahua live in mixed communities of Apache and engage in farming or urbanized labour.

Chiricahua National Monument, wilderness of unusual volcanic-rock formations—tall and slender pinnacles crowded into 19 square miles (48.5 square km) of ridge and canyon on the west flank of the Chiricahua Mountains—in southeastern Arizona, U.S., 40 miles (64 km) northeast of Douglas. Established in 1924, it unfolds a geological story nearly 1 billion years long of the Earth's eruptive and erosional forces. The region was once a stronghold of Apache Indian tribes under the chiefs Cochise and Geronimo.

Chirico, Giorgio de: *see* de Chirico, Giorgio.

Chiricoa (people): *see* Guahibo and Chiricoa.

Chirikov, Aleksey Ilich (b. 1703—d. November 1748, Moscow, Russia), explorer, second in command on the Arctic expeditions of Vitus Bering, whose discovery of southern Alaska supported Russian claims to northwestern America as far south as 55°.

Chirikov joined Bering's first exploratory mission in the far northern Pacific in midsummer of 1727. Chirikov again was second in command on the second Bering expedition (1733–43), whose goal was to map Siberia's Arctic coast and explore routes to America. It was 1741 before the organization and dispatch of coastal parties were complete and the American quest could sail from Okhotsk. Chirikov commanded the *St. Paul* and Bering the *St. Peter,* supported by smaller vessels with supplies and scientist-observers. A storm separated Bering and Chirikov on June 20, and Chirikov lingered in the area several days before heading east alone. Bering, meanwhile, moved on to the north and west, and to his death.

On July 11 Chirikov's crew sighted signs of land and four days later confirmed landfall on what now is western Prince of Wales Island in the extreme south of Alaska—just off the coast of present British Columbia. The *St. Paul* anchored off what now is Cape Addington and the next day sent a landing party to reconnoitre. After waiting a week with no word, Chirikov finally sent another party in his only remaining small boat. When this second party also failed to return, Chirikov reluctantly weighed anchor and headed west, short of water, his crew of 76 reduced by nearly half, plagued by fog and scurvy and the imminent end of the short Arctic summer. They reached Kamchatka's Avacha Bay on October 8, having discovered many islands en route.

The following spring Chirikov commanded an expedition in search of Bering, passing not far from the present Bering Island in the Komandorskiyes, where, unknown to the searchers, the *St. Peter* lay wrecked and Bering dead. Weather forced a return to port, and, before Chirikov could set out again, survivors from the wrecked *St. Peter* had straggled back to the mainland in supply vessels and the effort was canceled.

This was Chirikov's last expedition. He later returned to St. Petersburg, where he took part in the mapping of the Kamchatka Peninsula.

Chiron, in Greek mythology, one of the Centaurs, the son of the god Cronus and Philyra, a sea nymph. Chiron lived at the foot of Mount Pelion in Thessaly and was famous for his wisdom and knowledge of medicine. Many Greek heroes, including Heracles, Achilles, Jason, and Asclepius, were instructed by him. Accidentally pierced by a poisoned arrow shot by Heracles, he renounced his immortality in favour of Prometheus and was placed among the stars as the constellation Sagittarius.

Chiron, comet, once thought to be the most distant known minor planet. It was discovered in 1977 by Charles Kowal, an American astronomer, at the Palomar Observatory in southern California. Chiron travels in an unstable, eccentric orbit between the orbits of Saturn and Uranus. It measures 300–400 km (190–250 miles) in diameter. In 1989 astronomers detected a cloud of particles around Chiron. Such a dusty envelope is considered to be a distinguishing feature of comets. On the basis of this discovery, Chiron was reclassified from an asteroid to a comet.

chironomid (fly): *see* midge.

chiropractic, a system of healing based on the theory that disease in the human body results from a lack of normal nerve function. Chiropractors employ treatment by manipulation and specific adjustment of body structures, such as the spinal column, and use physical therapy when necessary. Chiropractors thus are concerned with the relationship between the musculoskeletal structures and functions of the body and the nervous system in the restoration and maintenance of health. The chiropractic method was founded in 1895 by an Iowa merchant, D.D. Palmer, who reportedly cured deafness in one individual by realigning a misaligned vertebrae. Doctors of chiropractic are trained in and through accredited chiropractic colleges. Procedures include the adjustment and manipulation of the articulations and adjacent tissues of the human body, particularly of the spinal column, and sometimes related therapies such as heat therapy, traction, and nutrition counseling.

Chirua, Lake (Malawi): *see* Chilwa, Lake.

chisel, cutting tool with a sharpened edge at the end of a metal blade, used—often by driving with a mallet or hammer—in dressing, shaping, or working a solid material such as wood, stone, or metal. Flint ancestors of the present-day chisel existed as far back as 8000 BC; the Egyptians used copper and later bronze chisels to work both wood and soft stone. Chisels today are made of steel, in various sizes and degrees of hardness, depending on use.

Chishima-Rettō (Russia): *see* Kuril Islands.

Chisholm, Caroline, *née* JONES (b. May 1808?, near Northampton, Northamptonshire, Eng.—d. March 25, 1877, London), British-born Australian philanthropist.

The daughter of a yeoman farmer, Caroline Jones married an officer in the East India Company, Archibald Chisholm, in 1830. While Archibald was stationed in Madras, India, she started a school for the daughters of European soldiers there. In 1838 she and her husband settled at Windsor, near Sydney, in Australia.

Australia had large numbers of unemployed immigrant labourers at this time, and Caroline Chisholm established a home in Sydney for destitute immigrant girls, for whom she found jobs in the countryside. By the time she returned to England in 1846, she had cared for about 11,000 immigrants. Her first published report on her work, *Female Immigration, Considered in a Brief Account of the Sydney Immigrants' Home* (1842), was the first work by an Australian woman. She spent the years from 1846 to 1854 in England, raising funds for the immigration of whole families to Australia, a task rendered unnecessary by the gold rush to Australia in the early 1850s. Chisholm returned to Australia in 1854 and lectured on and made inspections of the living conditions in the goldfields. Her health broke down in 1857, and in 1866 she and her family returned to England, where she was granted a government pension of £100 in 1867. Her pioneering and very useful attempts at social work in Australia had a notable influence on her contemporaries.

Chisholm, Hugh (b. Feb. 22, 1866, London, Eng.—d. Sept. 29, 1924, London), English newspaper and encyclopaedia editor noted for his editorship of the 11th edition of the *Encyclopædia Britannica.*

Graduating from the University of Oxford in 1888, Chisholm became assistant editor of the *St. James's Gazette* in 1892 and editor in 1897. In 1900 he joined *The Times* as coeditor of the new supplementary volumes constituting the 10th edition of the *Encyclopædia Britannica.* As editor in chief and head of the London office from 1903, he was largely responsible, with Franklin Hooper, for the authoritative 11th edition of the *Britannica,* which was published in 1910–11. Chisholm then served as city editor of *The Times* from 1913 to 1920, when he reassumed the editorship of *Britannica* for the new supplementary volumes of the 12th edition.

Chisholm Trail, 19th-century cattle drovers' trail in the western United States. Although its exact route is uncertain, it originated south of San Antonio, Texas, ran north across Oklahoma, and ended at Abilene, Kan. Little is known of its early history. It was probably named for Jesse Chisholm, a 19th-century trader. In 1867 a cattle-shipping depot on the Kansas Pacific Railroad was established in Abilene by Joseph G. McCoy. Between 1867 and 1871 about 1,500,000 head of cattle were driven north along the trail to Abilene, which was the departure point for shipment of the cattle to eastern markets. The trail's importance declined after 1871, as other railheads were established, but increased again in the 1880s when the Santa Fe Railroad reached Caldwell, Kan. The long cattle drives gradually declined as the railroads built branch lines in the late 19th century.

Articles are alphabetized word by word, not letter by letter

Chisholm v. Georgia (1793), U.S. Supreme Court case distinguished for at least two reasons: (1) it showed an early intention by the court to involve itself in political matters concerning both the state and the federal governments, and (2) it led to the adoption of the Eleventh Amendment, which forbade a citizen of one state from suing another state in a federal court without the consent of the defendant state.

In 1792 the executors of the estate of a South Carolina citizen, Alexander Chisholm, sued the state of Georgia in the Supreme Court to force payment of claims made against that state. Georgia refused to appear before the court, denying the court's authority to hear cases in which a state was a defendant. The court, citing Article III, Section 2 of the Constitution, rendered a decision for the plaintiff. Georgia then challenged both the decision and the court's jurisdiction.

In 1798 the Eleventh Amendment was adopted, removing the court's jurisdiction in such cases. A citizen suing a state in a state court may, however, bring that suit on appeal to a federal court.

Chishtīyah, Muslim Ṣūfī order in India and Pakistan, named after Chisht, the village in which the founder of the order, Abū Isḥāq of Syria, settled.

Brought to India by Khwājah Mu'īn-ad-Dīn Chishtī in the 12th century, the Chishtīyah has become one of the most popular mystical orders in the country. Great emphasis was originally placed by the Chishtīyah on the Ṣūfī doctrine of the unity of being (*waḥdat al-wujūd*), oneness with God; thus, all material goods were rejected as distracting from the contemplation of God; absolutely no connection with the secular state was permitted; and the recitation of the names of God, both aloud and silently (*dhikr jahrī, dhikr khafī*), formed the cornerstone of Chishtī practice. Members of the order were also pacifists. The ideals of

the early adherents are still revered, but some modifications of practice—*e.g.*, ownership of property—are tolerated.

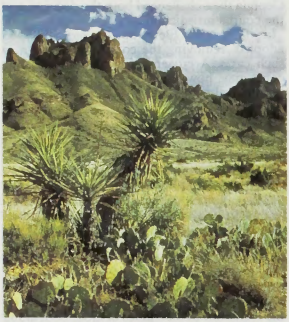
In the history of the Chishtīyah, the period of the Great Sheikhs (*c.* 1200–1356) was marked by the establishment of a centralized network of monasteries (*khānqahs*) in the northern provinces of Rājputāna, the Punjab, and Uttar Pradesh. From the 14th century, these monasteries were provincial institutions where various branches of the order took root, notably the Ṣābirīyah branch in the 15th century at Rudawlī and the Nizāmīyah, revived in the 18th century in Delhi.

Chisimaio (Somalia): *see* Kismaayo.

Chişinău, formerly KISHINYOV, also spelled KISHINEV, or KIŠIN'OV, city and capital of Moldova (Moldavia), situated along the Byk River. The first documentary reference to Chişinău dates from 1466, when it was under the rule of the Moldavian prince Ştefan III. After Ştefan's death the city fell under the control of the Ottoman Turks. Gradually Chişinău's trading importance increased, though the city suffered severe destruction in the Russo-Turkish War of 1788. In 1812 Chişinău was ceded to Russia with the rest of Bessarabia. It was henceforth known by its Russian name, Kishinyov. Following World War I it was included in Romania as Chişinău, but it was ceded with the rest of Bessarabia back to the Soviet Union in 1940 and became the capital of the newly formed Moldavian S.S.R. Heavy damage was inflicted on the city in World War II, but after the war Kishinyov was rebuilt. Newer parts of the city lie on terraces along the Byk; parts of the old town, however, are still subject to flooding. With the collapse of Soviet authority in Moldavia in 1991, the Romanian-language version of the city's name once more came into official use.

Chişinău is the major industrial centre of Moldova and is especially important for light engineering and the manufacture of measuring equipment, machine tools, tractors, pumps, refrigerators, washing machines, and insulated wiring. Wine making, flour milling, and tobacco processing are notable among the city's agriculture-related industries. There are also clothing and footwear factories. The city is the cultural centre of Moldova, with an academy of sciences, a university (1945), other institutions of higher education, and several scientific-research establishments. Pop. (1991 est.) 676,700.

Chisos Mountains, southernmost segment of the Rocky Mountains, covering 40 square miles (104 square km) along the Rio Grande in southwestern Texas, U.S. They form the state's third highest mountain group, culminating at Emory Peak (7,777 feet [2,370 m]). The mountains are within Big Bend National Park, and tourists are attracted by their self-guiding trails, unique geologic formations, and spectacular scenery. Chisos has been interpreted as an Indian word for "ghost," or "spirit," or as having come from the Castilian *hechizos* ("enchantment").



Lost Mine Peak, Chisos Mountains in Big Bend National Park, Texas
David Muench

Chistopol, also spelled ČISTOPOL, city and administrative centre, Chistopol *rayon* (sector), Tatarstan, west-central Russia. Formed in 1781, when the village of Chistoye Pole became the town of Chistopol, it is today a port along a large reservoir on the Volga River. The city's main industries are ship repairing, flour milling, sawmilling, and metalworking. A teachers college and a biological-research station are located in the city. Pop. (1993 est.) 67,200.

Chistyakovo (Ukraine): *see* Torez.

Chita, also spelled ČITA, *oblast* (province), far eastern Russia. The oblast is centred on Chita city and includes the Agin-Buryat autonomous *okrug* (district). Its terrain is marked with a complex series of mountain ranges (principally the Yablonovo), plateaus, valleys, and broad basins. Most of the oblast is in coniferous forest, chiefly of Dahurian larch; in southern depressions there are forest-steppe and steppe vegetation. The climate is dry and severely continental. Apart from the Buryat peoples there are a few Evenks, but the bulk of the population consists of Russians who settled the area in the mid-17th century. In 1654 Nerchinsk was founded as a major trading centre with China. After the 1689 Treaty of Nerchinsk, which halted the Russian advance down the Amur River, the Chita region remained a frontier area and a place of exile and penal labour for criminals and political prisoners in the silver mines east of Nerchinsk. There was little free settlement until the coming of the Trans-Siberian Railroad in the 1890s. The railway remains the main axis of communication. Today mining and primary-ore processing dominate the economy and include gold (at Baley), tin, tungsten, molybdenum, lead, zinc, fluorspar, lithium, tantalum, and some lignite (brown coal). Timber working is widespread. Petrovsk-Zabaykalsky is a metallurgical centre of regional significance. Agriculture, despite much new plowing in the 1950s, is poorly developed, and livestock raising, especially of sheep, is dominant. Fox and squirrel furs are produced on fur farms. Area 166,600 square miles (431,500 square km). Pop. (1993 est.) 1,375,900.

Chita, also spelled ČITA, city and administrative centre of Chita *oblast* (province), far eastern Russia. The city lies at the confluence of the Chita and Ingoda rivers. It was founded in 1653 as a wintering camp, and a fort was built there in 1690. Chita then became a centre for trade with China, along the caravan route that was later followed by the Chinese Eastern Railroad. The Decembrists, exiled there after a plot in December 1825, developed the town, but a greater spur to its growth was the coming of the Trans-Siberian Railroad to the locality in 1900. The modern city, an industrial and cultural centre of eastern Siberia, has spread from the river valleys up the lower slopes of the Chersky Range. Nearby is the junction of the Trans-Siberian with the former Chinese Eastern Railway to Harbin and Shen-yang (Mukden), opened in 1903. This junction led to the establishment of large locomotive and rolling-stock repair works in the city. Chita also has a machine-building factory and produces textiles, sheepskin, and leather goods and a range of foodstuffs. Lignite is mined in its suburb, Chernovskye Kopi. Pop. (1993 est.) 369,000.

chital, also called SPOTTED DEER, or AXIS DEER (*Cervus axis,* sometimes *Axis axis*), Asiatic deer, belonging to the family Cervidae (order Artiodactyla). It lives in grasslands and forests in India and Sri Lanka in herds of



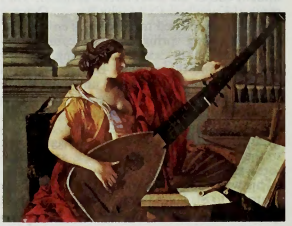
Chital stag (*Cervus axis*)
Kenneth W. Fink—Root Resources

up to 100 or more. It stands 90–95 cm (35–37 inches) at the shoulder. Its spotted coat is reddish brown above and white below. The male chital has branching, usually three-tined antlers up to 100 cm long.

Chitaldrug (India): *see* Chitradurga.

chitarrone, large bass lute, or archlute, developed in Rome about 1600. It was usually about 6 feet (less than 2 m) tall, with a normal lute body.

The chitarrone had six to eight strings running over the fingerboard to a pegbox (the part of the instrument in which the tuning pegs are set) positioned midway in an extended neck.



The Muse Euterpe playing the chitarrone, "The Allegory of Music," oil on canvas by Laurent de la Hire, 1649; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, Charles B. Curtis Fund, 1950

The instrument had six to eight additional bass strings, or diapasons, lying off the fingerboard and running to a second pegbox at the end of the neck. Having a sonority approaching that of the contemporary harpsichord, it was used as a basso continuo instrument in 17th-century chamber-music ensembles.

Chitembwe-Mwera Highlands (Malaŵi): *see* Dowa Highlands.

Chitimacha, North American Indian tribe of the Macro-Algonquian linguistic phylum, once the most powerful tribe on the north-

ern Gulf of Mexico coast, west of what is now Florida. They inhabited the area around Grand Lake in present southern Louisiana, and their estimated population in 1650 was 3,000. The Chitimacha linguistic group included, besides the Chitimacha tribe, the Washa and Chawasha tribes. The Chitimacha were sun worshipers who reinterred the bones of their dead and practiced ritual head deformation. The men used nose ornaments, wore their hair long, and tattooed their arms, legs, and faces.

Their dwellings were the cabinlike structures common to many of the southeastern tribes. The Chitimacha were particularly noted for the skill of their basket weaving, employing a "double-weave" technique resulting in different designs on two surfaces. They subsisted on corn (maize), beans, and squash; wild fruits and berries; deer and bear; and many varieties of fish.

Early in the 18th century the Chitimacha went to war with the French for 12 years. The French prevailed, with the result that French slaves in the early days of the Louisiana colony were mostly Chitimacha. In 1781 the Chitimacha were assigned a place near present-day Plaquemine for settlement. By 1881 the surviving Chitimacha were living near Charenton, on Grand Lake in Louisiana. In the late 20th century there were about 260 descendants of the tribe living on reservations in that part of the state.

chitin, white, horny substance found in the outer skeleton of insects, crabs, and lobsters and in the internal structures of other invertebrates. It is a polysaccharide consisting of units of the amino sugar glucosamine. As a by-product of crustacean processing, chitin is used as a flocculating agent for waste water, a wound-healing agent, a thickener and stabilizer for foods and pharmaceuticals, an ion-exchange resin, a membrane for chromatography and electrodialysis, a binder for dyes, fabrics, and adhesives, and a sizing and strengthening agent for paper.

chiton, any of numerous flattened, bilaterally symmetrical marine mollusks, worldwide in distribution but most abundant in warm regions. The approximately 600 species are usually placed in the class Placophora, Polyplacophora, or Loricata (phylum Mollusca).

Chitons are usually oval in shape. On the dorsal (upper) surface is a row of eight overlapping plates surrounded or covered by a tough girdle. Chitons use a large, flat foot for creeping along and clinging to rocks; they also have a well-developed radula (filelike structure) with which to scrape algae and other plant food from rocks. On either side of the foot is a groove containing the gills.



Chiton
E.S. Ross

About 5 cm (2 inches) is the maximum length of most chitons, but *Cryptochiton stelleri,* of the Pacific coast of North America, may grow to about 43 cm. Chitons are very flexible and can fit snugly into rock crevices or curl into a ball when detached. They can also adhere so firmly to rocks that they may be injured when pried loose.

Chitons, especially in warm areas, are usually found in the intertidal zone or in shallow water. In colder regions more species inhabit deeper water to about 4,000 m (13,000 feet), although some have been found to depths of 7,000 m. Most are nocturnal in habit. The tremendous numbers of free-swimming young (trochophores) are an important element in the marine plankton.

chiton, Greek CHITŌN, garment worn by Greek men and women from the Archaic period (*c.* 750–*c.* 500 BC) through the Hellenistic period (323–30 BC). Essentially a sleeveless shirt, the chiton was a rectangular piece of linen (Ionic chiton) or wool (Doric chiton) draped by the wearer in various ways and kept in place at the shoulders by brooches (fibulae) and at the waist by a belt. Excess fabric (the chiton was longer than the wearer was tall) was pulled up under the belt in blouse fashion. At all times the chiton was worn at ankle length by women.

During the Archaic period, Greek men wore a long chiton; thereafter, except for charioteers, priests, and the elderly, they wore a knee-length version. Sleeved chitons were worn by actors and priests. Patterns and colours varied with the times and with the status of the wearer. The chiton is well illustrated in the caryatid (*q.v.*) porch of the Erechtheum in Athens.

Chitor (India): *see* Chittaurgarh.

Chitose, city, Hokkaido, Japan. It lies southeast of Sapporo, on the railway to Tomakomai. Because of the extension of Sapporo and the growth of the commercial and industrial harbour of Tomakomai after World War I, Chitose grew rapidly. A Japanese Ground Self-Defense Force base was established in the city in 1962. The Chitose airport, one of Japan's larger airports, serves Sapporo. The city is a tourist centre for Shikotsu-Toya National Park. Pop. (1990) 78,947.

Chitradurga, also called CHITALDRUG, town, eastern Karnātaka state, southern India. A cotton-trading centre and terminus of a spur railway line in the Hagari River valley, it has industries that include cotton ginning and pressing. It is the site of massive fortifications erected by Hyder Ali of Mysore in the 18th century. Remains of the 2nd-century-AD city of Chandravalli are to the west. The Vānivilāsa Sāgara Dam, on the Hagari River, provides irrigation for rice, sugarcane, and cotton in the surrounding area. Pop. (1991 prelim.) 87,053.

Chitrāl, also spelled CHITRĀR, or QĀSHQĀR, town, northern North-West Frontier province, Pakistan. The town lies along the Chitrāl River, a tributary of the Kunar River, in a valley 2 miles (3 km) wide, at an elevation of about 4,900 feet (1,490 m) above sea level. Chitrāl has a government woolen and sericulture centre, the Maghor (the fort of the former chieftain), a polo ground, and fruit gardens in the neighbourhood. It is accessible via several mountain passes and is linked with Peshāwar by air.

The local inhabitants were converted to Islām in the 11th century and are now mostly members of the Ismā'ilī sect. The practice of deriving income from the sale of Chitrālī women, known for their beauty, in Peshāwar and Afghanistan made Chitrāl a centre for slave traders until the coming of British rule. Khowari, the language of the Khōs, the dominant tribe in the locality, is the lingua franca. The Chitrālis are fine horsemen and excel at the game of polo.

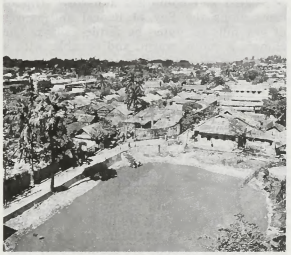
The surrounding area is a scenic region of lofty ranges (Tirich Mīr; 25,230 feet [7,690 m]), fertile valleys, and rich pine forests. It is drained by the Kunar River. Wheat, barley, corn (maize), and rice are the chief crops in the area, and walnuts, grapes, apricots, and mulberries are also grown. Pop. (1981) 34,832.

Chitrasena, also called MAHENDRAVARMAN (fl. early 7th century, Chenla), soldier who expanded the kingdom of Chenla (precursor of modern Cambodia) and ruled as king about 600–611.

With his brother or cousin Bhavavarman (later Bhavavarman I), Chitrasena led a campaign against Funan, an adjoining kingdom, in about 550, conquering and incorporating it within the realm. During Bhavavarman I's reign, Chitrasena had command of the military forces. He secured an area approximately the size of the present Cambodian state, stretching from Kratie (Krâchéh) on the Mekong River toward the southwest, north to the Mun River, south from the Khorat Plateau, and west beyond the Tonle Sap ("Great Lake"). Inscriptions recording his victories have been found in these regions. According to Chinese and Cham sources, Chitrasena was a brave warrior and a popular hero.

At Bhavavarman's death (*c.* 600) Chitrasena ascended the throne and took the title Mahendravarman ("Protégé of the Great [God] Indra"). During his reign he sought to establish peaceful relations with neighbouring states. He gave his daughter in marriage to a Cham king to cement their friendship. Chitrasena was succeeded by his son, Īśanavarman, who continued his expansionist policy.

Chittagong, also called CHITTAGRĀM, city that is the chief Indian Ocean port of Bangladesh. It lies about 12 miles (19 km) north of the mouth of the Karnaphuli River,



Chittagong, Bangladesh
Art Resource

in the southeastern arm of the nation. It is a major communications centre and is linked by rail with Dhākā and Comilla, by road with Feni and Comilla, and by air with Dhākā, Jessore, Cox's Bāzār, and Calcutta. The second most important industrial city in Bangladesh, its varied manufacturing establishments extend about 10 miles (16 km) to the north and northeast.

Chittagong has a splendid natural harbour. After the creation of Pakistan in 1947, much trade was diverted to Chittagong from Calcutta, and the port was considerably improved. It is equipped with modern facilities and has numerous permanent jetties and moorings. An offshore terminal was built that is connected with the city's eastern oil refinery by a large-capacity pipeline. Chittagong's foreign trade has increased with Bangladesh's economic development, and city life centres around the harbour. Tea, naphtha, jute, and jute manufactures constitute the port's principal exports.

The city grew in different directions along the main routes of transportation and was developed according to a master plan. Among other buildings, two markets covering an area of about 700,000 square feet (65,000 square m) were constructed. The principal industries of Chittagong include cotton and jute mills,

tea and match factories, and chemical and engineering works. The city has an iron and steel mill, and its large oil refinery went into production in 1968. Being the gateway of Bangladesh for foreign trade, the city has offices of many foreign firms and banks. It is the headquarters of the Bangladesh Railway, and the railway workshop is located in the nearby town of Pahartali.

Constituted a municipality in 1864, Chittagong has several hospitals, an ethnological museum, a medical college, a technological institute, and the University of Chittagong (1966), with numerous affiliated colleges. Nearby are a cadet college (at Faujdār Hāt) and a merchant-marine academy.

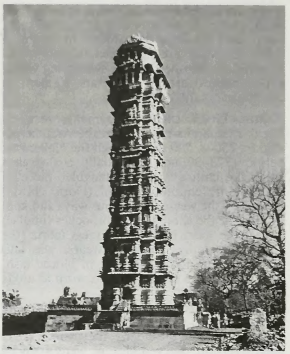
Chittagong's port was known to the Mediterranean world from the early Christian era and was known to Arab sailors by the 10th century AD. It was called Porto Grande by Portuguese and Venetian voyagers and was described by João de Barros in 1552 as "the most famous and wealthy city of the Kingdom of Bengal." It has been generally identified with the city of Bengala described by early Portuguese and other writers. Conquered by the Muslims in the 14th century, Chittagong passed to the Arakanese in the next century. The piratical raids of the Arakanese and their Portuguese mercenaries led to the dispatch of a strong force by Shaista Khan, the Mughal governor (nawab) of Bengal, who in 1666 occupied the region. Chittagong was ceded to the British East India Company in 1760.

The area surrounding Chittagong is heavily populated and comprises a narrow strip of coast along the Bay of Bengal and ranges of low hills separated by fertile valleys. The climate is moist, warm, and equable, with a heavy rainfall amounting to more than 100 inches (2,540 mm) annually, falling mainly during the summer monsoons. The area's chief rivers are the Karnaphuli, Feni, Halda, Sangu, and Mātāmuhari. The higher parts of the Chittagong Hills are forested, while the lower portions are covered predominantly with brushwood. Between the hills lie cultivated valleys that were originally filled by deposits of sand and clay washed down from the hills. Rice is the most important crop; tea is grown on low hills that are unfit for rice cultivation. Chilies and vegetables are also grown, and cane and bamboo are economically valuable forest products. Pop. (1991 prelim.) city, 1,566,070; metropolitan area, 2,040,663.

Chittaurgarh, also spelled CHITTORGARH, also called CHITOR, city, south-central Rājasthān state, northwestern India. Served by rail and road, it is an agricultural market centre.

Chittaurgarh, formerly called Chitrakut after Chitrang, a chieftain of the Rājputs, lies at the foot of a hill slope on which stands Chitor fort. From the 8th century to the 16th it remained the capital of the state of Mewār and was the stronghold of the Sesodia Rājputs. It was thrice besieged by Muslim attackers: 'Alā'-ud-Dīn Khaljī (1303), Bahādur Shāh of Gujarāt (1534–35), and the Mughal emperor Akbar (1567–68). In each case the defenders chose death for themselves and *jauhar* (collective immolation) for their families rather than surrender. After Chittaurgarh's capture by Akbar (1568), the capital of Mewār was transferred from there to Udaipur. Within the Chitor fortress are several palaces, Jaina and Hindu temples, and two exquisitely carved Jaina pillars (the towers of Fame and Victory), erected in the 12th and 15th centuries, respectively. The city has a government college affiliated with the University of Rājasthān.

The surrounding area is composed of a series of hills running north to south and forming narrow, confined valleys. Agriculture is the principal occupation. Wheat, corn (maize), sorghum, oilseeds, cotton, and sugarcane are the chief crops; iron-ore and limestone deposits are worked. Pop. (1991 prelim.) city, 71,566.



The Tower of Victory in Chittaurgarh, Rājasthān, India

Stephanie Dinkins—Photo Researchers

Chittoor, city, southern Andhra Pradesh state, southern India. Situated 80 miles (130 km) west-northwest of the city of Madras, the city is a road and trade centre; rice and oilseed milling are the main industries. The bulk of Indian steatite (soapstone) comes from the nearby hills.

The surrounding area is composed mainly of the Chittoor Basin along the course of the Penner River in the vicinity of the mountains of Cuddapah. Natural resources are poor, and the only agricultural products of note are sorghum, peanuts (groundnuts), and bajra (pearl millet). Pop. (1991 prelim.) city, 133,233.

Chiu-chiang, Pinyin JIUJIANG, river port and city lying in northern Kiangsi *sheng* (province), China. It lies along the Yangtze River to the west of its junction with Lake P'o-yang and the Kan River's tributary system. Chiu-chiang is an important river port, although it does not have a good natural harbour. It is an outlet for trade from Kiangsi and is connected with the rest of the province both by waterways and by a railroad to Nan-ch'ang built in 1915.

Originally a customs station in the late 3rd century AD, the settlement was fortified in the 5th century and was constituted as a county town in 589. Historically, it was both a strategic place, guarding the route into Kiangsi, and a commercial centre. Between the 17th and 19th centuries Chiu-chiang became one of the major centres of the Chinese tea trade. In 1861 it was opened as a treaty port to foreign trade, and in the latter part of the 19th century a sizable European settlement grew up there, not only in the port itself but also in nearby Ku-ling to the west, which became a summer resort. The tea trade, however, gradually declined, and much of Chiu-chiang's remaining export trade was siphoned off by the railway, opened in 1936–37, from Nan-ch'ang to the coast. Chiu-chiang declined to a local economic centre for northern Kiangsi, functioning as a collection centre for grain, cotton, ramie, tea, and other products from the Hsiu River valley and the region around Lake P'o-yang. There are copper deposits in the hills to the west.

Until 1949 there was little industry in the city, except for some handicrafts. A large cotton textile industry, minor engineering works, oil presses, and rice mills have since been established. There are also brickworks and tile works, and hydroelectric projects have been constructed in northern Kiangsi to provide power for industry. Pop. (1990 est.) 291,187.

Chiu Chu-chi (Taoist monk and traveler): *see* Ch'ang-ch'un.

Chiu-ch'üan, also spelled KIUCHÜAN, Pinyin JIUQUAN, city in western Kansu *sheng* (province), China. An important staging post on the ancient Silk Road to Central Asia, Chiu-ch'üan was founded in 111 BC as a military outpost. From AD 581 onward it was the seat of Su-chou prefecture, and under the T'ang dynasty (618–907) it was given its present name. From the 5th century onward, it became the seat of a cult centred on two sets of cave temples in Wen-shu Mountain (Mañjuśrī's Mountain) about 9 miles (14 km) to the southwest. Subsequently, however, because of the decay of the Old Silk Road, the city became comparatively insignificant until modern times. Its modern development began in the late 1950s with the discovery of very large iron-ore deposits at Mount Ching-tieh to the south and the development of coal mines at Shan-tan to the southeast, both served by the new Lan-chou–Sinkiang railway. A large integrated iron and steel plant has been built at Chiu-ch'üan. Pop. (mid-1980s est.) 10,000–50,000.

Chiu-ling Mountains, Wade-Giles CHIU-LING SHAN, Pinyin JIULING SHAN, range in northern Kiangsi province, China. The range runs southwest-northeast from east of Ch'ang-sha in Hunan province to the valley of the Hsiu River west of Lake P'o-yang, a distance of some 155 miles (250 km). It lies south of, and parallel to, the Mu-fu Mountains, from which it is separated by the valley of the Hsiu River. Unlike the Mu-fu Mountains, which form a continuous ridge, the Chiu-ling Mountains are much more complex, being formed of two or three parallel ridges with an identical southwest-northeast orientation. Most of the ridges are about 3,300 feet (1,000 m) in elevation, though several peaks in the central range reach 4,250 to 4,600 feet (1,300 to 1,400 m), and Mounts Wu-mei and Kao-shan are more than 5,250 feet (1,600 m). The mountain terrain is extremely rugged and heavily forested. The area is sparsely populated and produces chiefly timber and forest products, though there is also some tea production.

Chiu-lung River, Wade-Giles romanization CHIU-LUNG CHIANG, Pinyin JIULONG JIANG, river in southeastern Fukien province, China. The Chiu-lung River rises in the mountains northwest of Chang-chou, draining a large interior basin above Chang-p'ing. The Hsin-ch'iao River and the Yen-shih River and their tributaries drain the northeast and the southwest of this basin, respectively. The river then breaks through the coastal ranges in a generally southeasterly direction, parallel to the Po-p'ing Mountains, running northwest-southeast; the range forms the watershed between the Chiu-lung and the upper waters of the Han River. The Chiu-lung River discharges into the Amoy estuary, receiving just above its mouth its largest southern tributary, the Hsi River. The river itself is too swift and dangerous for navigation in its upper reaches, and junks and steamboats can use the estuary only as far as Lung-hai (Shih-ma), and the Hsi River as far as Chang-chou, which was once an important seaport until the estuary silted up.

Although the river is unnavigable, the Chiu-lung valley is an important route from Amoy to the interior, and since 1957 it has been followed by a railway and a highway.

Ch'iu Ying, Pinyin QIU YING (b. *c.* 1494—d. *c.* 1552, T'ai-ts'ang, Kiangsu province, China), Chinese painter noted for the *kung-pi* brush technique of producing highly detailed figure and architectural paintings, as well as

flower studies. Ch'iu Ying did not pursue the other characteristic arts and activities of the man of letters that Chinese critics believed were marks of the great painter; but he earned their respect for the dexterity, representational skill, and refinement of feeling evident in his paintings.



"Narcissus and Flowering Apricots," hanging scroll in ink and colour by Ch'iu Ying, 1547; in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

He lived in the Su-chou region, home of the revered Wu school of painting, and counted among his artist associates Chou Ch'en, who may have been his teacher, and T'ang Yin.

Ch'iung-shan, also called CH'IUNG-CHOU, Pinyin QIONGSHAN, or QIONGZHOU, also called KIUNG CHOW, town in Hainan *sheng* (province), China. It is situated some 3 miles (5 km) south of Hai-k'ou on the northern coast of Hainan Island. A county town was first established there in the early years of the 1st century BC, and after AD 25 its name was changed to Chu-yai ("Shore of Pearls"), after the famous pearl fisheries of the region. Under later dynasties it became the centre of a commandery or prefectural government, receiving the name Ch'iung-shan during 627–649. Under the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties it became the superior prefecture of Ch'iung-chou. It had always been the administrative capital of Hainan Island and in the 16th century began to be an important commercial centre.

In 1876 it was opened to foreign trade, but thereafter its outport of Hai-k'ou began to outstrip it in size and importance and in 1949 replaced it as the administrative capital. Pop. (mid-1980s est.) 10,000–50,000.

Chiva (Uzbekistan): *see* Khiva.

chivalry, the knightly class of feudal times. The primary sense of the term in the European Middle Ages is "knights," or "fully armed and mounted fighting men." Thence the term came to mean the gallantry and honour expected of knights. Lastly, the word came to be used in its general sense of "courtesy."

In English law "chivalry" meant the tenure of land by knights' service. The court of chivalry instituted by Edward III, with the lord high constable and earl marshal of England as joint judges, had summary jurisdiction in all cases of offenses of knights and generally as to military matters.

The concept of chivalry in the sense of "honourable and courteous conduct expected of a knight" was perhaps at its height in the 12th and 13th centuries and was strengthened by the Crusades, which led to the founding of the earliest orders of chivalry, the Order of the Hospital of St. John of Jerusalem (Hospitalers) and the Order of the Poor Knights of Christ and of the Temple of Solomon (Templars), both originally devoted to the service of pilgrims to the Holy Land. In the 14th and 15th centuries the ideals of chivalry came to be associated increasingly with aristocratic display and public ceremony rather than service in the field.

chive (species *Allium schoenoprasum*), small, hardy perennial plant of the lily family (Liliaceae) related to the onion. Its small, white, elongated bulbs and thin, tubular leaves grow in clumps. Dense, attractive, spherical umbels of bluish or lilac flowers rise above the foliage; they characteristically produce only a few seeds. Chives may be propagated by planting seeds but are cultivated more commonly by dividing the clumps and planting the tiny bulbs. A flowerpot of chives can be kept in a sunny window for a continuous supply of



Wild chives (*Allium schoenoprasum*)

Ingmar Holmasen

leaves, which may be cut off at earth level and used for seasoning foods, particularly eggs, soups, salads, and vegetables.

Chivington Massacre: *see* Sand Creek Massacre.

Chkalov (Russia): *see* Orenburg.

Chkheidze, Nikolay Semyonovich (b. 1864, Kutaisi, in the Caucasus, Russian Empire—d. June 13, 1926, Leuville-sur-Orge, France), Menshevik leader who played a prominent role in the revolutions of Russia (1917) and Georgia (1918).

Chkheidze, a schoolteacher who helped to introduce Marxism into Georgia in the 1890s, was elected to the Russian State Duma (legislature) in 1907. There he became the leader of the Menshevik faction of the Russian Social-Democratic Party and earned a reputation as a spokesman for extreme left-wing positions, including opposition to participation in World War I. In 1917, on the outbreak of the February (March, New Style) revolution, he became chairman of the Petrograd (St. Petersburg) Soviet of Workers' and Soldiers' Deputies, in which he vainly sought to conciliate the moderate and radical elements. His vacillations helped to discredit the original leadership of the soviet, which was soon swept away by the rising tide of Bolshevism. After the Bolsheviks seized power in October 1917, Chkheidze returned to Georgia and became president of the assembly that created the independent Transcaucasian Federal Republic (April 1918); when that republic disintegrated, he took part in the formation of the independent Republic of Georgia (May 1918). When the Bolsheviks overthrew the Menshevik regime in Georgia in 1921, he emigrated to France, where he later committed suicide.

Chlamydia, a genus of bacterial parasites that cause several different diseases in humans. The genus is composed of three species: *C. psittaci,* which causes psittacosis (*q.v.*); *C. trachomatis,* various strains of which cause trachoma, lymphogranuloma venereum, and conjunctivitis (*qq.v.*); and *C. pneumoniae,* which causes respiratory-tract infections.

C. trachomatis also causes a variety of sexually transmitted diseases, chiefly nongonococcal urethritis (infection of the urethra) in males and females and epididymitis (infection of the epididymus) in males. In men, nongonococcal urethritis has symptoms similar to those of gonorrhea. A gonorrhea-like discharge from the penis is the most prominent symptom. Painful urination may occur but is usually less prominent than with gonorrhea. The symptoms of nongonococcal urethritis appear one to four weeks after the infection has been contracted through sexual intercourse.

A chlamydial infection ordinarily produces few if any symptoms in women. There may be a slight vaginal discharge and pelvic pain. If untreated, however, *C. trachomatis* can seriously infect the cervix (causing cervicitis), the urethra (causing urethritis), or the fallopian tubes (causing salpingitis), and it can also cause pelvic inflammatory disease. Infection of the fallopian tubes can cause sterility, and a chlamydial infection also leads to a higher risk of premature births, ectopic pregnancies, and postpartum infections. A woman with an infected cervix may give birth to infected newborns who can develop pneumonia or the eye disease known as neonatal conjuctivitis.

C. pneumoniae was identified as a separate *Chlamydia* species in the 1980s. It causes various respiratory-tract infections, most commonly a mild, atypical pneumonia with symptoms of fever, cough, and sore throat.

In diagnosis it is important to eliminate gonorrhea as a cause for the symptoms. Specific tests for chlamydia include smears and cultures. The preferred treatment for chlamydial infections is tetracycline. Erythromycin and sulfonamide drugs have also been effective in treating the infections. Appropriate treatment produces a speedy recovery.

Chlamydomonas, genus of green biflagellated single-celled organisms of disputed classification, placed botanically in the green algal order, Volvocales, and zoologically in the plantlike protozoan order, Volvocida. *Chlamydomonas* is considered a primitive life form of evolutionary significance. The cell has a spherical cellulose membrane (theca), a stigma (eyespot), and a cup-shaped, pigment-containing chloroplast. Although photosynthesis oc-



Chlamydomonas

J.M. Langham

curs, nutrients also may be absorbed through the cell surface. Asexual reproduction is by zoospores; sexual reproduction is by formation of gametes. The development of motility, sexuality, and fusion seems dependent on the production of substances (termones, gamones) that have a regulatory action similar to hormones. *Chlamydomonas* is found in soil, ponds, and ditches polluted by manure. It may colour water green. The species *C. nivalis,* which contains the red pigment hematochrome, imparts a red colour to melting snow.

Chlamydosaurus, also called FRILLED LIZARD, genus of the reptile family Agamidae, found in Australia and New Guinea and consisting of only one species, *Chlamydosaurus kingii.* This lizard averages 85 cm (33 inches) in length and spends most of its time in trees feeding on insects and small mammals.



Frilled lizard (*Chlamydosaurus kingii*) with its frill extended in defensive posture
Jean-Paul Ferrero—Ardea London

The animal is of interest because it can run standing up on its hind legs with its forelegs and tail in the air and because of the scaly membrane around its neck that is used in defensive posture. This neck frill, often as wide as the lizard is long, lies like a cape over the shoulders. When irritated, the frill becomes perpendicular to the body, enabling the lizard to surprise its enemies by suddenly displaying a head several times its normal size.

Chlodio, also spelled CLODION, French CHLODION (d. *c.* 447), king of a tribe of Salian Franks, considered the founder of the Merovingian dynasty. Chlodio's tribe renounced the suzerainty of Rome after 428 and broke across the Scheldt River, spreading southward into Gaul until they reached Tournai and Cambrai. Their defeat (*c* 431) by the Roman general Aetius at Helena (Hélesme), between Tournai and Cambrai, prevented further expansion. Chlodio did occupy all the country as far as the Somme River, however, and he made Tournai the capital of the Salian Franks. His successor was Merovech.

Chlodomer (Merovingian king): *see* Clodomir.

Chlodovech (name of Merovingian kings): *see under* Clovis.

Chlodwig (name of Merovingian kings): *see under* Clovis.

Chłopicki, Józef, in full GRZEGORZ JÓZEF CHŁOPICKI (b. March 14, 1771, Kapustynie, Volhynia, Pol. [now in Ukraine]—d. Sept. 30, 1854, Kraków, Pol., Austrian Empire [now in Poland]), general who served with distinction with the armies of Napoleon and was briefly the dictator of Poland after the November Insurrection of 1830.

Chłopicki enlisted in the Polish army in 1785 and fought in the campaigns of 1792–94 before and after the Second Partition of Poland. He then took service under the French in the new Polish legions and distinguished himself in the Italian campaigns of 1797 and 1805. He commanded Napoleon's First Vistula Regiment in Poland in 1807 and from 1808 served in the Peninsular War in Spain, receiving the Legion of Honour for heroism at Epila and in the storming of Saragossa. He accompanied Napoleon's Grande Armée into Russia in 1812. On the reconstruction of the Polish army under Russia in 1814, he was made general of a division but resigned his commission after a quarrel in 1818 with Grand Duke Constantine of Russia.

Chłopicki at first kept aloof from the November Insurrection of 1830 but accepted the dictatorship at his countrymen's request on Dec. 5, 1830. Lacking faith in the war's success, he clung to the hope of negotiation with Russia and acted purely on the defensive until he was forced to resign on Jan. 17, 1831, and became nominally a private soldier. Actually, he retained his military command until he was seriously wounded during the Battle of Grochów (near Warsaw) on Feb. 25, 1831, and was forced to retire from public life.

chloral hydrate, also called TRICHLOROACETALDEHYDE MONOHYDRATE, a sedative-hypnotic drug that has the molecular formula $CCl_3CH(OH)_2$. Chloral hydrate is a transparent crystalline compound with a melting point of 57° C (135° F). It is commonly produced by the hydration of trichloroacetaldehyde.

Chloral hydrate was first synthesized in 1832 but was not introduced into medicine until 1869, when Mathias E.O. Liebreich discovered its effectiveness in inducing sleep. Chloral hydrate acts as a depressant on the central nervous system, with sedative effects similar to those of barbiturates. A therapeutic dose (500 mg to 1 g) produces a deep sleep lasting four to eight hours with few aftereffects, but habitual use of the drug results in addiction. Symptoms of overdose may include deep stupor, dilation of blood vessels, fall in blood pressure and body temperature, and slowed respiration. In a severe overdose, death usually occurs within 5 to 10 hours.

chloramphenicol, antibiotic substance of molecular formula $C_{11}H_{12}Cl_2N_2O_5$, originally found as a product of the metabolism of the soil bacterium *Streptomyces venezuelae* (order Actinomycetales) and now synthesized chemically. It is effective against many disease-causing bacteria, rickettsias, and *Mycoplasma* but is the preferred treatment only for typhoid fever. Chloramphenicol achieves its antibacterial effect by interfering with protein synthesis in these microorganisms. The drug can cause serious bone marrow disturbances and can prove toxic to newborn infants.

chlordane, a chlorinated cyclodiene that is the principal isomer formed in the preparation of a contact insecticide of the same name. Chlordane is a thick, odourless, amber liquid with a molecular formula of $C_{10}H_6Cl_8$. The compound's accepted name is octachlorohexahydromethanoindene.

The organochlorine insecticide chlordane (also called octachlor) was used extensively in agriculture from the mid-1940s through the mid-'60s. It is made by the chlorination of chlordene (hexachlorotetrahydromethanoindene), a cyclodiene having the molecular formula $C_{10}H_7Cl_5$. The commercial insecticide contains 60 to 75 percent chlordane; the remainder consists of several compounds closely related to it, including heptachlor. Heptachlor was first observed as a minor component (about 10 percent) in the manufacture of chlordane. It is a white crystalline solid with a melting point of about 95° C and a molecular formula of $C_{10}H_5Cl_7$ and is also known as heptachlorotetrahydromethanoindene.

Chlordane and heptachlor are highly toxic to many insects, and as a class, the organochlorine compounds are considered less toxic to mammals than either the carbamate or organophosphate insecticides. But because chlordane and heptachlor are readily absorbed through the skin and can cause liver damage in laboratory animals, their use has been banned in many countries.

chlordiazepoxide, a minor tranquilizing drug used orally or by injection for treatment of anxiety and tension states. It has a molecular formula of $C_{16}H_{14}ClN_3O$ and forms yellow crystals that have a melting point of about 236° C (457° F). The drug was introduced in the 1960s under several proprietary names, including Libritabs (the original base) and Librium (the hydrochloride salt).

Chlordiazepoxide belongs to a group of chemically related compounds called benzodiazepines. It can be used as a sedative to relieve stress either before or after surgery, to control anxiety symptoms associated with acute alcohol withdrawal, and as a treatment for panic disorders. Among the most common side effects of usage are drowsiness, confusion, and an inability to control voluntary muscular movements. Prolonged use may lead to physical dependence.

Chlorella, genus of green algae found either singly or clustered in fresh or salt water and in soil. The alga is spherical and has a cup-shaped chloroplast. It is used often in photosynthetic studies, in mass cultivation experiments, and for purifying sewage effluents. Because *Chlorella* multiplies rapidly and is rich in proteins and B-complex vitamins (one tablespoon of the dried, lima-bean–tasting powder contains as much food value as one ounce of steak), it has been studied as a potential food product for humans both on Earth and in outer space. *Chlorella*'s effectiveness in sewage purification depends on a growth-inhibiting substance (chlorellin) it synthesizes that prevents bacterial growth. *Chlorella*'s reproduction is asexual by nonmotile reproductive cells (autospores).

chlorguanide (drug): *see* chloroguanide.

chlorine (Cl), chemical element, second lightest member of the halogen elements, or Group VIIa of the periodic table.

A brief treatment of chlorine follows. For full treatment, *see* MACROPAEDIA: Chemical Elements: *Halogen elements.*

Chlorine is a toxic, corrosive, greenish yellow gas that is irritating to the eyes and respiratory system; it is two and a half times heavier than air. It becomes a liquid at −34° C (−29° F). First prepared from hydrochloric acid and manganese dioxide in 1774 by Carl Wilhelm Scheele, it was considered a compound until Sir Humphry Davy showed (1810) that it cannot be decomposed and that muriatic (hydrochloric) acid consists of hydrogen and another true element that he named chlorine.

Chlorine constitutes about 0.013 percent of the Earth's crust. Free chlorine has been reported as a very minor constituent of volcanic gases, of which hydrogen chloride (*q.v.*) is a fairly common component. Chlorine, as the chloride ion Cl^-, is the main negative ion in ocean water (1.9 percent by weight) and in inland seas such as the Caspian Sea, the Dead Sea, and the Great Salt Lake of Utah; it is found in evaporite minerals, for example, combined with sodium, as rock salt (halite) and in the minerals chlorapatite and sodalite. Natural chlorine is a mixture of two stable isotopes: chlorine-35 (75.53 percent) and chlorine-37 (24.47 percent). The Chloride ion is present in the body fluids of higher animals and as hydrochloric acid in the digestive secretions of the stomach.

Chlorine gas, a poison, was the first gas used in chemical warfare in World War I. It causes suffocation, constriction of the chest, tightness

in the throat, and edema of the lungs. As little as 2.5 mg per litre (approximately 0.085 percent by volume) in the atmosphere causes death in minutes, but less than 0.0001 percent by volume may be tolerated for several hours. Its strong odour gives warning of its presence at much lower concentrations than are dangerous.

Most chlorine is industrially produced by the electrolysis of brine; some is also obtained as a by-product in the manufacture of sodium metal by the electrolysis of molten sodium chloride. Chlorine and its compounds are used extensively for bleaching in the paper and textile industries, for disinfecting municipal water supplies, for household bleaches and germicides, and for the production of many organic and inorganic chemicals.

Chlorine molecules are composed of two atoms (Cl_2). Chlorine combines directly with almost all the elements (exceptions are oxygen, fluorine, nitrogen, carbon, and the noble gases) to give chlorides; those of most metals are ionic crystals, whereas those of the semimetals and nonmetals are predominantly molecular. Besides the −1 oxidation state of the chlorides, chlorine also exhibits +1, +3, +5, +7 oxidation states, respectively, in the following ions: hypochlorite, ClO^-; chlorite, ClO_2^-; chlorate, ClO_3^-; and perchlorate, ClO_4^-. Four oxides, chlorine monoxide (Cl_2O), chlorine dioxide (ClO_2), dichlorine hexoxide (Cl_2O_6), and dichlorine heptoxide (Cl_2O_7), all highly reactive and unstable, have been indirectly synthesized. Chlorine can displace the heavier halogens, bromine and iodine, from their ionic compounds and undergoes addition or substitution reactions with organic compounds. Chlorine enters directly or as an intermediate into the synthesis of many organic chemicals that are used as solvents, dyes, plastics, and synthetic rubber.

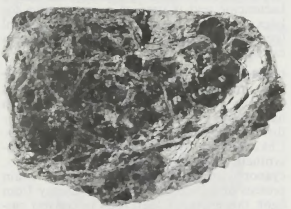
atomic number	17
atomic weight	35.453
melting point	−103° C (−153° F)
boiling point	−34° C (−29° F)
density (1 atm, 0° C)	3.214 g/litre
oxidation states	−1, +1, +3, +5, +7
electronic config.	2-8-7 or $1s^2 2s^2 2p^6 3s^2 3p^5$

chlorine deficiency, condition in which an organism fails to receive or maintain an adequate supply of the element chlorine, a component of all body secretions and excretions resulting from processes of building (anabolism) and breaking down (catabolism) body tissues. Levels of chlorine closely parallel levels of sodium intake and output, since a primary source of both is sodium chloride, or common table salt. Chlorine is stored to a limited extent in the skin, subcutaneous tissues, and the skeleton and constitutes two-thirds of the negatively charged ions (anions) in the blood. Chlorides (chlorine compounds) play an essential role in the electrical neutrality and pressure of extracellular fluids and in the acid-base balance of the body. Gastric secretion is composed of chlorides in the form of hydrochloric acid and salts. Chlorine is readily absorbed during digestion, and similarly its rate of excretion through sweat, kidney excretion, and intestinal expulsion is high (about 92 percent). The body's supplies of chlorine are rapidly depleted during hot weather, when excessive perspiration reduces the fluid content of the body. Also, stored chlorides may become dangerously low in periods of severe vomiting and diarrhea and in diseases that produce severe alkalosis, a pathological accumulation of base or loss of acid in the body.

The best source of supply is found in ordinary table salt, but chloride is also naturally contained in meat, milk, and eggs. Almost all canned foods have salt added during the canning process.

Chloris, genus of annual and perennial grasses of the family Poaceae, with about 70 species distributed throughout warm regions of the world. Many are known as finger grass, or windmill grass. Feathered finger grass (*C. virgata*) is a weedy North American annual with feathery spikelets. Windmill grass (*C. truncata*) of Australia and tumble windmill grass (*C. verticillata*) of North America are perennial species of waste areas. Several strains of Rhodes grass (*C. gayana*), a tufted perennial native to South Africa, have been introduced into other areas of the world as forage and hay grasses.

chlorite, widespread group of layer silicate minerals occurring in both macroscopic and clay-grade sizes; they are hydrous aluminum silicates, usually of magnesium and iron. The name, from the Greek for "green," refers to chlorite's typical colour. Chlorites have a silicate layer structure similar to that in micas with compositions near $(Mg,Fe,Al)_3(Si,Al)_4O_{10}(OH)_2$ and with brucitelike interlayers with compositions near $(Mg,Fe,Al)_3(OH)_6$.



Chlorite from Calaveras county, California
B.M. Shaub

The overall composition is then $(Mg,Fe,Al)_6(Si,Al)_4O_{10}(OH)_8$. Chlorites are divided into two groups: orthochlorites, which conform closely to the ideal chemical composition; and leptochlorites (many containing ferric iron), which may have been formed by the oxidation of the orthochlorites. The great many names found in older literature for chlorites with small variations of chemical composition are no longer used. The accepted names are: clinochlore (Mg-rich chlorite), chamosite (Fe-rich), nimite (Ni-rich), and pennantite (Mn-rich). Adjectival modifiers are used to indicate compositional variations.

Chlorites characteristically occur as alteration products of other minerals. They are common rock-forming minerals in clastic sediments and in hydrothermally altered igneous rocks; chlorites are widespread and important constituents of such metamorphic rocks as greenschists or chlorite schists. For detailed structure and physical properties, *see* clay mineral (table).

chloritoid, common silicate mineral, a basic aluminosilicate of manganese, magnesium, and iron. Once thought to be a member of the brittle mica group, chloritoid has been demonstrated to be structurally different; it is further distinguished by its high iron content, its lack of calcium, its greater hardness, and its lesser flexibility. Chloritoid occurs in metamorphosed, fine-grained sediments; it also can be found in lavas, tuffs, and rhyolites. Manganese-rich chloritoid is known as ottrelite; the magnesium-rich variety is called sismondine. For chemical formula and detailed properties, *see* mica (table).

chlorobenzene, a colourless, mobile liquid with a penetrating almondlike odour; it belongs to the family of organic halogen compounds and is used as a solvent and starting material for the manufacture of other organic compounds.

Chlorobenzene was first prepared in 1851 by the reaction of phenol and phosphorus pentachloride; its formation by the chlorination of benzene was observed in 1868. It has been manufactured on a large industrial scale in Europe and the United States since the early 20th century by the reaction of benzene with chlorine in the presence of catalysts, usually the trichloride of a metal such as iron, antimony, or aluminum.

Chlorobenzene reacts readily with chlorine, nitric acid, or sulfuric acid, forming dichlorobenzenes, chloronitrobenzenes, or chlorobenzenesulfonic acids, respectively, and with chloral in the presence of sulfuric acid to form DDT, an insecticide. Under high pressure and at high temperature, chlorobenzene reacts with water or with ammonia, which displace the chlorine atom and form phenol or aniline.

Pure chlorobenzene freezes at −45.6° C (−50.1° F) and boils at 132° C (270° F); it is denser than water and practically insoluble in it, but it dissolves in a number of organic solvents.

chloroethane: *see* ethyl chloride.

chloroethylene: *see* vinyl chloride.

chlorofluorocarbon (CFC), any of several organic compounds composed of carbon, fluorine, chlorine, and hydrogen. CFCs are manufactured under the trade name Freon (*q.v.*). Developed during the 1930s, CFCs found wide application after World War II. These halogenated hydrocarbons, notably trichlorofluoromethane (CFC-11, or F-11) and dichlorodifluoromethane (CFC-12, or F-12), have been used extensively as aerosol-spray propellants, refrigerants, solvents, and foam-blowing agents. They are well-suited for these and other applications because they are nontoxic and nonflammable and can be readily converted from a liquid to a gas and vice versa.

Their commercial and industrial value notwithstanding, CFCs have been found to pose a serious environmental threat. Studies undertaken by various scientists during the 1970s revealed that CFCs released into the atmosphere accumulate in the stratosphere, where they had a deleterious effect on the ozone layer. Stratospheric ozone shields living organisms on Earth from the harmful effects of the Sun's ultraviolet radiation; even a relatively small decrease in the stratospheric ozone concentration can result in an increased incidence of skin cancer in humans and in genetic damage in many organisms. In the stratosphere the CFC molecules break down by the action of solar ultraviolet radiation and release their constituent chlorine atoms. These then react with the ozone molecules, resulting in their removal.

Because of a growing concern over stratospheric ozone depletion and its attendant dangers, a ban was imposed on the use of CFCs in aerosol-spray dispensers in the late 1970s by the United States, Canada, and the Scandinavian countries. In 1990, 93 nations agreed to end production of ozone-depleting chemicals by the end of the century, and in 1992 most of those same countries agreed to end their production of CFCs by 1996.

chloroform, also called TRICHLOROMETHANE, nonflammable, clear, colourless, mobile, heavy liquid with a pleasant, etherlike odour, used as a solvent and an anesthetic. It was first prepared in 1831. The Scottish physician Sir James Simpson of Edinburgh was the first to use it as an anesthetic, in 1847, and it was generally accepted by 1853, when an English physician, John Snow, gave it to Queen Victoria during the birth of Prince Leopold, her eighth child.

Chloroform is one of the most potent inhalation anesthetics, a few millilitres usually being enough to produce surgical anesthesia within a few minutes. It is mainly excreted with the

exhaled air, and the patient awakens in 10–15 minutes, usually groggy but with very little nausea or vomiting.

The margin of safety in chloroform use is relatively narrow. It has a depressing effect on most organs, especially the heart, blood vessels, liver, pancreas, and kidneys. Fatalities occurring during induction of anesthesia, termed primary collapse, are most often due to overdosage. Delayed chloroform poisoning results when chloroform is given in high concentration with too little oxygen and occurs most often in poorly nourished patients. Chloroform is often the preferred anesthetic in very hot climates because of its high boiling point, in very cold climates because of its high potency, and in the presence of flames and high-voltage electricity and under other conditions in which explosive anesthetics would be too dangerous to use.

Chloroform is sometimes used internally as a pain reliever, for gas relief, and in cough medicines. Externally, it is used in solutions, ointments, or liniments as a local irritant or counterirritant for treatment of rheumatic conditions, headache, and neuralgia. It is an anti-itching agent for insect bites and in industry has a limited use as a solvent for fats.

The specific gravity of chloroform is 1.476 at 20° C (68° F). The vapour is about four times as dense as air. Chloroform solidifies at −62° C (−80° F) and boils at 61° C (142° F). Its solubility in water is low (1 millilitre in 140 at 20° C) but high in animal and vegetable fats, alcohol, ether, acetone, gasoline, and most other organic solvents.

Chloroform can be prepared from various organic compounds (most often from alcohol or acetone). Although it is not flammable, it may be decomposed to toxic compounds when exposed to flame, heat, light, or oxygen. The chemical formula is $CHCl_3$.

chloroguanide, also called PROGUANIL, synthetic drug introduced into medicine in the 1940s to suppress and prevent malaria. Chloroguanide is administered orally for effective control of the malarial parasites *Plasmodium falciparum* and, to a lesser extent, *P. vivax* and *P. malariae*. It suppresses the activity of *P. falciparum* and usually eradicates the infection. The drug must be administered daily because it is eliminated quickly. It rarely produces side effects. By the late 20th century, *P. falciparum* had acquired resistance to chloroguanide in many areas of the world, thus reducing the drug's usefulness.

chloromethane (chemical compound): *see* methyl chloride.

chloromonad, any protozoan of the phytoflagellate order Chloromonadida, sometimes considered a member of the algal class Chloromonadophyceae because it has many disk-shaped, chlorophyll-containing chloroplasts. Chloromonads are characterized by two flagella, one projecting forward and one trailing. All species are comparatively rare and of little economic importance. Typically, the cell is flattened and may contain metabolic products, always stored as fats.

chlorophenol, any of a group of toxic, colourless, weakly acidic organic compounds in which one or more of the hydrogen atoms attached to the benzene ring of phenol have been replaced by chlorine atoms; 2-chlorophenol is a liquid at room temperature, but all the other chlorophenols are solids. The most generally useful property of the chlorinated phenols is their toxicity to various organisms: they and compounds made from them are used to control bacteria, fungi, insects, and weeds. Many members of the group are manufactured by treating phenol with chlorine; a few are made by hydrolysis of polychlorobenzenes.

The compound 4-chlorophenol is a starting material for making 2-benzyl-4-chlorophenol, a germicide; it can also be converted to acetophenetidin, an analgesic.

Formaldehyde reacts with 2,4-dichlorophenol to form methylenebis(dichlorophenol), used as a mothproofing agent, an antiseptic, and a seed disinfectant; 2,4-dichlorophenol, with chloroacetic acid, forms 2,4-dichlorophenoxyacetic acid (2,4-D), a weed killer.

Of the trichlorophenols, the 2,4,6-isomer is used as a bactericide and fungicide. The 2,4,5-isomer has similar applications and also can be converted to methylenebis(trichlorophenol), or hexachlorophene, or into thiobis(trichlorophenol), both used as germicides in soap; into dimethyl trichlorophenyl phosphorothioate, a systemic agent effective against grubs in cattle; and into 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) or 2,4,5-trichlorophenoxypropionic acid (2,4,5-TCPPA), both widely used as weed killers.

Tetrachlorophenol is an insecticide and a bactericide and is used as a preservative for latex, wood, and leather. Pentachlorophenol (penta) is a disinfectant, a fungicide, and an extremely effective preservative for wood.

chlorophyll, any member of one of the most important classes of pigments involved in photosynthesis (*q.v.*), the process by which light energy is converted to chemical energy through the synthesis of organic compounds. Chlorophyll is found in virtually all photosynthetic organisms, including green plants, cyanophytes (blue-green algae), and certain protists and bacteria. It absorbs energy from light; this energy is then used to convert carbon dioxide to carbohydrates.

Chlorophyll occurs in several distinct forms: chlorophylls *a* and *b* are the major types found in higher plants and green algae; chlorophylls *c* and *d* are found, often with *a*, in different algae; chlorophyll *e* is a rare type found in some golden algae; and bacterio-chlorophyll occurs in certain bacteria. In green plants chlorophyll occurs in disklike units in organelles called chloroplasts. The chlorophyll molecule consists of a central magnesium atom surrounded by a nitrogen-containing structure called a porphyrin ring; attached to the ring is a long carbon–hydrogen side chain, known as a phytol chain. Variations are due to minor modifications of certain side groups. Chlorophyll is remarkably similar in structure to hemoglobin, the oxygen-carrying pigment found in the red blood cells of mammals and other vertebrates.

Chlorophyta, division of algae the members of which are commonly known as green algae (*q.v.*).

Chlorophytum, genus of African plants, of the family Liliaceae (order Liliales), that is especially noted for the popular spider plant. The spider plant is a houseplant possessing long, grassy green-and-white-striped leaves. Periodically a flower stem emerges, and tiny white flowers—not always produced—are replaced by young plantlets, which can then be detached and rooted.

chloropicrin, also called TRICHLORONITROMETHANE, organic compound that has been used as a chemical-warfare agent, notably as tear gas; it also is used as a chemical intermediate and an ingredient of fumigants, insecticides, fungicides, and rodenticides. This toxic, colourless liquid is usually prepared by treating picric acid with an aqueous suspension of bleaching powder.

chloropid fly (insect): *see* frit fly.

chloroplast, structure within a green plant cell in which photosynthesis occurs. One of three types of round, oval, or disk-shaped bodies known as plastids, chloroplasts are distinguished from the other two types (colourless leucoplasts and yellow-to-red chromoplasts) by their green colour, which results from the presence of two pigments, chlorophyll *a* and chlorophyll *b*. A function of these pigments is to absorb light energy, which is converted to chemical energy during the process of photosynthesis.

A chloroplast is ellipsoidal, about 2.5 microns (1 micron = 0.001 millimetre) thick and 5 microns long. The chloroplast is enclosed in a double membrane, within which are the stroma (a matrix containing dissolved enzymes) and the lamellae (internal membranes consisting of closed hollow disks, the thylakoids). These disks are necessary for the formation of adenosine triphosphate (ATP), an energy-rich storage compound. In the chloroplasts of most higher plants are regions called grana (singular granum), in which the thylakoids are tightly stacked.

chloroplatinic acid (chemistry): *see* hexachloroplatinic acid.

Chloropseidae, family of eight leafbird (*q.v.*) species. Chloropseidae is sometimes classified as the family Irenidae (*q.v.*; order Passeriformes).

chloroquine, synthetic antimalarial drug introduced into medicine in the 1940s. Chloroquine is a member of an important series of chemically related antimalarial agents, the quinoline derivatives. Chloroquine partially displaced quinacrine, a widely used drug, as well as the earlier quinoline derivatives (such as pamaquine).

Chloroquine is administered orally as chloroquine phosphate or chloroquine sulfate. It also can be given by intramuscular injection as chloroquine hydrochloride. Chloroquine is effective against susceptible strains of the malarial parasites *Plasmodium vivax* and *P. falciparum*, as well as certain parasitic worms and amoebas. Some mild side effects may occur, including headache and abdominal cramps, which are common to antimalarials.

Chloroquine has also been used in the treatment of rheumatoid arthritis, but its toxicity when used over a long period limits its usefulness for that purpose.

Chloros (Greece): *see* Flórina.

chlorosis, symptom of plant disease in which normally green tissue is pale, yellow, or bleached. It results from failure of chlorophyll to develop because of infection by a virus; lack of an essential mineral or oxygen; injury from alkali, fertilizer, air pollution, or cold; insect, mite, or nematode feeding; gas main leaks; compaction or change in soil level; and stem or root rot. Severely chlorotic plants are stunted, and shoots may die back to the roots. Control is aimed specifically at the causal agent of the disease.

chlorotrifluoroethylene, flammable, colourless gas that belongs to the family of organic halogen compounds, used in the manufacture of a series of synthetic oils, greases, waxes, elastomers, and plastics that are unusually resistant to attack by chemicals and heat. These products are polymers; that is, they are composed of very large molecules built up by combination of hundreds or thousands of smaller molecules, which may be all alike or of two or more different compounds.

Polymers were first prepared from chlorotrifluoroethylene in Germany in 1937 and were developed to a useful stage in the United States in the 1940s, when materials resistant to chemical corrosion were needed in the atomic-bomb project. Chlorotrifluoroethylene is produced from tetrachloroethylene by first converting it into trichlorotrifluoroethane, which is then caused to react with either zinc or hydrogen. Chlorotrifluoroethylene, which liquefies upon cooling to −28° C (−18° F), has low toxicity but must be protected from oxygen, which reacts rapidly with it. The polymers it forms, alone or with numerous other com-

pounds, have been commercialized under the trade name Kel-F. *See also* polychlorotrifluoroethylene.

chlorpheniramine, also called 2-[*p*-CHLORO-α-(2-DIMETHYLAMINOETHYL) BENZYL]PYRIDINE, synthetic drug used to counteract the histamine reaction, as in allergies. Chlorpheniramine, introduced into medicine in 1951, is administered orally or by intravenous, intramuscular, or subcutaneous injection in the form of chlorpheniramine maleate. It is effective in controlling the symptoms of hay fever, acute skin reactions (such as hives), and contact dermatitis (such as from poison ivy). The most common side effect is drowsiness.

chlorpromazine, potent synthetic tranquilizing drug that acts selectively upon the higher centres in the brain as a depressant of the central nervous system. It is used in the treatment of persons with psychotic disorders. Chlorpromazine was first synthesized in 1950 and became generally available for medical use in the mid-1950s. One of the first tranquilizers introduced into medicine—along with the rauwolfia alkaloid, reserpine—chlorpromazine soon displaced reserpine in psychiatric practice.

Chlorpromazine is a representative and important member of a series of tranquilizing agents that includes promazine, triflupromazine, and trifluoperazine; these agents are called phenothiazines because they are chemically related to the parasiticide phenothiazine.

Generally considered as the standard compound in the treatment of psychotic patients, chlorpromazine is widely used to suppress or mitigate delusions and hallucinations, to reduce agitation and violent behaviour, and to restore or increase the patient's response to psychotherapy. Some specific conditions treated with chlorpromazine are chronic delirium, manic states, conceptual disorders, motor hyperactivity, catatonia, and paranoia. A wide variety of schizophrenic conditions are alleviated by chlorpromazine.

The introduction of chlorpromazine and related drugs onto the wards of mental hospitals in the 1950s had profoundly beneficial medical and social effects. Many previously intractable, agitated, or grossly delusional patients became quieter, more rational, and more accessible to conventional psychotherapy. Such drugs enabled many episodically psychotic patients to have shorter stays in the hospital, and many other patients who would otherwise have been permanently institutionalized were able to live in the outside world once they were maintained on chlorpromazine.

The principal side effect of chlorpromazine is the rigidity it imparts to the muscles of certain patients; this rigidity may be accompanied by a characteristic tremor of the limbs involved. Chlorpromazine hydrochloride, sometimes marketed under the trade name Thorazine, may be administered orally or rectally or by injection.

Chlotar, also spelled CHLOTACHAR, LOTHAIR, or LOTHAR, French CLOTAIRE, or LOTHAIRE, name of Merovingian kings grouped below chronologically and indicated by the symbol •.

• **Chlotar I** (b. *c.* 500?—d. late 561, Compiègne, Fr.), Merovingian king of Soissons from 511 and of the whole Frankish kingdom from 558, who played an important part in the extension of Frankish hegemony.

The youngest of Clovis I's sons, Chlotar shared in the partition of his father's kingdom in 511, receiving the old heartlands of the Salian Franks in modern northern France and Belgium. After the death of his brother, Clodomir, in 524, he murdered his nephews and shared the kingdom of Orléans with his two remaining brothers, Childebert I and Theodoric I. The deaths without heirs of the latter's grandson, Theodebald, in 555 and of Childebert in 558 brought all the Frankish lands finally under Chlotar's sway.

Chlotar's principal campaigns were against the Burgundians in 523 (with Childebert and Clodomir) and 532–534 (when he and Childebert finally imposed Frankish rule), against the Visigoths in 532 (with Theodoric) and 542 (with Childebert), and against the Thuringians in *c.* 531 (with Theodoric); he married the Thuringian princess, Radegunda. Chlotar was ruthless and brutal, and the family rivalries and sometimes open hostilities in which he figured prominently were characteristic of Merovingian history; in 560 he even had his rebellious son, Chram, together with Chram's family, put to death. Gregory of Tours describes Chlotar, wracked with fever on his deathbed, asking—whether in outrage or in admiration—what manner of heavenly king it was who would bring great rulers to their deaths in such a fashion.

• **Chlotar II** (b. May or June 584—d. Oct. 18, 629), Merovingian king of Neustria and sole ruler of the Franks from 613.

An infant when his father, Chilperic I, was assassinated in 584, he was assured the succession by the power of his mother, Fredegund, and by the protection of his uncle, Guntram, king of Burgundy. Fighting off an attack by his cousin Childebert II of Austrasia-Burgundy in 592, Chlotar himself seized territory from Childebert's young successors, Theodebert II and Theodoric II, in 596 but lost much of his realm to them in 599 or 600. In 613, however, when both were dead, Austrasian hostility toward Brunhild, great-grandmother of Theodoric's young son, Sigebert II, allowed Chlotar to seize both Austrasia and Burgundy and thus to reunite the Frankish lands. He killed both Sigebert and Brunhild.



Chlotar II, gold coin, 7th century; in the Bibliothèque Nationale, Paris

By courtesy of the Bibliotheque Nationale, Paris

Chlotar enjoyed a high reputation among churchmen, relations with whom were regulated in a wide-ranging edict issued at the Council of Paris in October 614 and intended to settle the problems arising from the long years of turmoil. Apart from some trouble in Burgundy, the years after 613 were in fact peaceful. Chlotar did not unify the administration, however; he maintained separate mayors of the palace for the three districts over which he ruled, and in 623 he established his son, Dagobert I, as king of Austrasia.

• **Chlotar III** (d. March 10/11, 673), Merovingian king of Neustria and Burgundy, who succeeded his father, Clovis II, in 657. After the retirement of his mother, Bathilda, to a monastery in 664 or 665, he came—and remained—under the domination of the Neustrian mayor of the palace, Ebroïn.

• **Chlotar IV** (d. 719), allegedly the Merovingian king of Austrasia, placed on the throne by the mayor of the palace, Charles Martel, in 715/716 in order to check the pretensions of the Neustrian Chilperic II. He was possibly a son of Theodoric III, but his bloodline is doubtful.

Chlothilde, also spelled CHLOTILDA: *see* Clotilda, Saint.

Chmel'nickij (*oblast* and city, Ukraine): *see* Khmelnitsky.

Chmielnicki, Bogdan: *see* Khmelnitsky, Bohdan.

Cho Lon, city, southern Vietnam, immediately west of Ho Chi Minh City (formerly Saigon), from which it is separated by a small water channel. Founded in 1778 by Chinese emigrants, it later was unified commercially and physically by streetcars, roads, canals, and railways and in 1932 became one political unit; it became part of Ho Chi Minh City province-borough in 1976.

Cho Lon is a marketing and distribution centre for rice and fish. It has timber mills, junk-building yards, tanneries, and crude dye works; brickworks and pottery works using local clays supply a huge demand for earthenware utensils. In 1978, with the nationalization of large-scale commerce and repatriation offers from the People's Republic of China, thousands of Vietnamese of Chinese descent left Cho Lon, disrupting the large commercial sector, which had been run mainly by them.

Cho Oyu, mountain, one of the world's highest (26,906 feet [8,201 m]), in the Himalayas on the Nepalese–Tibetan (Chinese) border about 20 miles (30 km) northwest of Mt. Everest. The Nangpa La, a glacier saddle (pass) 19,050 feet high lying south of the peak, forms part of the trade route between Tibet and the valley of Khumbu. Glaciers and a bitter climate delayed the climbing of Cho Oyu until Oct. 19, 1954, when the summit was reached by an Austrian party including Herbert Tichy, Sepp Jöchler, and Pasang Dawa Lama, a Sherpa.

Cho Sok, also called CH'ANGGANG (Korean: "Wide River"), or CH'WI ONG ("Drunken Old Man") (b. 1595), noted Korean painter of the Yi dynasty (1392–1910) famous for his depiction of birds. A scholar by training, Cho was offered numerous official posts but always declined, preferring to spend his days painting. Magpies were his favourite subject, so much so that almost any painting with a magpie in it is often attributed to him.



"Bird on a Tree," scroll in ink and slight colour on silk by Cho Sok; in the National Museum, Seoul

By courtesy of the National Museum of Korea, Seoul

Cho Sok-chin, also called SARINO (Korean: Small Jade) (b. 1853, Korea—d. 1920, Korea), noted painter of the late Yi dynasty (1392–1910) whose paintings were nostalgic re-creations of the decadent traditional Confucian style of China and Korea.

Born into a family of court painters, Cho was early sent to China to study with the old masters. On his return, he specialized in paintings of carp and portraits of Yi monarchs and was subsequently appointed to official position and made a local magistrate. After the fall of the Yi dynasty, he helped establish the Academy of Painting and Calligraphy and also the Association of Painters and Calligraphers to train artists in the classical style.

choanoflagellate, any protozoan of the flagellate order Choanoflagellida (sometimes classified in the order Kinetoplastida) having a transparent food-gathering collar of cytoplasm around the base of the flagellum. Many choanoflagellates are solitary and sessile (attached to a surface), with or without a stalk. Some have a lorica (rigid covering). These organisms closely resemble the collar cells of sponges. *Salpingoeca* is an example.

Choate Rosemary Hall, in Wallingford, Conn., coeducational college-preparatory school (grades 9–12) for boarding and day students.

The Choate School, for boys only, was founded and endowed by Judge William Gardiner Choate in 1896. Many Choate graduates are admitted to Harvard, Yale, Princeton, and other much-respected universities. The late U.S. Pres. John F. Kennedy is among Choate's many prominent alumni.

Rosemary Hall was founded in Wallingford as a girls preparatory school in 1890. The school was moved to Greenwich, Conn., in 1900 but returned to Wallingford in 1971. Choate and Rosemary Hall were merged into a single coeducational institution in 1974.

Chocho, Middle American Indians of northern Oaxaca in southern Mexico, speaking a Popolocan language. The region is rough, broken highland terrain of harsh climate. The Chocho are agricultural, using plows and hoes to cultivate staple crops of corn (maize), beans, and peas, as well as a variety of herbs and vegetables. Irrigation is beginning to be used to increase yield. Wild foods are gathered, goats are raised for meat, and chickens and turkeys are also common. Settlement is usually in congregated villages with houses of poles or twigs and thatched roofs. Most crafts have disappeared, but, as among the neighbouring Ixcatec (*q.v.*), weaving hats of palm fibre is of major economic importance. Clothing, is the standard Mexican-peasant type. *Compadrazgo,* or godparent relationship, is found, but with little of the usually associated ritual. *Cofradías,* Roman Catholic laymen's societies of the usual Middle American pattern, organize the fiestas for the community's patron saints and, among the Chocho, also keep the saint's image under their care. Myths about the old gods and spirits are still told, but Catholicism has largely displaced the native religion.

chocho (vine): *see* chayote.

Chocó, Cariban-speaking Indian people of the Panamanian and Colombian lowlands. The Northern Chocó, the most populous, live in villages along the lower reaches of rivers flowing into the Golfo de San Miguel (in Panama) and the rivers of Colombia's Pacific coast; the Southern Chocó are concentrated around the Río San José; and the Catio inhabit the eastern portions of the Atrato Valley.

Chocó villages consist of round dwellings on



Chocó Indian family in their house on stilts in the jungle of the Mogué River, Panama
Thomas Hollyman—Photo Researchers

piles, usually along rivers. The Chocó practice shifting horticulture, the slash-and-burn pattern common throughout much of tropical America. Unlike most of their neighbours, the Chocó grow only food crops. They also hunt with bow and arrow and with blowgun and poisoned darts.

Chocó society is organized around the household, the oldest male being head spokesman. Because of shifting residence resulting from the ownership of fields by both men and women and because of the necessity of living near these fields, the members of the household are not always the same. The Chocó have legends of battles with the neighbouring Cuna; and they were successful in repulsing the Spanish on several occasions in the 17th century.

Chocó, department, western Colombia, bounded northwest by Panama, northeast by the Río Atrato, and west by the Pacific Ocean. Almost the entire area of 17,965 sq mi (46,530 sq km) is covered with dense tropical rain forest, and the average annual rainfall of more than 420 in. (10,700 mm) probably exceeds that of any other equatorial area on Earth. The scant population is largely descended from escaped colonial slaves, who were employed in placer mining for gold on the Atrato and San Juan rivers, still Colombia's primary sources of platinum. There is also a thriving lumber industry and some agriculture. The vast swamplands of the Atrato are the most formidable barrier blocking completion of the Pan-American Highway; however, road construction across the Darién gap is under way. The departmental capital is at Quibdó (*q.v.*). Pop. (1981 est.) 331,943.

chocolate, food product made from cocoa beans, consumed as candy and used to make beverages and as a flavouring ingredient or coating for various confections and bakery products. Rich in carbohydrates, it is an excellent source of quick energy and also contains minute amounts of the stimulating alkaloids theobromine and caffeine.

At the court of Montezuma, the Aztec ruler of Mexico, in 1519, Hernán Cortés was served *xocoatl,* a bitter cocoa-bean drink, which he introduced to Spain. Sweetened, flavoured with cinnamon and vanilla, and served hot, the beverage remained a Spanish secret for almost a hundred years before its introduction to France. In 1657 a Frenchman opened a shop in London, at which solid chocolate for making the beverage could be purchased at 10 to 15 shillings a pound. At this price only the wealthy could afford to drink it, and there appeared in London, Amsterdam, and other European capitals fashionable chocolate houses, some of which later developed into famous clubs. About 1700 the English improved chocolate by the addition of milk. The reduction of the cost of the beverage was hampered in Great Britain by the imposition of high import duties on the raw cocoa bean, and it was not until the mid-19th century, when the duty was lowered to a uniform rate of 1 penny a pound, that chocolate became popular.

Chocolate manufacture started in the American colonies in 1765 at Dorchester, Mass., using beans brought in by New England sea captains from their voyages to the West Indies. James Baker financed the first mill, which was operated by an Irish immigrant, John Hanan. Waterpower was used for grinding the beans.

Chocolate is made from the kernels of fermented and roasted cocoa beans. The kernels are ground to form a paste called chocolate liquor, which may be hardened in molds to form baking (bitter) chocolate; pressed to reduce the cocoa butter (vegetable fat) content and then pulverized to make cocoa powder; or mixed with sugar and additional cocoa butter to make sweet (eating) chocolate, developed by the English firm of Fry and Sons in 1847. Coating chocolate for use on candies and biscuits (cookies) came into use soon



Brazilian cocoa pods
Carl Frank—Photo Researchers

afterward. The addition of concentrated milk to sweet chocolate produces milk chocolate, introduced by Daniel Peter of Switzerland in 1876. *See* cacao.

chocolate pot, vessel in which hot chocolate is served. It is similar in form and stylistic



American silver chocolate pot by Edward Winslow, *c.* 1700; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York, bequest of A.T. Clearwater, 1933

development to the coffeepot, but it has a hinged or sliding finial covering an aperture through which is introduced a molionet, or stick for stirring and crushing the chocolate.

The earliest surviving chocolate pot dates from 1685 and was made by the English silversmith George Garthorne. The drinking of chocolate in coffee houses was very fashionable during the last quarter of the 17th and the first quarter of the 18th century, but by the middle of the century it had fallen out of favour.

Choctaw, North American Indian tribe of Muskogean linguistic stock that lived in what is now southeastern Mississippi. The Choctaw dialect is practically identical to that of the Chickasaw (*q.v.*), and there is evidence that they are a branch of the latter tribe. In the mid-18th century there were 20,000 Choctaw living in 60 or 70 settlements along the Pearl, Chickasawhay, and Pascagoula rivers. Their dwellings were thatched-roof cabins of logs or bark, plastered over with mud. Among the southeastern agriculturalists the Choctaw were the most skillful farmers, the only tribe who had surplus produce to sell or trade. They planted corn (maize), beans, and pumpkins; fished; gathered nuts and wild fruits; and hunted deer and bear.

The Choctaw wore their hair long. They picked the bones of their dead in a rite performed some days after death by professional bone pickers, male and female, who had distinctive tattooing and long fingernails. The Choctaw also practiced head deformation, flattening the heads of male infants; this was a common custom among the Southeast Indians. Their most important religious ceremony was the Busk, or Green Corn, festival, a first-fruits and new-fire rite celebrated at midsummer.

In the power struggles that took place after white settlement, the Choctaw were generally allied with the French against the English and other Indian tribes. They also fought a succession of wars with the Chickasaw. After the French defeat in the French and Indian War (1754–63), some Choctaw land was ceded to the U.S. and they began moving west across the Mississippi. In the 19th century the growth of the European market for cotton increased the pressure for the acquisition of Choctaw land, and in 1820 they ceded 5,000,000 acres in west central Mississippi to the U.S. Along with the Creek, Cherokee, Chickasaw, and Seminole, they were forced to move to what is now Oklahoma in the 1830s. For three-quarters of a century each tribe had a land allotment and a quasi-autonomous government modelled on that of the U.S. In preparation for Oklahoma statehood (1907), some of this land was allotted to individual Indians; the rest was opened up to white homesteaders, held in trust by the federal government, or allotted to freed slaves. Tribal governments were effectively dissolved in 1906 but have continued to exist in a limited form. Some Indians now live on tribal landholdings that are informally called reservations. In the late 20th century, Choctaw descendants in eastern Oklahoma numbered about 17,500. There is also a Choctaw reservation in Mississippi.

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Choctawhatchee River, river in southeastern Alabama and northwestern Florida, U.S., rising in Barbour County, Ala., and flowing southwest to Geneva, where it is joined by the Pea River. It then flows south into Florida and west to the east end of Choctawhatchee Bay, where it empties into an inlet of the Gulf of Mexico. The river, about 180 mi (290 km) long, is navigable in its lower course. The name derives from the Choctaw Indian tribe and *hatchee,* meaning "stream."

Chodkiewicz, Jan Karol (b. 1560, probably at Stary Bykhov, Pol.—d. Sept. 24, 1621, Chocim), Polish general who won remarkable victories against the Swedes and the Turks despite the vacillating policies and inadequate support of his king, Sigismund III Vasa of Poland.

The son of a prominent Ruthenian military family active in Lithuania, Chodkiewicz made a name for himself in a campaign against the Turks in 1600 under the command of Jan Zamoyski, whom he accompanied to Lithuania in 1601 to fight in the war against Sweden for possession of Livonia. Appointed acting commander in chief of Lithuania after Zamoyski's return to Poland in 1602, Chodkiewicz, despite inadequate supplies and little support from the Polish Sejm (Diet) and King Sigismund III Vasa, drove the duke of Södermanland (later Charles IX of Sweden) from Riga, took Dorpat (Estonian Tartu) in 1603, defeated the Swedes near Weissenstein in 1604, and destroyed a Swedish Army four times larger than his own at Kirchholm (Salaspils) on the Dvina River in September 1605.

After helping to put down the Polish insurrection of 1606–07 and to relieve Riga when



Chodkiewicz, detail from a portrait by an unknown artist, early 17th century; in the Istorijos-etnografijos muziejus, Vilnius, Lithuania

By courtesy of the Istorijos-etnografijos muziejus, Vilnius, Lithuania

the Swedes again threatened it in 1609, he was sent to attack Moscow (1612), but his army mutinied for lack of pay, and he had to retreat to Smolensk. Reinforced by Sigismund's son Prince Władysław (later King Władysław IV Vasa), he took the fortress of Dorohobuzh in 1617. After the Truce of Deulino between Poland and the Muscovite state, he was sent to defend the southern frontier against the Turks. He died just after forcing the Turks to raise the siege of Chocim, in the Moldavian borderland, by successfully defending it against a force many times the size of his own.

Chodor carpet, floor covering handmade by the Chaudor (Chodor) Turkmens. Usually, they are made either in carpet size or as bag faces (the fronts of bags used for storage in tents or for baggage on camels). They are characterized by their colouring, which ranges from plum through violet-brown shades to chestnut, and by their gul, or major design motif, an oval with flattened and delicately stepped sides.

In the carpets this gul occurs in diagonal rows, alternated with rows of a similar figure in a contrasting colour, within a fine diamond network of thin stems that connect tiny rosettes. In the bag faces, the demi-guls that appear may contain a pair of block-bodied birds facing a conventionalized tree. The alternate, or secondary, figure varies widely from bag face to bag face, and the network of stems is disconnected. Chodors are generally Senna (Sehna) knotted, and the bag faces in particular are finely woven, entirely of wool or goat hair.



Detail of the oval motif of a Chodor carpet from Russian Turkistan, 19th century; in a private collection in New York state

In a private collection, New York state; photograph, Otto E. Nelson—EB Inc.

Chodowiecki, Daniel (Nikolaus) (b. Oct. 16, 1726, Danzig, Pol.—d. Feb. 7, 1801, Berlin), German genre painter and engraver of Polish descent who developed a particular talent for recording the life and manners of the German middle class.

Largely self-taught, Chodowiecki achieved his first popular success with the sentimental painting "The Parting of Jean Calas From His Family" (1767; Berlin-Dahlem Museum), which shows the influence of Greuze. Chodowiecki began engraving in 1758. After engraving several subjects from the story of the Seven Years' War, Chodowiecki produced the famous "History of the Life of Jesus Christ." Many books were published in Prussia with plates or vignettes by Chodowiecki. His 2,000



"The Artist's Study," engraving by Daniel Chodowiecki depicting himself (right) with his family, 1771; in the Kupferstichkabinett, Berlin

By courtesy of the Kupferstichkabinett, Berlin

etchings were a record of 18th-century life in comfortable interiors, observed with a kindly humour that lacked the bite of William Hogarth, with whom he was often compared de-

spite his own disclaimers. He became director of the Berlin Academy in 1797.

Chodsko, historic border area of Západočeský *kraj* (region), Czech Republic. It roughly corresponds to Domažlice *okres* (district), along the border with Germany. The 14th-century "Chode Privileges" granted by King John of Bohemia to the Chods (a Czech-speaking ethnic group) as guardians of the frontier helped shape a distinctive culture and a spirit of Czech nationalism. The documents of the privileges were kept at Chode Castle in Domažlice, Chodsko's main town and the district's centre, and they inspired Jan Kozina's revolt against Habsburg oppression in 1693. Chodsko guarded the Všerubsky Pass, southwest of Domažlice, where in 1040 the Bohemian prince Břetislav I defeated the army of the German king Henry III and where in 1431 Hussite troops frightened off a larger Roman Catholic army.

Prospecting for gold along the Radbuza River, which crosses Chodsko, began in medieval times; cloth weaving was a traditional industry. Glassworks were established in Domažlice in the 18th century. Today Domažlice is preserved as a historic town under national trust. Clothing, wood carvings, baked goods, dairy products, fruit preserves, and industrial jet looms (modern shuttleless looms) are produced in the region.

Chodsko's mountainous terrain is nearly two-fifths forest and is a centre for winter sports. Tourists are also drawn by Domažlice's architecture and festivals. The town's main square is surrounded by houses with Renaissance, Baroque, and Empire arcades, balconies, and gables and is dominated by the 13th-century tower beside the Church of the Birth of the Virgin Mary on the northern side of the square. The Ethnographic Museum of Chodsko is located in Domažlice, which is also the site of an annual Chode festival of song and dance; the traditional costumes and bagpipes, unique in the Czech Republic to the Chods and the people of Strakonice in Jihoceský *kraj*, are featured at the festival. Chodsko is also known for the writer Jindřich Šimon Baar, who is commemorated by a statue near Klenči pod Čerchovem, his native village.

Domažlice has rail and road connections to Plzeň (Pilsen) and Germany.

Ch'oe Che-u (b. 1824, North Kyŏngsang province, Korea [now in South Korea]—d. 1864, Seoul), founder of the Tonghak sect, a religion amalgamated of Buddhist, Taoist, Confucian, and even some Roman Catholic elements with an apocalyptic flavour and a hostility to Western culture, which was then beginning to undermine the traditional Korean order. The sect, later known as the Ch'ŏndogyo ("Religion of the Heavenly Way"), was important in the modernization of Korea by advocating the strengthening of the country to combat foreign influences.

The son of a poor village scholar, Ch'oe repeatedly failed the civil-service examinations that he had to pass to qualify for high office. Then in May 1860, following news of China's defeat by a combined British-French force in the "Arrow" War and the success of the great Christian-inspired Taiping Rebellion in South China, Ch'oe claimed he had received a mandate to create a religion that would make Korea as strong as the West. Calling his doctrine Tonghak ("Eastern Learning"), he taught that it was the duty of all men to "serve heaven." If everyone believed, said Ch'oe, all would live in harmony with the "one heaven"; moreover, everyone would be equal before it.

Ch'oe's new doctrine immediately gained a tremendous following, especially among the downtrodden, underprivileged peasants of southern Korea. Many were inspired to rise up against the government. That rebellion led to Ch'oe's arrest and execution, along with 20 of his followers. Tonghak survived, however, and spread into every province in Korea, causing numerous peasant rebellions. Ch'oe's emphasis on the need to strengthen the Korean nation to combat foreign influence provided later reformers with a strong rationalization for political and economic reforms.

Ch'oe Kyŏng, also called KUNJAE (Korean: "Prudent Study") (fl. 15th century, Korea), one of the most famous Korean painters of the early Yi dynasty (1392–1910). Ch'oe was also one of the first court painters of the Yi dynasty; he excelled in portrait painting and made the portraits of many members of the royal family. His success led to his appointment as head of the royal office of painting, and he was made a court noble.

Ch'oe Si-hyŏng (b. 1827, Korea—d. 1898, Seoul [now in South Korea]), second leader of the Korean apocalyptic antiforeign Tonghak (Ch'ŏndogyo) religion, who helped organize the underground network that spread the sect after the 1864 execution of its founder, Ch'oe Che-u, for fomenting rebellion.

After Ch'oe Che-u's death, Ch'oe Si-hyŏng took over the important task of realigning the sect's ranks through a series of underground networks. In 1880 and 1881, he published the first two Tonghak scriptures, thus giving the religion an intellectual basis. In these scriptures he expanded his predecessor's idea that all men are not only equal before heaven but that they also must serve heaven. Moreover, he translated these principles into social action by teaching that people ought to "serve Man as they serve heaven." Meanwhile, he continued to preach the necessity of Korea's becoming as strong as the Western imperialist powers. In 1892 he mobilized tens of thousands of his followers to stage a peaceful demonstration under the banner of "Expel the West, Expel the Japanese, and Inculcate Righteousness," claiming the innocence of the Tonghak founder and calling for administrative reform. In 1894 he led the so-called Tonghak Revolt against the "corrupt government." The uprising was viciously suppressed, and in 1898 Ch'oe Si-hyŏng was finally arrested and executed, but not before Tonghak had spread throughout Korea.

Choerilus (fl. *c.* 510 BC, Athens [Greece]), one of the earliest recorded Athenian tragic poets, of whose work only one title and one disputed fragment remain. Choerilus is said to have produced his first play about 523 BC and to have competed against the tragedian Aeschylus about 498. Some sources credit him with 13 victories and with certain innovations in tragic masks and costumes.

Choerilus (fl. 5th century BC, Samos, Ionia [Greece]), Greek epic poet of the Aegean island of Samos, author of a lost verse chronicle, the *Persica*, probably relating the story of the Persian wars as narrated in prose by the historian Herodotus. According to the biographer Plutarch, Choerilus was later employed by the Spartan general Lysander to celebrate his exploits. He died at the court of Archelaus, king of Macedonia. Scanty extant fragments of his work include a lament for the decline of the epic tradition, of which he saw himself as a last representative.

Chōfu, city, Tokyo *to* (metropolis), Honshu, Japan. It is bordered by Tokyo city (east) and the Tama River (south). During the Tokugawa period (1603–1867), Chōfu was a post town on the Kōshū Highway. After its connection to Tokyo by railway in the early 1920s, industrialization progressed rapidly. Chōfu's products now include machinery, electrical equipment, chemicals, and foods. Since World War II, Chōfu has become a residential suburb of the Tokyo-Yokohama metropolitan area. The Jindai ("Age of the Gods") Temple in the northern part of the city was built in 733. Chōfu has a racetrack and an amusement park. Pop. (1991 est.) 198,696.

Choghā Zanbīl, also spelled CHOGHĀ ZAMBĪL, or CHOGA ZAMBIL, ancient DUR UNTASHI, ancient Elamite site located near Sūsa in the Khūzestān region of Iran. It is especially known for its remains dating to the Middle Elamite Period (*c.* 1500–*c.* 1000 BC), when the Elamite ruler Untash-Gal (reigned *c.* 1250 BC) built a magnificent ziggurat, temples, and a palace. The remains of the ziggurat, the largest one known, are 335 feet (102 m) square and 80 feet (24 m) high, less than half its estimated original height. In addition to the architectural remains, there are also a variety of small artifacts, including an excellent collection of Middle Elamite cylinder seals.



Ziggurat of Choghā Zanbīl
Robert Harding Picture Library/Sybil Sassoon

Chogori (Jammu and Kashmir): *see* K2.

Choibalsan (Mongolia): *see* Choybalsan.

choice, in philosophy, a corollary of the proposition of free will—*i.e.*, the ability voluntarily to decide to perform one of several possible acts or to avoid action entirely. An ethical choice involves ascribing qualities such as right or wrong, good or bad, better or worse to alternatives.

Determinism denies the reality of choice, because of a complete causal connectedness of motive and volition with physical, psychological, social, and even unconscious forces. Indeterminists insist, on the other hand, that human beings, however limited in choices, still are free to choose among alternatives and to put such choices into action. Thus volition (in this view) is, at least partly, independent of the strength of motivation, and itself determines which motive prevails.

The existential attitude in philosophy emphasizes such freedom of choice as well as the necessity of having to choose. *See also* free will; determinism.

choir, body of singers with more than one voice to a part. A mixed choir is normally composed of women and men, whereas a male choir consists either of boys and men or entirely of men. In the United States, the

term boys' choir is often applied to a choir in which the treble parts are sung by boys instead of women.

Choirs have taken part in church services from the earliest times, but for many centuries their role was confined to singing plainsong in unison. Such choirs varied considerably in size and style, but the choir of a well-endowed abbey or royal chapel might have 50 or 60 trained voices. In medieval England a system allowing a canon to appoint a substitute led to the formation of self-governing colleges of vicars choral, who were usually ordained deacons or subdeacons. Below them were clerks of the choir, also in minor orders and sometimes called altarists, or secondaries.

In cathedrals, boys were trained by the precentor, or choir director, to take part not only in the singing but also in the liturgy. Boys with intelligence and good voices could progress as far as the rank of vicar choral, and as time went on they enjoyed lodgings and privileges, as well as tuition in subjects other than music.

Apart from plainsong, there was no choral singing in the early church. When polyphony (multipart music) first came into use, its relative complexity demanded soloists as interpreters. About 1430, however, Italian manuscripts began to hint at choral singing of straightforward polyphony with the direction that sections in three parts were to be sung by the chorus, or all voices, in contrast to sections in two parts, marked either *unus* (one voice to a part) or *duo* (duet for solo voices). The alternation of soloists and chorus eventually led to the use of two choirs, one on each side of the church or (as at St. Mark's, Venice) in the galleries, so that psalms, canticles, and even masses could be sung antiphonally (*i.e.*, by contrasting choirs). Music for divided choirs, or *cori spezzati,* was developed in the early 16th century and reached a peak of excellence in the late 16th- and early 17th-century works of Giovanni Gabrieli.

The growth of secular choirs, sometimes called choruses, coincided largely with the beginnings of opera, in which choruses have generally taken some part. Opera-house choruses normally employ professional singers. An oratorio choir, on the other hand, is part of a different tradition, which stems from the augmented church choirs used to provide choral portions of a given oratorio, whether performed in or out of church. Oratorio choirs thus formed an outlet for amateur singers.

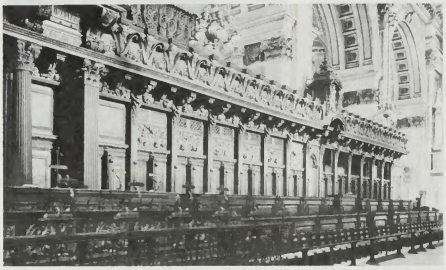
Handel presented his oratorios and operas with a choir of medium size, but the Handel Commemoration in 1784 in London called for as large a body of singers as could be conveniently found: 274. This choir, however, was dwarfed by the 2,000 singers who participated in the first Handel Festival at the Crystal Palace, London, in 1857. In later years of this festival the number crept up to well over 3,000. Even the *concerts monstres* of the French composer Hector Berlioz rarely required a choir of more than 500. Berlioz stated that he heard at St. Paul's Cathedral in 1851, at the anniversary meeting of the Charity Children, a choir of 6,500. From meetings such as these, beginning with those of the Three Choirs of Gloucester, Worcester, and Hereford (1724 or perhaps earlier), developed the local choral festivals widely popular in the 20th century. Despite such large assemblages for special events, modern professional recording choirs number about 30.

choir, in architecture, area of a church designed to accommodate the liturgical singers, located in the chancel, between the nave and the altar. In some churches the choir is separated from the nave by an ornamental partition called a choir screen, or more frequently by a choir rail.

Earliest church architecture set no space aside for the clergy who sang the service; but as church ritual became more elaborate, beginning in the 10th century, it required more space for increased numbers of participants. At first the choir contained simple, unattached chairs, but by Gothic times the seats had developed into choir stalls, built-in rows of prayer rests and hinged seats, which, when folded, often revealed misericords—projections used for support during long periods of standing.

The stalls are usually arranged in two sets of stepped rows along the edges of the choir, facing each other and at right angles to the altar. Gothic craftsmen carved the wooden stalls elaborately—with animal forms, biblical scenes, or abstract designs. Frequently, wooden canopies over each stall, and high arms between them, made each seat resemble a separate little building. Outstanding examples of ornate choir stalls are those at the Convent of St. Thomas in Avila, Spain, and those designed by Grinling Gibbons in St. Paul's Cathedral, London.

Many modern churches have singers situated in a "choir loft," or on a balcony.



Choir stalls of St. Paul's Cathedral, London, by Grinling Gibbons, 1696–98
A.F. Kersting

Choiseul, island in the western Solomon Islands, southwestern Pacific Ocean, 30 miles (50 km) southeast of Bougainville across the Bougainville Strait. It is 83 miles (134 km) long and 20 miles (32 km) across at its widest point, largely surrounded by barrier reefs, mountainous (culminating in Mount Maitabo [3,500 feet, or 1,067 m]), and densely wooded. The main coastal settlement is Sasamungga. Copra is the chief product; subsistence crops include taros, sweet potatoes, and yams. In World War II, the Japanese thrusting southward from New Guinea invaded Choiseul (1942) and occupied the northern segment until their surrender in 1945. Pop. (1986) 12,549.

Choiseul, Étienne-François de Choiseul, duc de (duke of), also called (until 1758) COMTE (count) DE STAINVILLE (b. June 28, 1719, Lorraine, France—d. May 8, 1785, Paris), French foreign minister who dominated the government of King Louis XV from 1758 to 1770.

Choiseul, the son of François-Joseph de Choiseul, Marquis de Stainville, adopted the title Count de Stainville, entered the French army, and served with distinction against the British and Austrians in the War of the Austrian Succession (1740–48). At the end of the conflict, he joined the circle of nobles around Louis XV, and in 1752 he earned the undying favour of the king's mistress, Mme de Pompadour, by preventing her from falling victim to a court intrigue. The following year Mme de Pompadour had Stainville appointed ambassador to the Vatican, where he persuaded Pope Benedict XIV to help reduce the tensions within the French church between the Gallicans (who favoured independence from the papacy) and the Society of Jesus (Jesuits). As a result of his successful mission, Stainville was made ambassador to the Austrian court (March 1757) and was instructed to develop the newly formed Austrian alliance. By that time France and Austria had entered the Seven Years' War.

In November 1758 Stainville was made Duke de Choiseul. The following month Louis XV recalled him to Versailles and designated him secretary of state for foreign affairs. The appointment came at a critical moment when French forces were being defeated by the Prussians on the European continent and by the British in North America and India. In August 1761 he concluded with Spain a military alliance that was known as the Pacte de Famille ("Family Compact") because both countries were under Bourbon rule. The subsequent entry of Spain into the war (1762) gave Choiseul leverage in his negotiations with the British. By the Treaty of Paris (1763) France surrendered most of its North American and Indian colonies to Great Britain, but Choiseul's diplomatic maneuvers had enabled France to avoid even more humiliating terms.

Choiseul immediately began to rebuild French military power with the intent of striking back at the British. While serving as naval minister (1761–66) he dramatically increased the number of French warships, and as minister of war (1766–70) he initiated a period of army reforms that continued until the outbreak of the Revolution.

Choiseul did not, however, display the same boldness in domestic affairs. He was unwilling to challenge the authority of the Parlements (high courts of justice), which rejected all proposals for urgently needed financial reforms. He even stood by as the Parlement of Paris, against the will of the king, dissolved the Society of Jesus in 1762. In 1768–69 Louis XV brought into the ministry two men who were eager to take the offensive against Choiseul and the Parlements. When Choiseul called for war against Great Britain (1770), these ministers refused, and he was dismissed.

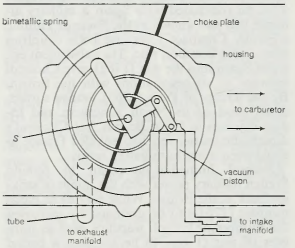


The duc de Choiseul, detail of a portrait by L.-M. Van Loo; in the Musée de Versailles
Cliché Musees Nationaux, Paris

ters convinced the King that the government was too heavily in debt to finance such a venture. Louis dismissed Choiseul from office on Dec. 24, 1770, and exiled him to his estates at Chanteloup. Allowed to return to Paris in 1774 after the death of Louis XV, Choiseul never recovered political power.

choke, in gasoline engine, valve, usually of the butterfly type, in the air-intake passage to the carburetor. It controls the volume of air drawn in to mix with the gasoline to form the fuel–air mixture. When the engine is cold, the choke is closed, so that the mixture is rich in gasoline; as the engine warms up, the choke is opened to make the mixture leaner, *i.e.*, to reduce its richness.

The choke may be controlled either manually or automatically. In the automatic choke shown in the illustration, the choke plate is mounted on a short shaft (*S*) that is pivotally mounted in the intake passage. The inside end of the spiral bimetallic spring, which is located in a separate housing, is attached to the shaft and controls its rotation. When cold, the spring holds the choke in the closed position. When the engine is cranked, the suction against the choke plate plus the intake-manifold vacuum acting on the vacuum piston tend to open the choke (*i.e.*, rotate the choke plate clockwise). As the engine warms up, air heated by the exhaust manifold enters the spring housing through the small tube and



Automatic choke

From E.F. Obert *Internal Combustion Engines*, 3rd ed. Copyright © 1968, 1950, and 1944 by International Textbook Company

raises the temperature of the spring, causing it to rotate the choke into the wide-open position.

chokecherry also spelled CHOKE CHERRY (*Prunus virginiana*), shrub or small tree, belonging to the rose family (Rosaceae) and native to North America. It is aptly named for the astringent, acidic taste of its reddish cherries. The fruit may, however, be made into jelly and preserves. The stones are poisonous, as is the wilted foliage, which may contain hydrocyanic acid in varying amounts.

Chokecherry trees often form dense thickets on moist soils. They are frequently attacked and defoliated by eastern tent caterpillars. The tree grows to a height of 6 metres (20 feet), producing hanging spikes of disagreeably scented white flowers. The slender brown twigs also have an unpleasant odour and a bitter taste. The bark is brown or gray, smooth on new growth but becoming scaly with age. Several varieties are available: *P. virginiana xanthocarpa*, with yellow fruit; *P. virginiana demissa*, with fuzzy underleaf; *P. virginiana melanocarpa*, with black fruit.

choker, in jewelry, necklace that fits closely around the neck like a snug, high collar. The choker became popular in the late 19th century, and its popularity has continued through the 20th.



Alexandra, princess of Wales (later queen consort to Edward VII), wearing a diamond and pearl choker known as a "dog collar"

The Fotomas Index

The most common early form of choker had one or more rows of pearls, which sometimes covered the neck from the base to the chin. Another popular choker was a band of velvet with a cameo pinned to its centre. Queen Alexandra, consort to Edward VII of Great Britain, in the late 19th century introduced a wide pearl and diamond choker that was soon dubbed the "dog collar."

Chōkōdō Shujin: *see* Akutagawa Ryūnosuke.

Chokwe, also spelled CIOKWE, or COKWE, also called BAJOKWE, or BADJOK, Bantu-speaking people who inhabit the southern part of Zaire from the Kwango River to the Lualaba; northeastern Angola; and, since 1920, the northwestern corner of Zambia. They live in woodland savanna intersected with strips of rain forest along the rivers, swamps, and marshlands. They are a mixture of many aboriginal peoples and conquering groups of Lunda origin. The Chokwe language belongs to the Benue-Congo branch of the Niger-Congo languages. In the early 1980s, the Chokwe numbered about 1,160,000.

Among the northern Chokwe, hunting is very important, and there are privileged corporations of hunters. Hoe cultivation overrides hunting among the southern Chokwe, the staple crops being cassava, peanuts (groundnuts), yams, millet, beans, and corn (maize); the southern Chokwe of Angola keep some cattle.

The political structure of the Chokwe seems to range from tributary chiefdoms to autonomous village groups. Villages are compact and arranged into compounds; square huts or circular grasshouses are grouped in circles around a central meetinghouse.

Descent is reckoned through the female line, although young married couples go to live with the husband's family. Polygyny is restricted to the chiefly and wealthy classes. Circumcision of boys, the use of initiation masks, and elaborate girls' initiation rites occur throughout the area. The Chokwe are exceptional craftsmen; plaiting, pottery, basketry, ironwork, and the carving of masks, statues, and stools are highly developed.

Chol, Mayan Indians of northern Chiapas in southeastern Mexico. The Chol language is closely related to Chontal, spoken by neighbouring people to the north, and to Chortí, spoken by people of eastern Guatemala. Although little is known of Chol culture at the time of the Spanish Conquest (early 16th century), Mayan linguists consider it highly probable that the language of the Mayan hieroglyphs was an earlier form of Chol. The Chol and Chontal people are lowlanders, although there are some mountainous areas in their territories. The climate is humid, and rainfall is heavy. The Chol are an agricultural people, growing corn (maize), beans, and squash as staples, as well as coffee, sugarcane, potatoes, rice, and vegetables. Poultry and pigs are also economically important. Crafts are declining, although some weaving is still done. Clothing is semitraditional, the women wearing short-sleeved cotton blouses and long skirts and the men wearing cotton pants and jackets and straw hats. Houses are built of poles with palm thatch roofs and may sometimes be coated with lime or mud.

Religion is Roman Catholic with pagan syncretism; saints are worshiped in the church, while sacred mountains and caves, the Sun and Moon, and stone idols are also venerated. Curing ceremonies are practiced to drive out evils that cause illness.

chol hamoed (Jewish semiholiday): *see* ḥol ha-mo'ed.

Chola DYNASTY: *see* Cōḷa dynasty.

cholecystitis, inflammation of the gallbladder, in most instances associated with gallstones (*see* gallstone). Disease-causing bacteria are usually found in instances of acute inflammation and in about 30 percent of the cases of chronic disease. In acute cholecystitis the organ is swollen, tense, and reddened; there may be areas of dead tissue, and pus may be present in quantities. A person with acute inflammation of the gallbladder is feverish and usually feels pain in the abdomen at the right of the stomach. He experiences nausea, vomiting, and chills. In chronic cholecystitis the gallbladder often is contracted rather than swollen; its wall is grayish white, tough, and thickened. There is discomfort after eating and difficulty in digesting fatty foods; there may be episodes of colic, pain, nausea, and vomiting. Surgical removal of the gallbladder is the usual treatment, particularly when gallstones are present or when there is evidence of gangrene or perforation. Medical management includes administration of pain-alleviating drugs, drugs to inhibit contractions of the gallbladder muscles, and antibiotics to control infection.

cholecystography, X ray of the gallbladder and biliary channels, following the administration of a radiopaque dye, one of the techniques of diagnostic radiology (*q.v.*). In oral cholecystography, the dye is ingested, absorbed by the intestine, and concentrated by the gallbladder, which normally appears well opacified in the X ray. Abnormalities (*e.g.*, gallstones) may be demonstrated by radiolucent areas. Oral cholecystography is usually indicated in cases of suspected gallbladder disease. Newer dyes that permit visualization of the bile channels without concentration by the gallbladder are administered intravenously to determine or rule out the presence of intermittent obstruction of the bile ducts or recurrent biliary disease after biliary surgery.

cholecystokinin/pancreozymin, a digestive hormone released with secretin when food from the stomach reaches the first part of the small intestine (the duodenum). Once considered to be two separate hormones because of its two distinct actions, cholecystokinin/pancreozymin evokes the release (ascribed to pancreozymin) of enzymes from the pancreas; it also causes contraction (ascribed to cholecystokinin) of the gallbladder, thereby forcing bile into the duodenum.

cholera, acute bacterial infection of the small intestine, caused by *Vibrio cholerae* and characterized by massive diarrhea with rapid and severe depletion of body fluids and salts. Cholera often rises to epidemic proportions in Southeast Asia, particularly in India and Pakistan, having been responsible for at least

370,000 deaths in India in the period from 1898 to 1907. In the 1980s cholera spread among the crowded refugee camps and city slums of famine-stricken countries in Africa, particularly Ethiopia and The Sudan.

The vibrio enters the body via the mouth, usually in contaminated water or foods, and causes an infection in the mucous membranes lining the lumen of the small intestine. The diarrhea is caused by the action of the *Vibrio cholerae* toxin in the intestine. This toxin combines with a substance in the cells of the intestinal wall, activating an enzyme system that causes the rapid excretion of body fluids containing bicarbonate and sodium.

After an incubation period of 12 to 28 hours, the disease usually starts with an abrupt, painless, watery diarrhea that may amount to a volume of 15 to 20 litres (3 to 4 gallons) or more in 24 hours. This purging diarrhea is soon followed by vomiting, and the patient rapidly becomes dehydrated; the skin becomes cold and withered, and the face is drawn; the blood pressure falls, and the pulse becomes faint; muscular cramps may be severe, and thirst intense. As dehydration increases, the person becomes stuporous and comatose and may die in shock. The disease ordinarily runs its course in two to seven days.

With prompt fluid and salt repletion, which is accomplished by the oral or intravenous administration of an alkaline solution of sodium chloride, recovery can be remarkably rapid; but if therapy is inadequate, the mortality rate is high. The administration of antibiotics during the first day of treatment usually shortens the period of diarrhea and decreases the requirement for fluid replacement.

The prevention of cholera outbreaks rests upon better sanitation, particularly the use of clean drinking water. Immunization with a vaccine of killed vibrio bacteria provides partial protection in individuals for a limited time, but its use on a massive scale does not prevent the spread of infection. This can be accomplished only by attacking the source of the infection, usually the water supply.

cholesterol, a waxy substance that is present in the blood plasma and in all animal tissues. Chemically, cholesterol is an organic compound belonging to the steroid family; its molecular formula is $C_{27}H_{46}O$. In its pure state it is a white, crystalline substance that is odourless and tasteless. Cholesterol is essential to life; it is a primary component of the membrane that surrounds each cell, and it is the starting material or an intermediate compound from which the body synthesizes bile acids, steroid hormones, and vitamin D. Cholesterol circulates in the bloodstream and is synthesized by the liver and several other organs. Human beings also ingest considerable amounts of cholesterol in the course of a normal diet. A compensatory system regulates the amount of cholesterol synthesized by the liver, with the increased dietary intake of cholesterol resulting in the liver's decreased synthesis of the compound.

High levels of cholesterol in the bloodstream are an extremely important cause of atherosclerosis. In this disorder, deposits of cholesterol and other fatty substances circulating in the blood accumulate in the interior walls of the blood vessels. These fatty deposits build up, thicken, and become calcified, eventually converting the vessel walls to scar tissue. The deposits narrow the channels of the blood vessels and thus can constrict the blood flow, causing heart attacks and strokes. High levels of cholesterol in the blood (more than 240 mg of cholesterol per 100 cc of blood plasma) accelerate the buildup of cholesterol deposits in the vessel walls; people with high cholesterol levels thus eventually become more susceptible to coronary heart disease.

Cholesterol is insoluble in the blood; it must be attached to certain protein complexes called lipoproteins in order to be transported through the bloodstream. Low-density lipoproteins (LDLs) transport cholesterol from its site of synthesis in the liver to the various tissues and body cells, where it is separated from the lipoprotein and is used by the cell. High-density lipoproteins (HDLs) may possibly transport excess or unused cholesterol from the tissues back to the liver, where it is broken down to bile acids and is then excreted. Cholesterol attached to LDLs is primarily that which builds up in atherosclerotic deposits in the blood vessels. HDLs, on the other hand, may actually serve to retard or reduce atherosclerotic buildup.

The chief means of avoiding high cholesterol levels in the blood is to lower one's dietary intake of cholesterol. Because cholesterol is present in animal fats (*i.e.,* saturated or polysaturated fats) but not in fats obtained from plant sources (*i.e.,* unsaturated or polyunsaturated fats), this can be done by: (1) reducing one's total intake of fats, (2) partly or wholly replacing one's consumption of saturated fats with that of unsaturated fats, and (3) reducing one's consumption of foods containing cholesterol. Thus, foods high in saturated fats, such as lard, butter, cheese, whole milk, red meat, candy, and baked goods containing shortening, would be avoided, as would such cholesterol-containing foods as egg yolks, shrimp, and brains and other animal organs. Unsaturated fats such as fish oils and corn, peanut, safflower, and soybean oils would be substituted for animal fats. Recently, the fish oils found in salmon, tuna, mackerel, and certain other marine fishes were found to raise HDL levels and thus reduce or retard atherosclerotic processes. Extensive research has now verified the causal relation between a cholesterol-rich diet, high blood cholesterol levels, and coronary heart disease, but authorities disagree about the overall value of long-term cholesterol reduction for the "normal" individual. *See also* lipoprotein.

Cholet, town, Maine-et-Loire *département,* Pays de la Loire *région,* western France. It lies along the Moine River, southeast of Nantes. First mentioned in the 11th century, the name Cholet was probably derived from the Latin *cauletum* ("cabbage") for the local growing of cabbage. The town's older buildings were destroyed (1793–96) during the Wars of the Vendée. The town was slowly rebuilt, mainly in the 19th century; it is dominated by the Church of the Sacred Heart (1939), built in a modernized Romano-Byzantine style.

Cholet is an important cattle market, with some light industry. The centre of a small traditional region (*pays*) called the Choletais, the town is known for its agriculture-based industries; from ancient times it has made linen products, supplemented since the 19th century by the production of cotton. More recent manufactures are shoes, toys and baby buggies (prams), machinery, radio-electronics, televisions, and radar. Pop. (1982) 51,620.

Choli-Maheshwar (India): *see* Maheshwar.

choline, a nitrogen-containing alcohol related to the vitamins in activity. It is apparently an essential nutrient for a number of microorganisms and higher animals (including some birds) and is also important in metabolic processes in other animals, including humans.

Choline has several important functions. It is a constituent of an important class of lipids (fats) called phospholipids (*e.g.,* lecithin), which form structural elements of cell membranes. It is also a component of acetylcholine, which is important in nerve function. Choline serves as a source of the methyl groups ($-CH_3$ groups), which are required in various metabolic processes, and it functions in the transport of fats from the liver.

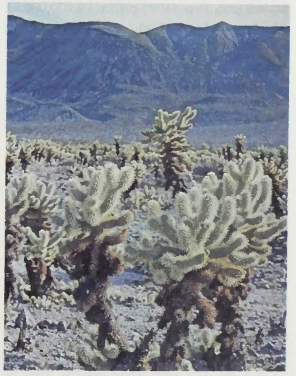
Choline, which is usually classified with the B vitamins because of similarities in function and in distribution in foods, is abundant in wheat germ, soybean oil, egg yolk, and nervous and glandular tissues.

Choline-deficient animals suffer from hemorrhagic kidneys and excessive deposition of fat in the liver. These effects can be alleviated by adding to the diet compounds that can be changed into choline—*e.g.,* proteins containing the amino acid methionine.

cholinergic drug, any of various drugs that inhibit, enhance, or mimic the action of the neurotransmitter acetylcholine within the body. Acetylcholine is the primary transmitter of nerve impulses within the parasympathetic nervous system—*i.e.,* that part of the autonomic nervous system that consists chiefly of cholinergic fibres and which helps contract smooth muscles, dilate blood vessels, increase secretions, and slow the heart rate. Some cholinergic drugs, such as muscarine, pilocarpine, and arecoline, mimic the activity of acetylcholine in stimulating the parasympathetic nervous system. These drugs have few therapeutic uses, though one of them, nicotine, is widely used as a stimulant. Other cholinergic drugs, such as atropine and scopolamine, inhibit the action of acetylcholine and thus suppress all the actions of the parasympathetic nervous system. These drugs help dry up such bodily secretions as saliva and mucus and relax smooth-muscle walls. They are used therapeutically to relieve spasms of the smooth-muscle walls of the intestines, to relieve bronchial spasms, to diminish salivation and bronchial secretions during anesthesia, and to dilate the pupil during ophthalmological procedures. *See also* anticholinesterase.

cholla, any cylindroid-jointed cactus of the genus *Opuntia,* family Cactaceae, native to North and South America. Chollas vary in size, from the small *O. pulchella,* which is almost never noticed except when blooming, to small trees about 3 m (10 feet) in height.

They have small flowers, sometimes chartreuse and inconspicuous, but more commonly of more striking colours. At least three species—*O. pulchella, O. imbricata,* and *O. whipplei*—are hardy to −18° C (0° F) or below. *O. leptocaulis,* the desert Christmas cactus, holds its bright red fruits through the winter. Eve's pin cushion (*O. subulata*), found in South America, has large leaves for an *Opuntia;* they are awl-shaped, grow to 12.5 cm (5 inches) long, and last much longer than the usual few weeks.



Jumping cholla (*Opuntia bigelovii*)
Grant Heilman—EB Inc.

The living plants serve as food for desert livestock, and cholla wood, a hollow cylinder with regularly spaced holes, is used for fuel and novelties. Some cholla fruit is edible.

Chŏlla-nam, English SOUTH CHŎLLA, *do* (province), extreme southwestern South Korea. It is bounded north by Chŏlla-puk province, east by Kyŏngsang-nam province, south by Cheju Strait, and west by the Yellow Sea. Its coastline, including nearly 2,000 islands, of which three-fourths are uninhabited, is about 3,800 miles (6,100 km) long and represents one-third of the country's total. Its marine products lead the nation, particularly the cultivation of laver (seaweed) and oyster; its shrimp and mackerel are also prized.

Although the province is partly mountainous, its plains spread out along the Sŏmjin (132 miles [212 km]), Yŏngsan (72 miles [116 km]), and Tamjin (25 miles [40 km]) rivers, making it the largest granary in the country. The plains receive abundant rainfall, exceeding 47 inches (1,200 mm) per year, and average temperatures of 55°–57° F (13°–14° C) make the province the warmest in Korea. The fertile land and the favourable climate make possible the production of large quantities of rice, wheat, barley, pulses, potatoes, and vegetables. Cotton, fruits, and bamboo are also grown. Cattle breeding has been carried on in several hilly districts since the late 1960s. Some coal and gold are mined in the province, and industries have been developed. Kwangju is the provincial capital. Area 4,561 square miles (11,812 square km). Pop. (1990 prelim.) 2,523,000.

Chŏlla-puk, English NORTH CHŎLLA, *do* (province), southwestern South Korea. It is bounded by the provinces of Ch'ungch'ŏng-nam and Ch'ungch'ŏng-puk (north); Kyŏngsang-puk and Kyŏngsang-nam (east); Chŏlla-nam (south); and by the Yellow Sea (west). The province is divided by the Noryŏng Mountains, a spur of the T'aebaek Mountains. The eastern part is a plateau, and the western part is a plain through which flow the Sŏmjin, Mankyŏng, Tongjin, and Kŭm rivers. The plain, one of the largest granaries in the country, produces rice, barley, cotton, hemp, and paper mulberry, used to make paper for sliding screens. There is cattle breeding on the plateau. Since the late 1960s and the construction of Honam highway, an industrial belt connecting the provincial capital of Chŏnju, Iri, and the port city of Kunsan has been established. Area 3,109 square miles (8,053 square km). Pop. (1990 prelim.) 2,070,000.

Cholmondeley, Hugh: *see* Delamere (of Vale Royal), Hugh Cholmondeley, 3rd Baron.

Cholo (Malawi): *see* Thyolo.

Cholula, in full CHOLULA DE RIVADABIA, city, northwestern Puebla *estado* ("state"), central Mexico, on the central plateau at 7,052 feet (2,149 m) above sea level, just northwest of Puebla city, the state capital. Cholula (Nahuatl: "Place of Springs"), an important pre-Spanish-conquest town dedicated to the god Quetzalcoatl, is known for its many domed churches, for the Spaniards built a church on top of each native temple. Cholula was a major centre of the preconquest Mesoamerican Indian culture as far back as the Early Classic period (AD 100–600) and reached its maximum growth in the Late Classic period (900–1200). An imposing pyramid there of sun-dried bricks, the largest structure built by Mesoamerican Indians (177 feet [54 m] high, covering nearly 45 acres [18 hectares]), dates from the Late Classic. Any historical data in the temple of Quetzalcoatl that once crowned the pyramid (now topped by the Christian chapel Sanctuario de los Remedios) was doubtless destroyed in 1519 by Hernán Cortés during his march inland to conquer Montezuma's capital, Tenochtitlán. The Cholulans, who were makers and traders of textiles and pottery, were Nahuatl speakers and at the time of the conquest owed a nominal allegiance to Montezuma.



The Pyramid Chapel, Cholula, Mex.
Victor Englebert

In addition to its role as a pilgrimage and tourist centre, Cholula processes agricultural products—cereals, maguey (a Mexican agave), fruits, vegetables, and livestock. Wine and liquor are produced in the city, and there are flour and textile mills. It is accessible by railroad and highway. Pop. (1980) 26,748.

Choluteca, city, southern Honduras. It is situated in the hot Pacific lowlands along the Choluteca River. It was founded in 1522 as a mining centre and was given city status in 1845. Choluteca is a commercial and manufacturing centre for an agricultural hinterland yielding mainly coffee, cotton, and cattle; there is also some beekeeping. Dairies, tanneries, sawmills, rice mills, and a number of other industries are located in the city. The city retains many interesting buildings from the Spanish colonial period. Choluteca is on the Pan-American Highway, which connects it with other Honduran and Nicaraguan centres, and it has an airfield. Pop. (1989 est.) 57,400.

Chomsky, Noam, in full AVRAM NOAM CHOMSKY (b. Dec. 7, 1928, Philadelphia, Pa., U.S.), American linguist, writer, educator, and political activist, one of the founders of transformational, or generative, grammar, an original system of linguistic analysis.

Chomsky was introduced to the study of linguistics by his father, a Hebrew scholar who worked within the framework of historical linguistics. The early stages of Chomsky's theories of language appear in his University of Pennsylvania Ph.D. dissertation, "Transformational Analysis" (1955). After receiving his degree, he taught modern languages and linguistics at the Massachusetts Institute of Technology, becoming a full professor in 1961. In 1966 he was appointed Ferrari P. Ward professor of foreign languages and linguistics and Institute professor in 1976.

Chomsky views language as the result of a universal innate facility and considers his ideas concerning language to be related to those of the 17th-century Rationalist philosophers.

Chomsky also became known for his opposition to U.S. involvement in Vietnam in the 1960s and '70s. He delivered many lectures and wrote books and numerous articles expressing his political views on several social and economic issues including *American Power and the New Mandarins* (1969), *The Political Economy of Human Rights,* 2 vol. (1979), and *Towards a New Cold War* (1982).

Among Chomsky's major publications on grammatical theory are *Syntactic Structures* (1957), in which he set out his theory of transformational grammar; *Aspects of the Theory of Syntax* (1965); *Cartesian Linguistics* (1966); *The Sound Pattern of English* (with Morris Halle, 1968); *Language and Mind* (1968; enlarged ed., 1972); *The Logical Structure of Linguistic Theory* (1975); and *Reflections on Language* (1975). *Language and Responsibility* (1979) discusses the relation of language and politics, the history of ideas and science, and the ramifications of generative grammar. His later books, including *Pirates and Emperors* (1986), *On Power and Ideology* (1987), and *Language and Problems of Knowledge* (1988), further examine those subjects.

Chomutov, German KOMOTAU, city, Severočeský *kraj* (region), Czech Republic. It lies at the foot of the Ore Mountains (Krušné hory) near the German border, northwest of Prague. Probably Czech in origin, Chomutov was a command post of the Teutonic Knights in the 14th century and remained German until the end of World War II. It is an industrial centre and rail junction at the western end of the northern Bohemian coal basin, a lignite-mining area. Metal products from the rolling mills of Kladno are finished there. Pop. (1991 prelim.) 53,191.

Chon Buri, also spelled CHONBURI, town, south-central Thailand. Chon Buri is located on the coastal road leading south from Bangkok, on the eastern shore of the Gulf of Thailand. Locally known as Bang Pla Soi, it has food-processing industries and a meteorological station.

The surrounding area is a rich agricultural region, producing rice in surplus and serving as one of the nation's major sources of sugarcane and cassava. Fishing and salt extraction are important along the coast; fish freezing and processing, sugar refining, and liquor distilling are the major industries. Pop. (1986 est.) town, 48,203.

Ch'ŏnan, city, Ch'ungch'ŏng-nam *do* (province), western South Korea, south of Seoul. A transportation junction since ancient times, it is known by a famous folk song, "Ch'ŏnan-Samgŏri" (Samgŏri meaning "three-forked road"). It is connected with the surrounding provinces by rail and road and is the market centre for agricultural products (rice, barley, and vegetables) from the northern part of Ch'ungch'ŏng-nam province. The picturesque, old Sŏngbul Temple is on the nearby mountain. The area around Onyang, a few miles west, has some of the country's largest hot-spring spas and is the site of Hyŏnch'ung Temple. Pop. (1990 prelim.) 211,382.

Ch'ŏndogyo (Korean: "Religion of the Heavenly Way"), formerly TONGHAK ("Eastern Learning"), indigenous Korean religion that combines elements of Confucianism, Buddhism, Taoism, shamanism, and Roman Catholicism. There is no concept of eternal reward in Ch'ŏndogyo, because its vision is limited to bringing righteousness and peace to the world. Toward this end, converts to Ch'ŏndogyo dedicate themselves to God by placing clean water on an altar in a ritual called *ch'ŏngsu.* They are instructed to meditate on God, offer prayers (*kido*) upon leaving and entering their homes, dispel harmful thoughts (*e.g.,* of greed and lust), and worship God in church on Sundays.

The essence of Ch'ŏndogyo is said to be contained in a 21-word formula (*chumun*) that is recited as the way to enlightenment. It is translated: "May the creative power of the universe be within me in abundance. May heaven be with me and every creation will be done. Never forgetting this truth, everything will be known." This formula contains the basic principle of Ch'ŏndogyo: "Man and God are one" (*In-Nae-Ch'ŏn*); this oneness is realized by individuals through sincere faith in the unity of their own body and spirit and through faith in the universality of God.

Ch'ŏndogyo was established by Ch'oe Che-u in 1860, after what he said was a direct inspiration from the Heavenly Emperor (Ch'ŏnju). Because Ch'oe sought to effect change in the social order, he was seriously at odds with the civil authorities, who ordered his execution in 1864. Ch'oe Si-hyŏng, already prominent in

the movement, took over the leadership but met a similar fate in 1899. The third leader, Son Pyŏng-hi, proposed the current name, Ch'ŏndogyo, in 1905 as preferable to Tonghak, which had been chosen by its founder. In 1979 Korean government statistics indicated that Ch'ŏndogyo had more than 1,100,000 adherents.

chondrichthian, class name CHONDRICHTHYES, or SELACHII, any member of a group of cartilaginous fishes that includes the sharks, skates, chimaeras, and rays. The term Selachii is also used as an order of sharks.

A brief treatment of chondrichthians follows. For full treatment, *see* MACROPAEDIA: Fishes.

Before dying out, the armour-plated Placodermi of the Devonian Period (350,000,000 years ago) gave rise to the osteichthians (bony fishes) and the chondrichthians (cartilaginous fishes). Most chrondrichthians entered the oceans, but there are still some freshwater species of shark. They are unimportant as a food source, but their tough skin (shagreens), covered with abrasive scales, are used to make wood polishers as well as footwear, belts, wallets, and other accessories.

All sharks are carnivorous, and about 27 species are identified as being dangerous to humans. The most ferocious of the man-eaters is the white shark (*Carcharodon carcharias*), which is found in cool waters of the temperate zones. Most sharks and rays tend to stay in water no cooler than 21° C (70° F). The largest species, the whale shark (*Rhincodon typus*) and basking shark (*Cetorhinus maximum*), feed on plankton.

Sharks in a feeding frenzy will attack each other, and all species avoid the hammerhead sharks, whose oddly shaped heads give them great maneuverability. The first stimulus to attack comes to sharks by smell, but they are also attracted and guided by their vision.

The rays are chiefly bottom-dwelling fish that feed on other fish and invertebrates such as mollusks and crustaceans. Whip-tailed rays dig shellfish by stirring up the bottom sand or mud with their large pectoral fins. Skates partially bury themselves on the bottom, emerging suddenly to pursue prey such as herring. Electric rays have powerful electric organs with which they stun even such large and active fish as salmon and dogfish. Devil rays swim near the surface and use their cephalic fins to sweep small fish and plankton into their mouth. Chimaeras are also bottom dwellers; they feed at night and subsist almost entirely on small fishes and invertebrates.

Only a few species of sharks, rays, and chimaeras are egg layers. Fertilization is internal among most species. The male has a pair of copulatory organs called claspers used to insert sperm into the female, and the male holds her firmly by biting her pectoral fin. Several sharks and rays other than skates hatch their eggs within the female. In these cases, the egg is coated with a temporary membrane until the embryo is formed and develops inside the oviduct. In some species an embryo will eat other yolks or embryos when its own food supply is exhausted. *See also* ray; shark.

Consult the INDEX *first*

chondrite, any stony meteorite characterized by the presence of chondrules (*see* chondrule). Chondrites represent the most abundant meteorite class, comprising more than 86 percent of meteorite falls and 51 percent of known meteorites. The structure of chondrites in some respects resembles that of such terrestrial rocks as volcanic tuffs; two distinguishing features are the eccentricity of the point from which the fibres in the chondrules diverge and the not uncommon enclosure of one chondrule by another. Chondrites are primary in origin, having crystallized 4,700,000,000 years ago, and are divided into three main groups according to chemical composition: hypersthene chondrites, in which the ratio of magnesium (Mg) to iron (Fe) atoms lies between two and four; bronzite chondrites, with a magnesium to iron ratio between four and nine; and enstatite chondrites, with a magnesium to iron ratio larger than nine. Chondrites are chemically similar to one another and also to the solar atmosphere, the only discrepancy being in the amount of iron. Most chondrites contain the anhydrous silicate minerals olivine, ortho- and clino-pyroxenes, and plagioclase, as well as kamacite, taenite, and troilite. Some contain claylike hydrous silicates and carbonaceous material (*see* carbonaceous chondrite).

chondrodystrophia fetalis (cartilage disorder): *see* achondroplasia.

chondrosarcoma, a relatively uncommon malignant tumour of cartilage. Primary chondrosarcoma arises and grows rapidly without a preexisting cartilaginous focus; the secondary type develops slowly from a previously benign tumour of cartilage. Pain is the major symptom. Surgical removal may afford cure although the tumour shows a tendency to recur in the area of surgery. Five years after diagnosis, some 35 percent of patients remain alive.

chondrostean, any member of the subclass Chondrostei, a group of primitive, ray-finned bony fishes, represented by the sturgeons and paddlefishes and many fossil species. The extant bichir and reedfish of Africa are often included in this group.

A brief treatment of chondrosteans follows. For full treatment, *see* MACROPAEDIA: Fishes.

The sturgeon, a food fish, is widely distributed in the Northern Hemisphere. Marine species appear along both the American and European coasts of the Atlantic Ocean. A freshwater species (*Acipenser fulvescens*) is found in the Mississippi River and the Great Lakes and in Canada, while other species appear in the Black Sea, the Caspian Sea, and southern rivers of that region.

Long and somewhat tapered, sturgeons generally grow to a length of 2 m (7 feet), but one species (*Huso huso,* or hausen) can reach 8.5 m in length. The sturgeon is protected by two narrow rows of bony plates on its side and one row along its top. With a mouth at the base of its pointed snout, the sturgeon is a bottom-feeding fish. In front of the toothless mouth are four fleshy barbels (whiskers) that the sturgeon drags across river and ocean bottoms in search of small fish or invertebrates on which to feed. Ocean species of sturgeon migrate up rivers to spawn; freshwater species may breed near lakeshores. Their numerous small eggs (prized as caviar) hatch and grow rapidly. Sturgeons can live to great ages; *Huso huso* might reach an age of 200 to 300 years.

Like the sturgeon, the paddlefish is highly specialized. The paddlefish's most distinguishing feature is a long paddle-shaped snout, made of cartilage and often half the paddlefish's length. The Chinese paddlefish may reach lengths of 6.3 m, while the Mississippi paddlefish only grows to 1.8 m. Paddlefish feed entirely on plankton. They reach maturity at seven or eight years and breed during spring floods. Two or three weeks after hatching, the young paddlefish's snout begins to develop.

The skull and skeletons of both the paddlefish and sturgeon are more cartilaginous than those of ancestral forms of Chondrostei. Both have rayed fins (*i.e.,* fins supported with bony rods), but while the sturgeon is covered with scales, the paddlefish has only a few vestigial scales.

The bichir and reedfish inhabit the freshwaters of Central Africa. The bichir grows no longer than 70 cm (28 inches), while the reedfish grows to 90 cm. Both are elongated in shape, with the bichir almost cylindrical, or eel-like. They have numerous dorsal finlets and are covered with hard rhomboid (diamond-shaped) scales. Their upper bodies tend to be dark and their lower bodies pale. Living near stream edges, bichir and reedfish forage at night for insects, worms, crustaceans, and small fish.

Extinct orders of Chondrostei include the Palaeonisciformes, Tarrasiiformes, Haplolepiformes, and 13 other orders collectively known as the subholosteans. The rise of the holosteans and teleosts during the Mesozoic Era is believed to have led to the decline of these fossil orders. The palaeonisciforms, the earliest known chondrosteans, lived in both marine and freshwater habitats throughout the world, beginning in the Middle Devonian Period. They grew to lengths of one metre, and most were covered with hard rhomboid scales. Their caudal fins were heterocercal, as are the sturgeon's, and their dorsal and anal fins were almost exactly opposite. Their body shapes ranged from fusiform to deep bodied. The jaws and jaw musculature of palaeonisciforms were more primitive and less powerful than those of the holoceans. Among the tarrasiiforms and haplolepiforms, which flourished in the Carboniferous Period (280,000,000 to 345,000,000 years ago), the skeletal structure diverged from that of the palaeonisciforms and their jaws and jaw musculature were more efficient. The subholosteans grew to lengths of 30 cm.

The surviving chondrosteans share with their ancestors a similar skull structure. Fossil specimens of bichir and reedfish date from 65,000,000 years ago and those of sturgeons and paddlefish from 65,000,000 to 100,000,000 years ago.

Chondrosteiformes, an extinct order of ray-finned saltwater fishes (class Actinopterygii) comprising a single family Chondrosteidae. These fishes were prominent in seas during the Lower Triassic to Upper Jurassic (from 225,000,000 to 136,000,000 years ago). Some species were suctorial feeders that probably gave rise to present-day sturgeon (*q.v.*).

chondrule, small, rounded particle embedded in most stony meteorites called chondrites. Chondrules are usually about one millimetre in diameter and consist largely of the silicate minerals olivine and pyroxene. From textural and chemical relationships, it is clear that they were formed at high temperatures as dispersed molten droplets, which subsequently solidified and aggregated into chondritic masses. This process occurred in space in earliest times before the planets accreted. How the chondrules were melted, however, is not understood. It seems likely that dust particles or planetesimals already in existence were melted by high-energy events such as high-velocity collisions and splashed about as droplets that quickly cooled and crystallized.

Chondrus crispus (alga): *see* Irish moss.

Chŏng Sŏn, also called KYŎMJA (Korean: "Humble Study") (b. 1676, Korea—d. 1759, Korea), noted painter who was the first Korean artist to depart from the Chinese academic models. He frequently left his studio to paint from direct observation of the world around him. Other Korean artists were soon inspired to follow his example.

Born into a humble family, Chŏng impressed an aristocratic neighbour with his unique artistic talents and, as a result, was recommended to the court, where he soon won official position. An extremely diligent man, he is said to have painted daily, well into his 80s. In technique, he was a member of the Southern school, but he developed a unique brush

"wrinkle," which consisted of bold vertical parallel strokes and which was said to be unforgettable.

Chŏng Yak-jong, also called AUGUSTINE CHŎNG (b. 1760, Korea—d. 1801, Korea), one of the most eminent leaders in the early propagation of Roman Catholicism in Korea. He was the elder brother of Chŏng Yak-yong, the famous scholar of the Silhak (Korean: "Practical Learning") movement in the late Yi dynasty.

Born to a family noted for its scholarly background, Chŏng was converted to Roman Catholicism by the Chinese priest Chou Wen-mu (James Chou), the first ordained priest ever to enter Korea. Chŏng made a great contribution toward the spread of the gospel in Korea and served as the first president of Myŏngdo-hoe ("Society of Bright Truth"), an institute established for the study and spread of Roman Catholic doctrines. He also wrote the *Principal Articles of the Religion,* the first guidebook to Roman Catholicism written in Korean; it contributed toward the spread of the Korean alphabet, which had been generally neglected in favour of Chinese.

His second book remained unfinished because of government persecution. Arrested in 1801, Chŏng refused to submit to the will of the authorities. He claimed that the prohibition of Roman Catholicism was wrong, declaring that he was not afraid to die for the sake of truth. He was executed at the age of 42 and became one of the most celebrated Korean Christian martyrs.

Ch'ŏngch'ŏn River, Korean CH'ŎNGCH'ŎN-GANG, river, central North Korea. It rises in the Chŏgyu Mountains about 75 miles (120 km) northwest of the city of Hamhŭng. The Ch'ŏngch'ŏn flows generally southwest for about 125 miles (200 km) past the cities of Hŭich'ŏn, Kujang, and Anju, draining an area of rich agricultural plains and emptying into Korea Bay about 15 miles (24 km) due west of Sinanju.

Ch'ŏngjin, city, northeastern North Korea. The city is situated along Kyŏngsŏng Bay, facing the Sea of Japan. Before it became an open port in 1908, Ch'ŏngjin was a small fishing village. During the later stages of the Japanese occupation (1910–45), it developed rapidly as a base for the Japanese invasion of China. It was the terminus of the North Manchurian rail line and the sea lines connected with Japan. Iron manufacturing and oil and fat industries were established. After Korean independence in 1945, Ch'ŏngjin was joined with Puryŏng county, an area of metallurgical works, and Nanam city (southwest), making it one of the biggest industrial cities of North Korea.

The large combination of metal industries in Ch'ŏngjin is based on the manufacture of iron and steel and ferroalloys. Shipbuilding and the manufacture of machinery, chemicals, textiles, and gum are also carried on in the city. Pop. (1987 est.) 520,000.

Ch'ŏngju, city, Ch'ungch'ŏng-puk *do* (province), central South Korea. An old inland rural city, it is now the political and economic centre of the province. After the city was connected to Seoul by highway in 1970, it developed rapidly. Rice, barley, beans, cotton, and tobacco are produced within the vicinity. The main industries are tobacco products for the Office of Monopoly of Tobacco Manufacturers, which is located there, and silk weaving. The city is also the educational centre of the province, being the site of Chungbuk National University, Ch'ŏngju University (1946), Ch'ŏngju Women's College (1969), and Ch'ŏngju Junior Teachers' College (1962). Pop. (1990) 477,783.

Chongming Dao (Shanghai): *see* Ch'ungming Island.

Chongqing (China): *see* Chungking.

Chongzhen (Chinese emperor): *see* Ch'ungchen.

Choniates, Michael, also called MICHAEL ACOMINATUS (b. *c.* 1140, Chonae, Byzantine Empire [now in Turkey]—d. *c.* 1220, Ceos, Cyclades Islands [now Kéa, Greece]), Byzantine humanist scholar and archbishop of Athens whose extensive classical literary works provide the principal documentary witness to the political turbulence and academic decline of 13th-century Greece after its devastation by the Western crusaders.

Having studied at Constantinople (Istanbul) under the classicist Eustathius of Thessalonica, Michael Choniates became metropolitan (senior archbishop) of Athens about 1175 and laboured for almost 30 years to reverse the material and moral deterioration of that taxladen city. Amassing a collection of original and copied manuscripts, he advanced classical learning by his own scholarship. At the fall of Athens to the Franks under Duke Boniface of Montferrat in 1204, he refused to submit to the papacy and fled to the island of Ceos.

Michael Choniates' writings comprise a variety of forms, including doctrinal conferences, eulogies, poetry, and letters. In iambic verse he mourned the intellectual destitution of 13th-century Athenian society and, by various rhetorical pieces, castigated the avarice and tyranny characterizing the local landlords and Byzantine bureaucracy. He also wrote laudatory odes to his brother Nicetas and to Emperor Isaac II Angelus (reigned 1185–95), the defender of Constantinople against Frederick I Barbarossa.

Choniates, Nicetas, also called NICETAS ACOMINATUS (b. *c.* 1150, Chonae, Byzantine Empire [now in Turkey]—d. 1213, Nicaea, Empire of Nicaea [now Iznik, Tur.]), Byzantine statesman, historian, and theologian. His chronicle of Byzantium's humiliations during



Nicetas Choniates, manuscript illumination, 14th century; in the Austrian National Library, Vienna (Codex historicus graecus 53)

By courtesy of the Österreichische Nationalbibliothek, Vienna

the Third and Fourth Crusades (1189 and 1204) and his anthology of 12th-century theological writings constitute authoritative historical sources for this period and established him among the most brilliant medieval Greek historiographers.

Nicetas, a protégé of his brother Michael, archbishop of Athens, served as a district governor in Philippopolis (now Plovdiv, Bulg.), where he witnessed the crusaders' ravages under Frederick I Barbarossa. He later experienced the looting of Constantinople (Istanbul) in 1204 by the crusaders from the West. Forced to flee Constantinople, Nicetas moved to Nicaea, site of the Byzantine courtin-exile, and wrote the 21-volume "History of the Times," a record of the rise and fall of the 12th- and 13th-century Byzantine dynasties, beginning with the Greek emperor John Comnenus (1118–43) and concluding with the intrusion of the first Latin Eastern emperor, Baldwin I of Flanders (1204–05).

A fervent Greek Byzantine nationalist, Nicetas produced a generally objective and concrete, although rhetorical, account of the crusaders' campaigns in Byzantium.

In the theological sphere Nicetas composed the "Thesaurus of Orthodoxy," a collection of tracts as source material for responding to contemporary heresies and to document the 12th-century Byzantine philosophical movement.

chōnin (Japanese: "townsman"), class of townsmen that emerged in Japan during the early years of the Tokugawa period (1603–1867) and became an influential and prosperous sector of society.

So named because of their residence in city wards (*chō*), the *chōnin* were generally merchants, though occasionally craftsmen and artisans were included in their number. In spite of compulsory loans, property confiscations, and legislation designed to restrict their wealth, the *chōnin* multiplied rapidly during the Tokugawa period, and their prosperity contrasted greatly with the financial straits of the peasant and samurai classes, who became heavily indebted to the *chōnin.* This resulted in considerable resentment and discontent, for which the government was often blamed.

Under *chōnin* sponsorship, advances were made in the fields of astronomy, agronomy, medicine, and civil engineering in Japan. Moreover, a distinct *chōnin* culture developed in the major Japanese cities, especially during the Genroku (1688–1703) and Bunka-Bunsei (1804–29) periods. Characterized by conspicuous consumption, this culture led to the development of new art forms such as haiku poetry, kabuki and *jōruri* theatre, and erotic novels and short stories. It also involved the extensive use of female entertainers and courtesans, such as geisha, who first came into prominence at this time.

Unlike their Western contemporaries, the *chōnin* never emancipated themselves from dependence on government sponsorship. When freed of governmental interference and allowed to develop independently after the Meiji Restoration, the 1868 overthrow of feudal rule, the *chōnin* class gradually declined. Samurai entrepeneurs generally replaced *chōnin* as leaders of the business community.

Chŏnju, city, Chŏlla-puk *do* (province), southwestern South Korea. It is 21 miles (34 km) east of the Yellow Sea and is surrounded by steep hills with fortified castles. One of the oldest cities in Korea, Chŏnju had its origins in the Three Kingdoms period (*c.* 57 BC), when it was a strategic point of local civil and military administration. Known as the cradle of the Yi dynasty (1392–1910), the city has many historical remains. Although the population has grown, the city has retained a rural appearance, with three-fourths of its land containing vegetation. It is connected by rail and highway with Seoul north through Taejŏn and with the port cities of Kunsan and Yŏsu. A large paper mill was constructed in 1968. Other industries include textiles and canning. Chŏnbuk National University (1947), Chŏnju University (1946), and Chŏnju Junior Teachers' College (1962) are located there. Pop. (1990) 517,059.

Chono, extinct South American Indian group that lived in southern Chile, between the Corcovado Gulf and the Gulf of Penas. At no time represented by more than a few hundred individuals, the Chono have never been thoroughly described by linguists or ethnographers. The linguistic affiliation of the Chono language is unknown. The last surviving family of Chono was reported in 1875, after which it appears that the entire Chono tribe died out or was absorbed into the populations of other Fuegian peoples.

The Chono lived a nomadic life along the seacoast, hunting birds and seals, fishing, gathering eggs and shellfish, and utilizing the occasional beached whale. Women customarily dove for shellfish; men captured fish in bark-fibre nets, as well as seals in nets of rawhide. The only domesticated animal kept by the Chono in pre-Spanish times was a small, long-haired, shaggy dog. The Chono dogs were trained to help in hunting and fishing, and their shaggy hair provided fibre that was combined with bark and other vegetable fibres and woven into clothing and mats. The Chono did not practice agriculture, except for the cultivation of potatoes and other vegetables in small garden plots, in pre-Spanish times. In the post-Columbian years, the Chono grew some corn (maize) and barley and kept a few sheep and goats.

chonotrich, any small, vase-shaped, sessile (*i.e.,* attached at the base) member of the protozoan order Chonotrichida. Usually marine, they belong to subclass Holotrichia. As adults, chonotrichs have no cilia (minute hair-like projections) for independent locomotion. Instead, they attach themselves to aquatic arthropods either directly or by means of short, noncontractile stalks. Chonotrichs produce swimming larvae by asexual budding; in



Spirochona on the gill cover of a crustacean (*Gammarus*)
M.I. Walker from the Natural History Photographic Agency

some forms, where conjugation occurs, there is complete fusion of the conjugants. *Spirochona,* with a winding, funnel-shaped collar, is a common genus. *Stylochona, Trichochona,* and *Chilodochona* are also chonotrich genera.

Chons (Egyptian god): *see* Khons.

Chontal, Mayan Indians of Oaxaca and Tabasco states in southeastern Mexico. They are linguistically closely related to the Chol, to the south, and to the Chorti, of eastern Guatemala. The Chontal and Chol also share a similar environment and culture. Rainfall is heavy and the climate humid. The Chontal grow corn (maize), beans, and squash as staple crops and weave palm-leaf fibre into strips to be used for making hats. The making of hats is of great economic importance to the region. Other crafts have for the most part died out. Chontal houses are built of poles or lumber with palm thatch roofs, sometimes plastered with mud or covered with lime.

Their religion is Roman Catholic, centred on the worship of patron saints. Annual fiestas celebrate saints' days. The church also serves as a sort of community centre. Elves or dwarfs are also venerated; these appear to correspond to pagan mountain and forest deities.

Chopin, Frédéric (François), Polish FRYDERYK FRANCISZEK SZOPEN (b. March 1, 1810, Żelazowa Wola, near Warsaw, Duchy of Warsaw [now in Poland]—d. Oct. 17, 1849, Paris, France), Polish-French composer and pianist of the Romantic period, best known for his solo pieces for piano and his piano concerti. Although he wrote little but piano works, many of them brief, Chopin ranks as one of music's greatest tone poets by reason of superfine imagination and fastidious craftsmanship.

Life. Chopin's father, Nicholas, a French émigré in Poland, was employed as a tutor to various aristocratic families, including the Skarbeks, at Żelazowa Wola, one of whose poorer relations he married. When Frédéric was eight months old, Nicholas became a French teacher at the Warsaw lyceum. Chopin himself attended the lyceum from 1823 to 1826.

All the family had artistic leanings, and even in infancy Chopin was always strangely moved when listening to his mother or eldest sister playing the piano. By six he was already trying to reproduce what he heard or to make up new tunes. The following year he started piano lessons with the 61-year-old Wojciech (Adalbert) Żywny, an all-around musician with an astute sense of values. Żywny's simple instruction in piano playing was soon left behind by his pupil, who discovered for himself an original approach to the piano and was allowed to develop unhindered by academic rules and formal discipline.

Chopin found himself invited at an early age to play at private soirées, and at eight he made his first public appearance at a public charity concert. Three years later he performed in the presence of the Russian tsar Alexander I, who was in Warsaw to open Parliament. Playing was not alone responsible for his growing reputation as a child prodigy. At seven he wrote a *Polonaise in G Minor,* which was printed, and soon afterward a march of his appealed to the Russian grand duke Constantine, who had it scored for his military band to play on parade. Other polonaises, mazurkas, variations, ecossaises, and a rondo followed, with the result that, when he was 16, his family enrolled him at the newly formed Warsaw Conservatory of Music. This school was directed by the Polish composer Joseph Elsner, with whom Chopin already had been studying musical theory.

No better teacher could have been found, for, while insisting on a traditional training, Elsner, as a Romantically inclined composer himself, realized that Chopin's individual imagination must never be checked by purely academic demands. Even before he came under Elsner's eye, Chopin had shown interest in the folk music of the Polish countryside and had received those impressions that later gave an unmistakable national colouring to his work. At the conservatory he was put through a solid



Frédéric Chopin, detail of a portrait by Eugène Delacroix; in the Louvre
Giraudon—Art Resource

course of instruction in harmony and composition; it was only in piano playing itself that he was practically self-taught.

Despite the lively musical life of Warsaw, Chopin urgently needed wider musical experience, and so his devoted parents found the money to send him off to Vienna. After a preliminary expedition to Berlin in 1828, Chopin visited Vienna and made his performance debut there in 1829. A second concert confirmed his success, and on his return home he prepared himself for further achievements abroad by writing his *Piano Concerto No. 2 in F Minor* (1829) and his *Piano Concerto No. 1 in E Minor* (1830), as well as other works for piano and orchestra designed to exploit his brilliantly original piano style. His first études were also written at this time (1829–32) to enable him and others to master the technical difficulties in his new conception of piano playing.

In March and October 1830 he presented his new works to the Warsaw public and then left Poland with the intention of visiting Germany and Italy for further study. He had gone no farther than Vienna when news reached him of the Polish revolt against Russian rule; this event, added to the disturbed state of Europe, caused him to remain profitlessly in Vienna until the following July, when he decided to make his way to Paris. Soon after his arrival in what was then the centre of European culture and a focal point of the Romantic movement, Chopin realized that he had found the exact milieu in which his genius could flourish. He quickly established ties with many Polish émigrés and with a younger generation of composers, including Franz Liszt, Hector Berlioz, Vincenzo Bellini, and Felix Mendelssohn. The circles to which Chopin's talents and distinction admitted him quickly acknowledged that they had found the artist whom the moment required, and after a brief period of uncertainty Chopin settled down to the main business of his life—teaching and composing. His high income from these sources set him free from the strain of concert giving, to which he had an innate repugnance.

Initially, there were problems, professional and financial. After his Paris concert debut in February 1832, Chopin realized that his extreme delicacy at the keyboard was not to everyone's taste in larger concert spaces. But an introduction to the wealthy Rothschild banking family later that year suddenly opened up new horizons. With his elegant manners, fastidious dress, and innate sensitivity, Chopin found himself a favourite in the great houses of Paris, both as a recitalist and as a teacher. His new piano works at this time included two startlingly poetic books of études (1829–36), the *Ballade in G Minor* (1831–35), the *Fantaisie-Impromptu,* and many smaller pieces, among them mazurkas and polonaises inspired by Chopin's strong nationalist feeling.

Chopin's youthful love affairs with Constantia Gladkowska in Warsaw (1830) and Maria Wodzińska in Dresden (1835–36) had come to nothing, though he actually became engaged to the latter. In 1836 he met for the first time the free-living novelist Aurore Dudevant, better known as George Sand. She fell in love with him and offered to become his mistress. Chopin eventually succumbed to her persuasions, and their liaison began in the summer of 1838. That autumn he set off with her and her children, Maurice and Solange, to winter on the island of Majorca. They rented a simple villa and were idyllically happy until the sunny weather broke and Chopin became ill. When rumours of tuberculosis reached the villa owner, they were ordered out and could only find accommodations in a monastery in the remote village of Valldemosa.

The cold and damp, malnutrition, peasant

suspiciousness of their strange ménage, and the lack of a suitable concert piano hindered Chopin's artistic production and further weakened his precarious physical health. Indeed, the privations that Chopin endured brought on the slow decline in his health that ended with his death from tuberculosis 10 years later. Sand realized that only immediate departure would save his life. They arrived at Marseille in early March 1839, and, thanks to a skilled physician, Chopin was sufficiently recovered after just under three months for them to start planning a return to Paris. The summer of 1839 they spent at Nohant, Sand's country house about 180 miles (290 km) south of Paris. This period following the return from Majorca was to be the happiest and most productive of Chopin's life, and the long summers spent at Nohant bore fruit in a succession of masterpieces. As a regular source of income, he again turned to private teaching. His method permitted great flexibility of the wrist and arm and daringly unconventional fingering in the interests of greater agility, with the production of beautiful, singing tone a prime requisite at nearly all times. There was also a growing demand for his new works, and, since he had become increasingly shrewd in his dealings with publishers, he could afford to live elegantly.

Health was a recurrent worry, and every summer Sand took him to Nohant for fresh air and relaxation. Close friends, such as Pauline Viardot and the painter Eugène Delacroix, were often invited, too. Chopin produced much of his most searching music at Nohant, not only miniatures but also extended works, such as the *Fantaisie in F Minor* (composed 1840–41), the *Barcarolle* (1845–46), the *Polonaise-Fantaisie* (1845–46), the *Ballade in A-flat Major* (1840–41) and *Ballade in F Minor* (1842), and the *Sonata in B Minor* (1844). Here, in the country, he found the peace and time to indulge an ingrained quest for perfection. He seemed particularly anxious to develop his ideas into longer and more complex arguments, and he even sent to Paris for treatises by musicologists to strengthen his counterpoint. His harmonic vocabulary at this period also grew much more daring, though never at the cost of sensuous beauty. He valued that quality throughout life as much as he abhorred descriptive titles or any hint of an underlying "program."

Family dissension arising from the marriage of Sand's daughter Solange caused Chopin's own relationship with Sand to become strained, and he grew increasingly moody and petulant. By 1848 the rift between him and Sand was complete, and pride prevented either from effecting the reconciliation they both actually desired. Thereafter Chopin seems to have given up his struggle with ill-health.

Broken in spirit and depressed by the revolution that had broken out in Paris in February 1848, Chopin accepted an invitation to visit England and Scotland. His reception in London was enthusiastic, and he struggled through an exhausting round of lessons and appearances at fashionable parties. Chopin lacked the strength to sustain this socializing, however, and he was also unable to compose. By now his health was deteriorating rapidly, and he made his last public appearance on a concert platform at the Guildhall in London on Nov. 16, 1848, when, in a final patriotic gesture, he played for the benefit of Polish refugees. He returned to Paris, where he died the following year; he was buried at the cemetery of Père Lachaise.

Works. As a pianist Chopin was unique in acquiring a reputation of the highest order on the basis of a minimum of public appearances—few more than 30 in the course of his lifetime. His original and uninhibited approach to the keyboard allowed him to exploit all the resources of the piano of his day. He was inexhaustible in discovering colourful new passage work and technical figures; he understood as no one before him the true nature of the piano as an expressive instrument, and he had the secret of writing music that is bound up with the instrument for which it was conceived and which cannot be imagined apart from it. His innovations in fingering, his use of the pedals, and his general treatment of the keyboard form a milestone in the history of the piano, and his works set a standard that is recognized as unsurpassable.

Chopin's works for solo piano include about 55 mazurkas; 16 polonaises; 26 preludes; 27 études; 21 nocturnes; 20 waltzes; 3 sonatas; 4 ballades; 4 scherzos; 4 impromptus; and many individual pieces, such as the *Barcarolle,* Opus 60; the *Fantasia,* Opus 49; and the *Berceuse,* Opus 57; as well as 17 Polish songs.

As a composer Chopin has acquired increased stature after a period in the late 19th century when his work was judged by academic standards that were in fact inapplicable to its individual character. In keyboard style, harmony, and form, he was innovative according to the demands of each specific compositional situation. He had the rare gift of a very personal melody, expressive of heartfelt emotion, and his music is penetrated by a poetic feeling that has an almost universal appeal. Although "romantic" in its essence, Chopin's music has none of the expected trappings of Romanticism—there is a classic purity and discretion in everything he wrote and not a sign of Romantic exhibitionism. He found within himself and in the tragic story of Poland the chief sources of his inspiration. The theme of Poland's glories and sufferings was constantly before him, and he transmuted the primitive rhythms and melodies of his youth into enduring art forms. At the same time, he subtly differentiated, for example, the intimate poetic inspiration of the mazurka from the more outward-looking, ceremonial aspect of the polonaise, which in works like the *Polonaise-Fantaisie* he expanded to the proportions of symphonic poems for the piano. The waltz, meanwhile, offered him a courtly dance medium on a smaller scale, and he responded not by expanding it but by bringing it to unprecedented levels of polish and grace. From the great Italian singers of the age he learned the art of "singing" on the piano, and his nocturnes reveal the perfection of his cantabile style and delicate charm of ornamentation. His ballades and scherzos, on the other hand, have a dramatic turbulence and passion, as well as a symphonic scope, which effectively dispel the notion that Chopin was merely a drawing-room composer.

Chopin's small output was mostly confined to solo piano; yet within its limited framework its range is seen to be vast, comprehending every variety of intensely experienced emotion. Though Chopin squandered too much time on the drawing-room Parisian aristocracy and disappointed critics who valued artistic worth only in terms of large-scale achievement, he was immediately recognized at his true worth by more discerning contemporaries, who were astounded by the startling originality he reconciled with exquisite craftsmanship. Present-day evaluation places him among the immortals of music by reason of his insight into the secret places of the heart and because of his awareness of the magical new sonorities to be drawn from the piano. (A.Hy./Ed.)

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Chopin, Kate, *née* KATHERINE O'FLAHERTY (b. Feb. 8, 1851, St. Louis, Mo., U.S.—d. Aug. 22, 1904, St. Louis), American novelist and short-story writer known as an interpreter of New Orleans culture. There was a revival of interest in Chopin in the late 20th century because her concerns about the freedom of women foreshadowed later feminist literary themes.

Chopin lived in Louisiana after her marriage (1870) to Oscar Chopin; after his death she began to write about the Creole and Cajun people she had observed in the South. Her first novel, *At Fault* (1890), was undistinguished, but she was later acclaimed for her finely crafted short stories, of which she wrote more than 100. Two of these stories, "Désirée's Baby" and "Madame Celestin's Divorce," continue to be widely anthologized.

In 1899 Chopin published *The Awakening,* a realistic novel about the sexual and artistic awakening of a young wife and mother who abandons her family and eventually commits suicide. This work was roundly condemned in its time because of its sexual frankness and went out of print for more than 50 years. It was rediscovered in the 1950s and has received critical acclaim for the beauty of its writing and for its modern sensibility.

Chopin's work has been compared to that of George Washington Cable, a local-colourist who took a more literary approach to character treatment. Chopin, in contrast, was more of a realist, using "local colour" to depict the interactions of men and women.

Her stories were collected in *Bayou Folk* (1894) and *A Night in Acadie* (1897).

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Chopper chopping-tool industry, certain stone tool traditions of Asia, probably of later Pleistocene age, characterized by roughly worked pebble chopper (*q.v.*) tools. These traditions include the Choukoutienian industry of China (associated with *Homo erectus*), the Patjitanian industry of Java, the Soan industry of India, and the Anyathian industry of Myanmar (Burma).

Stone with good fracture qualities—such as flint, jasper, and chert—was not always as readily available in Asia as it was elsewhere in the world. Asian populations, therefore, depended on coarse-grained quartz, volcanic tuff, and petrified wood, none of which lends itself to fine tool fabrication. The lack of good material may explain why stone toolmaking did not evolve in Asia. Choppers and chopping tools were still being made, for example, by Solo man of Asia, while his European contemporary, Neanderthal man, was able to manufacture hand axes, borers, and knives, as well as choppers.

The characteristic tools of the Chopper chopping-tool industry were the chopper, with a single straight or curved cutting edge flaked from a pebble or from a chunk of stone; the chopping tool, with a bifacial cutting edge flaked, again, from a pebble or chunk of stone; and the hand adze, shaped from a block of stone, with a rounded butt and a single-bevel straight or curved cutting edge. Stone scrapers, cleavers, and points were also fashioned, and some tools were made of bone.

chopsticks (from Chinese *kuai-tzu,* "quick ones," by way of Pidgin *chop,* "quick"), eating utensils, consisting of a pair of slender sticks held between the thumb and fingers of one hand, that predominate in much of East Asia and are used in conjunction with East Asian-style cuisine worldwide.

Chopsticks of bamboo or wood, and subsequently of ivory and precious metals, originated in China as early as the Shang dynasty (*c.* 1766–*c.* 1122 BC) and from there spread throughout East Asia. In China, the substitution of chopsticks for knives at the table reflected the ascendancy of the scholar over the warrior as a cultural hero.

Modern mass-produced chopsticks are commonly made of unadorned wood, bamboo, or plastic, although exquisite lacquerwork, inlay, and engraving are still used in the decoration of finer examples. As a general rule, the chopsticks of China are longer and more blunt than those of Japan, which are usually tapered.

Choquette, Robert Guy (b. April 22, 1905, Manchester, N.H., U.S.), American-born French-Canadian writer whose work was regarded as revolutionary and who influenced an entire younger generation of poets.

Choquette moved to Montreal at the age of eight. His first collection of poetry, *A travers les vents* (1925; "Through the Winds"), won him a reputation based on his disregard of syntax and his freedom of expression. For this volume, Choquette received the Prix David in 1926; his collection of poetry *Metropolitan Museum* (1930) won it for him again in 1931. Other of his books of poetry included *Suite marine* (1953), the influential two-volume *Oeuvres poétiques* (1956; "Poetic Works"), and *Poèmes choisis* (1970; "Select Poems").

La Pension Leblanc (1928), Choquette's first published novel, provided a foundation on which future television and radio series were to be based. A group of recognizable characters from his novels *Le Curé de Village* (1936; "The Village Curate") and *Les Velder* (1941) peopled a radio series called "Le Curé de Village." Two other serials, "La Pension Velder" and "Métropole," followed. Choquette also brought out a collection of prose sketches, *Le Fabuliste La Fontaine à Montréal* (1935), *Language and Religion* (1975), and *Moi, Pétrouchka* (1980), and a collection of both prose and poetry entitled *Le Choix de Robert Choquette dans l'oeuvre de Robert Choquette* (1981).

Choquette was elected to the French-Canadian Academy and the Ronsard Academy (Paris), and he served as Canadian consul general to Bordeaux, France (1965–68), and Canadian ambassador to Argentina, Uruguay, and Paraguay (1968–70).

choragic monument, large, freestanding pedestal that formed the display base for an athletic or choral prize won at an ancient Greek festival. Although the only surviving example is the choragic Monument of Lysicrates, or Lamp of Diogenes, erected in Athens in 334 BC, literary evidence of their existence may be found in Virgil's *Aeneid*.

Erected in honour of victory at Dionysia, the Monument of Lysicrates has a 9.5-foot (2.9-metre) square foundation that is 13 feet (4 m) high and topped by a circular edifice 21 feet (6.4 m) high made of Pentelic marble. Upon this edifice rests a circular structure supported by six Corinthian columns, the latter being the earliest surviving examples of that order. The entablature of the monument supports a shallow dome, which, in turn, is the base of three scrolls intended to hold the tripod trophy (now missing). Although hollow, the interior of the monument was not intended for use. A frieze on the monument shows the Tyrrhenian pirates being turned into dolphins by the god Dionysius.

choragus, also spelled CHOREGUS, or CHORAGOS, plural CHORAGI, CHOREGI, or CHORAGOI, in ancient Greek theatre, any wealthy Athenian citizen who paid the costs of theatrical productions at festivals during the 4th and 5th centuries BC.

Since theatrical performances were civic ceremonies in ancient Greece, the state paid the actors' salaries. The additional expenses of production—including the salaries and training of the chorus, costumes for the chorus and flute players, and payment of the mutes or extras—were assigned to choragi, or producers, on a rotating basis.

Choragi were appointed to playwrights by lot in July, giving them time to prepare for the dithyrambic, tragic, and comic contests of the Lenaea festival in winter and the Great Dionysia festival in spring, both of which honoured the Greek god Dionysus. Since the spirit of these contests was highly competitive, a rich, helpful, and charitable choragus gave the playwright an advantage. If the play won a prize, however, it officially was awarded to the choragus.

In 406–405 BC, when the Peloponnesian War increased financial burdens, the duties of the choragus for tragedy and comedy were divided between two choragi. A century later the Athenian choragus was replaced by an agonothete, an annually elected producer provided with state funds, thereby transferring the burden of financing productions from the citizens to the state.

choral music, music sung by a choir with two or more voices assigned to each part. Choral music is necessarily polyphonal—*i.e.*, consisting of two or more autonomous vocal lines. It has a long history in European church music.

A brief treatment of choral music follows. For full treatment, *see* MACROPAEDIA: Musical Forms and Genres.

Although choirs existed in churches and cathedrals throughout Europe in the Middle Ages, their role was restricted to the unison singing of plainsong, or Gregorian chant. Beginning in the 9th and 10th centuries, the polyphonic development known as organum added a second vocal line to the plainsong, and writing for this solo second voice gradually became more elaborate. These two-part compositions were superseded in the 13th century by three- and four-part organa by Pérotin, a composer of the Notre-Dame school. Another Frenchman, Guillaume de Machaut, became in the mid-14th century the first composer to write single-handedly a polyphonic setting of the Ordinary of the mass. Masses became the main vehicle for choral composition for centuries thereafter.

The early masses of Machaut and others were intended for soloists, though they are often performed by large choirs today. Choral settings of the mass became the focal point of choral music in the 15th and 16th centuries, when Giovanni da Palestrina and many other composers wrote them. Instrumental accompaniments were added by Claudio Monteverdi and others in the 17th century. In the 18th century, the mass was partly supplanted in popularity by the oratorio, which is a large-scale composition on a sacred subject for solo voices, chorus, and orchestra, and by the cantata, which is basically a short oratorio that may utilize arias, recitatives, chorales, and purely orchestral passages in its structure. The most important such works are the approximately 200 cantatas composed by Johann Sebastian Bach and the *Messiah* (1741) and other oratorios written by George Frideric Handel. Franz Joseph Haydn wrote masses and such important oratorios as *The Creation* (1798) and *The Seasons* (1801). The Classical composer Wolfgang Amadeus Mozart wrote many masses, including the unfinished *Requiem* (1791), and Ludwig van Beethoven's *Missa Solemnis* (1823) is one of the great masterpieces of choral music. Such 19th-century composers as Franz Schubert, Felix Mendelssohn, Hector Berlioz, Johannes Brahms, and Anton Bruckner continued to write masses and oratorios. In the 20th century, Ralph Vaughan Williams, Benjamin Britten, and Igor Stravinsky were among the foremost composers of choral music, much of it secular in subject matter.

Apart from opera, a truly secular tradition of choral writing did not emerge until the 17th century, and even after that, the church and the opera tended to monopolize choral writing. But the spread of choral societies, or amateur choirs, throughout Europe in the 19th century stimulated the production of secular choral works. Amateur choral societies also began adapting secular polyphonic songs, such as the Italian madrigal, German lied, and French chanson, and assigned each solo vocal line to a group of singers. In this way the body of choral music, which was already extensive, has been expanded still further.

chorale, metrical hymn tune associated in common English usage with the Lutheran church in Germany. From early in the Reformation, chorales were to be sung by the congregation during the Protestant liturgy. Unison singing was the rule of the reformed churches, both in Germany and in other countries. Early polyphonic (multivoiced) versions may have been intended for a choir singing only the melody while the full version was played on the organ. In later polyphonic arrangements the melody shifted gradually to the treble line from its original position in the tenor.

The words of the Lutheran chorales were often Latin plainsong hymn texts translated into the vernacular. The melodies were often borrowed from secular song and therefore displayed great melodic and structural simplicity. Martin Luther's own versions were often more irregular than the polished versions that later predominated.

The earliest large collection of such melodies was the *Geystliches Gesangk-Buchleyn* (1524), edited by Johann Walther with a preface by Luther. From that time, the technique of chorale writing expanded and many collections were published. Luther's own compositions include "Ein' feste Burg" ("A Mighty Fortress") and "Vom Himmel hoch" ("From Heaven High"), of which he certainly wrote the words and almost certainly wrote or adapted the music.

Prominent in the development of the chorale in the 16th century were Michael Weisse, Philipp Nicolai, composer of the celebrated "Wachet auf!" ("Wake, Awake"), and Melchior Vulpius. Active in the 17th century were Johann Hermann Schein and Johann Crüger. Crüger edited the first editions of *Praxis Pietatis Melica,* a collection of tunes first published in 1644.

More complex chorale settings came from Johan Eccard and Michael Praetorius. Eccard's chorale settings are virtually brief motets, and Praetorius was one of the first systematic arrangers in polyphonic style of tunes from earlier sources (*Musae Sioniae,* 1610). For these and for later German hymnody, *see* hymn.

In the passions and cantatas of Johann Sebastian Bach, the chorale appears as a richly harmonized hymn tune in which the congregation is expected to join with the choir. Bach's chorales are strictly choral arrangements of well-known hymn tunes adorned with elaborate harmony; he never composed an original chorale.

In modern times the chorale is considered to be a musical setting, usually polyphonic, of a traditional religious text. The melody may be either a traditional tune, such as a hymn, or composed especially for the text. Alternatively, a chorale may set a traditional text in a traditional tune.

chorale prelude, musical genre most closely associated with organ music for Protestant churches and epitomized by the numerous examples composed by J.S. Bach, who built

upon a 17th-century tradition identified with the work of Dietrich Buxtehude and Johann Pachelbel, among others. Reflecting the long-standing convention of improvised introductions to Lutheran chorales or hymn tunes to be sung by the entire congregation, the chorale prelude retained improvisational characteristics even as a fixed compositional type. Typical examples feature the hymn tune as a cantus firmus broken down into its constituent phrases played in long note values and preceded, accompanied, and followed by contrapuntal manipulations of their salient motivic substances.

Generically, the term chorale prelude is often applied to compositions not genuinely associated with the chorale but preserving the genre's textural characteristics. The late 19th century witnessed a revival of the Lutheran chorale prelude with major works by Johannes Brahms (*e.g.,* Opus 122) and Max Reger.

Chorasmia (historic Asian region): *see* Khwārezm.

chord, in music, three or more single pitches heard simultaneously. Depending on the harmonic style, chords may be consonant, implying repose, or dissonant, implying subsequent resolution to and by another chord. In traditional Western harmony, chords are formed by superimpositions of intervals of a third. Thus, the basic triad results from the superimposition of two conjunct thirds encompassing the interval of a fifth; for example, e–g (a minor third) superimposed on c–e (a major third) yields the triad c–e–g. Superimposition of an additional third produces a seventh chord, for example, c–e–g–b or c–e–g–b♭ (c–b and c–b♭ are, respectively, major and minor seventhS); a further third expands the seventh chord to a ninth chord (c–e–g–b–d′). In Western art music of the late 19th century, seventh and ninth chords, serving as expressive reinforcements of basic harmonic functions, often replaced the triad altogether.

Chords of superimposed fourths, for example, c–f♯–b♭–e′–a′–d″, the "mystic chord" of the Russian composer Aleksandr Scriabin (1872–1915), first appeared in early 20th-century works. More recently, "tone clusters" of adjacent pitches (for example c–d–e–f♯) were introduced into music that eschewed the traditional harmonic approach in favour of purely melodic-rhythmic forces.

Broken chords (*i.e.,* chords broken up melodically into their intervallic components) have long furnished basic motivic materials for instrumental compositions, especially of the homophonic variety conceived in terms of the diatonic harmonic system that governed the late 18th and early 19th centuries, when triadic themes were favoured. Early in the 20th century, on the other hand, Arnold Schoenberg enhanced his *First Chamber Symphony,* Opus 9 (1906), with a melodic motto of four superimposed fourths.

chordate, any member of the phylum Chordata, which includes the most highly evolved animals, the vertebrates, as well as two other subphyla. Some classifications also include the phylum Hemichordata with the chordates.

A brief treatment of chordates follows. For full treatment, *see* MACROPAEDIA: Chordates.

All of the chordates possess certain features at some time in their life cycle, including a dorsal supporting rod called the notochord, pharyngeal apertures (gill slits), and a dorsal nerve cord. These features are present in the young of all chordates, but they are altered or absent in adults of some chordate groups. The chordates include the mammals, birds, reptiles, amphibians, fishes, and lampreys (subphylum Vertebrata); lancelets, or amphioxus (subphylum Cephalochordata); and the tunicates (subphylum Tunicata, or Urochordata). The tunicates and cephalochordates differ markedly from the vertebrates in lacking any kind of brain or skeleton, although tunicate larvae show some resemblance to vertebrate embryos. Cephalochordates superficially resemble fishes, but their heads are poorly differentiated from their bodies.

Chordate bodies consist essentially of a body wall encasing a gut, with a space between called the coelom. The body is usually long, with the right and left sides similar to each other (bilateral symmetry). It is supported by the notochord, which contains a substance resembling mucus. Also running along the back is a nerve cord that is slightly enlarged at the anterior end but that only develops into a true brain in vertebrates. The mouth and sense organs are concentrated in the anterior end, and the anus is at the base of the tail. Movement is achieved by the contraction of muscle tissues (myotomes) flanking the notochord. All of these characteristics are present in adult cephalochordates, larval tunicates, and embryonic vertebrates.

When hatched the tunicate larva possesses the basic chordate characteristics: long, bilaterally symmetrical body; notochord; neural cord; and myotomes. It also has a tail, a rudimentary eye, a mouth, gill slits, and a gut, but it does not have an anus, since it does not ingest food and pass waste. It retains this form for little more than a day before metamorphosing into either a sessile (attached) or a floating adult. The tail is resorbed, and the body develops a coat, or tunic (hence the name tunicate). Two apertures emerge from the tunic, one to admit water (and with it, food) into the body and another to pass water out. Suckers form on the anterior part of the body and are used to attach the animal to a surface. In the adult, the gill slits are the only remaining chordate features.

Members of the subphylum Cephalochordata are commonly called lancelets, or amphioxi. They rarely are longer than 5 to 6 cm (about 2 inches) and usually live on the sea bottom. The adult animal is sedentary, passing its time for the most part half-buried in sand or gravel. Water enters its body through the mouth and yields oxygen to the blood as the water passes through the gill slits. Food is extracted from the water and passed to the gut.

Vertebrates are able to attain large sizes owing to their internal skeleton, which is composed of bone or cartilage (or both) and a dorsal vertebral column that provides support and flexibility. Vertebrates also have a spinal cord. The vertebrate groups known as fishes retain gill slits, while the land-dwelling forms lose the gills during embryonic development and instead respire by lungs. Terrestrial vertebrates have developed much more complex hearts than the strictly marine forms, as well as more complex excretory systems. All vertebrates except the lampreys and hagfishes have movable jaws.

Reproduction among chordates is usually a sexual process that involves the fertilization of eggs, although tunicates can reproduce by asexual means. Most vertebrate eggs (those of mammals being the exception) have a high yolk content, which affects the rate and degree of cleavage, or cell division, in the embryo. In vertebrate embryos the development of the head is especially notable, along with the brain and the organs of sight, smell, and hearing.

Because of their soft bodies, the primitive chordates have left no fossils, making it difficult to determine their evolutionary history. It is believed, however, that the phyla Chordata, Hemichordata, Echinodermata, and Pogonophora have a common sessile ancestor. Among the chordates the tunicates revert to the sessile state at maturity, while the cephalochordates and vertebrates apparently are derived from forms that attained sexual maturity in the free-swimming state.

The vertebrates were able to swim into the relative safety of freshwater, where their eggs and larvae could develop in size. The amphibians developed from the fishes and in turn gave rise to the wholly terrestrial reptiles. From the reptiles came the birds and mammals, animals capable of regulating their body temperature, a capacity that led to an intensified activity and greater brain size.

The higher vertebrates include the classes Agnatha (lampreys and hagfishes), Chondrichthyes (sharks and rays), Osteichthyes (bony fishes), Placodermi (extinct fishes), Amphibia (newts, frogs, and toads), Reptilia (turtles, crocodiles, lizards, snakes, and many extinct forms, including dinosaurs), Aves (birds), and Mammalia (mammals).

chordophone, any of a class of musical instruments in which a stretched, vibrating string produces the initial sound. The five basic types are bows, harps, lutes, lyres, and zithers. The name chordophone replaces the term stringed instrument when a precise, acoustically based designation is required. *Compare* aerophone; electrophone; idiophone; membranophone.

chorea, neurological disorder characterized by irregular, involuntary, and purposeless movements of muscle groups in various parts of the body. The principal types of chorea are Sydenham's chorea (St. Vitus' dance) and Huntington's chorea.

Sydenham's chorea is usually associated with rheumatic fever and is sometimes called chorea minor, infectious chorea, or rheumatic chorea to distinguish it from other choreiform diseases. The name St. Vitus' dance derives from the late Middle Ages, when persons in the grip of the disorder attended the chapels of St. Vitus, who was believed to have curative powers.

In Sydenham's chorea the involuntary jerking movements are most obvious in the extremities and face but are also present in the trunk and may involve muscles of speech and swallowing. It is chiefly a disease of childhood, occurring most frequently between the ages of 5 and 15 years, and is more common in girls than in boys. It may occur in young adults and is an infrequent complication of pregnancy, when it is especially severe. Because more than 70 percent of cases of chorea are clinically associated with rheumatic fever, it may be considered a peculiar manifestation of that disease; it is estimated that 50 percent of children who have had rheumatic fever also develop chorea.

While emotional crises and anxiety may appear to be intimately related to the onset of Sydenham's chorea, they are actually a manifestation of the disease rather than a cause of it. Facial grimaces, tics, and habit spasms are frequently confused with chorea, but these repetitive movements are quite different from the uncoordinated, purposeless jerking movements of the disease. The latter, which are typical and recognizable, are usually preceded by or appear with evidence of irritability and emotional instability, chiefly episodes of crying initiated by trivial incidents.

The symptoms of chorea range in severity from mild to completely incapacitating. The inability to hold objects or to write properly and difficulty in walking are frequent. A vague deterioration in the ability to perform customary tasks is soon replaced by the gross twitching of muscle groups, most easily observed in the limbs. The movements are more marked on the limbs of one side of the body but are present on both.

While there is debate concerning the pathological changes in the central nervous system, there is considerable evidence that both the emotional manifestations and the typical movements are related to changes in the cerebral cortex. It is thought that the disease is caused by a malfunctioning of the neuronal circuits of the basal ganglia.

Attacks of Sydenham's chorea tend to be self-limited, although the duration is several weeks. Recurrence is frequent. Recovery is hastened by rest in bed in a pleasant, sympathetic environment; patients improve quickly in hospitals or convalescent homes. Sedation is helpful, and administration of tranquilizers may give striking though partial relief in severe cases, when the patient is helpless.

Huntington's chorea, or Huntington's disease, is a relatively rare, and invariably fatal, hereditary disease. The symptoms usually appear between ages 35 and 50 and worsen over time. They begin with occasional jerking or writhing movements or what appear to be minor problems with coordination. These choreiform movements worsen over the next few years and progress to random, uncontrollable, and often violent twitchings and jerks that merge with a person's more purposeful movements. Symptoms of mental deterioration may appear at some point, with apathy, lassitude, irritability, restlessness, or moodiness progressing to memory loss, dementia, manic depression, or schizophrenic symptoms. The choreiform muscular spasms, which are absent only during sleep, eventually become totally incapacitating. Death usually occurs 10 to 20 years after the appearance of the first symptoms. There is no effective therapy, though the choreiform movements may be partially and temporarily suppressed by phenothiazines or other antipsychotic drugs.

The symptoms are caused by the gradual degeneration of neurons in the basal ganglia, a pair of nerve clusters deep within the brain that help control movement. The disease itself is passed on as an autosomal dominant trait, and the child of someone afflicted with it has a 50-percent chance of developing it. In 1983 a genetic test for detecting the disease was developed for use in research. In 1993 researchers determined that Huntington's chorea arises from an inherited mutation that produces extra copies of a gene sequence on chromosome 4; the resulting disruption of protein manufacture is apparently responsible for the death of nerve cells in the basal ganglia.

Senile chorea is a progressive disease caused by vascular lesions. Onset usually occurs late in life. The muscular symptoms somewhat resemble those of Sydenham's chorea, and there may be a severe personality disturbance.

chorea, also called HYPERKINESIA, in dogs, a disorder in which muscle spasms are prominent. It is usually associated with distemper, encephalitis, or other diseases and often appears during the convalescent period. Jaw spasms may interfere with eating, and extreme exhaustion follows severe episodes in which the dog cannot sleep. Treatment involves good nutrition, vitamin supplements, and sedation. Antispasmodic drugs and muscle relaxants are used to relieve the symptoms.

choregus (Greek theatre): *see* choragus.

choreography, the art of creating and arranging dances. The word derives from the Greek for "dance" and for "write." In the 17th and 18th centuries, it did indeed mean the written record of dances. In the 19th and 20th centuries, however, the meaning shifted, inaccurately but universally, while the written record came to be known as dance notation (*q.v.*).

A brief treatment of choreography follows. For full treatment, *see* MACROPAEDIA: Dance, The Art of; Dance, The History of Western.

The composition of dance is creative in the same way in which the composition of music is. The notation of dance, however, is a work of analysis and reporting, performed generally by people other than the choreographer, in language or signs that may well not be understood by the creator.

During the Renaissance, dance masters in Italy, such as Domenico da Piacenza, taught social dances at court and probably began to invent new ones or arrange variants of known dances, thus combining a creative function with their educational ones. Staged ballet employed the same steps and movements as social dance and differed from it principally in floor arrangement and visual projection.

In the 16th century, dance masters at the French court so organized the floor patterns and theatrical and artistic contexts of their social dances as to initiate a choreographic form, the *ballet de cour*. In the two centuries that followed, the gap between social dance and theatrical dance widened until ballet in the 19th century achieved a basically independent vocabulary.

The ballet master of this era, the choreographer, was an arranger of dance as a theatrical art. The giant of late 18th-century choreographic art was Jean-Georges Noverre, whose work and writings made the dramatic ballet, or ballet d'action, celebrated. In this, ballet incorporated mime as well as academic dances, giving expression to the dance by narrative and histrionic context. After Noverre and his contemporary Gasparo Angiolini, others developed this trend in various ways—especially Jean Dauberval in the realistic depiction of contemporary country folk, Charles Didelot in moving toward Romantic stage illusion and fantasy, and Salvatore Viganò in the dramatic use of the ensemble (*choreodramma*) and naturalness of tragic gesture.

The choreographers of the Romantic movement employed ballet, as codified by such masters as Carlo Blasis, chiefly in the ballet d'action theatrical forms of Noverre's day or in opera divertissements (balletic interludes). The ballerina, her role heightened by the newly invented pointework (position of balance on extreme tip of toe), and the female corps de ballet both acquired new prominence. The choreographers who best developed the art of theatrical dance narrative were August Bournonville in Copenhagen; Jules Perrot, particularly in London and St. Petersburg; and Marius Petipa, who in St. Petersburg brought the spectacular classical ballet d'action to its peak in such works as *The Sleeping Beauty*, in which extended and complex suites of classical dance brought poetic and metaphorical expression to the plot.

Early modern dance in the United States introduced new elements of movement and expression; and in ballet the work of Michel Fokine emphasized more naturalistic styles and a more potent theatrical image than had Petipa's ballet classicism. Since then, choreographic forms have varied between the poles of representation and abstraction.

Dance notation in the 20th century came to be concerned with basic movement as well as formal dance and was assisted by the invention of new systems of abstract symbols—those of Rudolf von Laban and Rudolf Benesh being the most influential. Labanotation was the first to indicate duration, fluency, or intensity of movement. Today, these systems and others continue to evolve rapidly, amplified by film and videotape.

Choreography evolved no less rapidly. Methods of composition vary radically—some choreographers using their dancers' improvisations as raw material, others devising every movement prior to rehearsal. Merce Cunningham radically changed the context for choreography in his attitude to music and decor as coincidental (rather than collaborative or supportive) to dance, in his employment of chance methods in dance composition and organization, and in his use of nontheatrical performance space. He, George Balanchine, and Sir Frederick Ashton became the leading exponents of classical or abstract dance; but the latter two—like Martha Graham, Leonide Massine, Jerome Robbins, and others—also produced major representational works of choreography. The only absolute rules in choreography today are that it should impose order upon dance beyond the level of pure improvisation and that it should shape dance in the three dimensions of space and the fourth dimension of time, as well as according to the potential of the human body.

chorion, also called SEROSA, in reptiles, birds, and mammals, the outermost membrane around the embryo. It develops from an outer fold on the surface of the yolk sac. In insects the chorion is the outer shell of the insect egg.

In vertebrates, the chorion is covered with ectoderm lined with mesoderm (both are germ layers) and is separated from other embryonic membranes by an extraembryonic body cavity, the coelom. In reptiles and birds it fuses with the allantois. In direct contact with the eggshell of reptiles and birds, this chorioallantoic membrane absorbs oxygen through the porous shell from the atmosphere for nourishment of the embryo; it also discharges waste carbon dioxide through the shell.

In mammals (except marsupials), the chorion develops a rich supply of blood vessels and forms an intimate association with the endometrium (lining) of the female's uterus. Chorion and endometrium together form the placenta, which is the embryo's principal organ of respiration, nutrition, and excretion.

Chorley, district and borough, county of Lancashire, England. It lies on the northwest periphery of the Greater Manchester metropolitan area.

The west of the borough is part of the rich agricultural Lancashire Plain, and in the east the land rises to the Pennine moorlands. Cotton weaving and calico printing are still the chief industries, and machinery for the mills has been manufactured locally since 1866. Other industries include motor engineering (British Leyland), paint manufacturing, and rubber. The town of Chorley and surrounding parishes are within the designated new town of Central Lancashire, which aims to enhance the local environment, especially by improving housing and transport. Astley Hall, an Elizabethan mansion set in parkland, was presented to the borough as a World War I memorial. Chorley was incorporated in 1881. Area 78 square miles (203 square km). Pop. (1984 est.) town, 35,104; (1991 prelim.) district, 96,500.

Chorog (Tajikistan): *see* Khorog.

Choromański, Michał (b. June 22, 1904, Yelizavetgrad, Ukraine, Russian Empire [now Kirovograd, Ukraine]—d. May 24, 1972, Warsaw, Pol.), Polish novelist and playwright.

Although born of Polish parents, Choromański was educated in the Soviet Union, and when he returned to Poland in 1924, he began his literary activity as a translator of the work of Polish poets into Russian. From 1938 to 1958 he lived primarily in Argentina and Canada.

His first success as a Polish novelist was *Zazdrość i medycyna* (1932; *Jealousy and Medicine*), which used experimental methods of narrative sequence and was remarkable for its clinical analysis of the jealousy and eroticism experienced by the participants in a love triangle. Another Choromański psychological study was his collection of essays and short stories entitled *Kobieta i mężczyzna* (1959; "Female and Male"). Choromański's tales show his strong interest in describing such psychopathological states as nymphomania and narcotic euphoria, which he treats in a macabre and ironic fashion. Later works include *Schodami w górę, schodami w dół* (1967; "Upstairs, Downstairs"), *W rzecz wstąpić* (1968; "To Get to the Heart of the Matter"), and *Słowacki wysp tropikalnych* (1969; "Słowacki of the Tropical Islands").

Chorotega, the most powerful American Indian tribe of northwest Costa Rica at the time of the Spanish conquest. They spoke Mangue, a language of Oto-Manguean stock, and had probably migrated from a homeland in Chiapas many generations prior to the conquest, driving the aboriginal inhabitants out of their new territory.

The Chorotega were corn farmers, had markets and a semidemocratic social structure in which chiefs were elected, and carried on frequent warfare with neighbouring peoples. They wore padded cotton armour and fought with bow and arrow and a wooden sword set with small flint knives. Religious festivals featured the South American custom of the ritual drinking bout; however, Mexican traits such as human sacrifice and self-mutilation of the ears, tongue, and genitals were also present. A pantheon of gods was worshiped in specially constructed temples. Chorotegan culture and language disappeared during the colonial period.

Chorrillos, city and district, Peru, located in the southern portion of the Lima–Callao metropolitan area. Founded as a village beach resort in 1824, Chorrillos became a town in 1856 and a city in 1901. In 1881, during the War of the Pacific, it was sacked and burned by Chilean forces, and it also suffered heavy damage in a 1940 earthquake. Chorrillos is now a middle-income residential area and contains two of Lima's most popular public beaches (Agua Dulce and La Herradura) as well as private clubs. The national military school is in Chorrillos, and on a hill just to the south of the city stands Peru's monument to its unknown soldier. Pop. (1972 prelim.) city, 57,022; (1981) district, 141,881.

Chortí, Mayan Indians of eastern Guatemala and Honduras and formerly of adjoining parts of El Salvador. The Chortí are linguistically related to the Chol and Chontal (*qq.v.*) of Chiapas, Oaxaca, and Tabasco in southeastern Mexico. Culturally, however, the Chortí are more similar to their neighbours on the west, the Pocomam. They live in an uneven terrain varying from lowlands to mountains; climate is warm and wet in the lowlands, cool to cold in the highlands.

The Chortí are agriculturalists and small-scale merchants. Individual Chortí villages specialize in a crop or craft product, which they trade or sell to other Chortí villages to provide necessities. Corn (maize), fruits and vegetables, sugarcane, coffee and tobacco, and beans are among village agricultural specializations. Baskets, hats, woven mats, tanned leather, wood products and carpentry, pottery, charcoal, leather goods, soap, indigo dye, and processed sugarcane are among the goods and skills traded. Tortillas and beans are dietary staples.

Several sleeping houses, a kitchen, and outbuildings make up the typical household among the Chortí. Their buildings are constructed of leaves, poles, or thatch on a pole framework. Weaving and pottery making are practiced at the household level as well as at the village industrial level. Their clothing is semitraditional; women wear handwoven skirts and blouses and men wear white cotton shirts and pants.

Households made up of eight or nine related families are the rule among the Chortí; the father of the family group acts as head of household. Ritual kinship bonds are made at the baptism of children. Their religion is basically Roman Catholic, and is centred on the veneration of patron saints. The Catholic laymen's society (*cofradía*) arranges fiestas and has care of the village's patron saint. Various native gods and spirits are acknowledged and propitiated.

chorus, in drama and music, those who perform vocally in a group as opposed to those who perform singly. The chorus in Classical Greek drama was a group of actors who described and commented upon the main action of a play with song, dance, and recitation. Greek tragedy had its beginnings in choral performances, in which a group of 50 men danced and sang dithyrambs—lyric hymns in praise of the god Dionysus. In the middle of the 6th century BC, the poet Thespis reputedly became the first true actor when he engaged in dialogue with the chorus leader. Choral performances continued to dominate the early plays until the time of Aeschylus (5th century BC), who added a second actor and reduced the chorus from 50 to 12 performers. Sophocles, who added a third actor, increased the chorus to 15 but reduced it to a mainly commentarial role in most of his plays. The chorus in Greek comedy numbered 24, and its function was displaced eventually by interspersed songs. The distinction between the passivity of the chorus and the activity of the actors is central to the artistry of the Greek tragedies. While the tragic protagonists act out their defiance of the limits subscribed by the gods for man, the chorus expresses the fears, hopes, and judgment of the polity, the average citizens. Their judgment is the verdict of history.

As the importance of the actors increased, the choral odes became fewer in number and tended to have less importance in the plot, until at last they became mere decorative interludes separating the acts. During the Renaissance the role of the chorus was revised. In the drama of Elizabethan England, for instance, the name chorus designated a single person, often the speaker of the prologue and epilogue, as in Christopher Marlowe's *Doctor Faustus*.

The use of the group chorus has been revived in a number of modern plays, such as Eugene O'Neill's *Mourning Becomes Electra* (1931) and T.S. Eliot's *Murder in the Cathedral* (1935).

In music, chorus refers to the organized body of singers in opera, oratorio, cantata, and church music; to compositions sung by such bodies; to the refrain of a song, sung by a group of singers, between verses for solo voice; and, as a medieval Latin term, to the crwth (the bowed lyre of medieval Wales) and to the bagpipe. (*See* choir.)

In musicals, the chorus, a group of players whose song and dance routines usually reflect and enhance the development of the plot, became increasingly more prominent during the 20th century. During the late Victorian era, musical comedy was characterized by thin plot, characters, and setting, the main attraction being the song and dance routines, comedy, and a line of scantily clad chorus girls. Their performances provided an extravagant bonus at the beginnings and ends of songs or special dance numbers, and they were considered the flashy sex symbols of the day. As musicals developed, however, more attention was given to integrating their various elements. In the mid-1920s, song and dance numbers began to stem more naturally from the plot, and the chorus danced more than it sang. The dancing itself soon developed from the lines of synchronized leg kicking of the early 1900s into highly sophisticated ballet and modern dance.

chorus (musical instrument): *see* crwth.

chorus frog, also called SWAMP TREE FROG, or SWAMP CRICKET FROG (*Pseudacris*), any of about seven species of tree frogs belonging to the family Hylidae. Chorus frogs are found from Canada to the southern United States. They are able to climb into low shrubbery and other vegetation but are not as adept at climbing as are most other hylids.

Chorus frogs typically have a trilling call and



Mountain chorus frog (*Pseudacris*)

a light streak on the upper lip. Maximum length is about 2.5 to 3 centimetres (1 to 1 1/5 inches).

Chorzów, city in the centre of the Zagłębie Górnośląskie (Upper Silesian Basin) agglomeration in Katowice *województwo* (province), southwestern Poland. It existed as early as 1136, fell under control of several central European powers, and in 1790 became one of Śląsk's (Silesia's) first coal-mining centres. In 1864 it was granted municipal rights. In 1934 old Chorzów combined with four neighbouring villages as one community. The city is located on the Kraków–Wrocław rail line and contains the Kościuszko Iron and Steel Works. Founded in 1802, the Kościuszko Works is the largest industrial concern in Śląsk, and concentrates on mining and metallurgical works. Chorzów was once mainly German-speaking, but the expulsion of these citizens and the immigration of Poles left the population wholly Polish-speaking soon after 1945. The city contains a historical and ethnographic museum. Pop. (1984 est.) 145,100.

chosen people, the Jewish people, as expressed in the idea that they have been chosen by God as his special people. The term implies that the Jewish people have been chosen by God to worship only him and to fulfill the mission of proclaiming his truth among all the nations of the world. This idea is a recurring theme in Jewish liturgy and is expressed in many passages of Scripture, as for example: "For you are a people holy to the Lord your God, and the Lord has chosen you to be a people of his own possession, out of all the nations that are on the face of the earth" (Deut. 14:2). The term chosen people is a free translation of the biblical terms *'am segullah* ("treasure people") and *'am nahallah* ("heritage people").

The idea of the chosen people has had a profound and lasting effect on the Jews because it imparted a special significance to their relationship with God. It implied a covenant between God and the people of Israel whereby Israel was to be faithful to God and obey his commandments, and God in turn was to protect and bless his faithful people. Being chosen brought to Israel not more privileges but, rather, special obligations to carry out the will of God: "Obey my voice, and I will be your God, and you shall be my people; and walk in all the way that I command you, that it may be well with you" (Jer. 7:23). Being God's chosen people carried with it greater spiritual responsibilities and implied more demanding standards and the necessity to develop a spiritual vigour worthy of those whom God had selected to preserve and transmit his revelation to all the world.

The Old Testament contains two variant traditions as to when God selected Israel to be his chosen people; some passages imply the covenant was made when God led them out of Egypt, whereas others state that God had

already chosen Israel at the time of Abraham and the other patriarchs.

Critical analysis of the Old Testament has revealed a long and complex evolution of this doctrine in the history of ancient Israel. The notion evidently originated in the basic concept of Israel's early nationalistic religion that Yahweh was Israel's one and only national God and that in turn Israel was God's people and his alone. But the new concepts of world unity and of God as a universal deity that later arose in Israel during the 8th century BC conflicted with this, since God as the deity of Israel alone was obviously contradictory to the new conception of him as the creator of the universe and the God of all humanity.

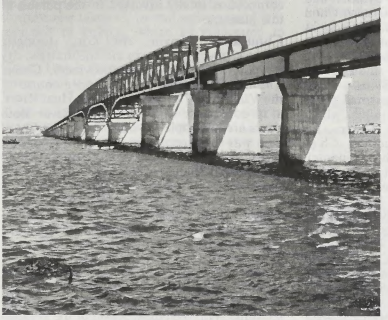
In the following centuries a slow and gradual harmonization of these two conflicting principles occurred, beginning with the prophet Amos and continuing through the period of the Babylonian Exile until the chosen-people doctrine emerged from the synthesis in its fullest form in the utterances of the prophet Deutero-Isaiah. The Exilic period gave rise to the belief (as stated by Jeremiah) that it was Yahweh's avowed purpose to eventually restore Israel to national independence and that all other nations were doomed to destruction for not recognizing Yahweh as God. After this had happened (as stated by Ezekiel), a renewed Israel purged of its sins would be restored to its homeland and would exist thereafter as the supreme nation on earth. Near the end of the Babylonian Exile, Deutero-Isaiah brought the doctrine to the climax of its evolution. This prophet emphatically denied the existence of all gods except Yahweh. He asserted that the events of history and the destinies of all nations were shaped toward the fulfillment of God's purpose and that this purpose was to ultimately unite all humanity as one people in their acknowledgment of him as God. Israel was to be God's instrument to accomplish this great revelation and would serve as the messenger and witness of God's reality and law to all the other nations of the earth. The people of Israel would exemplify and teach God's statutes to the rest of humanity and would thus help bring the entire human race to salvation. Israel would be the saviour of humanity and the national embodiment of the messiah, even if this meant suffering for Israel in the performance of its divinely appointed mission. In this way the Jewish people's perilous historical situation was inextricably linked to their sense of religious mission and spiritual destiny, and the concept of the chosen people came to form perhaps the strongest link in the Jewish group identity.

After Deutero-Isaiah the idea of the chosen people underwent little change, all-sufficient as it already was in reconciling Jewish nationalism with belief in a universal deity. The eternal nature of the Jewish people's covenant with God formed the bulwark of the rabbinic community's response to the new religion of Christianity, which claimed that its believers were now the elect of God and constituted the true Israel. Because Jews believed that the Jewish people's covenant with God was for all time, Christianity's challenge was bound to appear obviously invalid to Jews. Similarly, the Jews interpreted their sufferings upon the loss of their homeland and throughout all the peregrinations of the Diaspora as both a consequence and a partial fulfillment of the covenant. They believed their dispersion and persecution to be in part due to their sinfulness and failure to keep God's commands, and they viewed their sufferings as manifestations of his love, for through faithfully enduring God's chastisement they would eventually regain his favour. The Jews interpreted their very persecution as the sign that God had indeed chosen them to carry out his purpose.

Modern Judaism has toned down the historic exaltation of the Jewish people above others in the liturgy but has retained the concept of the chosen people, stressing the prophetic idea of Judaism's world mission. The concept that the Jewish people are a "consecrated brotherhood" destined to be purified by suffering toward the carrying out of some yet-unknown mission remains fundamental to Judaism in the 20th century. It has continued to reinforce Jewish morale, self-discipline, and religious devotion in the face of the Holocaust and other destructive impacts on world Jewry in the modern era.

Chosen Women, Quechua ACLLA CUNA, or AKLYA KONA ("Virgins of the Sun"), in Inca religion, women who lived in temple convents under a vow of chastity. Their duties included the preparation of ritual food, the maintenance of a sacred fire, and the weaving of garments for the emperor and for ritual use. They were under the supervision of matrons called Mama Cuna. At the time of the Spanish conquest in the early 16th century, the Virgins numbered several thousand and were governed by a high priestess, the Coya Pasca, a noblewoman who was believed to be the earthly consort of the sun god. The Virgins, not of noble birth, were village girls selected by officials for their beauty and talent; they were chosen at the age of 8 or 10 and shut up in the temples, which they were not allowed to leave for six or seven years. Of these girls, some became sacrificial victims, whereas others were sometimes made imperial concubines or the wives of nobles.

Chōshi, city, in Chiba Prefecture (*ken*), Honshu, Japan. Chōshi is situated at the mouth of the Tone-gawa (Tone River), near Inubō-saki (Cape Inubō). In the late 17th century it was a commercial port on the sea route between Edo (now Tokyo) and northern Japan. With the decline of sea transport and coastal fishing in the late 19th century, however, its main activities shifted to offshore fishing. Chōshi is now one of eastern Japan's main bases for deep-sea fishing, and it has a developing industry for processing marine products. The city is also well known in Japan for its production of soy sauce, an industry that dates back to the early 17th century. Chōshi serves as a tourist base for such scenic spots as Inubō-saki and Byobuga-ura (Byobuga Lake). Pop. (1980) 89,416.



Chōshi–Hasaki bridge spanning the Tone-gawa (Tone River) at Chōshi, Japan

Imperial Press—FPG/EB Inc.

Chōshun: *see* Miyagawa Chōshun.

Chosŏn DYNASTY (Korea): *see* Yi Dynasty.

Chosroes: *see under* Khosrow.

Chota Nāgpur, plateau in eastern India, in Bihār state. The plateau is composed of Precambrian rocks (more than 570,000,000 years old). Chota Nāgpur is the collective name for the Rānchi, Hazāribāgh, and Kodarma plateaus, which have an area of 25,293 sq mi (65,509 sq km). Its largest division is the Rānchi Plateau, which has an average elevation of 2,300 ft (700 m). The Chota Nāgpur plateau in its entirety lies between the basins of the Ganges and Son rivers to the north and the Mahānadi River to the south; through its centre, from west to east, runs the coal-bearing, faulted Dāmodar Valley. Numerous streams have dissected the uplands into a peneplain (an area reduced almost to a plain by erosion) with isolated hills.

Centuries of heavy cultivation have depleted the plateau of much of its natural vegetation, though some valuable forests still remain. Forest products, such as tussah silk and lac, are economically important. The Chota Nāgpur area has the most valuable concentration of mineral resources in India. The Dāmodar Valley has vast coal reserves, and Hazāribāgh district is one of the main sources of mica in the world. Other minerals are copper, limestone, bauxite, iron ore, asbestos, and apatite (useful in the manufacture of phosphate fertilizers). A huge thermal plant for generating electricity and a large steel mill are located at Bokāro. Railroads cross the plateau, connecting Calcutta to the southeast with Patna to the north, and also link other cities in the south and west.

Chou, Pinyin ZHOU, also called TI-HSIN, or TI-HSIN-SHOU (b. *c.* 1154 BC, China—d. 1111, China), last sovereign of the Shang, or Yin, dynasty (18th–12th century BC), who, according to legend, lost his empire because of his extreme debauchery. To please his concubine, Ta-chi, Chou is said to have built a lake of wine around which naked men and women were forced to chase one another. His cruelty was such that the nearby forests were strung with human flesh. Moreover, he provoked the resentment of the people by levying taxes to build, over the course of seven years, the elaborate Deer Tower Palace. It was supposed to have been 600 feet high and a half mile in circuit, with doors and chambers constructed of precious stones. When Wu Wang, founder of the succeeding Chou dynasty (1111–255

BC), overthrew the Shang, Chou set fire to his palace and committed suicide by leaping into the flames.

Chou DYNASTY, Pinyin ZHOU (traditionally, 1122–256/255 BC), dynasty that ruled ancient China for almost a millennium, establishing the distinctive political and cultural characteristics that were to be identified with China for the next 2,000 years. (The latest [proposed] date for the beginning of the Chou dynasty is 1027 BC; many scholars favour a date between the traditional date and 1027, roughly 1050 BC.)

The Chou coexisted with the Shang for many years, living just west of the Shang territory in what is now Shensi province. At various times they were a friendly tributary state to the Shang, alternatively warring with them. One of the Chou ruling house devised a plan to conquer the Shang, and a decisive battle was fought, probably in the mid-11th century. Before the whole Shang territory could be consolidated by the Chou, a rebellion broke out. The fighting went on for three years before the rebellion was put down, and finally the Chou solidified their reign over all of China. An array of feudal states was created within the empire to maintain order and the emperor's hold on the land. The original Chou capital had been located near present-day Sian on the Wei River above its confluence with the Huang Ho (Yellow River). To support the empire in the east and its loyal feudal rulers, an eastern capital was built at Lo-yang on the middle reaches of the Huang Ho.

It was some 200 years before the stability of this arrangement began to collapse with the increasing local interests of the 20 or more feudal lords, and in the 8th century BC the political system, which had essentially consisted of a network of extended family, began to weaken seriously. With the decline of the feudal king's power, de facto power fluctuated among various of the feudal chiefs as they were able to make themselves overlords.

The period before 771 BC is usually known as the Western Chou (Hsi Chou) dynasty, and that from 770 is known as the Eastern Chou (Tung Chou) dynasty. The Eastern Chou itself is often further subdivided into the Spring and Autumn (Ch'un-ch'iu) Period (770–476), when China consisted of many small squabbling states, and the Warring States (Chan-kuo) Period (475–221), when the small states consolidated into several larger units, which struggled with one another for mastery. Finally, one of these small kingdoms, Ch'in (from which derives modern China's name), succeeded in conquering the rest of the states and establishing the Ch'in dynasty (221–206 BC).

The visual arts of the Chou dynasty reflect the diversity of the feudal states of which it was composed and into which it eventually broke up. The arts of the early Chou dynasty were essentially a continuation of those of the Shang dynasty. This was especially true of works in bronze, in which there was an accelerated deterioration of the variety of shapes, the decoration, and the craftsmanship of casting. It was not until the Eastern Chou and the classical age of Confucius and Lao-tzu that unique local traditions became apparent. The range of applied decoration for the first time included pictorial subjects—for example, hunting scenes and chariots and horsemen.

As the empire was breaking up, arts and culture were flowering in the various component states, encouraged and stimulated by the very localized interests that fed the impulse toward independence of the empire. The remains of many of the feudal capitals during the Chou period have been uncovered and reveal great buildings with rammed-earth floors and walls; there were also two-story buildings and observation towers, and Lao-tzu mentions a nine-story tower.

Although (with the exception of a few works on silk) no painting survives from the Chou, written descriptions of paintings evidence their themes, including figures, portraits, and historic scenes. Lacquerware including gold and silver inlay became finely developed, and bronzework carried on from the great legacy of the Shang. Jade ornaments and objects were used lavishly for funerary and ritual purposes, and ornamental carvings reflected superb craftsmanship. Pottery continued Shang traditions and expanded greatly in variety of shapes and finishes during the Warring States Period.

During the Chou dynasty, China underwent quite dramatic changes. Iron, ox-drawn plows, crossbows, and horseback riding were all introduced; large-scale irrigation and water-control projects were also instituted for the first time, greatly increasing the crop yield of the North China Plain. The communication system was also greatly improved through the construction of new roads and canals. Trade was increased, towns grew up, coinage was developed, chopsticks came into use, and the Chinese writing system was created out of its primitive beginnings in the Shang period.

There was also a great philosophical flowering: the schools of Confucianism, Taoism, and legalism developed in this period. Literature flourished with Confucius and other great Chinese philosophers. Later generations of Chinese regularly studied the Chou dynasty for information regarding the origin of their civilization.

Chou En-lai (Chinese official): *see* Zhou En-lai.

Chou Fang, Pinyin ZHOU FANG (fl. late 8th century; b. Ch'ang-an, Shensi province, China), with the older Chang Hsüan, one of the two most famous painters of the T'ang dynasty (618–907). He specialized in painting court figures, especially ladies, which well describe the standards of taste for this period—a preference for the portly, elegantly garbed female caught frozen at a perfect moment of composure, totally involved in the pursuit of idle pleasure.

Chou-k'ou, Pinyin ZHOUKOU, formerly CHOU-K'OU-CHEN, Pinyin ZHOUKOUZHEN, city in eastern Honan *sheng* (province), China. The city is situated on the upper course of the Ying River, a tributary of the Huai River, at its confluence with the Chia-lu River. Both rivers are navigable for small craft, and Chou-k'ou was traditionally an important river port providing a transportation route southward to Anhwei and Kiangsu provinces and northward toward the city of Cheng-chou in Honan. It is also the focus of a dense road network covering east and southeast Honan. Chou-k'ou is an important regional market and collecting centre for the agricultural produce of a wide area.

Chou-k'ou was a flourishing city in Ming (1368–1644) and Ch'ing (1644–1911/12) times, with a walled city divided into three sections. With the construction of the Peking–Han-k'ou railway to the west and the Tientsin–P'u-k'ou line to the east, Chou-k'ou lost some of its importance to Lo-ho and Shang-ch'iu (also both in Honan province), but it, nevertheless, retains considerable local importance. Its industry includes the manufacture of coarse ceramic ware, as well as oil pressing. Pop. (1990) 146,288.

Chou Kuan: *see* Chou li.

Chou-kung, Pinyin ZHOUGONG, English DUKE OF CHOU (fl. 12th century BC, China), major political figure who solidified the power of the Chou dynasty (*c.* 11th century–255 BC) in its early years. Confucius esteemed Chou-kung as a paragon for later Chinese rulers and ministers.

Chou-kung was a brother of the powerful Wu-wang, the founder of the Chou dynasty, whose reign Chou-kung helped consolidate. Upon Wu's death, Chou-kung resisted the temptation to seize the throne and chose instead to serve as counselor to Wu's young son Ch'eng-wang, whom he then began to train in the art of governing. No sooner had Chou-kung assumed the role of regent, however, than a large rebellion broke out headed by two of his brothers and the heir of the defeated Shang dynasty. Chou-kung put down the rebellion and also launched a series of expeditions that brought much of the plain of the Huang Ho (Yellow River) under control of the Chou. He subsequently built a new subsidiary capital for the eastern part of the empire near the site of modern-day Lo-yang, in Honan province.

Chou-kung completely ended the Shang's domination over their former territories and established new administrative units in the regions he conquered, with trustworthy Chou officials to govern them. By the time he voluntarily gave up his position as regent after seven years of service, the Chou political and social system had been stabilized throughout the whole of North China. The administrative framework he helped establish served as a model for future Chinese dynasties. So much did Confucius admire the achievements of the long-dead Chou-kung that he once said: "I must have grown really feeble and old, since I have not for a long time dreamed of seeing Duke Chou." Chou-kung is often mistakenly credited for the writing of the *Chou li* ("Rites of Chou"), one of the traditional Chinese Classics.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Chou li (Chinese: "Rites of Chou"), Pinyin ZHOU LI, also called CHOU KUAN ("Offices of Chou"), one of three ancient ritual texts listed among the Nine, Twelve, and Thirteen Classics of Confucianism. Though tradition ascribed the text to Chou-kung (12th century BC), the work is considered by modern scholars to have been an anonymous utopian "constitution" written perhaps about 300 BC. For many centuries *Chou li* was joined to *Li chi* ("Collection of Rituals") and thus constituted one of the Six Classics (*Liu Ching*) of Chinese literature.

Chou li, which was influenced by legalist as well as Confucian ideas, discusses government in general under the title "Offices of Heaven," education under "Offices of Earth," social and religious institutions under "Offices of Spring," the army under "Offices of Summer," justice under "Office of Autumn," and population, territory, and agriculture under "Office of Winter." In the 12th century *Chou li* was given special recognition by being placed among the Six Classics as a substitute for the long-lost Classic of Music (*Yüeh Ching*).

Chou Lien-hsi (Chinese philosopher): *see* Chou Tun-i.

Chou-shan Archipelago, Chinese CHOU-SHAN CH'ÜN-TAO, Pinyin ZHOUSHAN QUNDAO, conventional CHUSAN ARCHIPELAGO, group of more than 400 islands off the northern coast of Chekiang *sheng* (province), China. The administrative centre of the archipelago is at Ting-hai, the main town on Chou-shan Island. Tai-shan Island lies north of Chou-shan Island.

The Chou-shan islands represent the submerged peaks of the northeasterly continuation of the mountain ranges of Chekiang and Fukien provinces, which were originally connected with the ranges of the southwestern

part of the Korean peninsula. The islands are steep and rugged, and many of them rise to heights of 800 ft (250 m) and more above sea level. The highest peak of Chou-shan Tao, the largest island of the group, rises to a height of 1,640 ft. Situated at the entrance to Hangchou Wan (Hangchow Bay), the islands also receive much of the silt load discharged from the mouth of the Yangtze River to the north; many of the islands are surrounded by mudbanks, which may eventually join some of them to the mainland.

The islands were first brought under regular Chinese administration in the 8th century, after which they were administered from Shanghai on the mainland. The islands were important because they provided excellent harbours for the flourishing trade between Japan, the Ryukyu Islands, and the Chekiang ports of Ning-po and Hang-chou.

The connection with Japan was not merely commercial in character. One of the small islands to the east of Chou-shan itself, P'u-t'o Shan, is an important Buddhist cult centre. Now covered with monasteries, cave temples, and shrines, it was a place of pilgrimage as early as the Sung dynasty (960–1279). It is believed to have been founded in 916, its early cult being connected with Kuan-yin, the goddess of mercy, an image of whom was brought there from the T'ien-t'ai Shan (T'ien-t'ai Mountains), a centre of Buddhism on the nearby mainland. A temple to the goddess was rebuilt and greatly enlarged in the 11th century and in 1131 became a major temple of Ch'an (Japanese Zen) Buddhism. Extensive sea traffic with Japan enabled the island centre to develop strong links with the major centres of Zen Buddhism in Japan; and when, in the late 13th century, the Mongol ruler Kublai Khan attempted his conquest of Japan, he employed monks from P'u-t'o Shan as intermediaries.

Under the Ming dynasty (1368–1644) the area was badly damaged by the raids of Japanese pirates, and the temples fell into disrepair. They were, however, restored in 1580. Under the Ch'ing dynasty (1644–1911) they were given Imperial recognition.

In the early 16th century the islands began to play a role in the European trade. In 1661 some of the monasteries were looted and pillaged by the Dutch. At the end of the 18th century, one of the demands presented by the British mission to Peking (1794) led by Lord Macartney was for the establishment of a British trading settlement in the islands. During the first Opium War (1839–42), fought between Great Britain and China, part of the archipelago was for a time occupied by the British.

With the growth of modern shipping and the emergence of Shanghai as a major port in the 19th century, the commercial importance of the archipelago decreased. It remains, however, one of the most important Chinese fishing grounds; an enormous fishing fleet—much of it now motorized—is organized in communes. The islands produce great quantities of fish for market and such marine products as kelp, algae, and edible seaweeds. The islands are also intensively cultivated, producing two crops of rice a year. There has been some reclamation of the mud flats in order to extend the area under cultivation.

Ting-hai, the chief town of the archipelago, is a walled city located some distance inland on Chou-shan Tao; it is connected to the coast by a short canal. Ting-hai became the administrative centre when the Ch'ing (Manchu) dynasty transferred the administration of the islands from the mainland in the 17th century.

Chou Shu-jen (Chinese writer): *see* Lu Hsün.

Chou Tso-jen, Pinyin ZHOU ZUO-REN (b. Jan. 16, 1885, Shao-hsing, Chekiang Province, China—d. November 1966, Peking?), essayist and literary scholar who translated fiction from many languages into vernacular Chinese.

Chou Tso-jen and his elder brother Chou Shu-jen (literary name Lu Hsün), a writer and literary critic, received a classical education, which was temporarily interrupted by financial difficulties in the family. Although Chou Tso-jen passed the examinations to qualify for an official career, he chose to devote himself to scholarship, learning English and studying Western intellectual history. In 1905 his first translation, of Edgar Allan Poe's "The Gold Bug," was published. The following year he and his brother went to Japan, where Chou Tso-jen studied Japanese language and literature, classical Greek literature, and English literature. He continued his translating and published a collection of European fiction, selecting works to stimulate the people of China with the examples of others who had rebelled under oppressive rule.

In 1912 Chou Tso-jen and his Japanese wife returned to China, where he taught at Peking University and began writing the essays that won him renown. One of his favourite topics was the need for language reform and the use of the vernacular; he also pleaded for what he termed a "humane" literature and praised the social realism of Western writers. His collections of translations—from Greek, Roman, Russian, and Japanese literature—continued to be published as his popularity as an authority on foreign literature increased.

During the 1920s Chou Tso-jen was active in several socially and politically oriented literary societies, which led to his being blacklisted, in 1926, for radical activities. This, combined with increasingly frequent attacks from leftists on his stand against propagandist literary doctrines, forced Chou Tso-jen out of public literary life in China, but he resumed his studies privately in Peking.

Because he remained in his home in northern China during the Sino-Japanese War (1937–45) and worked for a Japanese-sponsored bureau of education, he was tried as a collaborator by the National Government after the war ended and was condemned to death. His sentence was commuted to imprisonment, and he received a full pardon in 1949, permitting him to continue his research. After the Communist takeover in that same year, Chou returned to Peking, where he continued to write and translate.

Chou Tun-i, Pinyin ZHOU DUNYI, also called CHOU LIEN-HSI, Pinyin ZHOU LIANXI (b. 1017, Ying-tao, Tao-chou, China—d. 1073, Nan-k'ang-ch'ing), Chinese philosopher considered the most important precursor of Neo-Confucianism, the ethical and metaphysical system that became the officially sponsored mode of thought in China for almost 1,000 years. Ideas he derived from Neo-Taoism led him to a reformulation of Confucianism.

Chou was born into a highly influential official family and served in high governmental capacities throughout most of his life. He successively held the posts of magistrate, prefectural staff supervisor, professor of the directorate of education, and assistant prefect before resigning from office only a year before he died. He pursued his philosophical speculations while performing official duties.

In his reformulation of Confucianism, Chou drew from Taoist doctrines and elaborated on the *I Ching*, or *Book of Changes*. One of his two major works was the short treatise *T'ai-chi-t'u shuo* ("Explanation of the Diagram of the Great Ultimate"), in which he developed a metaphysics based on the idea that "the many are [ultimately] one, and the one is actually differentiated into the many." Chou combined Taoist schema of the universe with the *I Ching*'s concept of an evolutionary process of creation: originating from the Great Ultimate (which is simultaneously the Non-Ultimate) are yin (tranquillity) and yang (movement). The interactions of yin and yang then give rise to the Five Elements (fire, earth, water, metal, and wood), and the integration and union of all of the preceding entities give rise to the male and female elements, which in turn are the cause of the production and evolution of all things. According to Chou, human beings receive all the aforementioned qualities and forces in their "highest excellence," and when man reacts to the external phenomena thus created, the distinction between good and evil emerges in his thought and conduct.

In the longer treatise entitled *T'ung-shu* ("Explanatory Text"), Chou's restatement and reinterpretation of Confucian doctrines laid the basis for the ethics of later Neo-Confucianism. According to Chou, the sage, or superior man, reacts to external phenomena according to the principles of propriety, humanity, righteousness, wisdom, faithfulness, and tranquillity. Chou viewed sincerity as the foundation of man's moral nature, the source of his ability to distinguish good from evil, and thus also of one's ability to perfect oneself.

Chou's grounding of Confucian ethics in an impressive metaphysical scheme had a reviving and purifying influence on Neo-Confucianism. Chou laid the foundation for the more systematic exposition of Neo-Confucianism provided by his later disciples, especially Chu Hsi (1130–1200). Because of his efforts the *I Ching* was revered as a great Confucian classic by Chu and other Neo-Confucianists of the late Sung dynasty.

Chouan, member of any of the bands of peasants, chiefly smugglers and dealers in contraband salt, who rose in revolt in the west of France in 1793 and joined the Vendêan royalists (*see* Vendée, Wars of the). The Breton word *chouan,* meaning "screech owl," is supposed to have been applied originally as a nickname to Jean Cottereau (1757–94), leader of the unsuccessful revolt, and afterward extended to his followers.

The motive for revolt was less devotion to the monarchy than resentment at interference by the new republican government with the Chouans' old habits, the ruin of their contraband trade by the abolition of the gabelle (a centuries-old tax on salt), government measures against the clergy, and the enforcement of conscription. The rebels are vividly described in Honoré de Balzac's novel *Les Chouans.*

chough, any of three crowlike birds with down-curved bills. In the family Corvidae (*q.v.;* order Passeriformes) are the common chough (*Pyrrhocorax pyrrhocorax*), of sea cliffs and rocky uplands from the British Isles to China, and the alpine chough (*P. graculus*), of high



Common chough (*Pyrrhocorax pyrrhocorax*)
© Richard Scothill/NHPA

mountains from Morocco and Spain to the Himalayas. Both are about 38 cm (15 inches) long and glossy blue-black; the former is red-billed, the latter yellow-billed. These choughs are gregarious, have whistling calls, and are aerial acrobats. In the family Grallinidae is the white-winged chough (*Corcorax melanorhamphus*) of Australian forests. It is almost identical to the corvid choughs but has white wing patches and a less powerful, black bill. Flocks feed on the ground, with much jumping about. The mud-walled nest, high in a tree, is made and used cooperatively.

Choukoutienian industry, tool assemblage discovered along with cultural remains at the Chou-k'ou-tien (Pinyin Zhoukoudian) caves near Peking, site of *Homo erectus* finds. *See* Chopper chopping-tool industry.

Chouteau, (René) Auguste (baptized Sept. 7, 1749, New Orleans [now in Louisiana, U.S.]—d. Feb. 24, 1829, St. Louis, Mo., U.S.), wealthy fur trader, cofounder of St. Louis, and leading citizen of the Missouri Territory.

Chouteau was an infant when his mother separated from his father. In 1757 she formed a liaison with Pierre Laclède Liguest, who took Auguste and the rest of the family to the Illinois country in 1763. The following year, 14-year-old Auguste commanded a group of 30 men who built a village on the west bank of the Mississippi at the junction of the Mississippi and Missouri rivers. Laclède, under whose direction the village was created, named the new settlement St. Louis. From that time on he was one of the growing town's most influential citizens, eventually becoming the leader of its economic and social life.

In 1778—following Laclède's death—Auguste succeeded to his mentor's prosperous fur-trading business and greatly enlarged it. By 1794 Auguste Chouteau enjoyed a monopoly of the trade with the Osage tribe. He also helped finance most of the other individuals and companies involved in the fur traffic of the Louisiana Territory. After the Louisiana Territory was sold to the United States (1803), he was appointed one of the three justices of the first territorial court.

During the remainder of his life Auguste Chouteau held a number of public offices: colonel of the St. Louis militia, judge of the Court of Common Pleas, negotiating commissioner with several tribes, president of the board of trustees of St. Louis, and U.S. pension agent for the Missouri Territory. But his primary interest always was his business, which continued to prosper. At his death Chouteau was the wealthiest citizen in St. Louis, the unofficial banker to the community, and the town's largest landowner.

Chouteau, Pierre, Jr. (b. Jan. 19, 1789, St. Louis [U.S.]—d. Sept. 6, 1865, St. Louis, Mo.), American western entrepreneur who started in the Indian trade and died a multimillionaire.

Chouteau's father, born Jean Pierre Chouteau, was a half brother of Auguste Chouteau, being the son of Marie Thérèse (Bourgeois) Chouteau and Pierre Laclède Liguest. Pierre junior worked briefly in his father's store, but by the second decade of the 19th century he was in business for himself, trading with the Indians in the upper Mississippi and Missouri valleys.

In 1831 Chouteau joined the firm that acted as the western agent for the American Fur Company of John Jacob Astor. Three years later Chouteau bought out Astor's interest, and in 1838 the firm of Pierre Chouteau, Jr., & Company enjoyed almost complete control over the Indian trade in the area.

But his business interests extended well beyond the Indian trade. In the 1830s he launched the first steamboat on the upper Missouri, and he later was an owner of an Illinois railroad. To augment his interests in trade and transportation, he was also associated with an iron-mining company in Missouri.

Chouteau's business acumen was matched by his generosity. He exerted himself to help the Indians, western travelers, scientific expeditions, and many others. A fort and a city (Pierre, capital of South Dakota) were named after him.

Chovd (Mongolia): *see* Hovd.

Chövsgöl Lake (Mongolia): *see* Hövsgöl Lake.

chow chow, breed of dog that differs from all other dogs in having a blue-black tongue. The breed originated in China and is known to date to the Han dynasty (206 BC–AD 220); it



Chow chow
Sally Anne Thompson—EB Inc.

is believed by some to be one of the oldest of all breeds. The name chow chow is apparently derived from an English term used in the 19th century to refer to cargo from the Orient. The chow chow is built compactly with a large head and a thick coat that forms a dense ruff about the neck. The coat is evenly coloured, in any of various shades, such as reddish brown, black, or blue-gray. The adult stands about 18 to 20 inches (46 to 51 cm) and weighs 50 to 60 pounds (23 to 27 kg). Temperamentally, the breed is usually loyal to owners but reserved and aloof with strangers.

chowder, in North American cuisine, hearty soup usually containing fish or shellfish, especially clams. The word chowder is a corruption of the French *chaudière* ("cauldron"), and chowder may have originated among Breton fishermen who brought the custom to Newfoundland, whence it spread to Nova Scotia, New Brunswick, and New England. The standard New England-style chowder contains fish or shellfish, salt pork, onions, potatoes, and milk. Manhattan-style chowder replaces the milk with tomatoes. Eighteenth-century chowders were more varied; meat or poultry chowders were made, and wine, spices, herbs, cider, and other flavourings were often added. Pounded common crackers or ship biscuits served as thickening. In the Southern and Midwestern United States, fresh sweet corn (maize) often replaces the clams in chowder. Conch chowder is a specialty of Key West, Fla.

Choybalsan, also spelled CHOIBALSAN, or ČOJBALSAN, also called BAYAN TUMEN, town, eastern Mongolian People's Republic, on the Kerulen River. First a monastic centre and later a trading town on the Siberia–China route, it was named to honour Khorloghiyin Chojbalsan, a communist hero of the 1921 Mongolian revolution. With the construction of a branch of the Trans-Siberian Railway in 1939, Choybalsan became the leading Mongolian transportation centre in the east. In addition, a major truck road crossing the country from east to west connects the town with Ulaanbaatar, the national capital, and Hovd. An electric power plant is located there, and coal is mined in the surrounding area. Factories include a wool-washing plant, a meat combine, and brickyards. The town has an agricultural college. Pop. (1979) 28,600.

Chōzaemon: *see* Miyagawa Chōshun.

Chozumaru: *see* Matsunaga Teitoku.

Chraïbi, Driss (b. July 15, 1926, Mazagan [now el-Jadida], Mor.), Moroccan novelist, dramatist, and radio producer and commentator.

Chraïbi was educated first in a Qur'ānic school and then in a French school in Casablanca. In 1946 he went to Paris to study chemical engineering, receiving a degree in 1950, after which he did graduate work in neuropsychiatry, only to abandon science just before receiving a doctorate.

His first novel—*Le Passé simple* (1954; "Simple Past"), published shortly before the outbreak of hostilities in Algeria—is a powerful, bitter, ironic cry of revolt against oppressive traditionalism. *Les Boucs* (1955; *The Butts*) shifted the author's accusatory finger from a paternalistic Islāmic formalism to the oppressed condition of many North Africans living in France. Then, leaving aside the directness of polemic, Chraïbi turned to more allegorical political expression in *L'Âne* (1956; "The Donkey") and *La Foule* (1961; "The Crowd"); both confront the inadequacies of the newly independent Third World countries, as well as the failings of European civilization. The weaknesses of Western values appear most noticeably in *Un Ami viendra vous voir* (1966; "A Friend Is Coming to See You"), in which Chraïbi combines the themes of insanity, violence, and the oppression of women. Women's rights, in Europe as in North Africa, are also touched on in *Succession ouverte* (1962; *Heirs to the Past*), a sequel to his first novel, and in *La Civilisation, ma mère!* (1983; *Mother Comes of Age*). *Mort au Canada* (1975; "Death in Canada") is a study of passionate love. *Une Enquête au pays* (*Flutes of Death*) was published in 1981. The demand for freedom and justice, and a need for love, are the major themes of Chraïbi's life's work.

Chrestien, Florent (b. Jan. 26, 1541, Orléans, Fr.—d. Oct. 3, 1596, Vendôme), French satirist and Latin poet, especially known for his translations of Greek and Latin texts.

The son of Guillaume Chrestien, an eminent physician and writer on physiology, he became a pupil of Henri Estienne, the Hellenist, at an early age. Later, he was appointed tutor to Henry of Navarre, afterward Henry IV of France, who made him his librarian. Brought up as a Calvinist, he became a convert to Roman Catholicism.

Chrestien was the author of many good translations from the Greek into Latin verse—among others, of versions of the *Hero and Leander* attributed to Musaeus and of many epigrams from the *Anthology* of the 2nd century AD. In his translations into French he was not as successful, being noted more for an awkward fidelity to his original than for excellence of style. His principal claim to a place among memorable satirists is as one of the authors of the *Satyre Ménippée,* the famous pasquinade in the interest of his old pupil Henry IV, in which the harangue put into the mouth of Cardinal de Pelvé is usually attributed to Chrestien.

Chrétien DE TROYES (fl. 1165–80), French poet, who is known as the author of five Arthurian romances: *Erec; Cligès; Lancelot, ou Le Chevalier à la charrette; Yvain, ou Le Chevalier au lion;* and *Perceval, ou Le Conte du Graal.* The non-Arthurian tale *Guillaume d'Angleterre,* based on the legend of St. Eustace, may also have been written by Chrétien.

Little is known of his life. He apparently frequented the court of Marie, Countess de Champagne, and he may have visited England. In text he sometimes refers to himself by the English "of Troyes." His tales, written in the vernacular, followed the appearance in France of Wace's *Roman de Brut* (1155), a translation of Geoffrey of Monmouth's *Historia regum Britanniae,* which introduced Britain and the Arthurian legend to continental Europe. Chrétien's romances were imitated almost immediately by other French poets and were translated and adapted frequently during the next few centuries as the romance continued to develop as a narrative form. *Erec,* for example, supplied some of the material for the 14th-century poem *Sir Gawayne and the Grene Knight.*

Chrétien's romances combine separate adventures into a *conjointure,* or well-knit story. *Erec* is the tale of the submissive wife who proves her love for her husband by disobeying his commands; *Cligès,* that of the victim of a marriage made under constraint who feigns death and wakens to a new and happy life with her lover; *Lancelot,* an exaggerated but perhaps parodic treatment of the lover who is servile to the god of love and to his imperious mistress Guinevere, wife of his overlord Arthur; *Yvain,* a brilliant extravaganza, combining the theme of a widow's too hasty marriage to her husband's slayer with that of the new husband's fall from grace and final restoration to favour. *Perceval,* which Chrétien left unfinished, unites the religious theme of the Holy Grail with fantastic adventure.

Chrétien was the initiator of the sophisticated courtly romance. Deeply versed in contemporary rhetoric, he treated love casuistically and in a humorously detached fashion, bringing folklore themes and love situations together in an Arthurian world of adventure. Interest in his works, at first concentrated on their folklore sources, has been diverted during the 20th century to their structure and narrative technique. *See also* Arthurian legend.

Chrétien, Jean, in full JOSEPH-JACQUES JEAN CHRÉTIEN (b. Jan. 11, 1934, Shawinigan, Que., Can.), Canadian lawyer and Liberal Party politician who became prime minister of Canada in 1993.

Born the 18th of 19 children of a working-class family, Chrétien studied law at Laval University and was called to the bar in Quebec in 1958. He first won election to the House of Commons in 1963 and was reelected successively thereafter through 1984. In the successive administrations of Lester B. Pearson and Pierre Elliot Trudeau, Chrétien became a parliamentary secretary to the prime minister in 1965, a minister of state in 1967, and minister of national revenue in 1968. He served as minister of Indian affairs and northern development from 1968 to 1974 and became the first French Canadian ever to hold the post of minister of finance in 1977. He went on to serve as minister of justice and attorney general (1980–82), minister of energy (1982–84), and deputy prime minister (1984).

After losing to John Turner in a contest to succeed Trudeau as head of the Liberal Party, Chrétien resigned his seat in the House of Commons in 1986. He was reelected to Parliament in 1990 and took over the leadership of the Liberals that same year. Chrétien led his party to a landslide victory over the governing Progressive Conservative Party in national elections on Oct. 25, 1993, and became prime minister of Canada on November 4.

chrismation (from Greek *chriein,* "to anoint"), in Eastern Christianity, sacrament that, together with baptism, introduces new members into the church. It is the Eastern equivalent of confirmation in the West. A priest anoints the forehead, eyes, nostrils, mouth, ears, breast, hands, and feet of the newly baptized with chrism (myron), a mixture of olive oil and balsam blessed by a bishop, and says at each anointing, "The seal of the gift of the Holy Spirit." The sacrament may also be administered to certain non-Orthodox Christians whose baptisms are recognized as valid when they are admitted into Orthodoxy and to lapsed Orthodox when they are readmitted to the church.

Chrismation is considered a personal "Pentecost" of each new member of the church, related to the anointing of kings and priests in the Old Testament. Through the gift of the Spirit, each member of the new "people of God" shares in the prophecy, kingship, and priesthood of Christ, the Messiah.

Chrissie, Lake, Afrikaans CHRISSIESMEER, shallow freshwater lake, Eastern Transvaal province, South Africa. The largest natural body of freshwater in the country, it measures about 6 miles (9 km) long and 2 miles (3 km) wide and has a circumference of 14 miles (25 km). Its surface area and depth (maximum 20 feet [6 m]) vary seasonally.

Lake Chrissie is noted for its birdlife and herds of blesbok at the water's edge. The town of Chrissiesmeer lies on the northern shore of the lake.

Christ, Church of, any of several conservative Protestant churches, found chiefly in the United States. They are strongest in parts of the Midwest and in the western and southern parts of the United States. Each church is known locally as a Church of Christ, and its members as Christians; and each church is autonomous in government, with elders, deacons, and a minister or ministers. There is no organization beyond the local church.

The early history of this group is identical with that of the Disciples of Christ (*q.v.*). They developed from various religious movements in the United States in the early part of the 19th century, especially those led by Barton W. Stone in Kentucky and Thomas Campbell and Alexander Campbell in Pennsylvania and West Virginia. These men had all been Presbyterians. They pleaded for the Bible as the only standard of faith, without additional creeds, and for the unity of the people of God by the restoration of New Testament Christianity. Refusing affiliation with any sect, they called themselves simply Christians.

Controversies developed among the Christians about the middle of the 19th century, principally over the scriptural authorization for organized mission societies and the use of instrumental music in worship. In 1906 in the federal census of religion there was added to the earlier listing of Disciples of Christ a new listing of Churches of Christ that enumerated those congregations opposing organized mission societies and instrumental music. The New Testament mentions neither, and, therefore, the Churches of Christ consider them to be unauthorized innovations.

After the division, the Churches of Christ continued to grow. Though the churches oppose organized mission societies, missionary work is supported by individual churches and is carried on in 100 foreign fields. Members of the Churches of Christ support more than 20 liberal-arts colleges and many high schools in which the Bible is taught.

The Churches of Christ believe in the manifestation of God in Christ, the all-sufficiency of the Bible, with the primacy of the New Testament, as the revelation of the will of God and the only rule of faith and practice. Most churches do not take part in interdenominational activities.

Christ, Disciples of: *see* Disciples of Christ.

Christ, Jesus: *see* Jesus Christ.

Christ, two natures of, a dogma of Christian belief stating that when the Second Person of the Trinity became incarnate in the person of Jesus Christ, he then possessed both a divine and a human nature in the unity of a single person. The expression "two natures" indicated that Christ was fully God and fully human.

The clarification of Trinitarian doctrine during the first four centuries (one God, three distinct Persons) led to a 5th-century controversy over the divinity and humanity of Christ. At Alexandria the emphasis was on Christ's divinity, whereas Antioch emphasized Christ's reality as human. Nestorius brought the debate to a head by denying that Mary was Theotokos, God-bearer (or, more loosely, the Mother of God). Though the Council of Ephesus (431) condemned the Nestorian view of the semidivinity of the Son, the matter was not finally settled until the Council of Chalcedon (451) formally declared:

> We all unanimously teach . . . one and the same Son, our Lord Jesus Christ, perfect in deity and perfect in humanity . . . in two natures, without being mixed, transmuted, divided, or separated. The distinction between the natures is by no means done away with through the union, but rather the identity of each nature is preserved and concurs into one person and being.

Christ the King, Feast of, festival celebrated in the Roman Catholic church in honour of Jesus Christ as lord over all creation. Essentially a magnification of the Feast of the Ascension, it was established by Pope Pius XI in 1925. Originally, it was celebrated on the last Sunday in October, but in the revised liturgical calendar promulgated by Pope Paul VI in 1969, it was moved to the last Sunday of Ordinary Time (immediately preceding Advent), where its theme of Christ's dominion made it a fitting end to the liturgical year. The festival is also observed in Lutheran, Anglican, and other Protestant churches.

Christ thorn (plant): *see* crown of thorns.

Christadelphian (Greek: "Brother of Christ"), member of a Christian sect founded about 1848 by John Thomas, who, after studying medicine in London, Eng., migrated to Brooklyn, N.Y. He at first joined the followers of Thomas and Alexander Campbell, founders of the Disciples of Christ (Christians), but eventually he began preaching independently, largely applying Hebrew prophecy and the book of Revelation to current and future events. Both in the United States and in Great Britain he gathered a number of adherents. The name Christadelphian was adopted during the American Civil War (1861–65), when the followers of Thomas organized formally to justify their objection to military service.

The local organization, called an ecclesia, is the principal unit of government in the sect; there is no general overall organization, and no distinction is made between clergy and laity. Ruling or serving brethren are elected and minister without compensation. Generally an ecclesia does not have a building but meets in a rented hall or private home. Annual fraternal gatherings are held for fellowship and Bible study.

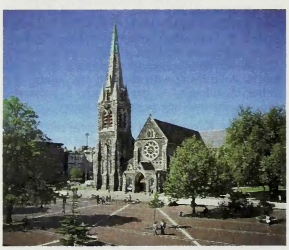
The Bible is the only authoritative creed, and membership in the group requires a profession of faith and baptism by immersion. Orthodox views of the Trinity are rejected, and theology is strongly millennialist.

Christchurch, district and borough, county of Dorset, England. It lies at the confluence of the Rivers Stour and Avon and adjoins the English Channel resort of Bournemouth. The site was significant during prehistoric times; Late Bronze–Early Iron Age trade with the European continent apparently focused on nearby Hengistbury Head and Christchurch. The town's original name, Twineham, long survived in the form Cristechurch Twynham. Its first charter was granted about 1150. A

Norman constable's house has been restored. The town's huge Augustinian priory church, one of the largest parish churches in England, dates from the 12th century and contains Norman elements of architecture.

Largely residential in character, modern Christchurch is also a seaside resort with a small harbour. The Red House is an art gallery and museum. Apart from its fisheries, the borough has light industries and aircraft manufacture, maintenance, and repair. Area 19 square miles (50 square km). Pop. (1981) town, 33,529; (1991 prelim.) district, 40,500.

Christchurch, city, Canterbury local government region, eastern South Island, New Zealand, on the Avon River. It was the last and most successful colonizing project inspired



The Anglican cathedral on Cathedral Square, Christchurch, N.Z.
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by Edward Gibbon Wakefield and his New Zealand Company. Christchurch was founded by the Canterbury Association, which was formed in 1848 largely through the efforts of John Robert Godley and which planned to establish a model Church of England settlement. The original immigrants arrived on five ships in 1850–51. Their settlement, known as Canterbury, was renamed after Christ Church College, Oxford, which Godley had attended. Proclaimed a city in 1862 and made a borough in 1868, it was expanded in 1903 and is now the second largest city (after Auckland) in New Zealand.

Before World War II, the city was chiefly dependent on its rich agricultural environs. After 1945, aided by good transportation facilities, adequate supplies of artesian water, and plentiful, inexpensive hydroelectric power, Christchurch expanded to become New Zealand's second most important industrial centre. To its traditional meat-freezing and woolen and agricultural-implement production have been added the manufacture of clothing, carpets, rubber, wood and cork goods, transportation equipment, tires, soap, fertilizers, glass, footwear, and flour.

The city's port is Lyttelton, a natural deep-water anchorage (7 miles [11 km] southeast) to which it is linked by rail and road tunnels through the Port Hills. The port's chief exports are wool, meat, dairy products, and wheat; chief imports are petroleum products, fertilizers, iron, and steel. Christchurch is also served by an international airport and the South Island Main Trunk Railway.

Because an average of one in eight of the city's acres is devoted to parks, public gardens, and other recreation areas, Christchurch has earned the nickname "Garden City of the Plains." One of the nation's principal educational centres, it has Lincoln University (1990; originally established in 1878 as a constituent agricultural college of the University of Canterbury), Christ's College, and the University of Canterbury (1873). Other notable institutions are an Anglican cathedral and Roman Catholic procathedral, the Robert McDougall Art Gallery, the Canterbury Museum, botanical gardens, and a planetarium. Pop. (1991) city, 292,858; (1992 est.) urban area, 308,200.

Christensen, Harold (b. Dec. 25, 1904, Brigham City, Utah, U.S.—d. Feb. 20, 1989, San Anselmo, Calif.), American dancer and teacher who, with his brothers, Willam and Lew, was instrumental in establishing ballet in the western United States.

Christensen studied dancing with the famous choreographer George Balanchine and appeared with the Metropolitan Opera Ballet (1934), Ballet Caravan (1936–40), San Francisco Opera Ballet (1942), and San Francisco Ballet Company (1941–46). He became director of the San Francisco Ballet School after he retired from dancing in 1946, and he remained there until his final retirement in 1975.

Christensen, Lew (Farr) (b. May 6, 1909, Brigham City, Utah, U.S—d. Oct. 9, 1984, Burlingame, Calif.), American dancer, teacher, and choreographer whose work with the San Francisco Ballet Company helped establish ballet in the western United States.

Trained at the School of American Ballet, New York City, Christensen first performed in vaudeville with his brothers, Willam and Harold, then appeared with such companies as the American Ballet (1935); the Ballet Caravan (1936–40), which he helped to found; and the Ballet Society (1946–52). He danced the title role in the American premiere of Igor Stravinsky's *Apollo Musagetes* (1937) and the role of Pat Garrett in Aaron Copland's *Billy the Kid* (1938).

As a choreographer he created more than 50 ballets, the most influential being those for the San Francisco Ballet, which he directed or codirected from 1952 until his death. His works include such dances as *Filling Station* and *Con Amore*. Under his direction the San Francisco Ballet gained both national and international stature.

Christensen, Willam, original name WILLIAM FARR CHRISTENSEN (b. Aug. 27, 1902, Brigham City, Utah, U.S.), American dancer, choreographer, and teacher who, along with his brothers, Harold and Lew, established the San Francisco Ballet Company.

Christensen studied with the great ballet master and reformer Michel Fokine. He performed in vaudeville with his brothers before joining the San Francisco Opera Ballet as soloist (1937) and choreographer (1938–58). In 1937 he founded the San Francisco Ballet Company.

Becoming a professor of theatre ballet at the University of Utah (1951), he organized a department of ballet and choreography, established an annual campus Ballet Gala with guest artists (1955), and founded the Utah Ballet (1952). In 1963 the company turned professional and in 1968 changed its name to Ballet West. Christensen retired as director a decade later and was succeeded by Bruce Marks. As a choreographer, Christensen created works to music by J.S. Bach, Felix Mendelssohn, Igor Stravinsky, Ludwig van Beethoven, and Darius Milhaud, and he revived such ballet classics as *The Nutcracker, Coppélia,* and *Swan Lake.*

Christian, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Danish	Christian
German	Christian
Norwegian	Christian
Swedish	Kristian

BRUNSWICK-LÜNEBURG-WOLFENBÜTTEL

• **Christian,** byname CHRISTIAN THE YOUNGER, German CHRISTIAN DER JÜNGERE (b. Sept. 20, 1599, Gröningen, Bishopric of Halberstadt [Germany]—d. June 16, 1626, Wolfenbüttel, Lower Saxony), duke of Brunswick-Lüneburg-Wolfenbüttel, Protestant military commander, and soldier of fortune during the early part of the Thirty Years' War (1618–48), who made his reputation predominantly through his wholesale plundering and burning.

"The mad Halberstadter" (*der tolle Halberstadter*), or "the mad Christian," as his contemporaries called him because of his unruly disposition, disliked his sedate position as administrator of the bishopric of Halberstadt, which he had assumed in 1616, and soon pursued the more exciting military life. After fighting under Maurice of Orange against the Spaniards in the Netherlands (1621), he raised an army for the Palatine elector Frederick V, and for five years he ranged across western Germany, eastern France, and the Netherlands, being twice defeated by the imperial marshal Johann Tserclaes, Count von Tilly. After renouncing his administrative role for the bishopric, Christian subsisted on the plunder he had taken and on French, Dutch, and English subsidies.

DENMARK

• **Christian I,** also spelled CHRISTIERN (b. 1426—d. May 21, 1481, Copenhagen, Den.), king of Denmark (1448–81), Norway (1450–81), and Sweden (1457–64, 1465–67), and founder of the Oldenburg dynasty, which



Christian I, detail of a portrait by an unknown artist; in Frederiksborg Castle, Denmark
By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

ruled Denmark until 1863. He tried to gain control over Sweden and maintain a union of the Scandinavian nations but was defeated by rebellious Swedish nobles (1471).

The son of Count Dietrich the Happy of Oldenburg and Hedvig of Holstein, Christian was elected to succeed Christopher III, king of Denmark and Norway, by the Danish Rigsråd (state council) in 1448. The following year he married his predecessor's widow, Queen Dorothea of Hohenzollern. The decision of a meeting of the Danish and Swedish councils at Halmstad, Swed. (1450), recognizing Christian as king of Norway and heir in Sweden was disputed by the Swedish king Charles VIII, touching off a Danish-Swedish war (1451–57). After Charles was finally deposed in 1457, Christian held the Swedish throne until 1464, when he was overthrown by a group of the higher Swedish nobility. He held the throne again in 1465–67. His last full-scale attempt to gain sovereignty over Sweden was ended by his defeat at Brunkeberg, near Stockholm (1471), by forces led by the Swedish nobleman Sten Sture the Elder.

Christian gained control over both Schleswig (now split between Denmark and Germany) and Holstein (now in Germany) in 1460, at the time that the Schleswig ducal line died

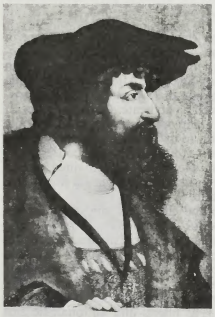
out. He offset the growing opposition of the Danish nobility by calling a meeting of the Danish estates (1468), a precedent followed by his immediate successors. Financially weak because of his wars against Sweden and land purchases in Schleswig and Holstein, Christian became dependent on the Hanseatic League, a north German trading confederation, and granted the league generous commercial privileges. He was drawn into a war with England (1469–74) when the Hanseatic traders challenged English trading rights in Iceland.

In 1469, when Christian's daughter Margaret was married to James III, king of Scotland, the Norwegian-controlled Orkney and Shetland islands were mortgaged to Scotland to help pay for Margaret's dowry, and the annual rent Scotland paid for the Hebrides Islands and the Isle of Man was cancelled. Christian concluded a concordat with Pope Sixtus IV, improving his relations with the Danish Church. After visiting Rome (1474) he obtained a papal bull (1475) for a university, which he founded at Copenhagen in 1479.

• **Christian II,** also spelled CHRISTIERN (b. July 1, 1481, Nyborg, Den.—d. Jan. 25, 1559, Kalundborg), king of Denmark and Norway (1513–23) and of Sweden (1520–23) whose reign marked the end of the Kalmar Union (1397–1523), a political union of Denmark, Norway, and Sweden.

After serving as viceroy in Norway (1502, 1506–12), Christian succeeded his father, John, king of Denmark and Norway, in 1513. He obtained office by agreeing to a royal charter that granted extensive privileges to the nobility, including effective control of the government by the noble-dominated Rigsråd (state council). He soon bypassed the Rigsråd, however, and used the chancellery to grant commercial privileges to merchants, overriding the claims of Danish nobles and traders of the Hanseatic League (a north German trading confederation).

In Norway, Christian had taken up with two bourgeois Dutch women: Dyveke, who was his mistress, and her mother, Sigbrit Villoms, his counsellor. After he became king, Sigbrit took charge of the state's financial affairs; and Christian continued his association with Dyveke even after his marriage (1515) to Elizabeth of Habsburg, sister of the future Holy Roman emperor Charles V. In 1517 Christian accused the governor of Copenhagen Castle of poisoning Dyveke, and thereafter he ignored the Rigsråd and the royal charter. He created an essentially bourgeois government with the burgomaster of Malmö, Hans Mikkelsen, as his special counsellor; and he gave the chancellery control of the provinces with loyal burghers as governors. He also appointed bishops freely.



Christian II, portrait by Jan Mabuse; in Frederiksborg Castle, Denmark

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

In 1517 Christian decided to conquer Sweden, which had repeatedly rebelled from the Kalmar Union after 1448. He allied with the Swedish Unionist Party headed by Archbishop Gustav Trolle, and after two setbacks (1517–18), he finally defeated the forces of the Swedish regent, Sten Sture the Younger, in 1520; Christian was crowned king of Sweden on Nov. 4, 1520. Four days later he ordered the execution of more than 80 leaders of Sten Sture's Swedish Nationalist Party after they had been accused of heresy by Gustav Trolle. The massacre (Stockholm Bloodbath) helped incite a Swedish war of liberation against Danish rule, led by Gustav Vasa, a Swedish nobleman. With the aid of leading Swedish magnates and the north German trading centre of Lübeck, Gustav established Swedish independence in 1523. His election (1523) to the Swedish throne as King Gustav I Vasa marked the end of the Kalmar Union.

Christian's sweeping commercial reforms, his anti-Hanseatic policies, and his defeat in Sweden led the Jutland nobles to revolt (1523) and to appoint his uncle, Frederick, duke of Holstein-Gottorp, as king. Christian was forced to flee to the Netherlands and did not launch a campaign to regain his kingdom until 1531, when he invaded Norway. After giving up the struggle the following year, he was arrested by Danish forces while attempting to negotiate with Frederick. He spent the rest of his life imprisoned in Danish castles at Sønderborg and, after 1549, at Kalundborg.

• **Christian III** (b. Aug. 12, 1503, Gottorp, Schleswig—d. Jan. 1, 1559, Kolding, Den.), king of Denmark and Norway (1534–59)



Christian III, detail of an oil painting by Jost Verheiden, c. 1554–59; in Frederiksborg Castle, Denmark

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

who established the state Lutheran Church in Denmark (1536) and, by forming close ties between the church and the crown, laid the foundation for the absolutist Danish monarchy of the 17th century.

The eldest son of Frederick I, king of Denmark and Norway, Christian was educated as a Lutheran and showed Protestant zeal as *statholder* (chief executive) in the Danish provinces of Schleswig and Holstein (1526). The predominantly Catholic state council therefore rejected his bid for the throne when Frederick died in 1533, preferring Christian's younger brother Hans. Meanwhile, the burgomasters of Copenhagen and Malmö allied with the north German city of Lübeck to restore the imprisoned former Danish king Christian II and provoked a civil war (the Count's War; 1533–36) when Lübeck's forces invaded Holstein.

After gaining the backing of leading Jutland nobles and bishops (1534), Christian sponsored successful military campaigns in the provinces of Jutland, Fyn, and Zealand and, with the capitulation of Copenhagen (1536), he assumed control of the kingdom. He soon arrested the Catholic bishops and organized the Diet of Copenhagen (October 1536), which confiscated episcopal property and established the state Lutheran Church. The Diet also confirmed the constitutional rights of the nobles' Rigsråd (state council), which thereafter ruled in alliance with the King. The continuing decline of Norway was indicated by the abolition of the Norwegian state council.

In 1537 the Danish Church was reorganized under the leadership of Christian's adviser Johann Bugenhagen. New bishops were appointed, all of bourgeois origins, and the church leaders were now called superintendents. Christian's chancellor, Johan Friis, maintained good relations between the crown and the leading nobles and helped modernize the local and national administrations.

In foreign affairs, Christian allied with the Protestant German rulers against the Habsburg Holy Roman emperor Charles V, who wanted to place the daughters of Christian II on the Scandinavian thrones. After settling his debt to Holstein in 1542, Christian declared war against Charles V and closed The Sound (Øresund), the entrance to the Baltic Sea, to shipping from the Netherlands; this was a serious economic blow to the Emperor. He concluded a peace with Charles at Speyer in 1544 and thereafter avoided interference in foreign wars. He gained the Emperor's favour especially for his noninterference in the war of the Schmalkaldic League (1546–47), a dispute between Charles and the Protestant Estates of his empire.

• **Christian IV** (b. April 12, 1577, Frederiksborg Castle, Hillerød, Den.—d. Feb. 28, 1648, Copenhagen), king of Denmark and Norway (1588–1648), who led two unsuccessful wars against Sweden and brought disaster upon his country by leading it into the Thirty Years' War. He energetically promoted trade and shipping, left a national heritage of fine buildings, and won repute as a plucky, hard-drinking man of grim wit and great resource.

Christian, the son of Frederick II of Denmark and Sophia of Mecklenburg, succeeded to the throne on the death of his father in 1588, but until his coronation in 1596 his country was governed by a regency of four members of the Rigsråd, the privy council, who also supervised his education. He was brought up as a Lutheran and studied Latin, French, Italian, and German as well as mathematics, navigation, drawing, military command, fencing, and dancing.

In 1597 he married Anna Catherine of Brandenburg, mother of his son and successor, Frederick III. She died in 1612, and three years later Christian married Kirsten Munk, a young Danish noblewoman, who remained his wife—bearing him 12 children—until 1630, when she committed adultery with a German count and was banished from the court.

After his coronation Christian succeeded in limiting the powers of the Rigsråd. He kept the most important offices vacant and surrounded himself with an entourage of aristocratic young officers and German officials drawn mainly from his dukedom of Holstein. The Rigsråd was opposed to a war against Sweden, but Christian threatened to declare war in his capacity as duke of Schleswig-Holstein, thus forcing the Rigsråd to sanction plans for a war (1611–13), with the aim of once more uniting Sweden with Denmark. Although Christian won the war, his victory remained essentially inconclusive.

After the war Christian centred his efforts on the economic development of his kingdom; he founded new towns, particularly ports to strengthen defenses, enlarged the royal shipyards, and built beautiful buildings and castles in and around Copenhagen. When the

Protestant cause in northern Germany was endangered, in 1624, Christian entered the Thirty Years' War, again in opposition to his councillors. His aims were to protect Danish interests in northern Germany, to stop the Swedish king from playing a role in European politics, and to take up the legacy of his father and grandfather as the leading member of the Lutheran Church and its defender against ex-



Christian IV, detail of an oil painting by Pieter Isaacsz, 1612; in Frederiksborg Castle, Denmark
By courtesy of Det Nationalhistoriske Museum paa Frederiksborg, Denmark

panding Catholicism. In 1625 he began operations against the Catholic League in Germany led by Tilly, the Bavarian commander in chief, who defeated him at Lutter am Barenberge on Aug. 17, 1626. Tilly's and Wallenstein's troops next invaded and plundered Jutland, thus forcing Christian to form an alliance with the Swedish king Gustavus II Adolphus against the Catholics. After the Swedish-Danish army and fleet had forced Wallenstein to raise the siege of Stralsund, however, Christian severed the alliance and concluded a separate peace with the Holy Roman emperor at Lübeck in May 1629. Though Christian's prestige and even his faith in himself as a great captain were diminished, he had not lost any lands. After the war he continued to try to impede Swedish progress in northern Germany and to maintain his rights in the Baltic and the North Sea. He repeatedly raised the shipping tolls through The Sound into the Baltic in order to augment his income independently of the Rigsråd, but he thus alienated his old allies, the sea powers of England and the Netherlands. With the help of the Netherlands, Sweden attacked Denmark in December 1643; and, by the end of January 1644, Jutland was in their possession. Christian led the defense personally, blockading the Swedish ships for a time, and lost an eye in the naval battle of Kolberger Heide. Although this battle was inconclusive, the Danish fleet was later annihilated by the combined navies of Sweden and Holland, and Christian was compelled to conclude a humiliating peace in August 1645 that cost him possessions in the Baltic, Norway, and Scania. Throughout his reign the Rigsråd and the nobility had opposed his warlike policies and the ensuing strain on finances, and after this defeat even Christian's sons-in-law turned against him, forcing him to accept the increased power of the nobility. Though he died a bitter and broken man, Christian IV had ruled his kingdom for more than 50 years and is remembered as one of the most popular of Danish kings.

Christian IV was inclined to occupy himself with every minor detail of his administration while losing sight of the larger problems. Not only did he personally lay down the lines of Denmark's mercantilistic policy, he even established the import duties; he started state-subsidized and privileged trading companies and manufactories—all of them with no marked success—and insisted on auditing their accounts personally. He founded a new academy for young noblemen, provided funds for the students at the university and built them a new college, personally examined the knowledge of Latin and the religious orthodoxy of the clergymen due for promotion, made designs for new types of guns and tested them himself, inspected the contents of the new arsenals, acted as a judge even in minor cases, and tried out the new ships of his navy. Christian was a great builder and founder of cities. He founded the towns of Kristiania (now Oslo) and Kristiansand in Norway; Kristianstad and Kristianopel in what is now Sweden; Christianshavn in Denmark; and Glückstadt (which was to compete with Hamburg) in Holstein. Evidence of his unremitting industry are his more than 7,000 handwritten letters still preserved, written in an imaginative and vivid Danish prose and teeming with orders and questions on all subjects from the eternal laws of God to the brewing of stronger beer. (J.E.)

• **Christian V** (b. April 15, 1646, Flensburg, Schleswig—d. Aug. 25, 1699, Copenhagen), king who consolidated absolutism in Denmark–Norway.

Christian was the son of Frederick III, whom he succeeded in 1670. Popular with the common people, he fortified the absolutist system against the aristocracy by accelerating his father's practice of allowing Holstein nobles and Danish commoners into state service. To accommodate them, Christian V created the new noble ranks of count and baron. Perhaps the greatest commoner elevated in the system was Peder Schumacher, named Count Griffenfeld in 1670 and high councillor of Denmark in 1674. Griffenfeld, however, fell out of favour with Christian V during the Scanian War (1676–79) against Sweden, which, initiated by Christian, exhausted Denmark without making any real gains. Christian V died in a hunting accident.

• **Christian VI** (b. Nov. 30, 1699, Copenhagen—d. Aug. 6, 1746, Hørsholm, Den.), king of Denmark and Norway, son of Frederick IV of Denmark and Louise of Mecklenburg-Güstrow, who ascended the throne after his father's death on Oct. 12, 1730.

Tolerably gifted, he became a diligent and conscientious ruler, choosing able administrators; but he was shy, reserved, and unprepossessing in appearance. Like his consort, Sophie Magdalene of Brandenburg-Kulmbach (1700–70), he was imbued with German pietism and devoutly encouraged a pietistic national church. Frivolous amusements were banned at court, but the royal couple's love of splendour led to costly buildings, such as Christiansborg Castle (built 1733–45). In 1733 he reestablished the national militia but acceded to the landowners' demand that peasants who were conscripted were bound to return as tenant farmers to the estates on which they were born. Christian's foreign policy was pacific, and he succeeded in forming alliances with Sweden, England, and France.



Christian VI, detail from a portrait by J.S. Wahl
By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

• **Christian VII** (b. Jan. 29, 1749, Copenhagen—d. March 13, 1808, Rendsburg, Schleswig), mentally incompetent king of Denmark and Norway; his reign saw the brief domination of the kingdom by Count Johann Friedrich Struensee.

The son of Frederick V, Christian VII came to the throne in 1766. His mental instability has been attributed to a brutal childhood governor and to morally corrupt court pages. After his 1766 marriage to Caroline Matilda, the daughter of Frederick, prince of Wales, he gave himself up to debauchery. Christian came under the influence of Struensee when the latter was appointed to accompany him on a 1768–69 European tour. In 1769 Struensee was named court physician and in 1770 a count and privy cabinet minister. Also in 1770, Struensee became the Queen's lover, for which he was arrested in 1772 on the King's order and executed. Christian's other advisers and, after 1784, Crown Prince Frederick then held power.

• **Christian VIII,** in full CHRISTIAN FREDERIK (b. Sept. 18, 1786, Copenhagen—d. Jan. 20, 1848, Amalienborg, Den.), king of Denmark during the rise of the liberal opposition to absolutism in the first half of the 19th century.

While still crown prince of Denmark and recent stadtholder (governor) of Norway, Christian accepted election as king of Norway in 1814 by the Norwegian independence faction, which refused to recognize the cession of Norway to Sweden. After leading a futile resistance against the Swedes, however, Christian was forced to abdicate. Christian's liberal sympathies emerged clearly in this episode, and, when he returned to Denmark, he was looked upon with suspicion by conservative state officials. He therefore remained out of public affairs until 1831, when he joined the council of state.



Christian VIII, detail of an oil painting by L.-A.-F. Aumont, 1834; in Frederiksborg Castle, Denmark
By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

Coming to the throne at the death of his father, Frederick VI, in 1839, Christian VIII gave up his earlier liberalism and firmly resisted the demands of the advocates of a constitutional regime. He did, however, reform the prison system and restore the Icelandic Althing (parliament) in 1843. Christian VIII died in 1848, as liberal and nationalistic agitation in Denmark rose to fever heat.

• **Christian IX** (b. April 8, 1818, Gottorp, Schleswig—d. Jan. 29, 1906, Copenhagen), Danish king who came to the throne at the



Christian IX, detail of an oil painting by Hans Christian Jensen, 1887; in Frederiksborg Castle, Denmark

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

height of a crisis over Schleswig-Holstein in 1863 and who later resisted the advance of full parliamentary government in Denmark.

Christian was the son of Duke William of Schleswig-Holstein-Sonderburg-Beck (and after 1825 Duke of Glücksburg). He entered the Danish army in 1835, serving in the Schleswig War (1848–50). In 1842 he married Louise of Hesse-Kassel, cousin of the childless Danish king, Frederick VII, and he was named successor to the throne of Denmark, Schleswig-Holstein, and Lauenburg in the London protocol of 1852. When Christian came to the throne at Frederick's death in November 1863, he was forced by popular feeling in Denmark to sign the November constitution, which incorporated Schleswig into the state and made war with the German states inevitable.

In the years after the disastrous war of 1864, Christian IX supported conservative minority governments against the ever-expanding democratic forces in Denmark. He finally submitted to them in 1901 by appointing a majority cabinet. This change brought full parliamentary government to Denmark.

• **Christian X** (b. Sept. 26, 1870, Charlottenlund, Den.—d. April 20, 1947, Copenhagen), king of Denmark (1912–47) who symbolized the nation's resistance to the German occupation during World War II.

The eldest son of the future King Frederick VIII and Louise of Sweden and Norway, Christian became chief of the royal guard in 1898 and married Alexandrine of Mecklenburg-Schwerin. Becoming crown prince in 1906, Christian led the opposition to the sale of the Danish West Indies to the United States in 1911. He assumed the throne on his father's death the following year.

Christian attended the first in a series of meetings of Scandinavian kings during World War I at Malmö in December 1914. In June 1915 he signed the new constitution that provided for a two-chamber parliament with equal suffrage for men and women; he also gave his assent to the federal act of 1918 making Iceland an independent kingdom. In July 1920 he received a warm welcome in North Schleswig, the part of Schleswig-Holstein ceded to Denmark by Germany under the Treaty of Versailles (1919).

During World War II, after the German occupation of Denmark began in 1940, Christian rode frequently on horseback through the streets of Copenhagen, showing that he had not abandoned his claim to national sovereignty. He rejected the Nazi demand for anti-Jewish legislation in September 1942 but was forced in May 1943 to condemn Danish sabotage of munitions works and railways. His speech against the occupation forces in August 1943, after fighting had broken out between the Germans and Danish resistance fighters, led to his imprisonment until the end of the war. He was succeeded on his death by his elder son, who became Frederick IX.



Christian X, detail from a portrait by Herman Videl, 1929

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Denmark

NORWAY

• **Christian I–VII:** *see* Christian I–VII (Denmark).

SWEDEN

• **Christian I–II:** *see* Christian I–II (Denmark).

Christian THE YOUNGER: *see* Christian (Brunswick-Lüneburg-Wolfenbüttel).

Christian, Charlie, byname of CHARLES CHRISTIAN (b. 1916, Dallas, Texas, U.S.—d. March 2, 1942, New York, N.Y.), American jazz guitarist, one of the first to produce improvised masterpieces using electrically amplified equipment. His recording career, tragically brief though it was, helped raise the guitar from an accompanying to a dominant solo instrument.

Reared in Oklahoma City, Christian studied music with his father. After a false start as a string bassist, he soon won a reputation in the Midwest as a guitarist of rare talent. In 1939 he was recruited into the Benny Goodman orchestra. He contracted tuberculosis in 1941, however, and died the following year.

Christian's playing was marked by great originality, and his harmonic tendencies anticipated the new styles of the bebop era. He is generally considered to have been one of the major soloists to straddle the swing era and the bebop era that followed; although he left few recordings apart from his dazzling performances for Goodman, it seems probable that he would have taken his place with such men as Charlie Parker and Dizzy Gillespie as a leader of the great chromatic revolution in jazz of the late 1940s.

Christian, Fletcher (b. 1764?, England—d. *c.* 1790–93?), seaman and leading mutineer on HMS *Bounty,* under the command of William Bligh (*q.v.*).

A member of a family that had moved from the Isle of Man to Cumberland, Eng., Christian had already served some years in the navy when, in 1787, he became master's mate on the *Bounty,* a discovery ship sailing (Dec. 23, 1787) from Spithead to the South Seas to collect breadfruit trees for the West Indies. The ship arrived in Tahiti on Oct. 26, 1788, and remained more than five months, providing apparently an idyllic life for the crew. On April 4, 1789, it set sail for the West Indies. On the morning of April 28, Christian, at the head of 25 petty officers and seamen, seized the ship, reacting to the alleged tyranny and insults of Bligh. Bligh and 18 of the crew were set adrift in a lifeboat, and the mutineers attempted to establish themselves on Tubuai in the Austral Islands. This attempt was abandoned, and 16 crewmen who requested to return to Tahiti were permitted to do so. Christian and eight others, together with some Tahitian men and women (including Mauatua, who became Christian's wife), sailed away, not to be heard of again until 1808, when a lone survivor (John Adams, who called himself Alexander Smith) and the mutineers' descendants were found on Pitcairn Island. His story was that the group landed at Pitcairn (reportedly in 1790), stripped and burned the *Bounty,* but later fell out among themselves and with the Tahitians, and were wiped out—Christian included.

Another story had Christian somehow escaping the island (perhaps on the ship of one Captain Folger in 1808) and secretly making his way back to England, where he allegedly visited his relatives in Cumberland in 1808–09 and was seen on the streets of Devonport (now a part of Plymouth).

Christian, William, byname ILLIAM DHÔNE (Manx: "Brown-haired William") (b. April 14, 1608—d. Jan. 2, 1663, Hango Hill, Isle of Man), Manx politician regarded in some circles as a patriot martyr.

Christian was the third son of Ewan Christian, one of the deemsters (judges) of the Isle of Man. In 1648 Christian was appointed to the post of receiver general by the 7th Earl of Derby, lord of the Isle of Man. In 1651 Derby left for England to fight with the armies of Charles II against the forces of Parliament; in his absence, he placed Christian in command of the island militia. That same year, however, the earl was captured by Parliamentary forces at the Battle of Worcester, whereupon the Countess of Derby, Charlotte de la Tremoille, initiated a fruitless attempt to ransom her husband's life through the surrender of the island to Parliament. Christian headed a revolt against the countess, but at the same time he negotiated independently with the Parliamentarians. In October of 1651, Christian cooperated in the landing of a Parliamentary fleet under Colonel Robert Duckenfield, and by November the countess surrendered the castles of Rushen and Peel, thus yielding control of the island to Parliament.

Christian continued in the office of receiver general until he was appointed governor of the Isle of Man in 1656. Two years later he fled amid charges of corruption, but he was arrested in London for debt and imprisoned for a year. Upon release from prison, he returned to the Isle of Man, where, in spite of the Act of Indemnity (*c.* 1661), he was arrested by Charles, 8th Earl of Derby. After a trial whose outcome was unfairly influenced by the earl, William Christian was executed by firing squad at Hango Hill. Christian is celebrated in the Manx ballad *Baase Illiam Dhône* ("The Death of Brown-haired William") and by the reference to him in Sir Walter Scott's novel *Peveril of the Peak* (1822).

Christian and Missionary Alliance, missionary and evangelistic movement that developed from the work of Albert B. Simpson (d. 1919), a Presbyterian minister who left that church to become an independent evangelist in New York City. In 1887 Simpson and others organized two societies, one for home and one for foreign missions. The two societies were merged into the Christian and Missionary Alliance in 1897. The organization is part of the Holiness church movement but does not consider itself a sect or denomination but a movement among all Christians. It stresses Christ as "Saviour, Sanctifier, Healer, and Coming King." It supports an active missions program.

In the United States, congregations are independent but are joined together in a general conference that meets annually. Headquarters are in Nyack, N.Y.

Christian art, Early: *see* Early Christian art.

Christian Brother, member of either of two separate but similar congregations of Roman Catholic laymen devoted to teaching youth.

The Institute of the Brothers of Christian Schools (F.S.C.) was founded by St. Jean-Baptiste de La Salle at Reims, France, in 1684 for the education of boys, especially of poor families; the congregation is now established on all continents. Besides teaching in elementary, secondary, and teacher-training schools, the brothers administer and staff colleges; agricultural schools; welfare or corrective schools; technical, trade, and commercial schools; and houses of retreat.

The Congregation of the Brothers of the Christian Schools of Ireland (C.F.C.) was founded in 1802 in Waterford, Ire., by Edmund Ignatius Rice, a merchant of that city. Rice established the order to serve the needs of poor Catholic boys in his native land, where the English laws of the period prohibiting Catholic schools had reduced great numbers of Catholics to poverty and ignorance. The congregation spread to distant countries largely as a result of Irish-born bishops seeking help in educating the youth of their dioceses. The brothers also conduct orphanages and institutions for the blind and deaf.

Christian caste, in India, the social stratification that persists among Christians, based upon caste membership at the time of an individual's own or of an ancestor's conversion. Indian Christian society is divided into groups geographically and according to denomination, but the overriding factor is one of caste. Caste groups may dine together and worship together, but, as a rule, they do not intermarry.

The problem of reconciling change in religious belief with existing social tradition has dominated the history of Christianity in India. The Syrian Christians along the Malabar coast trace their origin to the legendary visit of St. Thomas the Apostle, early in the 1st century AD. Many of the Syrian Christians were of high birth, and after conversion they continued to be accorded a mid-rank status by the Hindu society that surrounded them.

With the arrival of Europeans from the 16th century onward, a second group of Christian converts emerged. The thousands of fisherfolk converted by the Portuguese missionaries had little in common with the Syrian Christians. Missionaries took two approaches. Robert de Nobili (16th–17th century) was a Jesuit of noble birth who accommodated to the existing Indian social order. He learned Tamil and Sanskrit and lived the life of a *sādhu* (wandering ascetic). He also tried to disassociate himself from the Portuguese missionaries who were converting the fisherfolk of low rank. These practices gave him wide acceptance among the Indian upper classes, but they brought him into conflict with his own church.

In the 19th century, Protestant missionaries arrived in India in large numbers. They insisted on social reform along with religious conversion; the result was that most of their converts were from the lowest social classes.

Caste distinctions among contemporary Indian Christians are breaking down at about the same rate as those among Indians of other faiths. In some instances the old traditions persist, and there are Catholic churches where members of each caste sit apart for worship.

Christian Catholic Church, conservative American Christian sect founded in Chicago in 1896 by John Alexander Dowie. A Congregational minister from Australia, Dowie became interested in faith healing and established a tabernacle and "healing rooms" in Chicago, where he attracted a large following. With many of his followers Dowie established an exclusive Christian community in nearby Zion, Ill., a city that he planned and that was settled in 1901. Business and industry were controlled by church officials, with Dowie as general overseer. Financial difficulties led to his being deposed in 1906, and he was succeeded by Wilbur Glenn Voliva. The church remained strong in Zion, but the city eventually welcomed other businesses and churches.

The Christian Catholic Church is biblically conservative and has stressed millennialist teachings. It has remained small, but congregations have been established in other cities, and foreign mission work is carried on. The church has become known for the Passion play that it has presented annually since 1935.

Christian Democratic Party (Italian political party): *see* Italian Popular Party.

Christian Democratic Union, German CHRISTLICH-DEMOKRATISCHE UNION (CDU), German political party advocating regulated economic competition and close cooperation with the United States in foreign policy. It held power in the Federal Republic of Germany from the establishment of the West German republic in 1948 until 1969 and again from 1982. It oversaw the reunification of Germany in 1990.

At the end of World War II, Christian Democratic parties began to win elections in the occupied zones of Germany, though the CDU did not coalesce into a national party until 1950. A coalition between the CDU and Bavaria's Christian Social Union (Christlich-Soziale Union; CSU), begun in Königstein in 1947, won West Germany's first election in August 1949; the CDU leader Konrad Adenauer became the republic's first chancellor. Through the 1950s the CDU-CSU and Adenauer, credited with West Germany's rapid economic recovery, won majorities and near majorities in national elections.

In the 1960s the issues of German alignment with Great Britain or France in the European Economic Community, of a West German détente with eastern Europe, and of the appropriate way to discourage rising right-wing sentiment led to disagreement in the CDU-CSU coalition. After the provincial elections of 1966, when the Free Democratic Party (Freie Demokratische Partei; FDP) abandoned its alliance with the CDU-CSU, the CDU-CSU formed a short-lived "grand coalition" with its chief rival, the liberal Social Democratic Party of Germany (Sozialdemokratische Partei Deutschlands; SPD). After the election of 1969, the SPD formed a parliamentary coalition with the FDP and won parliamentary control (1969–82). The CDU-CSU, an opposition party for the first time in its history, remained out of power until 1982, when the FDP abandoned its coalition with the SPD and formed a government with the CDU and CSU under CDU leader Helmut Kohl. This coalition, with Kohl as chancellor, presided over the unification of West and East Germany, which was formalized on Oct. 3, 1990. The coalition was further strengthened by support from former East German parties; it won united Germany's first legislative elections on Dec. 2, 1990. In the following years the CDU-led coalition faced public discontent over the economic burden of reunification, but the coalition retained power in the elections of 1994 with a reduced majority.

Christian education: *see* Sunday school.

Christian Endeavor, International Society of: *see* International Society of Christian Endeavor.

Christian Front, in American history, anti-Semitic and pro-Nazi organization active from about 1938 until the United States entered World War II. Under the banner of anti-communism, it openly and clandestinely encouraged boycotts of Jewish merchants, used the slogan "Buy Christian," and published the *Christian Index,* a directory of non-Jewish merchants in part of New York City. It received support from the Brooklyn *Tablet,* a Roman Catholic weekly newspaper. The Front became associated with the activities of the Reverend Charles E. Coughlin of Royal Oak, Mich., who regularly preached on radio; at a Front-sponsored anti-Semitic rally in New York City in May 1939, Father Coughlin's *Social Justice* was distributed. The July 1939 issue of that magazine presented the Front's expansion plan, but the group was soon quieted by a growing anti-Nazi sentiment as World War II began.

Christian Methodist Episcopal Church, black Methodist church in the United States, organized in 1870 as the Colored Methodist Episcopal Church; it officially adopted its present name in 1956. The church originated from a movement begun in 1866 within the Methodist Episcopal Church, South, to organize the black members into an independent church. At the founding convention in 1870 two bishops from the Methodist Episcopal Church, South, consecrated two black elders as the first bishops of the new church.

The church is Methodist in church government and doctrine. A general conference is held every four years.

Christian Reformed Church in North America, Protestant denomination that developed in the United States from a group that separated in 1857 from the Reformed Protestant Dutch Church (now the Reformed Church in America) and called itself the True Holland Reformed Church. It was strengthened in 1882 when joined by other dissenters from the Reformed Church in America who believed that the parent church should reject Freemasonry. In 1890 it united with the True Reformed Dutch Church of New York and New Jersey, which had been formed in 1822 by members who left the Reformed Protestant Dutch Church because of doctrinal disagreements. Also in 1890, the present name was adopted. The primary membership of the Christian Reformed Church, however, came from Dutch immigrants. Canadian churches were established early in the 20th century.

The Christian Reformed Church is a conservative body that maintains an orthodox interpretation of its doctrinal standards, the Heidelberg Catechism (1562), the Belgic Confession (1561), and the canons of Dort (1618–19). Although worship services were held in the Dutch language for many years, the English language is now used. The church supports a system of elementary and high schools. Its headquarters are in Grand Rapids, Mich.

Christian Science, a religious denomination founded in the United States in 1879 by Mary Baker Eddy, author of the book that contains the definitive statement of its teaching, *Science and Health with Key to the Scriptures.* About one-third of its nearly 3,000 congregations are located in 56 countries outside the United States, with membership concentrated in areas with strong Protestant traditions. It is widely known for its practice of spiritual healing, an emphasis best understood in relation to its historical background and teaching.

History, organization, and development. Christian Science came into prominence in late 19th-century America, when Darwinism, biblical criticism, and other secularizing influences were undermining the supernaturalist structure of Protestant orthodoxy. Troubled Christians, divided between what Mrs. Eddy aptly called a "stern Protestantism" and a "doubtful liberalism," found in it not only physical healing but also a renewed faith.

Reared in a strict Congregationalist home in rural New Hampshire, Mary Baker rebelled at an early age against the hellfire determinism of her father's stark Calvinist theology. Yet she retained from that stern Protestant heritage

a Bible-centred, though somewhat unorthodox, piety that prevented her from accepting the attenuated Christianity characteristic of liberal Unitarianism and, later, of Transcendentalism. Mounting personal misfortune and ill health impelled a deep-lying preoccupation with the question of God's responsibility for human suffering.

Concurrently, Mrs. Eddy's own search for health led her to experiment with various alternative healing methods, including homeopathy and the suggestive therapeutics of a charismatic healer from Maine named Phineas Parkhurst Quimby. Her intermittent association with him from 1862 to 1865 strengthened a belief she had already arrived at through experiments with homeopathy as to the basically mental nature of disease. It also spurred her own search for a universal spiritual principle, which she increasingly felt must underlie New Testament healing. The controversial question of Quimby's influence on her has been muddied for many years by conflicting approaches that have reflected partisan standpoints. More balanced evaluations include the recognition that Quimby was an important stimulus to Eddy's development but that the religious teaching of Christian Science as it finally emerged was essentially foreign to Quimby's thought—as his own son noted with some relief.

Mrs. Eddy's followers place the germination of Christian Science in 1866, shortly after Quimby's death. At that time, while reading an account of one of Jesus' healings in the New Testament, she experienced a sudden recovery from the effects of what was thought to be a severe accident. Controversy has surrounded the details of this incident, but it seems to have marked a redirection in her life, prompting several years of intense scriptural study and writing, together with further healing experiences through which she tested her developing conclusions. In 1870 she taught her first class and began to attract a following in the mill town of Lynn, Mass., near Boston, where she was to remain until 1882. In 1875 she published *Science and Health*, which she repeatedly revised over the next 35 years to make it more effective as the "textbook" for the study and practice of Christian Science.

In 1879 Mrs. Eddy and a group of 15 followers founded the Church of Christ, Scientist, with the aim of reinstating "primitive Christianity and its lost element of healing." It was not until her years in Boston from 1882 to 1889 that the movement began its stable, long-term growth, largely through the healing work carried on by students whom Mrs. Eddy instructed at the Massachusetts Metaphysical College, chartered by her in 1881. By the end of the decade almost 100 Christian Science congregations had formed, mostly in the Atlantic states and the Midwest. By 1895 there were about 250 Christian Science congregations, and by 1910 more than 1,200.

Mrs. Eddy devoted the last two decades of her life to protecting the Christian Science movement by providing it with a coherent institutional structure. Leaving Boston in 1889, she suspended operation of the movement's existing national organizations in preparation for a thoroughgoing restructuring of the church over the next decade. This began in 1892 with the reorganization of the Church of Christ, Scientist, into its present form as The Mother Church, the First Church of Christ, Scientist, in Boston, and its branches around the world.

The government of the church was set forth in Mrs. Eddy's *Manual of The Mother Church*, published in 1895. She revised and refined this small volume over the next 15 years, with the expressed intention that in its final form it might remain the permanent authority in her church when she was no longer personally present. Execution of the provisions of the *Manual* she entrusted to a five-member, self-perpetuating Board of Directors, while providing also for the "distinctly democratic" character of Christian Science branch churches, which are self-governing within the federal framework established by the *Manual*.

In the 20 years prior to 1930, Christian Science churches had increased from 1,213 to 2,400. Mrs. Eddy herself had felt strongly that numbers were no measure of spiritual vitality and, at a time when the church was already growing rapidly, had established the rule that membership statistics should not be made public. But a report of the U.S. Bureau of the Census in 1936 listed Mother Church membership in the United States at about 269,000. Other indicators point to a levelling off of growth during the 1930s and 1940s and further decline since then, except in some areas (notably some Third World countries) where membership increased in the 1970s.

Beliefs and practices. Christian Science subscribes to the essential Christian belief in an omnipotent, purposeful God distinct from man, accepts the revelatory authority (though not the verbal inerrancy) of the Bible, and holds the crucifixion and resurrection of Jesus Christ to be the central event in history, indispensable to the redemption of mankind. It departs from traditional Christianity in rejecting the deity (but not the divinity) of Jesus, seeing his life as uniquely exemplifying a divine sonship that, correctly understood, belongs to all men and women.

Unlike some forms of Protestant liberalism, however, Christian Science does not view Jesus as simply a moral exemplar. Rather, his healing works, as well as his own victory over death and the grave, are regarded as demonstrating that all the ills and limitations of the mortal state can be overcome in proportion as one gains "the mind of Christ," *i.e.*, a rooted understanding of man's true spiritual status. This requires a penetration beyond material appearances to a spiritual order of being that traditional orthodoxy associates with a heaven in the hereafter but that Christian Science considers to be a present fact of scientific demonstrability in human life.

From this standpoint, the ordinary material picture of man and the universe constitutes a drastic misconception or false sense of reality. Matter is seen not as a God-created substance but as a limited mode of human perception. Once one accedes to the proposition that matter is created by God, Mrs. Eddy argued, one has made a fatal compromise with materialism, holding God responsible for all suffering in the universe. Christian redemption is therefore held to include regeneration from all phases of mortality, or "the flesh." Redemption from sin is basic to this process, since sin in all its forms, from lust to subtle acedia, denies God's sovereignty by claiming that life, will, and mind evolve from brute matter rather than from Spirit. This fundamental error, while destructive in its effects, is regarded as hypnotic in operation, though having no more substance, legitimacy, or logical necessity than the limitations imposed on thought and action by belief in a flat Earth or a world of billiard-ball atoms. At the same time Mrs. Eddy, unlike some of her more optimistic followers, saw the regenerative process as a long and demanding one, calling upon the tough Christian virtues of patience and humility, repentance and cross-bearing. As she wrote in *Science and Health*, "We need 'Christ and him crucified.' We must have trials and self-denials, as well as joys and victories, until all error is destroyed."

This emphasis differentiates her teachings from a philosophic idealism that claims to interpret experience but not to affect it—as Christian Science most obviously does in its practice of healing. The cure of disease through prayer is seen as a necessary element in a full redemption from the flesh.

A Christian Scientist is not compelled by the church to employ spiritual means for healing, though persons depending on medical treatment would have small reason for seeking membership in a voluntary organization dedicated to purely spiritual healing. The church encourages members to be scrupulous about obeying public health laws, including quarantine regulations, the reporting of suspected contagious diseases, and immunization requirements where religious exemptions are not provided by law. They also generally employ the services of dentists and optometrists, and often those of physicians for such mechanical procedures as the setting of bones, as well as using a qualified doctor or midwife for the delivery of a child. Christian Scientists in need of nursing care can go to a Christian Science sanitorium or seek the services of a Christian Science nurse in the home.

Those engaged in the full-time healing ministry are called Christian Science practitioners and are listed monthly in a directory published in the denomination's major religious periodical, *The Christian Science Journal*. Practitioners usually charge a nominal amount and are paid by their patients, but they are required to devote their full time to the healing work.

Systematic study and prayer are considered basic to the ongoing life of the denomination and the readiness of its members to meet the challenges of Christian healing. All Christian Science churches maintain Reading Rooms for this purpose. Central in this study is the "Bible lesson-sermon" composed of passages from the Bible and *Science and Health* on 26 rotating subjects. The lessons from these two books (designated by Mrs. Eddy in 1895 as the dual "pastor" of the denomination) are studied daily by Christian Scientists and form the basis of the Sunday service, read by a first and second reader elected from the congregation. In this simple form of service, which shows the influence of its New England Puritan origin, there are no formally observed sacraments. Wednesday evening meetings include the sharing of healings and other experience by the congregation.

Significance. In the perspective of religious history, Christian Science is a small religious movement, but it has had significance out of proportion to its size. It is one of several lasting denominations indigenous to 19th-century America (the others being Mormonism, Jehovah's Witnesses, and Seventh-Day Adventists) and reflects in its own way the emphasis of many American religious groups in the radical Reformed Protestant tradition on the revitalization of primitive Christianity. Yet Christian Science has aroused considerable controversy as well as misunderstanding by its view of creation as wholly spiritual, a view that breaks decisively with traditional Christian cosmology as well as with traditional scientific materialism.

Its impact on the religious world has lain chiefly in the fact that it acts on the basis of this radical position through its ministry of spiritual healing. Many of the more than 50,000 testimonials of healing published in church periodicals since the beginning of the 20th century concern undiagnosed disorders, emotional problems, and illnesses clearly or possibly psychosomatic in nature. On the other hand, a substantial number of testimonials involve healing of conditions medically diagnosed as congenital, degenerative, or terminal. There has been little systematic evaluation of such healings in either religious or medical terms. there is little doubt, however, that this phenomenon has played a leading part in reawakening interest in spiritual healing among many mainstream denominations.

In social terms, the Christian Science movement has increasingly been perceived as anticipating the development of feminism in the religious world. While not a feminist as such,

Mrs. Eddy was clearly "liberated" herself, and she taught that the spiritual equality of men and women must have political and social effects. She remains, for many reasons, an extremely controversial figure. Only since the 1960s has scholarship begun to break through the traditional male stereotypes of women that strongly conditioned perceptions of her by early critics and biographers. In the Christian Science movement as a whole, women have had significant roles as practitioners and church officers.

The church is widely known for its publication of *The Christian Science Monitor,* an international daily newspaper published in Boston. (S.Go.)

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Christian Science Monitor, The, daily newspaper (except Saturdays and Sundays), published in Boston under the auspices of the Church of Christ, Scientist.

It was established in 1908 at the urging of Mary Baker Eddy, founder of the church, as a protest against the sensationalism of the popular press. The *Monitor* became famous for its thoughtful treatment of the news and for the quality of its long-range, comprehensive assessments of political, social, and economic developments. It is one of the most highly respected American newspapers.

At the time of its founding, the *Monitor* set out to address a national audience, and its circulation grew to 120,000 in its first decade. Notably under Erwin D. Canham, managing editor and editor from 1940 to 1964, it gained worldwide prestige. Its writers and editors are chosen with great care and have included many journalists of distinction. In 1965 the *Monitor* revised its format to five columns instead of eight and introduced larger type to enhance readability. Its appearance, traditionally austere, was enlivened somewhat by photographs on the front page, although the paper remained spare and quite selective in using illustrations.

In 1975 the paper again changed its format, this time to that of a tabloid. In the late 1980s colour photography was introduced. The newspaper does not accept advertising for alcohol, tobacco, books and motion pictures it deems salacious, or financial investments it considers questionable. In the late 1980s only limited national advertisements were accepted. *The Christian Science Monitor* appears mornings on Monday through Friday. In the early 1980s there were several regional editions. A weekly, international edition is published in England. In 1988 publication of a monthly newsmagazine, *World Monitor,* began.

Christian Social Union, German CHRISTLICH-SOZIALE UNION (CSU), conservative German political party that was founded in Bavaria (Bayern), West Germany, in 1946 by various Roman Catholic and Protestant groups and committed to free enterprise, federalism, and a united Europe that would operate under Christian principles.

From 1946 the CSU has held the government of Bavaria continuously with only one exception, in 1954–57, although, until it achieved an absolute majority in 1962, it was forced to form coalition governments with minor parties. On the national scene it has customarily cooperated closely with the Christian Democratic Union (CDU), which has operated in all the West German states except Bavaria. The CSU chairman from 1961 has been Franz Josef Strauss, a Bundestag member from 1949 and a frequent federal minister in CDU–CSU federal governments, notably minister of defense in 1956–62 and of finance in 1966–69. In the 1980 elections Strauss was the CDU–CSU candidate for chancellor, and the CDU–CSU defeat was a heavy blow to him. After the CDU–CSU victory in the 1983, elections Strauss was not given a cabinet seat, but five other CSU leaders were.

Christian Socialism, movement of the mid-19th century that attempted to apply the social principles of Christianity to modern industrial life. The term was generally associated with the demands of Christian activists for a social program of political and economic action on behalf of all individuals, impoverished or wealthy, and the term was used in contradistinction to laissez-faire individualism. Later, Christian Socialism came to be applied in a general sense to any movement that attempted to combine the fundamental aims of socialism with the religious and ethical convictions of Christianity.

Early in the 19th century, the French philosopher Henri de Saint-Simon expounded a "new Christianity" primarily concerned with the plight of the poor. Saint-Simonians believed that the keynote of social development would be a spirit of association, with religion as the dominating force, that would gradually supplant the prevailing spirit of egotism and antagonism in society. They advocated (among other things) that inheritance rights be abolished so that capital could leave the hands of self-seeking capitalists and be placed at society's disposal. The Saint-Simonians imagined this and other related actions would effectively end the exploitation of the poor.

The term Christian Socialism was first appropriated by a group of British men including Frederick Denison Maurice, novelist Charles Kingsley, John Malcolm Ludlow, and others, who founded a movement that took shape in England immediately after the failure of the Chartist agitation of 1848. Their general purpose was to vindicate for "the Kingdom of Christ" its "true authority over the realms of industry and trade," and "for socialism its true character as the great Christian revolution of the 19th century." Four years after Karl Marx characterized religion as "the opiate for the people," Kingsley (probably unaware of Marx's phrase) asserted that the Bible had been wrongly used as "an opium-dose for keeping beasts of burden patient while they were being overloaded" and as a "mere book to keep the poor in order" (in *Politics for the People,* 1848).

Inspired principally by the writings of Philippe-Joseph-Benjamin Buchez, a disciple of Saint-Simon, and by the emergence of cooperative societies in France, Ludlow—who had been reared and educated in France—enlisted other churchmen in an effort to promote the application of Christian principles in industrial organization. Stirred by the sufferings of the poor and by factory and workshop conditions, Ludlow's group vigorously criticized socially conservative Christianity and laissez-faire attitudes within the industrial sector. Urging, among other measures, that cooperation replace competition, they joined forces with the cooperativist movement and financed several small cooperative societies that favoured copartnership and profit sharing in industry. They created the Council for Promoting Working Men's Associations, and in 1854 they founded the Working Men's College in London. The movement as such dissolved in the late 1850s. Some members of the movement continued working for cooperativism, however, and numerous Christian Socialist organizations were formed in the 1880s and '90s in England.

In addition to the French Roman Catholic social movement long in existence, movements similar to Ludlow's took shape among French Protestants in the latter half of the 19th century. The Protestant Association for the Practical Study of Social Questions, founded in 1888, opposed bourgeois Protestantism while rejecting a strict, egalitarian socialism. In Germany, the movement for Christian social action in the late 19th century became associated with violent anti-Semitic agitation. Adolf Stoecker, a court preacher and a founder of the Christian Social Workers' Party, took a leading role in the anti-Semitic drive. In the United States, Henry James, Sr., the father of novelist Henry James and philosopher William James, had argued the identity of the aims of socialism and Christianity as early as 1849. The Society of Christian Socialists was organized in 1889. The first years of the 20th century witnessed the rise of the Social Gospel movement, which was an outgrowth of Christian Socialism that stressed the social aspect of salvation.

Christianae religionis institutio (Calvin): *see* Institutes of the Christian Religion.

Christiania (Norway): *see* Oslo.

Christianity, major religion, stemming from the life, teachings, and death of Jesus of Nazareth (the Christ) in the 1st century AD. Christians number more than 1,700,000,000 and can be divided among three principal groups: the Roman Catholic church, the Eastern Orthodox churches, and the Protestant churches.

A brief treatment of Christianity follows. For full treatment, *see* MACROPAEDIA: Christianity.

Christianity began as a movement within Judaism. Jesus was a Jew, as were his chief followers, the Apostles. His followers accepted him as the "Christ," or chosen one, sent to fulfill God's promise to Abraham, Isaac, and Jacob. Believers in the one eternal truth and one universal salvation celebrated the rites instituted by Christ, especially baptism and the Eucharist. Authority passed through the apostle Peter, and the teachings of Jesus were collected and eventually consolidated in a body of writing known as the Gospel. From the outset, therefore, an informal pattern of bishop, creed, and biblical canon existed. The Gospel met opposition within Judaism, and its message was spread instead among the

Gentile world by the apostle Paul, the great missionary of the church. In the Hellenistic world, the Christ was interpreted by 3rd-century apologists, such as Clement and Origen, in terms derived from Greek philosophy. The Gospel was also interpreted metaphysically, especially in Syria, Egypt, North Africa, and Persia, where conditions existed for an ascetic, otherworldly interpretation. Wherever Christianity caught on, tension with the community of nonbelievers was inevitable. Pagan practices, especially the worship by Romans of the caesar, conflicted with monotheism and other worldly concerns and led to persecution of the Christians. The struggles with universal and particular interpretations of Christian doctrine, as embodied in the Gnostic and Montanist heresies, tested catholic Christianity, which viewed itself as possessing identity and universality. Tensions between the church and "the world," viewed as distinct, were redirected in 313 when the Roman emperor Constantine was converted and the church triumphed over the world.

The middle age of Christianity was neither a "dark" age nor an "age of faith." With the conversion of the Roman world, a general council was established for adjudicating controversies. Council decisions from the 4th to the 6th centuries produced the dogma of the Trinity and the Person of Christ. Christianity's intellectual formulation befitted its new status as the dominant religion of the Mediterranean. At the same time, monasticism reasserted the value of spiritual life nurtured by living apart from the world. The Gospel and the remnants of classical learning were preserved. Augustine's *City of God* translated the monastic ideal into a philosophy of history that was to prevail for more than a millennium. Barbarian invasions and the loss of Eastern territory to Islām created a new geographical context and new tension between East and West. Ideologies and religious practices of the different cultures competed as Christianity strove to win the acceptance of both the Greeks and the Germanic tribes. The papacy, a unique Western development, was both a cause and an effect of the new conditions. Its authority finally secured Christianity in a land ruled by Germanic kings. Popes Gregory VII and Innocent III built the papacy into the great institutional achievement of the Middle Ages. Another development was the rediscovery of Aristotelian philosophy, which Aquinas incorporated into a grand systematic theology. Medieval spirituality was heightened by the piety of St. Bernard and St. Francis, but spiritual values were at times difficult to apply, as with the Spiritual Franciscans and their ideal of poverty. Although new interpretations of Christian life clashed with the authority of Rome, dissent played an important role, especially in the late Middle Ages.

The Reformation continued the late medieval tradition of dissent. Revelation, pure teaching, and apostolic order were set against the "externals" of the Roman Catholic Church. Reformers may be classed according to how radical were their protests: Martin Luther and the Anglicans were the most conservative in their treatment of medieval theology, piety, and polity; John Calvin, in Geneva, was less conservative; and the Anabaptists were least conservative of all. Despite differences, reformers emphasized the authority of the Bible over church traditions, insisted on the sovereignty of free grace in the forgiveness of sins, stressed "faith alone" as the condition of God's acceptance, and demanded participation of the laity in church life. Reformers had not intended to break from the church, but soon Christendom was divided and the West secularized. No political structure was believed capable of fully bearing the divine, and distrustful reformers had allied with the civil power over the Roman Catholic Church. Other factors contributed to the transformation of Christianity: the discovery of the Americas, the Renaissance, the dawn of modern science, the rise of capitalist economy, and the growth of nationalism. The result was the end of "established" Christianity as it had been known since Constantine's conversion.

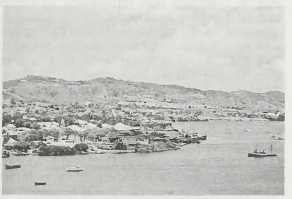
Paradoxically, the end of establishment coincided with the most rapid expansion in the history of Christianity. Africa, America, Asia, and Australia became missions for both Protestants and Roman Catholics. Modern Christianity lost prestige and authority, however, despite its rapid growth. The Enlightenment introduced toleration and religious liberty, and many Christians agreed with the modern political program out of concern for the freedom of personal faith. Disestablishment in America after the U.S. War of Independence was a prime expression of modern relations between church and state. Pietism, a personal approach to the new Protestant orthodoxy, unwittingly played into the hands of Enlightenment rationalists, who used it to undermine traditional belief. Sciences, especially geology and biology, clashed with cherished notions about the world and human nature. However, if the age of revolutions—political, intellectual, and technological—brought crisis to Christianity, it also brought opportunity. The 19th century, the great century of Christian missions, took the faith to every corner of the world. Critical methods of modern scholarship produced fresh editions of Christian texts: the Bible, the writings of the church founders and of the reformers, and devotional works from the Byzantine East. Such classics aroused unprecedented interest. The ecumenical movement of the 20th century renewed the effort to heal the schism within, and theologians creatively interpreted Christianity's relation to modern culture.

Christians of Saint Thomas, also called MALABAR CHRISTIANS, four major Christian groups—Syro-Malabar, Syro-Malankara, Syrian Jacobite, and Mar Thomite—living in the state of Kerala along the Malabar Coast of southwestern India, who claim to have been Christianized by the apostle St. Thomas.

The origins of the Christians of St. Thomas are uncertain, though they seem to have been in existence before the 6th century AD and probably derive from the missionary activity of the East Syrian (Nestorian) Church—which held that, in effect, the two natures of Christ were two persons, somehow joined in a moral union—centred at Ctesiphon. Despite their geographic isolation, they retained the Chaldean liturgy and Syriac language and maintained fraternal ties with the Babylonian (Baghdad) patriarchate; their devotional practices also included Hindu religious symbolism, vestiges of their early religion. Several mass migrations of Syrian Christians to the Malabar Coast (9th century) also strengthened their ties with the Middle East.

Contact with Rome was infrequent until the arrival of Portuguese missionaries in the early 16th century. The Portuguese, after initial professions of friendship, started a concerted effort to subject the Malabar Church to Roman obedience, replacing the local bishops with Portuguese ones and Latinizing the Malabar liturgy. In 1599 the Synod of Diamper, convened by the Portuguese archbishop Aleixo de Meneses, removed the Malabarese from the jurisdiction of the Chaldean (Nestorian) patriarch in India and placed them under the Latin-rite Portuguese; Latinized the liturgy; decreed priestly celibacy; and introduced the Inquisition. Consequently, the majority of the Christians of St. Thomas left Roman rule in 1653, swearing never to submit to Portuguese domination. When the news of the rebellion reached Rome, Pope Alexander VII sent the Syrian bishop Sebastiani at the head of a Carmelite delegation to Malabar in 1661 and established a hierarchy of Chaldean (formerly Nestorian) rite under Rome. By 1662 most of the Christians of St. Thomas (84 of 116 communities) had returned to Roman obedience (the Syro-Malabar); the rest joined the Syrian Jacobite (Monophysite) Church, brought to Malabar in 1665 by Bishop Gregorios from Jerusalem. The Jacobites adopted the Western Syrian language and Antiochene liturgy in their church. At the close of the 18th century, some of them fell under the influence of Anglican missionaries and established the Mar Thomite Church, which introduced many doctrinal and liturgical changes of a Western Protestant character. In 1930 the Syro-Malankara Church came into being as an Eastern rite of the Catholic Church when a large group of Jacobites under the leadership of Archbishop Mar Ivanios reunited with Rome; they were allowed to maintain their Antiochene liturgy.

Christiansted, also called BASSIN, chief town and port of St. Croix, U.S. Virgin Islands, on the northeastern coast of the island. Exports are mainly watches and rum. It was formerly capital of the Danish West Indies and was a boyhood residence (1765) of the American statesman Alexander Hamilton. Pop. (1980) 2,914.



Christiansted harbour on St. Croix island, U.S. Virgin Islands
Arthur Griffin—EB Inc

Christie, Dame Agatha (Mary Clarissa) (b. Sept. 15, 1890, Torquay, Devon, Eng.—d. Jan. 12, 1976, Wallingford, Oxfordshire), English detective novelist and playwright whose books have sold more than 100,000,000 copies.

Educated at home by her mother, she began writing detective fiction while working as a nurse during World War I. Her first novel, *The Mysterious Affair at Styles* (1920), introduced Hercule Poirot, her eccentric and egotistic Belgian detective, who reappeared in about 25 novels and many shorter stories before returning to Styles, where in *Curtain* (1975) he died. The elderly spinster Miss Jane Marple, her other principal detective figure, first appeared in *Murder at the Vicarage* (1930). Christie's first major recognition came with *The Murder of Roger Ackroyd* (1926), which was followed by some 75 novels that usually made best-sell-



Agatha Christie, 1946
UPI—EB Inc.

er lists and were serialized in popular magazines in England and the United States. Her plays include *The Mousetrap* (1952), which set a world record for the longest continuous run at one theatre (8,862 performances—more than 21 years—at the Ambassadors Theatre, London) and then moved to another theatre; and *Witness for the Prosecution* (1953), which, like many of her works, was adapted into a very successful film (1958). Other notable film adaptations include *Murder on the Orient Express* (1934; 1974) and *Death on the Nile* (1937; 1978).

Her first marriage, to Colonel Archibald Christie, ended in divorce in 1928. After her marriage in 1930 to the archaeologist Sir Max Mallowan, she spent several months each year on expeditions in Iraq and Syria with him. She also wrote romantic, nondetective novels, such as *Absent in the Spring* (1944), under the pseudonym Mary Westmacott. Her *Autobiography* (1977) appeared posthumously. She was created a Dame of the British Empire in 1971.

Christiern I–II: *see* Christian I–II *under* Christian (Denmark).

Christie's, officially CHRISTIE, MANSON & WOODS LTD., auction house founded in London in 1766 and now represented by offices and sales centres worldwide.

James Christie the Elder (1730–1803), a former navy officer, set up an auction house in Pall Mall, London, making his first sale on Dec. 5, 1766. On the same premises the Royal Academy of Arts held its exhibitions until 1779. Christie became the friend of such artists and craftsmen as Thomas Gainsborough, Sir Joshua Reynolds, and Thomas Chippendale, and his premises became a gathering place for collectors, dealers, and fashionable society. After the elder Christie died, his son James Christie the Younger (1773–1831) carried on the business, becoming an expert on ancient Greek and Italian vases and sculpture. In 1823 he moved the business to its present headquarters at 8 King Street, St. James's Square (vacated only from 1941 to 1953 because of war damage). After his death, the younger Christie's two sons, James Stirling and George Henry, took William Manson in as a partner and, later, a brother, Edward Manson. When Thomas J. Woods joined in 1859, the firm took its current name, Christie, Manson & Woods. Christie's became a public company in 1973.

From the 18th to the 20th century, Christie's handled many historic sales. Major events included negotiating the sale of Sir Horace Walpole's art collection to Catherine II the Great of Russia (1778), auctioning the contents of Sir Joshua Reynold's studio (1794), selling Madame du Barry's jewels (1795), managing the 40-day sale of the 2nd Duke of Buckingham and Chandos' Stowe House collection (1848), handling the 17-day Hamilton Palace sale of pictures (1882), selling pictures from Sir George Drummond's collection (1919), and handling the sale of the Ford Collection of Impressionist paintings (1980). In one year, 1990, the firm set two records—the sale of Vincent van Gogh's "Portrait of Dr. Gachet" for $82.5 million, then the most expensive painting ever sold at auction, and the sale of the Badminton Cabinet for $15.2 million, then the most expensive piece of furniture ever sold at auction.

Christie's publishes *Christie's International Magazine,* containing articles on collecting and news of upcoming sales. Subsidiary organizations are Christie's Appraisals; White Brothers, a major printing concern; Christie's Education, sponsor of the Fine Arts Course in London; and Phaidon/Christie's, publishers of art books.

Christina, Swedish KRISTINA (b. Dec. 8, 1626, Stockholm, Swed.—d. April 19, 1689, Rome [Italy]), queen of Sweden (1644–54) who stunned all Europe by abdicating her throne. She subsequently attempted, without success, to gain the crowns of Naples and of Poland. One of the wittiest and most learned women of her age, Christina is best remembered for her lavish sponsorship of the arts and her influence on European culture.



Christina, engraving by Cornelis Visscher published by P. Soutman, 1650
By courtesy of the Svenska Portrattarkivet, Stockholm

Christina was the daughter of King Gustav II Adolf and Maria Eleonora of Brandenburg. After her father died in the Battle of Lützen, Christina, his only heir, became queen-elect before the age of six. By his orders she was educated as a prince, with the learned theologian Johannes Matthiae as her tutor. Five regents headed by the chancellor Axel Oxenstierna governed the country. Her brilliance and strong will were evident even in her childhood. Oxenstierna himself instructed her in politics and first admitted her to council meetings when she was 14.

When Christina came of age and was crowned queen in 1644, she opposed Oxenstierna; and there was constant friction between them thereafter, particularly concerning the Thirty Years' War. In spite of his opposition, she was a prime mover in concluding the Peace of Westphalia (1648) and ending the war. An assiduous politician, Christina was able to keep the bitter class rivalries that broke out after the war from lapsing into civil war but was unable to solve the desperate financial problems caused by the long years of fighting. In the end, she had to recall Oxenstierna.

Highly cultured and passionately interested in learning, she rose at five in the morning to read and invited eminent foreign writers, musicians, and scholars to her court. The French philosopher René Descartes himself taught her philosophy and died at her court. For her wit and learning, all Europe called her the Minerva of the North; she was, however, extravagant, too free in giving away crown lands, and intent on a luxurious court in a country that could not support it and did not want it. Her reign was, nevertheless, beneficent: it saw the first Swedish newspaper (1645) and the first countrywide school ordinance; science and literature were encouraged, and new privileges were given to the towns; trade, manufactures, and mining also made great strides.

Christina's abdication after 10 years of rule shocked and confused the Christian world. She pleaded that she was ill and that the burden of ruling was too heavy for a woman. The real reasons, however, were her aversion to marriage and her secret conversion to Roman Catholicism, which was proscribed in Sweden. She chose her cousin Charles X Gustav as her successor, and, when he was crowned on June 6, 1654, the day of her abdication, Christina left Sweden immediately.

In December 1655 Pope Alexander VII received Christina in splendour at Rome. He was, however, soon disillusioned with his famous convert, who opposed public displays of piety. Although she was far from beautiful (short and pockmarked, with a humped right shoulder), Christina, by her manners and personality, created a sensation in Rome. Missing the activity of ruling, she entered into negotiations with the French chief minister, Cardinal Mazarin, and with the Duke di Modena to seize Naples (then under the Spanish crown), intending to become queen of Naples and to leave the throne to a French prince at her death. This scheme collapsed in 1657, during a visit by Christina to France. While staying at the palace of Fontainebleau, she ordered the summary execution of her equerry, Marchese Gian Rinaldo Monaldeschi, alleging that he had betrayed her plans to the Holy See. Her refusal to give reasons for this action, beyond insisting on her royal authority, shocked the French court, nor did the pope welcome her return to Rome.

In spite of this scandal, Christina lived to become one of the most influential figures of her time, the friend of four popes, and a munificent patroness of the arts. Always extravagant, she had financial difficulties most of her life: the revenues due from Sweden came slowly or not at all. She visited Sweden in 1660 and in 1667. On the second journey, while staying in Hamburg, she had Pope Clement IX's support in an attempt to gain another crown, that of her second cousin John II Casimir Vasa, who had abdicated the throne of Poland; but her failure seemed to please her since this meant that she could return to her beloved Rome. There she had formed a strong friendship with Cardinal Decio Azzolino, a clever, charming, prudent man, leader of a group of cardinals active in church politics. It was generally believed in Rome that he was her lover, a view sustained by her letters, which were decoded in the 19th century. With him, she, too, became active in church politics, insisting for years on the pursuance of the Christian war against the Turks. Pope Innocent XI, who pushed this war to its victorious conclusion, stopped her pension at her own urgent request in order to add it to the war treasury. In 1681, having secured a trustworthy administrator for her lands in Sweden, Christina at last became financially secure.

Christina's extraordinary taste in the arts has influenced European culture since her time. Her palace, the Riario (now the Corsini, on the Lungara in Rome), contained the greatest collection of paintings of the Venetian school ever assembled, as well as other notable paintings, sculpture, and medallions. It became the meeting place of men of letters and musicians. The Arcadia Academy (Accademia dell'Arcadia) for philosophy and literature, which she founded, still exists in Rome. It was at her instigation that the Tordinona, the first public opera house in Rome, was opened, and it was she who recognized the genius of and sponsored the composer Alessandro Scarlatti, who became her choirmaster, and Arcangelo Corelli, who directed her orchestra. The sculptor and architect Giovanni Bernini, her friend, considered her his saviour when she commissioned the art historian Filippo Baldinucci to write his biography while he was being discredited in 1680. Her enormous collection of books and manuscripts is now in the Vatican library. She was renowned, too, for her militant protection of personal freedoms, for her charities, and as protectress of the Jews in Rome.

Christina died in 1689, naming Cardinal Azzolino her heir; he died two months later, however. Christina's tomb is in St. Peter's Basilica in Rome. (Ru.S.)

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Christine DE PISAN (b. 1364, Venice [Italy]—d. *c.* 1430), prolific and versatile

French poet and author whose diverse writings include numerous poems of courtly love, a biography of Charles V of France, and several works championing women.

Christine's Italian father was astrologer to Charles V, and she spent a pleasant, studious childhood at the French court. At 15 she married Étienne du Castel, who became court secretary. Widowed after 10 years of marriage, she took up writing in order to support herself and her three young children. Her first poems were ballads of lost love written to the memory of her husband. These verses met with success, and she continued writing ballads, rondeaux, lays, and complaints in which she expressed her feelings with grace and sincerity. Among her patrons were Louis I, duke d'Orléans, the Duke de Berry, Philip II the Bold of Burgundy, Queen Isabella of Bavaria, and, in England, the 4th Earl of Salisbury.

In her *Épistre du dieu d'amours* (1399; "Letter from the God of Loves"), she defended women against the satire of Jean de Meun in the *Roman de la rose*. In *Le Livre de la cité des dames* (1405; *The Book of the City of Ladies*), she wrote of women known for their heroism and virtue. *Livre des trois vertus* (1406; "Book of Three Virtues") was a collection of moral instructions for women in the various social spheres. The story of her life, *La Vision de Christine* (1405), told in an allegorical manner, was a reply to her detractors.

At the request of the regent, Philip, duke of Burgundy, Christine wrote the life of the deceased king, Charles—*Livre des faits et bonnes moeurs du sage roi Charles V* (1404; "Book of the Deeds and Good Morals of the Wise King Charles V"), a firsthand picture of Charles V and his court.

Christine was devoted to France, and during the civil wars she wrote *Lamentations sur la guerre civile* (1410; "Lamentations on the Civil War") and *Livre de paix* (1413; "Book of Peace"), in which she urged harmony among the men of her country. After the disastrous Battle of Agincourt in 1415, she retired to a convent. Her last work was a lyrical, joyous outburst inspired by the early victories of Joan of Arc.

Christlich-Demokratische Union (German political party): *see* Christian Democratic Union.

Christlich-Soziale Union (German political party): *see* Christian Social Union.

Christmas (from Old English *Cristes maesse*, "Christ's mass"), Christian festival celebrated on December 25, commemorating the birth of Jesus Christ. It is also a popular secular holiday.

According to a Roman almanac, the Christian festival of Christmas was celebrated in Rome by AD 336. In the eastern part of the Roman Empire, however, a festival on January 6 commemorated the manifestation of God in both the birth and the baptism of Jesus, except in Jerusalem, where only the birth was celebrated. During the 4th century the celebration of Christ's birth on December 25 was gradually adopted by most Eastern churches. In Jerusalem, opposition to Christmas lasted longer, but it was subsequently accepted. In the Armenian Church, a Christmas on December 25 was never accepted; Christ's birth is celebrated on January 6. After Christmas was established in the East, the baptism of Jesus was celebrated on Epiphany, January 6. In the West, however, Epiphany was the day on which the visit of the Magi to the infant Jesus was celebrated.

The reason why Christmas came to be celebrated on December 25 remains uncertain, but most probably the reason is that early Christians wished the date to coincide with the pagan Roman festival marking the "birthday of the unconquered sun" (*natalis solis invicti*); this festival celebrated the winter solstice, when the days again begin to lengthen and the sun begins to climb higher in the sky. The traditional customs connected with Christmas have accordingly developed from several sources as a result of the coincidence of the celebration of the birth of Christ with the pagan agricultural and solar observances at midwinter. In the Roman world the Saturnalia (December 17) was a time of merrymaking and exchange of gifts. December 25 was also regarded as the birth date of the Iranian mystery god Mithra, the Sun of Righteousness. On the Roman New Year (January 1), houses were decorated with greenery and lights, and gifts were given to children and the poor. To these observances were added the German and Celtic Yule rites when the Teutonic tribes penetrated into Gaul, Britain, and central Europe. Food and good fellowship, the Yule log and Yule cakes, greenery and fir trees, and gifts and greetings all commemorated different aspects of this festive season. Fires and lights, symbols of warmth and lasting life, have always been associated with the winter festival, both pagan and Christian. Since the European Middle Ages, evergreens, as symbols of survival, have been associated with Christmas. Christmas is traditionally regarded as the festival of the family and of children, under the name of whose patron, Saint Nicholas (*q.v.*), or Santa Claus, presents are exchanged in many countries.

Christmas Atoll (Kiribati): *see* Kiritimati Atoll.

Christmas cactus (hybrid *Schlumbergera* × *buckleyi*), popular epiphytic cactus, with flattened stems, grown for its colourful cerise flowers that bloom indoors about Christmastime in the Northern Hemisphere. Most Christmas cacti now in cultivation are considered to be hybrids of the crab cactus (*S. truncata*) and *S. russelliana*. Like other *Schlumbergera* species, it is native to Brazil, growing in the rain forest perched on trees or shrubs or sometimes in shady places among rocks. The alternative genus name, *Zygocactus*, is frequently encountered.

Christmas cactus is often confused with the crab cactus, or Thanksgiving cactus (*S. truncata*, or *Epiphyllum truncatum*); however, in the former, the margins of the stem joints are rounded or crenated, whereas in the latter the margins are sharply saw-toothed. Thanksgiving cacti begin blooming in autumn and usually continue into midwinter. The long blooming period and the number of hybrids offering a wide range of flower colours have made the Thanksgiving cacti the more popular in the florist trade. Flower buds are initiated during the late summer and early fall as the hours of daylight decrease; cooler temperatures and reduced moisture during this time are important for maximum bloom.

The Easter cactus (*q.v.*), formerly classified as *S. gaertneri*, is now referred to as *Rhipsalidopsis gaertneri*.

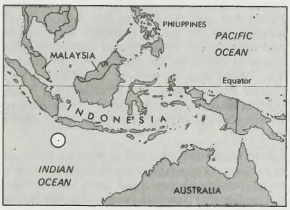
Christmas card, form of greeting card usually sent by mail as an expression of goodwill at Christmastime. The practice, which has been followed in all English-speaking countries, is growing in many others. Though wood engravers produced prints with religious themes in the European Middle Ages, the first Christmas card, as the term is now understood, is believed to have been designed in England in 1843. An edition of 1,000 copies was placed on sale in London. The design was of a family party, beneath which were the words "A Merry Christmas and a Happy New Year to You." In the United States, the owner of a variety store in Albany, N.Y., in the mid-19th century produced a card carrying Christmas greetings from "Pease's Great Variety Store in the Temple of Fancy."



The first Christmas card, designed by J.C. Horsley for his friend Sir Henry Cole, 1843
By courtesy of Hallmark Cards, Inc.

Christmas Island, island in the Indian Ocean, about 224 miles (360 km) south of the island of Java and 870 miles (1,400 km) northwest of Australia; it is administered as an external territory of Australia. It has an area of 52 square miles (135 square km) and comprises the summit of an oceanic mountain. The highest point on the island is Murray Hill, rising to 1,184 feet (361 m) above sea level in the western part of the island. The main settlement and chief port is at Flying Fish Cove on the northeastern part of the island.

First sighted in 1615 by Richard Rowe, master of the *Thomas*, the island was named on Christmas Day 1643 by Captain William



Christmas Island

Mynors of the British East India Company. In 1887 specimens of soil and rock were collected by the men of HMS *Egeria*; the British naturalist John Murray analyzed the specimens and found that they were nearly pure phosphate of lime. In 1888 the island was annexed by Great Britain, and the first settlement was established at Flying Fish Cove by George Clunies-Ross of Cocos (Keeling) Islands. A 99-year lease, granted in 1891 to Clunies-Ross and Murray, to mine phosphate and cut timber was transferred six years later to the Christmas Island Phosphate Company, Ltd., which was largely owned by the former lessees. In 1900 Christmas Island was incorporated in the British crown colony of the Straits Settlements with its capital at Singapore. During World War II the island was occupied by the Japanese. In 1948 the governments of New Zealand and Australia acquired the interests and assets of the Christmas Island Phosphate Company. The Christmas Island Phosphate Commission was established in 1949 to carry out mining and shipping operations on behalf of both governments. In 1958 the island became an Australian territory.

The central plateau of Christmas Island descends in an alternating series of slopes and terraces to abrupt cliffs over 65 feet (20 m) high along much of the coastline. There are also sand and coral beaches along the coast. Valuable deposits of phosphate occur on the island. There is a tropical rainy season between December and April and little seasonal variation in the average temperature of 81° F (27° C). Average annual rainfall is 113 inches (2,670 mm). Tropical rain forest covers most of Christmas Island, and fauna includes large

numbers of seabirds, small reptiles, land crabs, and insects. Springs and wells supply fresh water for the island's residents. Much of the western tip of the island is a national park.

The population, only one-third of which is female, includes about 73 percent Chinese and 9 percent Malay labourers recruited mainly from Malaysia, Singapore, and the Cocos (Keeling) Islands. There are also Australian management personnel. Most of the island's residents traditionally have been employees of the Phosphate Mining Company of Christmas Island, Ltd., which is owned by the Australian government. The territory's economy, based almost entirely on the mining and extraction of phosphate there for shipment to Australia and New Zealand, was undergoing change in the early 1990s. The recoverable reserves of phosphate were nearly exhausted, and other economic activities, such as tourism, had yet to be developed. Small-scale subsistence cropping and fishing are practiced, but most food is imported.

The Australian governor-general appoints an administrator of Christmas Island. The administrator has a staff for secretariat, education, postal, police, radio, and harbour duties. A locally elected assembly provides political representation for the islanders. Almost all of the island's residents are Australian citizens or residents under the statutes of the Christmas Island Act and the Citizenship Act. A small hospital on the island provides for medical and dental care. Primary and secondary education is based on an Australian curriculum. The island has an airfield used for weekly charter flights, roads, and a railway for transporting phosphate from the southern plateau to the port on Flying Fish Cove. Pop. (1989 est.) 1,232.

Christmas rose, also called WINTER ROSE, or BLACK HELLEBORE (species *Helleborus niger*), small poisonous perennial herb of the buttercup family (Ranunculaceae), known for its tendency to bloom from late autumn to early spring, often in the snow. It has evergreen compound leaves, of seven or more leaflets arranged like the fingers on a hand, that arise directly on leafstalks from the crown of the plant. The striking flowers, of five coloured sepals, are 5 to 7.5 cm (2 to 3 inches) across, are whitish to pinkish green, and appear during the winter, often at Christmas, in mild climates and in late spring in colder areas. Improved varieties include "Altifolius," somewhat taller, and "Potter's Wheel," with broader sepals. The Christmas rose flourishes in moist soil and partial shade in mild climates or in protected locations in colder areas and is sometimes forced to bloom in the greenhouse.

The closely related Lenten rose (*H. orientalis*), blooming later, with cream to purplish flowers in clusters of two to six, is popular in Europe.

Christmas tree, an evergreen, usually a balsam or douglas fir, decorated with lights and ornaments as a part of Christmas festivities. The use of evergreen trees, wreaths, and garlands as a symbol of eternal life was an ancient custom of the Egyptians, Chinese, and Hebrews. Tree worship, common among the pagan Europeans, survived after their conversion to Christianity in the Scandinavian customs of decorating the house and barn with evergreens at the New Year to scare away the devil and of setting up a tree for the birds during Christmastime; it survived further in the custom, also observed in Germany, of placing a Yule tree at an entrance or inside the house in the midwinter holidays.

The modern Christmas tree, though, originated in western Germany. The main prop of a popular medieval play about Adam and Eve was a fir tree hung with apples (paradise tree) representing the Garden of Eden. The Germans set up a paradise tree in their homes on December 24, the religious feast day of Adam and Eve. They hung wafers on it (symbolizing the host, the Christian sign of redemption); in a later tradition, the wafers were replaced by cookies of various shapes. Candles, too, were often added as the symbol of Christ. In the same room, during the Christmas season, was the Christmas pyramid, a triangular construction of wood, with shelves to hold Christmas figurines, decorated with evergreens, candles, and a star. By the 16th century, the Christmas pyramid and paradise tree had merged, becoming the Christmas tree.



Prince Albert, Queen Victoria, and the royal family gathered around the Christmas tree at Windsor Castle, from *The Illustrated London News,* 1848
J.R. Freeman & Co. Ltd.

The custom was widespread among the German Lutherans by the 18th century, but it was not until the following century that the Christmas tree became a deep-rooted German tradition. Introduced into England in the early 19th century, the Christmas tree was popularized in the mid-19th century by the German Prince Albert, husband of Queen Victoria. The Victorian tree was decorated with candles, candies, and fancy cakes hung from the branches by ribbon and by paper chains. Brought to North America by German settlers as early as the 17th century, Christmas trees were the height of fashion by the 19th century. They were also popular in Austria, Switzerland, Poland, and The Netherlands. In China and Japan, Christmas trees, introduced by western missionaries in the 19th and 20th centuries, were decorated with intricate paper designs.

Christo, in full CHRISTO JAVACHEFF (b. June 13, 1935, Gabrovo, Bulg.), environmental sculptor, noted for his controversial outdoor sculptures and displays of fabrics and plastics.

Christo attended the Fine Arts Academy in Sofia, Bulg., and had begun working with the Burian Theatre in Prague when the Hungarian Revolution of 1956 broke out. He fled to Vienna, where he studied for a semester, and then, after a brief stay in Switzerland, moved to Paris and began exhibiting his works with the *nouveaux réalistes.* In 1964 he relocated to New York City, where his art was seen as a form of Art Povera.

Christo's earliest sculptures were composed of cans and bottles, some as found, some painted or wrapped in paper, plastic, or fabric. The first larger works included "Dockside Packages" (1961; Cologne), "Iron Curtain—Wall of Oil Drums" (1962; Paris), and "Corridor Store Front" (1968; New York City). In the latter year he also completed a suspended 18,375-foot (5,600-metre) "air package" over Minneapolis, Minn., and "wrapped buildings" in Bern, Chicago, and Spoleto, Italy. His monumental later projects included "Valley Curtain" (1972; Rifle Gap, Colo.), "Running Fence" (1976; Marin and Sonoma counties, Calif.), and "Surrounded Islands" (1983; Biscayne Bay, Fla.). In 1985 in Paris, he wrapped the Pont Neuf (bridge) in beige cloth. In 1991 he created a display of umbrellas in the Japanese and California countrysides.

Christo's huge, usually outdoor sculptures are temporary, involve hundreds of assistants in their construction, are seen by viewers who would not necessarily visit museums, and force observers to reformulate their own aesthetics and views on the nature of art. His work is controversial, especially among environmentalists, but has for the most part been critically well received.

Christoffer (Danish, Norwegian personal name): *see under* Christopher.

Christophe, Henry (b. Oct. 6, 1767, Grenada?—d. Oct. 8, 1820, Sans Souci palace [now in National History Park—Citadel, Sans Souci, Ramiers], Haiti), a leader in the war of Haitian independence (1791–1804) and later president (1807–11) and self-proclaimed King Henry I (1811–20) of northern Haiti.

The facts of Christophe's early life are questionable and confused. An official document issued on his own order gives the birth date and birthplace conventionally cited, but these and other facts are debated by historians. He may have been born free but became enslaved as a youth. In any event, he reached Haiti sometime in his teens. In 1780, during the U.S. War of Independence, he may have fought in a French unit at Savannah, Ga., either as an enlistee or as the property of a French naval officer. Returning to Haiti, he apparently worked initially as a domestic in an inn called the Couronne, working his way up and marrying the proprietor's daughter. (Another story has him marrying the French naval officer's daughter after buying his freedom.)



Christophe, oil painting by Richard Evans, 1816; in the Museum of the National Pantheon, Port-au-Prince, Haiti
By courtesy of the Musee du Pantheon National, Port-au-Prince, Haiti

After the spirit of the French Revolution spread to Haiti, Christophe in 1793 openly embraced the party of the Haitian independence leader Toussaint-Louverture and became one of his chief lieutenants, fighting the French, the British, and the Spaniards. The French attempted to reconquer the colony in 1801, but Christophe held out until 1802, surrendering only on the promise of a pardon and retention

of his military rank in the French army. He later joined Jean-Jacques Dessalines in ousting the French and commanded the army under that ruler. After Dessalines's assassination he was appointed provisional chief of the nation by a military council. Although he thought despotism the only form of government for his people, he summoned a constituent assembly on Dec. 18, 1806.

Alexandre Sabès Pétion, Christophe's only rival for power, secured control in the south and west and thereby secured majority representation in the Assembly. He was appointed chairman to draft a constitution, which in its final form made Christophe little more than a figurehead. In retaliation, Christophe led his troops against Pétion but was defeated on Jan. 6, 1807, and he retreated north.

In northern Haiti, Christophe set up his own domain, which he ruled as King Henry I from 1811 and for which he created a hereditary nobility comprising 4 princes, 8 dukes, 22 counts, 37 barons, and 14 knights. He established an elaborate dress code and court ceremony and built himself eight palaces and six châteaus. During his reign he distributed plantations to military chiefs, restored soldier peasants to their former occupations, and maintained a general prosperity. He built the famous Citadelle Laferrière, a fortress south of his capital at Cap-Haitien. In August 1820 he suffered a paralytic stroke. When his condition was learned, revolts broke out. In despair over his failure to pacify the country, he shot himself, and his kingdom became part of the Haitian republic.

Christopher, name of rulers grouped below by country or papacy and indicated by the symbol •.

Foreign-language equivalents:

Danish	Christoffer
Latin	Christophorus
Norwegian	Christoffer, or Kristoffer
Swedish	Kristofer

Denmark

• Christopher III, also called CHRISTOPHER OF BAVARIA, Danish CHRISTOFFER AF BAYERN, Swedish KRISTOFER AV BAYERN, Norwegian CHRISTOFFER AV BAYERN (b. Feb. 26, 1418—d. Jan. 5, 1448, Hälsingborg, Den. [now in Sweden]), king of Denmark (1439–48), Sweden (1441–48), and Norway (1442–48) whose reign saw a sharp decline in royal power as a result of commercial domination by the north German trading centres of the Hanseatic League and increasing political authority of the Danish and Swedish state councils.

The son of John, count of the Upper Palatinate (Germany), Christopher succeeded his maternal uncle Erik of Pomerania as ruler of Denmark, Norway, and Sweden. Erik had been deposed in all of the three countries when dissident Swedish nobles opposed to his absolutist rule were supported by the Danish state council, which objected to the king's war against the Hanseatic League and the counts of Holstein. Christopher's accession restored peace and union in the three Scandinavian kingdoms.

Christopher quickly repressed a peasant rebellion in north Jutland (1441). He yielded, however, to the towns of the Hanseatic League and restored their commercial privileges in Scandinavia, despite the protests of Danish merchants. Denmark and Sweden came largely under the control of their councils of state, whereas Norway increasingly came under Danish domination. When Christopher died childless in 1448, the Scandinavian union was again dissolved.

Norway

• Christopher: *see* Christopher III (Denmark).

Papacy

• Christopher (b. Rome [Italy]—d. 904), antipope from 903 to 904. Once cardinal, he appears in many lists of the popes (including the *Liber Pontificalis,* edited by Louis Duchesne, and *Pontificum Romanorum*), but he is now regarded as an antipope. In the summer of 903 he drove Leo V from the papal chair but in January 904 was driven out, in turn, by the supporters of Bishop Sergius, who became Pope Sergius III. His only extant act was the confirming of the abbey of Corbie. It is presumed, particularly according to the writer Eugenius Vulgarius, that Christopher and his victim Leo were strangled in prison. But according to the chronicle of Hermann von Reichenau, Christopher was compelled to live his last days as a monk.

Sweden

• Christopher: *see* Christopher III (Denmark).

Christopher, COUNT OF OLDENBURG, German CHRISTOPH, GRAF VON OLDENBURG, Danish CRISTOFFER, GREVE AF OLDENBURG (b. *c.* 1504—d. Aug. 4, 1566, Rastede Monastery, Oldenburg [Germany]), professional soldier after whom the Count's War, Denmark's 1533–36 civil conflict, was named.

A leader of mercenary forces, Christopher's greatest opportunity for fame and power came in 1534, when he was given command over Danish and Lübeck forces favouring the restoration of King Christian II, who had been deposed in 1523. The count's forces were opposed by Danish, German, and Swedish forces favouring the candidacy of Duke Christian of Schleswig and Holstein (later King Christian III), the son of King Frederick I, who had died in 1533. The count's armies, after early successes, were soundly beaten in 1535. After a prolonged defense of Copenhagen with the remnants of his forces, Christopher surrendered to King Christian III in the summer of 1536. Christopher then returned to his former, lesser role in the service of various German princes.

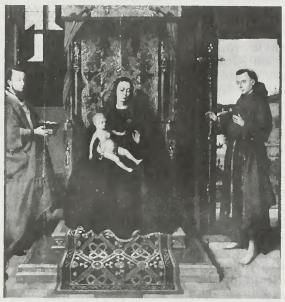
Christopher, SAINT (fl. *c.* 3rd century; Western feast day July 25; Eastern feast day May 9), patron saint of travelers and, in the 20th century, of motorists. Though one of the most popular saints, there is no certainty that he existed historically. According to the Roman martyrology, he died in Lycia under the Roman emperor Decius (*c.* 250). He is the hero of many later legends, which represent him as a giant who, after being converted, devoted his life to carrying travelers across a river. One day a small child asked to be transported, and in the middle of the river the child became so heavy that Christopher staggered under the burden, complained of the weight, and was told that he had borne upon his back the world and Him who created it. Hence, Christopher (Greek: "Christ-Bearer") is generally represented in art carrying the Christ child on his back. In 1969 his name was dropped from the calendar of the Roman Catholic church, and his feast day is no longer obligatory.

Christophorus (Latin personal name): *see under* Christopher.

Christ's thorn, any of several prickly or thorny shrubs, particularly *Paliurus spina-christi,* of the buckthorn family (Rhamnaceae). *P. spina-christi* is native to southern Europe and western Asia. It grows about 6 m (20 feet) tall and is sometimes cultivated in hedges. The alternate leaves are oval and finely toothed. The very small, greenish yellow flowers, which grow in small clusters, are followed by brownish yellow, leathery fruit. The sturdy thorns are straight or slightly hooked.

Christus, Petrus (b. *c.* 1420, Baerle, Brabant [now in Belgium]—d. 1472/73, Bruges), Flemish painter who reputedly introduced geometric perspective into the Netherlands.

In 1444 Christus became a citizen of Bruges, where he worked until his death. He is believed to have been trained in Jan van Eyck's studio. His naturalistic mature style, characterized by jewellike execution, is a simplified adaptation of his supposed master's style. But some of his motifs and compositions were drawn from the emotional tradition of Early Netherlandish art.



"Virgin with SS. Jerome and Francis," by Petrus Christus, probably 1457; in the Städelsches Kunstinstitut, Frankfurt am Main, Ger.

By courtesy of the Städelsches Kunstinstitut, Frankfurt am Main, Ger.

Christus' historical significance lies primarily in his intense interest in the definition of space; his "Virgin with SS. Jerome and Francis" is the earliest Netherlandish painting with a single vanishing point. Among Christus' most important paintings are "Portrait of a Carthusian" (1446), "St. Eligius" (1449), the "Virgin with SS. Jerome and Francis" (probably 1457), and the "Virgin with Child, St. Barbara and a Carthusian Monk."

Christy, Edwin P. (b. May 21, 1815, Philadelphia, Pa., U.S.—d. May 21, 1862, New York, N.Y.), early American minstrel show performer who founded (*c.* 1842) the Christy Minstrels, the most important of the early minstrel companies, and who originated the format of the typical minstrel show (*q.v.*).

Details of his early life are unknown. He first performed with his Christy Minstrels in Buffalo, N.Y., in 1842. Four years later his troupe appeared in New York City and played there successfully for nearly 10 years. During this period Stephen Foster wrote some of his best-known songs for Christy's shows. The troupe's later appearance in England popularized minstrel shows in music halls for many years and made "Christy minstrels" or "Christys" synonymous with that type of entertainment. After Christy retired in 1854, the troupe continued without him. He died after jumping from a window while insane.

Chrodigild, also spelled CHRODECHILDE (Frankish queen): *see* Clotilda, Saint.

chromaffinoma (tumour): *see* pheochromocytoma.

chromate mineral, any member of a small group of rare inorganic compounds that have formed from the oxidation of copper-iron-lead sulfide ores containing minor amounts of chromium. A noteworthy occurrence is at Dundas, Tasmania, known for its large, brilliant orange prismatic crystals of crocoite; of trivial economic importance, crocoite is one of the most highly prized of minerals among collectors and museums.

The basic structural unit of the chromate minerals is a tetrahedron formed from four oxygen atoms, each at one corner of a tetrahedron surrounding a central chromium atom; thus each CrO_4 tetrahedron has a net electric charge of -2, which is neutralized by metal ions outside the tetrahedron.

chromaticism (from Greek *chroma,* "colour"), in music, the use of notes foreign to the mode or diatonic scale upon which a composition is based, introduced in order to intensify or colour the melodic line or harmonic texture. In ancient Greek music, the term referred to the tetrachord (*q.v.*), or four-note series, that contained two half steps. Later, in European music, "chromatic" was applied to optional notes supplementing the diatonic (seven-note) scales and modes, because these notes produced halftone steps that were extraneous to the basic scale or mode. A full set of chromatic tones added to any diatonic scale produces a chromatic scale, an octave of 12 semitones.

In European medieval and Renaissance music, chromaticism was associated with the practice of musica ficta (*q.v.*), which facilitated, and in some instances mandated, halftone steps foreign to the church modes of that time. In the 16th and early 17th centuries, notably in the secular Italian and English madrigal, chromaticism was widely used to heighten expressiveness to the extent that eventually the traditional modes appeared irrelevant.

The 16th-century European preoccupation with ancient Greek sources in turn contributed to a growing theoretical interest in the chromatic gender of classical antiquity. The so-called monodic revolution brought all these and related developments to an inevitable head so that, by the middle of the 17th century, functional harmony based on the diatonic major and minor scales was beginning to assert itself as the primary structural device in Western music.

In functional harmony, chromaticism permits long-range modulation (changes of key) as well as momentary expressiveness. Its expressive potential was increasingly exploited for dramatic or pictorial purposes by both Classical (*e.g.,* "The Representation of Chaos" at the beginning of Joseph Haydn's oratorio *The Creation*) and Romantic composers.

By the late 19th century, the progressive reliance on chromaticism threatened the very survival of functional harmony, just as it had interfered with modality three centuries earlier. Already in some of Richard Wagner's music, chromaticism was so extensive that it undermined any immediate sense of tonal direction, and, by the time of such post-Wagnerians as César Franck and Max Reger, tonal stability had yielded to the tonally ambivalent enchainments of chromatically related chords. In the early 20th century, Arnold Schoenberg and others proceeded to reject the diatonic (seven-note) major and minor scales altogether in favour of a 12-note chromatic scale in which no note is allowed to predominate (*see* twelve-tone music). Others, including Igor Stravinsky and Sergey Prokofiev, freely intermixed diatonic and chromatic elements.

chromatography, method for separating chemical substances that makes use of the relative rates at which they are adsorbed from a moving stream of gas or liquid on a stationary substance, which is usually a finely divided solid, a sheet of filter material, or a thin film of a liquid on the surface of a solid. It is a versatile method that can separate very complex mixtures even in the absence of detailed previous knowledge of the number, nature, or relative amounts of the individual substances present.

A brief treatment of chromatography follows. For full treatment, *see* MACROPAEDIA: Analysis and Measurement, Physical and Chemical.

Chromatography depends for its separating ability on differential retardation or retention caused by unequal adsorption of the different components carried along by a stream of inert liquid or gas. The method is widely used for the separation of chemical compounds of biological origin (for example, amino acid fragments of proteins) and of complex mixtures of petroleums and volatile aromatic mixtures, such as perfumes and flavours (which can contain hundreds of different components). Chromatography is carried out by passing a gas or liquid (the mobile phase) containing the unknown mixture over or through an adsorbing material (the stationary phase) of high surface area. The components of the mixture will be separated by the stationary phase and can be identified individually. Further analysis can be carried out by subjecting the separated components to mass spectrometry.

Chromatography was originally used for the separation of coloured compounds (hence the name), notably by the Russian botanist Mikhail Tsvet (or Tswett), who investigated mixtures of plant pigments by adding solutions of these mixtures to the top of a column of powdered alumina and washing the column with an organic solvent. The pigments then separated into series of discrete coloured bands in the column. Each component thus isolated can be recovered either by extruding the solid column and physically separating the different bands or by using carefully chosen solvents to wash them off the column separately, a technique known as elution. Tsvet's method was neglected for many years, but since the 1930s it has been extensively used for identifying many biologically important materials, especially after it was adapted to use filter paper as the support. With suitable apparatus, mixtures applied to the paper can be separated in two dimensions; paper chromatography has been widely used to study colourless amino acids, steroids, carbohydrates, and other complex materials of natural origin. The components on the eluted paper appear as coloured spots when sprayed with suitable developing fluids.

Gas chromatography, which employs a gaseous mobile phase, is carried out in either a packed or capillary column configuration. In a packed column a solid support, contained in a metal or glass tube, serves as the stationary phase or is coated with a liquid stationary phase. Capillary columns are small-diameter tubes whose walls are coated with the stationary phase. Mixtures injected into the inlet of the column are driven by compressed gas (usually hydrogen or helium), and the components appear in well-separated zones. Several methods of detection of the eluted components are employed, notably devices that compare the thermal conductivity of the separated gas with that of a reference gas stream. Alternatively, in the flame ionization detector, the separated gas stream is mixed with hydrogen and burned; the resulting ions are detected by their ionization potential. This method is widely used for detection of microgram quantities of hydrocarbons.

Liquid chromatography is performed either in a column or on a plane. The most widely used columnar liquid technique is high-performance liquid chromatography, in which a pump forces the liquid mobile phase through a high-efficiency, tightly packed column at high pressure. Detection is accomplished by measuring some property of the sample components, such as absorbence or fluorescence.

In supercritical-fluid chromatography, the mobile phase is a supercritical fluid, a vapour phase that has reached a specific temperature beyond which it can no longer condense to a liquid regardless of how high the pressure is raised. This method is particularly useful in separating compounds that are thermally unstable, nonpolar, or nonvolatile.

chromatophore, pigment-containing cell in the deeper layers of the skin of animals. Depending on the colour of their pigment, chromatophores are termed melanophores (black), erythrophores (red), xanthophores (yellow), or leucophores (white). The distribution of the chromatophores and the pigments they contain determine the colour patterns of an organism.

chromite, relatively hard, metallic, black oxide mineral of chromium and iron ($FeCr_2O_4$) that is the chief commercial source of chromium. It is the principal member of the spinel series of chromium oxides; the other naturally occurring member is magnesiochromite, oxide of magnesium and chromium ($MgCr_2O_4$). Chromite is commonly found as brittle masses in peridotites, serpentines, and other basic igneous and metamorphic rocks; an unusual occurrence is as a crystalline inclusion in diamond. The earliest worked deposits were those in the serpentine of the Bare Hills near Baltimore, Md., U.S. The principal producing areas of chromite are South Africa, Russia, Albania, the Philippines, Zimbabwe, Turkey, Brazil, India, and Finland. For detailed physical properties, *see* oxide mineral (table).

chromium (Cr), chemical element of Group VIb of the periodic table, a hard, steel-gray metal that takes a high polish and is used in alloys to increase strength and corrosion resistance. Chromium was discovered (1797) by the French chemist Louis-Nicolas Vauquelin and isolated as the metal a year later; it was named for its multicoloured compounds. The green colour of emerald, serpentine, and chrome mica and the red colour of ruby are due to chromium.

Occurrence, uses, and properties. Chromium is a relatively abundant element in the Earth's crust. It is widely dispersed in natural deposits, where it is always combined with other elements, especially oxygen. Chromite ($FeCr_2O_4$) is the only important commercial mineral.

Chromium is added to iron and nickel in the form of ferrochromium (about 70 percent chromium) to produce alloys specially characterized by their high resistance to corrosion and oxidation. Used in small amounts, chromium hardens steel. Stainless steels are alloys of chromium and iron in which the chromium content varies from 10 to 26 percent. Chromium alloys are used to fabricate such products as oil tubing, automobile trim, and cutlery. Chromite is used as a refractory and as a raw material for the production of chromium chemicals.

For additional treatment of chromium metal and its production, *see* MACROPAEDIA: Industries, Extraction and Processing.

Natural chromium consists of a mixture of four stable isotopes: chromium-52 (83.76 percent), chromium-53 (9.55 percent), chromium-50 (4.31 percent), and chromium-54 (2.38 percent). The metal is paramagnetic (weakly attracted to a magnet). It exists in two forms: body-centred cubic (alpha) and hexagonal close-packed (beta). At room temperature, chromium slowly dissolves in hydrochloric and dilute sulfuric acids. Certain oxidizing agents produce a thin oxide layer on the metal, rendering it passive also to dilute mineral acids, such as sulfuric. At ordinary temperatures the metal shows no reaction to seawater or to wet or dry air.

Principal compounds. The most common oxidation states of chromium are +6, +3, and +2. A few stable compounds of the +5, +4, and +1 states, however, are known.

In the hexavalent state, the most important species formed by chromium are the chromate(VI), CrO_4^{2-}, and dichromate(VI), $Cr_2O_7^{2-}$, ions. These ions form the basis for a series of industrially important salts. Among them are sodium chromate, $NaCrO_4$, and sodium dichromate, $Na_2Cr_2O_7$, which are used in

leather tanning, in metal surface treatment, and as catalysts in various industrial processes.

Chromium forms several commercially valuable oxygen compounds, the most important of which is chromium(VI) oxide, commonly called chromium trioxide or chromic acid, CrO_3. An orange-red crystalline solid, chromatic acid liquefies gradually when exposed to moist air. It is usually produced by treatment of sodium dichromate with sulfuric acid. Chromic acid is used chiefly for chromium plating but is also employed as a colorant in ceramics. It is a powerful oxidant and may react violently with some organic materials, but such solutions are often utilized by controlled oxidations in organic synthesis.

Another significant oxygen compound is chromium(III) oxide, also known as chromium sesquioxide or chromic oxide, Cr_2O_3. It is prepared by calcining sodium dichromate in the presence of carbon or sulfur. Chromium oxide consists of a green powder and is employed extensively as a pigment; its hydrate form, known as Guignet's green, is used when chemical and heat resistance are required.

atomic number	24
atomic weight	51.996
melting point	1,890° C (3,434° F)
boiling point	2,482° C (4,500° F)
specific gravity	7.20 (28° C)
valence	2, 3, 6
electronic config.	2-8-13-1 or $(Ar)3d^54s^1$

chromo (printmaking): *see* oleograph.

chromoblastomycosis, infection of the skin and subcutaneous tissues characterized by the development of warty lesions, usually on the foot and leg, occurring as a result of traumatic inoculation with any of several saprophytic fungi (genera *Phialophora, Cladosporium,* and *Hormodendrum* [or *Fonsecaea*]). The lesions develop over a period of years and usually remain localized; metastases (transfers from one site to another) are very rare. Treatment is by excision of the lesions, by iodide or X-ray therapy, or by local injection of the antibiotic amphotericin B.

chromolithograph (printmaking): *see* oleograph; lithography.

chromophobe adenoma, common form of pituitary tumour and the most common cause of enlargement of the sella turcica, the bone "cavity" that houses the pituitary. Only rarely are chromophobe adenomas true cancers, and calcium deposits occur in only about 6 percent of the cases. Enlargement of the pituitary fossa may also occur, however, with extra-pituitary tumours in the brain, with Hodgkin's disease, or with extensions from cancer elsewhere in the body. It may also become enlarged during pregnancy, in myxedema or cretinism, by dilation of a nearby artery following a localized hemorrhage, or as a result of increases in intracranial pressure.

With appropriate staining techniques, such chromophobe tumours often prove to consist of amphophils—cells that are capable of secretory activity. Inappropriately high amounts of vasopressin may also occur in the plasma and urine of individuals with a chromophobe adenoma, perhaps because the tumour is secreting this polypeptide or because somehow the rate of its production is increased by the hypothalamus.

The operative mortality with surgical removal of a chromophobe adenoma ranges between 5 and 15 percent. The appearance of sudden blindness, however, in a person with a chromophobe adenoma is an indication that a hemorrhage has occurred in the tumour and is a signal for instant surgery if vision is to be restored. The relative ineffectiveness of irradiation in the treatment of chromophobe pituitary adenomas in the past has been partially canceled by the use of higher voltages directed more precisely at the tumour. Though results with X-ray irradiation of the adenoma may equal those seen following surgical removal, better results may be obtained by combining the two forms of therapy.

chromophore, a group of atoms and electrons forming part of an organic molecule that causes it to be coloured.

Correlations between structural features of compounds and their colours have been sought since about 1870, when it was noted that quinones and aromatic azo and nitro compounds often are highly coloured and that the colours are diminished or destroyed when the compounds are hydrogenated. The ability of a compound to take up hydrogen, called unsaturation, is caused by the presence of electrons that are not strongly fixed in covalent bonds between particular pairs of atoms but occupy larger regions of space (molecular orbitals) that may be associated with several atoms. These electrons can absorb energy from light over a certain range of wavelengths in the visible region; transmission or reflection of the remainder of the light gives rise to the observed colour of the compound. Deep coloration results if several chromophores are closely joined in the same molecule or if another group, called an auxochrome (*q.v.*), is present.

Consult the INDEX *first*

chromosomal disorder, any syndrome characterized by malformations or malfunctions in any of the body's systems, caused by abnormal chromosome number or constitution. Normally, humans have 46 chromosomes arranged in 23 pairs; the pairs vary in size and shape and are numbered by convention. Twenty-two of the pairs are autosomes, and one pair, number 23, is the sex chromosomes. Any variation from this pattern causes abnormalities. A chromosome from any of the pairs may be duplicated (trisomy) or absent (monosomy); an entire set of 23 chromosome pairs can be duplicated three (triploidy) or more (polyploidy) times; or one arm or part of one arm of a single chromosome may be missing (deletion). Part of one chromosome may be transferred to another (translocation), which has no effect on the person in which it occurs but generally causes a deletion or duplication syndrome in his or her children. Changes in chromosome number occur during sperm or egg formation or in the early development of the embryo. In the latter case, a mixture of cells, some normal (euploid) and some containing abnormal chromosome complements, may occur, a condition known as mosaicism. In either case, abnormalities of development occur because of the unusual genetic signals transmitted by the chromosomes. Some one of these chromosome imbalances occurs in 0.5 percent of all births.

Down syndrome (mongolism), trisomy of chromosome 21, was the first chromosomal disorder identified (in 1959); it is the most common trisomy and the most common cause of mental retardation. Mental retardation is perhaps the most common manifestation of chromosomal abnormalities, occurring to some extent in all major autosomal abnormalities. Several chromosomal abnormalities, including Down syndrome, have also been related to heart disease or malformations. Other evidence of chromosome abnormalities include abnormal sexual development, behavioral disturbances, malignancy (*e.g.,* the Philadelphia chromosome in chronic myelocytic leukemia), and spontaneous abortion.

Sex chromosome abnormalities are more common and tend to have less-drastic effects than autosomal abnormalities. Normal females have two X chromosomes and males have an X and a Y; abnormalities in sex chromosome distribution produce Turner's syndrome (XO), Klinefelter's syndrome (XXY), and the so-called "supermale" (XYY). Turner's and Klinefelter's individuals have female and male genitalia, respectively, with retarded development of sexual characteristics. Supermales tend to be taller than average and to have learning disabilities. In addition, some studies have revealed that the percentage of XYY individuals in institutions for the criminally insane exceeds the incidence of supermaleness in newborn male populations. However, many XYY are socially well adjusted, and the link between supermaleness and criminal behaviour is highly debatable.

Several chromosomal disorders can now be diagnosed before birth by examining cells obtained from the amniotic fluid. *See also* Down syndrome; D_1-trisomy; E-trisomy; cri-du-chat syndrome; mosaicism; Turner's syndrome; X-trisomy; Klinefelter's syndrome; XYY-trisomy.

chromosome, the microscopic, threadlike part of the cell that carries hereditary information in the form of genes. The structure and location of chromosomes is one of the chief differences between the two basic types of cells: prokaryotic cells and eukaryotic cells. Among organisms with prokaryotic cells (*i.e.,* bacteria and blue-green algae), chromosomes consist entirely of deoxyribonucleic acid (DNA). The single chromosome of a prokaryotic cell is not enclosed within a nuclear membrane. Among all other organisms (*i.e.,* the eukaryotes), the chromosomes are contained in a membrane-bound cell nucleus. The chromosomes of a eukaryotic cell consist primarily of DNA attached to a protein core. They also contain ribonucleic acid (RNA). Among both prokaryotes and eukaryotes, the arrangement of components in the DNA molecules determines the genetic information. The remainder of this article pertains to eukaryotic chromosomes.

Every species has a characteristic number of chromosomes (chromosome number). In species that reproduce asexually, the chromosome number is the same in all the cells of the organism. Among sexually reproducing organisms, the number of chromosomes in the body (somatic) cells is diploid (2n; a pair of each chromosome), twice the haploid (1n) number found in the sex cells, or gametes. The haploid number is produced during meiosis (*q.v.*). During fertilization, two gametes combine to produce a zygote, a single cell with a diploid set of chromosomes. *See also* polyploidy.

Somatic cells reproduce by dividing, a process called mitosis (*q.v.*). Between cell divisions the genetic material (chromatin) is diffused throughout the nucleus in a tangled network of filaments called chromonemata. These long filaments are formed from the uncoiled chromosomes and probably provide a large surface area, thereby facilitating DNA synthesis. During this phase, DNA duplicates itself in preparation for cell division.

At the onset of cell division, the chromonemata coil up and are surrounded by a protein sheath, forming a tiny rod, or chromosome. Each chromosome actually consists of a set of duplicate chromatids that are held together by the centromere. The centromere is the point of attachment to the spindle fibres (part of a structure that pulls the chromatids to opposite ends of the cell). During the middle stage in cell division, the centromere duplicates, and the chromatid pair separates; each chromatid becomes a separate chromosome at this point. The cell divides, and both of the daughter cells have a complete (diploid) set of chromosomes. The chromosomes uncoil in the new cells, again forming the diffuse network of filaments.

Among many organisms that have separate

sexes, there are two basic types of chromosomes: sex chromosomes and autosomes. Autosomes control the inheritance of all the characteristics except the sex-linked ones, which are controlled by the sex chromosomes. Humans have 22 pairs of autosomes and one pair of sex chromosomes (*see* sex chromosome). All act in the same way during cell division. For information on sex-linked characteristics, *see* linkage group.

Chromosome breakage is the physical breakage of subunits of a chromosome. It is usually followed by reunion (frequently at a foreign site, resulting in a chromosome unlike the original). Breakage and reunion of homologous chromosomes during meiosis is the basis for the classical model of crossing over, which results in unexpected types of offspring of a mating.

chromosphere, lowest layer of the Sun's atmosphere, several thousand kilometres thick, above the bright photosphere and below the extremely tenuous corona. Named by the English astronomer Joseph Norman Lockyer in 1868, the chromosphere (colour sphere) appears briefly as a bright crescent, red with hydrogen light, during solar eclipses when the body of the Sun is almost obscured by the Moon. Except during eclipses, it can be observed only with special instruments—*i.e.*, the spectroheliograph or coronagraph. The lower chromosphere was formerly called the reversing layer because it was thought to be responsible for producing the dark lines of the solar spectrum that appear reversed against the bright continuous spectrum; actually the weak dark lines and bright continuum can be produced in essentially the same regions, stronger lines being produced at higher levels. The term reversing layer is now seldom used. The lower chromosphere is more or less homogeneous; the upper contains comparatively cool columns of ascending gas known as spicules, having between them hotter gas much like that of the corona, into which the upper chromosphere merges gradually. Temperatures in the chromosphere range from about 4,500 to 100,000 K, increasing with altitude. Solar flares and prominences are primarily chromospheric phenomena.

chronic fatigue syndrome (CFS), also called POSTVIRAL FATIGUE SYNDROME, or LOW NATURAL KILLER CELL SYNDROME, disorder characterized by at least six months of debilitating fatigue that begins suddenly and is usually accompanied by mild fever, sore throat, tender lymph nodes, muscle pain and weakness, joint pain, headache, sleep disorders, confusion, memory loss, and visual disturbances. Once routinely dismissed as an imagined rather than a specific physical condition, chronic fatigue syndrome remains controversial. Indeed, many authorities still question whether it is a distinct disorder. No definitive diagnostic test has been developed yet, and CFS is commonly confused with such illnesses as chronic Epstein-Barr virus infection and myalgic encephalomyelitis. Although a number of theories about the cause of CFS have been advanced, not one has been proved. No effective treatment has been found, but only a few sufferers become progressively worse; most improve gradually, and some eventually achieve full recovery.

chronic granulomatous disease, rare inherited (X-linked or autosomal recessive) disease characterized by the development of minute abscesses in the viscera and lymph system; it is caused by defective ability of the white blood cells to destroy invading bacteria by phagocytosis (ingestion and digestion). Affected persons are particularly susceptible to common staphylococcus and coliform bacteria. The disease is manifest soon after birth and is progressive, with death in childhood; antimicrobial therapy may prolong life.

chronicle play, also called HISTORY PLAY, a didactic history play that lays emphasis on the public welfare by pointing to the past as a lesson for the present. The genre is characterized by its assumption of a national consciousness in its audience. It has flourished in times of intensely nationalistic feeling, notably in England from the 1580s until the 1630s, by which time it was "out of fashion," according to the prologue of John Ford's play *Perkin Warbeck*. Early examples of the chronicle play include *The Famous Victories of Henry the Fifth, The Life and Death of Jacke Straw, The Troublesome Raigne of John King of England,* and *The True Tragedie of Richard III.* The genre came to maturity with the work of Christopher Marlowe (*Edward II*) and William Shakespeare (*Henry VI,* parts 2 and 3).

In *An Apology for Actors* (1612) the dramatist Thomas Heywood wrote that chronicle plays

> are writ with this ayme, and carryed with this methode, to teach their subjects obedience to their king, to shew the people the untimely ends of such as have moved tumults, commotions, and insurrections, to present them with the flourishing estate of such as live in obedience, exhorting them to allegeance, dehorting them from all trayterous and fellonious stratagems.

At the same time, it was argued that the overthrow of a tyrant (such as Richard III, according to the Tudor reading of events) was right and proper.

Elizabethan dramatists drew their material from the wealth of chronicle writing for which the age is renowned, notably Edward Hall's *The Union of the Two Noble and Illustre Famelies of Lancastre and York,* and the *Chronicles of England, Scotlande, and Irelande* of Raphael Holinshed. The genre was a natural development from the didactic morality plays of the Middle Ages. In a forerunner of the chronicle play, John Bale's *Kynge Johan,* all the characters except the king himself are allegorical and have names such as Widow England, Sedition, and Private Wealth.

No age has matched the Elizabethan, either in England or elsewhere, in this kind of play. But chronicle plays are still sometimes written—for example, by the 20th-century English playwright John Arden (*Left-Handed Liberty, Armstrong's Last Goodnight*)—and the genre corresponds in many respects, especially in its didactic purpose and episodic structure, with the influential epic theatre of Bertolt Brecht in 20th-century Germany.

Chronicles, books of the, also called (in early Roman Catholic translation into English) PARALIPOMENON I AND II, two Old Testament books that were originally part of a larger work that included the books of Ezra and Nehemiah. These three (Ezra and Nehemiah were one book in the Jewish canon) were the final books of the Hebrew Bible. Together they survey Israel's history from Adam to the activity of Ezra and Nehemiah in the period after the Babylonian Exile (6th century BC). The uniformity of language, style, and ideas marks the work as the product of a single author, known as the Chronicler, who probably lived about 350–300 BC.

The material of the Chronicles lists genealogies from Adam to King Saul (1 Chronicles 1–2) and covers the death of Saul and the reign of King David (1 Chronicles 10–29), the reign of King Solomon (2 Chronicles 1–9), and from the division of the monarchy into the northern and southern kingdoms to the end of the Babylonian Exile (2 Chronicles 10–36).

The Chronicler used the Old Testament books of Samuel and Kings as sources for his historical account freely modified to accord with the Chronicler's own interests and point of view. Nothing is admitted that would lessen David's glory, but much is added to enhance it. For example, he is given credit (1 Chronicles 22) for making preparations to build the Temple of Jerusalem, though according to 1 Kings 5–7 it was Solomon who planned and built the Temple.

Solomon is likewise glorified, and unfavourable aspects of his reign (as viewed in 1 Kings 11) are omitted. The Chronicler's single-minded interest in the Temple causes him to omit mention of the palace built during Solomon's reign (1 Kings 7). The history of the divided monarchy is especially noteworthy because the Chronicler excludes almost all material from the books of Kings concerning the northern kingdom of Israel. Obviously, his interest was centred on the southern kingdom of Judah, ruled by the house of David and site of the Temple of Jerusalem.

The genealogies in 1 Chronicles 1–9 also serve the Chronicler's interests, for they are designed to show that the true Israel came to be realized in the kingdom of David. In the rest of his work the Chronicler also shows that he was interested in institutions that provided for the continuity of the true Israel: the Temple of Jerusalem and the Davidic dynasty. The historian thus uses even genealogies to serve an important function in the presentation of his people's history.

The writer's concern about the true Israel is not surprising, for the reconstitution of Israel's life after the Babylonian Exile required a redefinition of Israel's identity. This restatement was especially important since the deportation policies of Assyria (for the northern kingdom in 721 BC) and Babylonia (for the southern kingdom in 597 and 586 BC) had introduced alien peoples and religious practices into the Israelite scene. The Chronicler's decision to ignore the northern kingdom almost entirely indicates his bias against the Samaritan community in the north.

chronology, any method used to order time and to place events in the sequence in which they occurred. The systems of chronology used to record human history, which are closely related to calendar systems, vary in scope, accuracy, and method according to the purpose, degree of sophistication, and skills of the peoples using them.

A brief treatment of chronology follows. For full treatment, *see* MACROPAEDIA: History, The Study of.

Scientific chronology attempts to place all events at correctly proportionate intervals on a fixed scale in the order in which they occurred. Astronomy, geology, and paleontology can all be used to that purpose. Historical chronologies vary with the different skills and purposes of the civilizations that employed them. It is difficult to match historical chronologies with scientific chronologies because of the lack of sophistication in the methods of ancient civilizations and because many of the early writings and records have disappeared.

Chinese. The Chinese recorded events by referring to a monthly cycle within a given dynasty and marked the years by each harvest. In 163 BC the *nien-hao* ("reign name") was introduced by Emperor Han Wen Ti. After that, every emperor or head of state proclaimed a new *nien-hao* for his reign until the People's Republic of China was proclaimed in 1949 and the Chinese adopted the Gregorian calendar.

Japanese. The Japanese used two principal chronicles. The *Nihon shoki* compiled information by days, months, and years. The *Kojiki* related the events without a strict chronological order and frequently differs from the *Nihon shoki.* The Japanese also used a reign name (*nengō*), although frequently more than one *nengō* was in use at the same time. On Jan. 1, 1873, the Meiji emperor adopted the Gregorian calendar.

Hindu. The Hindus based eras on astronomical cycles, using the revolutions of planets and the evolution of the universe. The entire period was calculated to be 4,320,000 sidereal years and separated into four stages, or *yugas*. The Hindus also reckoned dates from the number of years elapsed since a king's consecration. During the 6th century BC, the death of Buddha and the death of Jina were taken as the beginning of eras. The official Indian calendar is based on the solar or lunar–solar reckoning of elapsed years that began in the Saka era (AD 78).

Egyptian. As far back as the 4th millennium BC, the Egyptians named each year by its main events and listed other records of historical and religious events. The Egyptian priests of the Ramessid period (*c.* 1300 BC) omitted events and recorded the names of kings. Only fragments of these documents still exist, forcing scholars to use astrological references to bridge the gaps.

Mesopotamian. Ptolemy's Canon provides the basis for Mesopotamian chronology, beginning with the accession of Nabonassar in 747 BC and covering 1,000 years of Babylonian kings. Assyrians recorded the names of those who held the office of *limmu* in addition to listing their kings, resulting in an extremely reliable chronological source.

Jewish. In the 9th century AD, the Jewish people began counting from the creation of the world (*anno mundi*). For earlier periods, discrepancies in biblical texts and variations in rabbinical computations resulted in several styles of reckoning. Even after the era of Exodus, when the Bible uses the reign of kings, it is difficult to synchronize this chronology with that of other king lists of the same period. Other major Jewish books such as the *Seder 'Olam Rabba'* ("Order of the World") and the *Megillat Ta'anit* ("Scroll of Fasting") connect days with events.

Greek. In the archaic period of Greece, events were associated with the lifetimes of well-known ancestors or heroes, blending myths with the lists of dynasties. Eratosthenes of Cyrene promoted the use of reckoning four-year periods from each celebration of the Olympic Games. Some cities listed their magistrates in eponyms (*i.e.,* named epochs after them) or counted from such events as a city foundation. In the Christian period, Eusebius began the work of reconciling all these methods to the Judaic tradition and laid the foundations for the Julian calendar. But before 480 BC no dates can be precise without confirmation from literary or archaeological sources.

Roman. Roman chronology is also dependent upon literary and archaeological evidence. In the 1st century BC, historians such as Sallust were more concerned with dramatic effectiveness than documentation or research. Though there were dates for the foundations of cities, various scholars computed them differently by counting back over the yearly lists of magistrates. Documentation was better after the 1st century BC, although various parts of the empire continued to use different methods to define eras, such as the 15-year cycle for levying taxes.

Christian. The Christian era is most commonly used throughout the world. Years before what was once thought to be the year of the Nativity are denoted BC (before Christ) while the years after the Nativity are AD (*anno Domini*, "in the year of the Lord"). Dionysius Exiguus invented the Christian Era in AD 525 to settle a long dispute over the correct method to calculate Easter. During the Middle Ages the Christians used other chronologies, such as the indiction and the Era of Passion. It was not until the 11th century that the system of Dionysius became common in Europe.

Muslim. The Muslims instituted their chronology soon after the event that began it, the *hijrah*, or the Prophet's flight from Mecca on Sept. 20, AD 622. However, there is no real agreement on the exact date of either the *hijrah* or the year that 'Umar I proclaimed it. The *hijrah* continues to be in official use throughout most of the Middle East, although those countries with a great deal of contact with European influences have made drastic changes in their chronologies.

America. The Maya made all time periods into gods and calculated millions of years into the past and the future. Reckoning was by *tuns* (360 days) and their multiples of 20. Other Pre-Columbian cultures recorded historical and astrological events; however, the Mayas were the only ones interested in an exact chronological system.

chronometer, timekeeping device of great accuracy, particularly one used for determining longitude at sea. The word was originally employed to denote any time-measuring instrument. Early weight- and pendulum-driven clocks were highly inaccurate at sea due to temperature changes and the ship's motion. It was not until the 18th century that John Harrison, a self-taught English carpenter, invented and constructed four practical marine timekeepers, the fourth of which won him the reward of £20,000 offered in 1714 by the British government for any means of determining a ship's longitude within 30 nautical miles (34 miles) at the end of a six week's voyage. A timekeeper fulfilling this condition would have to keep time within three seconds per day, a standard that, at the date the reward was offered, had not been attained by the best pendulum clocks on shore. Though Harrison's original invention was complicated, delicate, and costly, his success led to further investigations by others and eventually to the modern marine chronometer.

The modern chronometer is, broadly speaking, a large, heavy, well-made watch, suspended in gimbals (a set of two rings connected by bearings) so poised as to remain horizontal whatever the inclination of the ship. It is thus safeguarded from those alterations of position which slightly affect the timekeeping of even the best watches. In addition, it differs somewhat in its mechanism from the ordinary watch, the spiral balance spring and lever escapement of the latter being replaced by a helical balance spring and a spring detent, or chronometer escapement. This form of escapement is mechanically superior to any other and requires no oiling other than at the pivots, but it is not suitable for use in pocket watches, because if given a more or less circular twist, it will "trip," causing a rapid gain. For the purpose of equalizing the force of the mainspring, almost all chronometers are fitted with a fusee (no longer used in watches) and chronometer compensation balances, by which the effects of heat and cold upon their timekeeping are practically nullified. By these devices the chronometer may provide timekeeping accurate to within 0.1 second per day.

Chrotechildis (Frankish queen): *see* Clotilda, Saint.

Chrysander, Karl Franz Friedrich (b. July 8, 1826, Lübtheen, Mecklenburg—d. Sept. 3, 1901, Hamburg), German music historian and critic, whose collection of the works of G.F. Handel established him as a pioneer of 19th-century musicology.

Chrysander's early career was as a private tutor, but his strong interest in music led, briefly, to composition and then to music criticism and scholarship. His first publications, reviews and articles for local journals, were followed by essays on oratorio and folk song that appeared in 1853. By the time Chrysander was awarded the Ph.D. from Rostock University in 1855, he was already seriously involved in the study of Handel's works and had started collecting material for a biography of the composer. The first of these volumes was published in 1858 and the second in 1860; part of the third volume appeared in 1867 (covering Handel's life until 1740), but the project was never completed.

Together with the literary historian Gottfried Gervinus, Chrysander founded, in 1856, the Händelgesellschaft, with the intention of publishing a complete edition of Handel's works from the original manuscripts. Two years after the first volume appeared (1858) the society disbanded, and with some assistance from Gervinus, Chrysander continued alone and almost completely at his own expense. In 1860 King George V of Hannover granted an annual sum towards the project, but after Prussia's annexation of that state in 1866 Chrysander took over the entire production at a small printing shop in the garden of his Bergedorf home. During the time that he worked on this monumental undertaking (the last volume, 95, was completed in 1894), Chrysander made frequent extended visits to London to examine Handel's autograph scores and papers; in so doing he acquired much of that composer's writings for the music library at Hamburg, to which he had also sold part of his own considerable library in 1875 in order to raise funds.

Never free from financial worry, he was forced to take on additional work as editor: for the *Allgemeine musikalische Zeitung* (1868–71 and 1875–82); *Jahrbuch für musikalische Wissenschaft* (1863, 1867); and, in collaboration with Philipp Spitta and Guido Adler, the founding (1885) and editing of the authoritative journal *Vierteljahrsschrift für Musikwissenschaft.* Chrysander also participated in the editing of six volumes of the *Denkmäler der Tonkunst* (1869–71; "Monuments of Music") and was the author of numerous essays and articles on composers of the 18th and 19th centuries and a wide range of musical topics.

Chrysanthemum, genus of ornamental plants in the family Asteraceae, containing about 100



Chrysanthemum
A to Z Botanical Collection—EB Inc.

species native primarily to subtropical and temperate areas of the Old World. Cultivated species, often called mums, have large flower heads; those of wild species are much smaller. Most plants of the genus have aromatic leaves that alternate along the stem. Some have both disk and ray flowers in the heads, but others lack ray flowers.

Costmary (*C. balsamita*); pyrethrum (*C. coccineum*); Marguerite, or Paris daisy (*C. frutescens*); Shasta daisy (hybrid forms of *C. maximum*); florists' chrysanthemum (*C. morifolium*); feverfew (*C. parthenium*); corn marigold (*C. segetum*); and tansy (*C. vulgare*) are popular garden plants. Feverfew and pyrethrum are used in insecticides; feverfew and tansy were used in medicines in the past.

Chrysanthemum, Order of the, Japanese DAI-KUN-I KIKKA-SHŌ KUBIKAZARI, Japan's highest and most exclusive order, established in 1877 by the Meiji emperor, awarded mainly to members of Japan's royal family and to foreign royalty or heads of state. The order has only one class and is exclusively for men.

The badge consists of a white enameled star with 32 rays edged in gold with a central cabochon garnet surrounded by a gold band. Four small silver chrysanthemums placed between green leaves encircle the garnet. The medal is suspended from a large, gold-rimmed likeness of a chrysanthemum.

Chrysaora, genus of marine jellyfish of the class Scyphozoa (phylum Cnidaria) that is found in all temperate and tropical seas around the world.

The principal species of this jellyfish is *Chrysaora hysoscella,* also often called the compass jellyfish. The bell-shaped body of this variety is roughly hemispherical and smooth and measures as much as 200 mm (8 inches) in diameter. Sixteen brown, V-shaped radial markings point to the centre of the bell, typically against a background of cream to yellowish brown, though many other colours have been observed. Four long tentacles, commonly called mouth, or oral, arms, hang from the centre of the underside, where the mouth of the jellyfish is located. In most cases, 24 other, thinner extensile tentacles hang from the rim of the bell. Uniformly ciliated larvae, or planula, are brooded within the adult. The larvae develop into normal sessile (attached) forms, which give rise to medusae (*i.e.,* free-swimming, bell-shaped individuals). *Chrysaora* feeds on small planktonic animals, such as arrowworms (*Sagitta*), ctenophores (comb jellies), and young polychaetes (*e.g., Tomopteris*). The prey is passed to the mouth by the marginal tentacles and mouth arms.

Consult the INDEX *first*

Chryse Planitia, region of the planet Mars that includes the landing site of the U.S. Viking 1 planetary probe. The Viking 1 lander, which touched down at 22°.48 N and 47°.97 W in 1976, revealed that Chryse Planitia is a rolling, boulder-strewn plain, with scattered dusty dunes and outcrops of bedrock. The rocks are believed to be eroded remnants of basaltic lavas. Analysis of the dusty soil by Viking probe instruments showed the principal constituent materials by weight as silica (44 percent), ferric oxide (18 percent), magnesium oxide (8 percent), sulfur trioxide (8 percent), alumina (6 percent), and calcium oxide (6 percent). This composition is consistent with igneous rocks formed from magmas that interacted with subsurface ice. The rocks were later affected by weathering and leaching processes that stained their surfaces with reddish iron-oxide minerals and concentrated certain sulfates (and possibly carbonates) in the surface soil.

chryselephantine (from Greek *chrysos,* "gold," and *elephantinos,* "ivory"), type of figural sculpture in which the flesh was made of ivory and the drapery of gold. Statuettes of ivory and gold were produced in ancient Egypt, Mesopotamia, and Crete. Chryselephantine statues were made in Greece from the 6th century BC. Frequently they were colossal cult figures adorning the interiors of major temples; Classical writers record, for example, that the Greek sculptor Phidias made a 40-foot (12-metre) chryselephantine statue of Athena for the Parthenon at Athens and another large figure of Zeus for the temple at Olympia.



Snake goddess, chryselephantine sculpture found in palace at Knossos, Crete, *c.* 1600 BC; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, gift of Mrs. W. Scott Fitz

Chrysippus (b. *c.* 280 BC—d. *c.* 206), Greek philosopher from Soli (Soloi) who was the principal systematizer of Stoic philosophy. He is considered to have been, with Zeno, cofounder of the academy at Athens Stoa (Greek: "Porch"). Credited with about 750 writings, he was among the first to organize propositional logic as an intellectual discipline.

Chrysler, Walter P(ercy) (b. April 2, 1875, Wamego, Kan., U.S.—d. Aug. 18, 1940, Great Neck, N.Y.), founder of Chrysler Corporation.

Starting as an apprentice in a railroad machine shop, Chrysler worked his way up to plant manager for American Locomotive Company but left to become a manager for the Buick Motor Company. By 1916 he was company president. He resigned in 1919 after making Buick the strongest unit of General Motors. Six months after his resignation he assumed direction of Willys-Overland Company and of Maxwell Motor Company, Inc., which became the Chrysler Corporation in 1925. The new company produced a car that Chrysler designed. The car, which featured a high-compression engine, was highly successful, and the Maxwell car disappeared.



Chrysler

By courtesy of the Library of Congress, Washington, D.C.

In 1928 Chrysler purchased Dodge Brothers, Inc., and later that year introduced the Plymouth to compete with Ford and Chevrolet. The corporation became a major company in the American automotive industry.

Chrysler Building, office building in New York City, designed by William Van Alen, often cited as the epitome of the Art Deco skyscraper. Its sunburst-patterned stainless steel spire remains one of the most striking features of the Manhattan skyline. Built between 1926 and 1930, the Chrysler Building was briefly the tallest in the world (1,048 feet [319.4 m]) until the Empire State Building opened in 1931. The decorative scheme of the facade and interior is largely geometric; at the request of Walter P. Chrysler, who commissioned the building, stainless steel automobile icons (*e.g.,* radiator caps in the form of Mercury) were incorporated in the frieze on the setback at the base of the tower and in decorative work on other parts of the building. The building's pierless corners and sleek design are typical of the modernism of the 1920s. A major restoration of the landmark structure was conducted in the early 1980s.

Chrysler Corporation, American automotive company first incorporated in 1925 and reorganized and newly incorporated in 1986. Founded by Walter P. Chrysler, it took over the business and properties of Maxwell Motor Company, Inc. (first formed in 1913). Today its major subsidiaries include Chrysler Automotive Operations, Inc., which manufactures Plymouth, Dodge, and Chrysler passenger cars, Dodge trucks, and auto parts and accessories; Chrysler Financial Corporation; and Chrysler Technologies Corporation, with manufactures in aerospace and electronics. Headquarters are in Highland Park, Mich., U.S.

The first Maxwell car was made in 1904 by Jonathan Maxwell and Benjamin Briscoe, who in 1909 joined the short-lived United States Motor Company. With the collapse of this combine in 1913, Maxwell continued on alone until the postwar recession, when Walter P. Chrysler was brought in to revitalize the company (1920). In 1922 the Maxwell company took over Chalmers Motor Car Co. (founded 1908). In the following year Chrysler bought control, and in 1924 he produced the first car to bear his name, the six-cylinder Chrysler "70." In 1925 Maxwell Motor became the Chrysler Corporation, with Chrysler as president. With the purchase of Dodge Brothers, Inc. (founded 1914), in 1928, the Chrysler Corporation became a major company in the American automotive industry.

In the 1950s Chrysler began absorbing other companies in and out of the automotive industry. In 1966–67 it acquired control of Simca in France, Rootes Motors Ltd. in Britain, and Barreiros Diesel in Spain—which were renamed Chrysler France, Chrysler United Kingdom, and Chrysler España. In 1979 these were sold to P.S.A. Peugeot-Citroën in exchange for minority shares in Peugeot-Citroën. In 1970 Mitsubishi Motors Corporation of Japan began producing subcompact cars sold in the United States under the Chrysler label. In 1987 Chrysler purchased an Italian company, Nuova Automobili F. Lamborghini, maker of expensive, high-performance sports cars, and in 1987, American Motors Corporation, maker of the Jeep brand of four-wheel-drive vehicles. From 1985 to 1989 Chrysler formed joint-venture companies with Mitsubishi Motors Corp. (Japan) and with Renault (France) to manufacture small cars.

In serious financial straits during the 1970s, the Chrysler Corporation sought and acquired U.S. government-secured loans in 1980; under the leadership of Lee A. Iacocca, the company repaid the loans by the end of 1983.

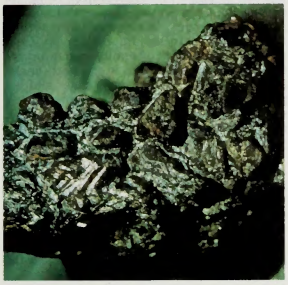
chrysoberyl, gemstone, beryllium and aluminum oxide ($BeAl_2O_4$). A variety that is often cloudy, opalescent, and chatoyant is known as cymophane. Some cymophane, when cut

en cabochon (in convex form), comprises the most highly prized cat's-eye.

Alexandrite is a remarkable and valued variety that when viewed along the different crystallographic (optical) axes, changes from columbine red to orange yellow to emerald green. In addition, the stone changes from green in daylight to red in artificial light.

Chrysoberyl occurs in pegmatites, aplites, and mica schists; because of its durability, it often occurs as a detrital mineral in streams and gravel beds. Most chrysoberyl comes from Minas Gerais, Braz.; the variety cymophane is mostly from the gem gravels of Sri Lanka. For detailed physical properties, *see* oxide mineral (table).

Chrysoberyl is often mistaken for chrysolite, because of their similar colour, and has been



Alexandrite (chrysoberyl) from Yekaterinburg (now Sverdlovsk), the Urals, U.S.S.R.

By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

called oriental chrysolite. The name chrysolite, however, should properly be restricted to a pale-green olivine, a silicate mineral that is softer and less dense than chrysoberyl.

chrysocolla, a silicate mineral, hydrated copper silicate, $CuSiO_3 \cdot 2H_2O$, formed as a decomposition product of copper minerals in most copper mines, especially in arid regions. It occurs as crusts or masses in the upper parts of copper-ore veins where the copper minerals have been altered by water containing dissolved silica. Specimens with a fine green or bluish-green colour may be used as ornamental stones. For detailed physical properties, *see* silicate mineral (table).



Chrysocolla from Miami, Ariz.

By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

The term chrysocolla was applied by Theophrastus and other ancient writers to various materials used in soldering gold.

chrysography, in calligraphy, the art of writing in letters of gold or a piece of calligraphic work so set off. From the 2nd century, scribes or book artists catering to the Roman luxury market responded to the allure of parchment and the rectangular page of the codex form of book. Chrysography perhaps reached its highest perfection, however, in the West during the Middle Ages under the impetus of the 8th- and 9th-century Carolingian literary renaissance, when a number of splendid manuscripts



Chrysographic page from the Evangeliarium of Vaast, Franco-Insular style, 2nd half of the 9th century (Arras, Bibliothèque Municipale, MS. 1055, fol. 41)

Giraudon—Art Resource/EB Inc.

known as the Golden Gospels were produced. Most famous among these masterpieces is the Godescalc Gospels, written before 783 (Bibliothèque Nationale, Paris).

Chrysoloras, Manuel (b. *c.* 1353, Constantinople—d. April 15, 1415), Greek scholar who was a pioneer in spreading Greek literature in the West.

The Byzantine emperor Manuel II Palaeologus sent him to Italy to get help against the Ottoman Turks. From 1394 onward he travelled in Europe and accompanied Manuel on his tour of the European countries. After



Chrysoloras, detail of a drawing by an unknown artist, *c.* 1400; in the Bibliothèque Nationale, Paris

J.P. Ziolo, Paris

Manuel's return to Constantinople in 1403, Chrysoloras remained for the most part in the West; he taught Greek at Florence and was well known as a translator of Homer and Plato. He was also active in trying to arrange for a general council to consider union of the Greek and Latin churches. He was on his way to the Council of Constance, having been chosen to represent the Greek Church, when he died. He left the *Erotemata* ("Questions"), a Greek grammar based on the question and answer method; some letters; the *Syncrisis,* a comparison of old and new Rome; and a Latin translation of Plato's *Republic.*

chrysomonad, any aquatic, algae-like, solitary or colonial protozoan of the phytoflagellate (plantlike) order Chrysomonadida. Chrysomonads are minute, have one or two anterior flagella, often near a red eye-spot, and contain yellowish or brown pigments in chromatophores. Most chrysomonads are photosynthetic, although some forms have pseudopodia (cytoplasmic extensions) for food gathering. Chrysomonads often lose their flagella and become cystlike or palmellar in form. Both palmellar and motile forms reproduce by asexual division. Encystment within a siliceous wall plugged by cytoplasm is common. The representative *Chromulina* sometimes colours water brown.

Chrysophyta, division of algae the members of which are commonly known as golden algae (*q.v.*).

chrysoprase, brittle, translucent, semiprecious chalcedony (*q.v.*), a variety of the silica mineral quartz. It owes its bright apple-green colour to colloidally dispersed hydrated nickel silicate; heating or prolonged exposure to sunlight will cause the colour to fade. Its physical properties are those of quartz (*see* silica mineral [table]). Typical occurrences are in



Chrysoprase from Porterville, Tulare County, Calif.

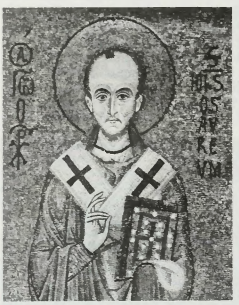
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

serpentine as a secondary mineral found in cavities and veins; California and Silesia have notable deposits. Imitation chrysoprase is chalcedony dyed with nickel or chromium salts.

Chrysostom, Saint John (b. *c.* AD 347, Antioch, Syria—d. Sept. 14, 407, Comana, Helenopontus; Western feast day September 13; Eastern feast day November 13), early Church Father, biblical interpreter, and archbishop of Constantinople; the zeal and clarity of his preaching, which appealed especially to the common people, earned him the Greek surname meaning "golden-mouthed." His tenure as archbishop was stormy, and he died in exile. His relics were brought back to Constantinople in about 438, and he was later declared doctor (teacher) of the church.

Early life. John, the son of a high-ranking military officer, was brought up as a Christian by his widowed mother and was intended for the law, to which end he studied under a distinguished pagan rhetorician, Libanius. But John also studied theology, and before long he gave up his profession to become a hermit-monk. This life was not for him, either. His health gave way, and he returned to Antioch, becoming an ordained deacon and priest there. For 12 years (from 386) he established himself as a great preacher, his homilies (sermons) including some on the first and fourth Gospels and on eight of St. Paul's letters. A sensational episode of this period was a riot in 387, during which the citizens of Antioch treated the images of the sacred emperors with disrespect and were threatened with reprisals; in a

famous course of sermons, "On the Statues," Chrysostom set himself to bring his hearers to a frame of mind suitable both to the season, Lent, and to the dangerous situation in which they stood. His reputation as a preacher was now assured. His brilliant exposition and moral teaching have the note of universality; his words strike the reader today as forcefully



St. John Chrysostom, detail of a 12th-century mosaic; in the Palatine Chapel, Palermo

Anderson—Alinari from Art Resource

as ever, and his humorous sallies are as pungent as when they provoked laughter in the congregations of Antioch and Constantinople. He was concerned, above all, for the spiritual and temporal welfare of the needy and oppressed. He was not alone among the early Fathers in speaking out against the abuse of wealth, teaching that personal property is not strictly private but a trust, and declaring that what was superfluous to one's reasonable needs ought to be given away. But none surpassed John Chrysostom in his eloquent, moving, and repeated insistence on almsgiving.

Archbishop of Constantinople. In 398 Chrysostom was called to Constantinople to be its archbishop, much against his will. There he gained a large following among the people, but his castigation of the misuse of riches angered the wealthy and influential. An unscrupulous alliance against John was made by Eudoxia, the wife of the Eastern Roman emperor Arcadius, and the archbishop of the rival see of Alexandria, the powerful Theophilus. In 403 Theophilus convened a synod of disaffected or subservient Syrian and Egyptian bishops at The Oak, across the Bosporus. This gathering indicted John on a large number of charges, many of which were purely frivolous or vexatious. Chrysostom refused to appear before the synod, whereupon it condemned him and professed to depose him from his see. The emperor Arcadius therefore banished Chrysostom from the city, recalled him at once, and finally banished him again in the following year. He was kept in confinement at Cucusus in Armenia.

Chrysostom appealed his banishment to the bishop of Rome, Pope Innocent I; the latter, with the help of the Western emperor Honorius, attempted to intervene, but his efforts were brought to nothing by Chrysostom's enemies. In exile, however, John found it possible to keep up a lively correspondence with his supporters and was still able to exert a measure of influence in his cause, and word came from Constantinople that he was to be removed to an even more remote place at the eastern end of the Black Sea. Chrysostom did not survive the exhausting journey. The official rehabilitation of John Chrysostom came about 31 years later, when his relics were brought from Comana to Constantinople and were solemnly received by the then archbishop Proclus and the emperor Theodosius II, son of Arcadius and Eudoxia.

Significance and works. Chrysostom was not an outstanding theologian or theological writer; it has been said that a detailed history of Christian theology could be written without mentioning his name. He was a superb orator, though. In his sermons he seldom used allegory but spoke plainly and combined penetration into the meaning of Scripture with a genius for its personal application. Each of his sermons had its moral or social lesson. His works consist of a large number of scriptural homilies and other sermons, together with some treatises and letters.

The most frequently used of the three eucharistic services of the Eastern Orthodox church is called the Liturgy of St. John Chrysostom, but the evidence that he had anything to do with its composition is unconvincing. The Prayer of St. John Chrysostom in *The Book of Common Prayer* of the Church of England is taken from this liturgy, hence the attribution of the prayer. (D.At./Ed.)

BIBLIOGRAPHY. The standard modern biography is by Chrysostomus Baur, *John Chrysostom and His Time,* 2 vol. (1959–60, reissued 2 vol. in 4, 1988). For a more popular treatment, see Donald Attwater, *St. John Chrysostom: Pastor and Preacher* (1959). Robert L. Wilken, *John Chrysostom and the Jews: Rhetoric and Reality* (1983), describes the world he lived in and its influence on his thinking, especially as manifested in his anti-Jewish homilies.

chrysotile (Greek: "hair of gold"), fibrous variety of the magnesium silicate mineral serpentine; chrysotile is the most important asbestos mineral.

Chrysotile fibres have a higher tensile strength than other asbestos minerals, but they are less acid-resistant than the fibrous amphiboles. Individual chrysotile fibres are white and silky, but the colour of the aggregate in veins is usually green or yellowish. The chief occurrence is in altered peridotite as veins with a lizardite matrix; the world's greatest deposits of this type are in Quebec and in the Ural Mountains of Russia. Most often the fibres are oriented across the vein and are less than 1.3 cm (0.5 inch) long, but sometimes they are more than 15 cm long and can be found oriented along the vein.

Under the electron microscope the fibres of chrysotile are seen to be tubes, actually the structural layers of the mineral rolled in spiral form. The space within and between the tubes may be filled with a partially developed, layered material.

Chrzanów, city, Katowice *województwo* (province), south-central Poland. Chrzanów forms part of the highly developed Upper Silesian industrial and mining area in the centre of the province. Chrzanów is located 15 miles (25 km) southeast of Katowice in the Jaworzno-Chrzanów district, an area of forests and rye and potato fields. The city is one of Poland's major zinc-producing centres. Other economic activities include coal mining, food processing, and the production of building materials and electrical machinery. It is the site of one of the province's regional museums. Pop. (1991 est.) 42,700.

Ch'u, Pinyin CHU, one of the most important of the small states contending for power in China between 770 and 221 BC, and one of the primary shapers of the state system that dominated China from the end of that period until the beginning of the 20th century.

Emerging in the early 8th century BC, Ch'u was formed around the present province of Hupeh, in the fertile Yangtze River valley of South China, an area then outside the fringes of Chinese culture. The Ch'u state seems to have been almost entirely "barbarian" in its origin, though some members of its ruling class possibly came from North China. Ch'u began to expand rapidly into China proper, conquering much of present-day Honan province, and its people soon began to acquire Chinese speech and customs. China itself was at the time divided into a series of small states, all of which theoretically owed allegiance to the Chou dynasty, although the Chou rulers had long since been unable to exercise control over more than their own fiefs. Ch'u was the first state to break with the established custom and give its rulers the title of *wang,* or "king," thus removing any pretense of overall Chou suzerainty.

Ch'u's rapid expansion into North China was halted temporarily in the 7th century BC, when the small states of the region banded together to protect themselves from being absorbed. But Ch'u continued nevertheless to be a major contender for power in China for the next 400 years. In the 3rd century BC, Ch'u and two other states of semibarbarian origin, Ch'i in the east and Ch'in in the west, finally absorbed all of the other little states and began a desperate struggle for supreme control of China. Ch'u was finally eliminated in 223, and the state of Ch'in united all of China two years later.

When the Ch'in dynasty fell after ruling for less than 15 years, the rebels, led by a former aristocrat, Hsiang Yü, installed a former member of the Ch'u ruling house as the new emperor of China. But this new Ch'u government survived only for a few months before Hsiang Yü was defeated by one of his former generals, Liu Pang, who then established the Han dynasty (206 BC–AD 220).

Chu-chi (China): *see* Shang-ch'iu.

Chu Ch'i-chen (Chinese emperor): *see* Cheng-t'ung.

Chu Ch'i-yü (Chinese emperor): *see* Ching-t'ai.

Ch'ü-chiang (China): *see* Shao-kuan.

Ch'ü Ch'iu-pai (Chinese Communist): *see* Qu Qiubai.

Consult the INDEX *first*

Ch'ü-chou, also spelled CHU-ZHOU, Pinyin QUZHOU, formerly CH'Ü-HSIEN, Pinyin QUXIAN, city in western Chekiang *sheng* (province), China. Ch'ü-chou has been a natural transportation centre since ancient times, being situated on the upper stream of the Ch'ien-t'ang River—there known as the Ch'ang-shan River—at its confluence with the Wu-hsi River. Natural routes lead westward into Kiangsi province, south into Fukien province, and southeastward to Wen-chou in southeastern Chekiang. It is the natural collecting centre for the upper valleys of the Ch'ien-t'ang tributaries. Its importance as the head of navigation on the Ch'ang-shan River has been increased since the completion in 1931 of the railway link to Hsiao-shan and later to Hangchou and Shanghai.

Besides its commercial importance as a collecting centre, Ch'ü-chou has traditionally had considerable industry. Before World War II, besides rice-polishing, oil-extraction, and other food-processing plants, woodworking and well-known paper and parchment industries were established there. After the mid-1960s great electric power resources from the Hsin-an River hydroelectric project became available, and a large aluminum-refining industry developed. In the late 1950s an industrial chemicals plant was constructed there, and a large fertilizer plant was subsequently built. Pop. (1990) 125,341.

Chu-chou, Pinyin ZHUZHOU, city in east-central Hunan *sheng* (province), China. Situated 15 miles (25 km) east of Hsiang-t'an on the east bank of the Hsiang River, Chu-chou, until the beginning of the 20th century, was only a minor market town and river port.

Its rise to importance came entirely from modern transportation and began with the opening of the P'ing-hsiang collieries in Kiangsi province to the east to provide coking coal for the Han-yang Ironworks (established 1894) in Hupeh province to the north. A railway was built from P'ing-hsiang to Chu-chou, whence the coal was shipped by water to Han-k'ou (now part of Wu-han) in Hupeh. Chu-chou was later connected by rail lines to Canton, Han-k'ou, Ch'ang-sha, and Nan-ch'ang, among other cities. Chu-chou has thus become an important rail junction. It has water communications with southern Hunan and also is the focus of a network of local highways.

The full benefits of these developments were delayed by the outbreak of the Sino-Japanese War of 1937–45. Northern Hunan was the centre of severe fighting during much of the war, and in 1944 a great Japanese offensive overran Chu-chou, which remained under Japanese occupation until 1945.

Under the Communist government, Chu-chou was designated as a major centre for industrial development. A large thermal power plant was installed with Soviet aid and came into operation in 1957. A large chemical fertilizer plant was also completed in the late 1950s and yet another in 1960. The surrounding area has rich mineral resources, which include iron, lead, manganese, zinc, tungsten, copper, and antimony. A large metallurgical industry, producing lead, zinc, and copper on a large scale, has been established.

Chu-chou's facilities as a transport centre have been greatly improved since 1949. The port facilities were redeveloped, and a freight yard—one of the largest in southern China—was built in the late 1950s. In the 1960s Chu-chou became a major producer of rolling stock, turning out railroad cars and electric locomotives. Pop. (1990) 409,924.

Chu Ch'üan-chung: *see* Chu Wen.

Ch'ü-fu, also spelled CHÜ-FOU, or KU-FOW, Pinyin QUFU, town, Shantung *sheng* (province), eastern China. It lies 70 miles (110 km) south of Chi-nan. In ancient times Ch'ü-fu was the capital of the small independent state of Lu, which flourished from the 6th to the 4th century BC. The town of Ch'ü-fu is notable as the birthplace and place of residence of Confucius, the ancient sage who founded Confucianism. Confucius was born in Ch'ü-fu in 551 BC, and in the later part of his life he forsook his previous wanderings and returned to live at his birthplace, writing, editing, and teaching numerous disciples there until his death in 479 BC.

The Great Temple of Confucius in the town was built in 1724. Inside the great ceremonial hall of the temple is a large statue of Confucius surrounded by statues of his disciples. The temple itself stands within a larger, oblong, walled enclosure that covers about 49 acres (20 hectares) and around which the town of Ch'ü-fu was built. Inside the enclosure is an extensive complex of Confucian temples, shrines, monuments, and pavilions. The enclosure contains a house that stands on the site of the one Confucius lived in, an ancient tree said to have been planted by the sage, and a well from which he drank.

Inside the town of Ch'ü-fu but lying outside of the temple enclosure is an elaborate complex of buildings that was the residence of Confucius' descendants, the K'ung family. Through the centuries the K'ungs were the guardians of the temple complex and the administrators of the town of Ch'ü-fu; the 76th lineal descendant of Confucius lived in the town before World War II. Lying outside the north gate of the temple enclosure is the family cemetery of the K'ungs, which contains the tomb of Confucius.

Ch'ü-fu has long been a major site for pilgrims and tourists who come to visit the temples, the tomb, and the other surviving memorials to China's greatest sage.

Chu Hou-chao (Chinese emperor): *see* Cheng-te.

Chu Hou-ts'ung (Chinese emperor): *see* Chia-ching.

Chu Hsi, Pinyin ZHU XI, literary name (*hao*) YÜAN HUI, or CHUNG HUI, courtesy names (*tzu*) HUI AN, CH'EN LANG, CHI YEN, HUI WENG, HSÜN WENG, or YÜN KU LAO-JEN, also called CHU-TZU, or CHU-FU-TZU (b. Oct. 18, 1130, Yu-hsi, Fukien province, China—d. April 23, 1200, China), Chinese philosopher whose synthesis of Neo-Confucian thought long dominated Chinese intellectual life.

Life. Chu Hsi was the son of a local official. He was educated in the Confucian tradition by his father and passed the highest civil service examination at the age of 18, when the



Chu Hsi, ink on paper, by an unknown artist; in the National Palace Museum, Taipei, Taiwan

By courtesy of the National Palace Museum, Taiwan, Republic of China

average age for such an accomplishment was 35. Chu Hsi's first official position (1151–58) was as a registrar in T'ung-an, Fukien. There he proceeded to reform the management of taxation and police, improve the library and the standards of the local school, and draw up a code of proper formal conduct and ritual, none being previously available. Before proceeding to T'ung-an, Chu Hsi called on Li T'ung, a thinker in the tradition of Sung Confucianism who decisively influenced his future thinking. He visited Li again in 1158 and spent several months studying with him in 1160. Li was one of the ablest followers of the 11th-century Neo-Confucians who had created a new metaphysical system to compete with Buddhist and Taoist philosophy and regain the Confucian intellectual ascendancy lost for nearly a millennium. Under his influence, Chu's allegiance turned definitely to Confucianism at this time.

After his assignment at T'ung-an ended, Chu Hsi did not accept another official appointment until 1179. He did, however, continue to express his political views in memorandums addressed to the emperor. Though Chu Hsi also remained involved in public affairs, his persistent refusal to accept a substantive public office reflected his dissatisfaction with the men in power and their policies, his spurning of factional politics, and his preference for the life of a teacher and scholar, which was made possible by his receipt of a series of government sinecures.

These years were productive in thought and scholarship as indicated both by his formal writings and by his correspondence with friends and scholars of diverse views. In 1175, for instance, he held a famous philosophical debate with the philosopher Lu Chiu-yüan (Lu Hsiang-shan) at which neither man was able to prevail. In contrast to Lu's insistence on the exclusive value of inwardness, Chu Hsi emphasized the value of inquiry and study, including book learning. Consistent with this view was Chu Hsi's own prolific literary output. In a number of works, including a compilation of the works of the Ch'eng brothers and studies of Chou-Tun-i (1017–73) and Chang Tsai (1020–77), he expressed his esteem for these four philosophers, whose ideas he incorporated and synthesized into his own thought. According to Chu Hsi, these thinkers had restored the transmission of the Way (*Tao*), a process that had been lost after the death of Mencius. In 1175 Chu Hsi and his friend Lü Tsu-ch'ien (1137–81) compiled passages from the works of the four to form their famous anthology, *Chin-ssu Lu* (*Reflections on Things at Hand*). Chu Hsi's philosophical ideas also found expression during this period in his enormously influential commentaries on the *Lun Yü* (*Analects*) of Confucius and on *Mencius,* both completed in 1177.

Chu Hsi also took a keen interest in history and directed a reworking and condensation of Ssu-ma Kuang's history, the *Tzu-chih t'ung-chien* ("Comprehensive Mirror for Aid in Government"), so that it would illustrate moral principles in government. The resulting work, known as the *T'ung-chien kang-mu* ("Outline and Digest of the General Mirror"), basically completed in 1172, was not only widely read throughout eastern Asia but also served as the basis for the first comprehensive history of China published in Europe, J.-A.-M. Moyriac de Mailla's *Histoire générale de la Chine* (1777–85).

While serving as prefect (1179–81) in Nan-k'ang, Kiangsi, Chu Hsi used the opportunity to rehabilitate the White Deer Grotto Academy, which had been founded in the 9th century and had flourished in the 10th century but had later fallen to ruin. The prestige restored to it by Chu was to last through eight centuries. Academies such as this provided an invaluable institutional basis for the Neo-Confucian movement.

In 1188 Chu Hsi wrote a major memorandum in which he restated his conviction that the emperor's character was the basis for the well-being of the realm. *Ta hsüeh* ("Great Learning"), a text on moral government, asserted that by cultivating his mind the emperor set off a chain reaction leading to the moral transformation of the entire world. In 1189 Chu Hsi wrote an important commentary on this text, and he continued to work on *Ta hsüeh* for the rest of his life. Similarly, in 1189 he wrote a commentary on *Chung yung* ("Doctrine of the Mean"). It was largely because of the influence of Chu Hsi that these two texts came to be accepted along with the *Analects* and *Mencius* as the Four Books basic to the Confucian educational curriculum.

On several occasions during his later career Chu was invited to the imperial court and seemed destined for more influential positions, but his invariably frank and forceful opinions and his uncompromising attacks on corruption and political expediency each time brought his dismissal or his transfer to a new post conveniently distant from the capital. On the last of these occasions, near the end of his life, his enemies retaliated with virulent accusations concerning his views and conduct, and he was barred from political activity. He

was still in political disgrace when he died in 1200. Chu Hsi's reputation was rehabilitated soon after his death, however, and posthumous honours for him followed in 1209 and 1230, culminating in the placement of his tablet in the Confucian Temple in 1241. In later centuries, rulers more authoritarian than those he had criticized, discreetly forgetting his political and intellectual nonconformity, made his philosophic system the sole orthodox creed, which it remained until the end of the 19th century.

Thought and influence. Chu Hsi's philosophy emphasized logic, consistency, and the conscientious observance of classical authority, especially that of Confucius and his follower Mencius. Chu Hsi held that the universe has two aspects: the formless and the formed. The formless, or *li,* is a principle or a network of principles that is supreme natural law and that determines the patterns of all created things. This law combines with the material force or energy called *ch'i* to produce matter, or things having form. In human beings the *li* (manifested as human nature) is essentially perfect, and defects—including vices—are introduced into the body and mind through impurities of *ch'i,* or matter. Man may eliminate his mental imperfections through study of ethical principles and metaphysics.

In these respects Chu differed from the eminent contemporary Neo-Confucian Lu Chiu-yüan, who saw no duality between natural law and matter and believed in human perfectability through meditation. In contrast to Lu Chiu-yüan's intuitionism, which focused on the discovery and understanding of principles within oneself, Chu Hsi and his followers stressed the "investigation of things," by which they meant primarily the study of ethical conduct and of the revered Five Classics. The study of ethical and metaphysical principles in turn constituted an ingredient both in building a personal faith and in advising emperors through whose self-cultivation order might be restored in the world.

Though his ideas never went unchallenged, Chu Hsi's Neo-Confucianism long dominated Chinese intellectual life and his commentaries on the Four Books (*Ssu shu*) became required reading for all who hoped to pass the civil service examinations. His intellectual influence was also paramount in Korea, and his ideas won wide acceptance and official support in Tokugawa Japan as well.

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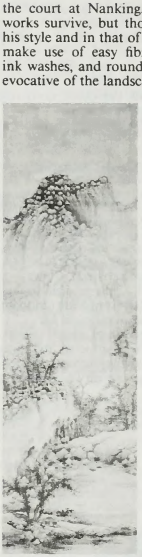
Ch'ü-hsien (China): *see* Ch'ü-chou.

Chu Huang (Chinese emperor): *see* Chu Wen.

Chu I-chün (Chinese emperor): *see* Wan-li.

Chü-jan, Pinyin JURAN (fl. mid-10th century), Chinese painter of the Five Dynasties (907–960) period and one of the most innovative of artists in the pure landscape tradition.

Little is known of Chü-jan other than that he was a Buddhist priest (Chü-jan is a priestly name—his family name is not known) and that he worked for the court of the southern T'ang in what is now Nanking. He was supposedly a follower of Tung Yüan, a similarly little-known painter of the Five Dynasties in the court at Nanking. No certain authentic works survive, but those considered to be in his style and in that of his teacher Tung Yüan make use of easy fibrous brushstrokes, wet ink washes, and rounded contours, which are evocative of the landscape of southeast China.



"Buddhist Monastery by Streams and Mountains," hanging scroll attributed to Chü-jan, second half of the 10th century; in the Cleveland Museum of Art

By courtesy of the Cleveland Museum of Art, gift of Mrs. Katherine Holden Thayer

The two artists became increasingly revered in later ages by critics who saw in their softly evocative paintings the paradigm of the attitude that would characterize the literary man (*wen-jen*).

Chu-ko Liang, Pinyin ZHUGE LIANG (b. 181, Yang-tu, Shantung province, China—d. 234, China), celebrated adviser to Liu Pei, founder of the Shu Han dynasty (221–263/264).

Chu-ko, to whom supernatural powers often are ascribed, has been a favoured character of many Chinese plays and stories. Legend states that Liu Pei, then a minor military figure, heard of Chu-ko Liang's great wisdom and came three times to the wilderness retreat to which Chu-ko had retired to seek him out as an adviser. It is known that Chu-ko helped Liu organize a large army and found a dynasty. Liu was so impressed with Chu-ko's wisdom that on his deathbed Liu urged his son to depend on Chu-ko's advice and urged Chu-ko to ascend the throne himself if the prince were unable to rule.

A mechanical and mathematical genius, Chu-ko is credited with inventing a bow for shooting several arrows at once and with perfecting the Eight Dispositions, a series of military tactics. In the *San Kuo chih yen-i* (*Romance of the Three Kingdoms*), the great 14th-century historical novel, Chu-ko is one of the main characters; he is portrayed as being able to control the wind and foretell the future. In 1724 he was made a Confucian saint.

Chu-lin ch'i hsien: *see* Seven Sages of the Bamboo Grove.

Chu River, also spelled ČU, river in Kyrgyzstan and Kazakhstan, rising in the Tien Shan at the confluence of the Dzhuvanaryk and Kochkor rivers. It flows north through the Boam Gorge, beyond which it is joined by the Chon-Kyomin; it then flows northwest through the fertile Chu Valley, in which much of its water is used for irrigation, before finally disappearing into the sands of the Muyunkum Desert. The Chu River's total length is 663 miles (1,067 km), and it drains a basin of 24,150 square miles (62,500 square km).

Ch'u-sa (Korean calligrapher): *see* Kim Chŏng-hi.

Chü-she (Buddhist philosophy): *see* Kusha.

Chu Shih-chieh, literary name HAN-CH'ING (fl. *c.* 1280–1303, China), one of the greatest of Chinese mathematicians, who made notable contributions to the development of Chinese algebra and the theory of equations.

Outside of his mathematical work, little is known of Chu's life. He was apparently a resident of Yen-shan, near Peking, and he traveled widely throughout China as a celebrated mathematician, attracting numerous pupils who wished to study under him. Chu's two surviving works are *Suan-hsueh ch'i-meng* (1299; "Introduction to Mathematical Studies") and *Ssu-yuan yu-chien* (1303; "Precious Mirror of the Four Elements"). The former was a relatively elementary work meant as a textbook for beginners. Although it was lost in China until the 19th century, it was widely adopted as a textbook in Japan and Korea in the 15th century and strongly influenced mathematics in those countries.

The second work, *Ssu-yuan yu-chien* of 1303, is a much more important treatise. It contains Chu's original extension of the "method of the celestial element" to express four unknown quantities in the same algebraic equation (whence the "four elements" in the book's title). The *Ssu-yuan yu-chien* marks the apex of the development of Chinese algebra in its treatment of simultaneous equations and equations having degrees as high as 14. Chu commonly solved the latter equations using a transformation method (called *fan fa*) that was rediscovered by the English mathematician W.G. Horner in 1819 (Horner's method). The *Ssu-yuan yu-chien* also contains a noteworthy diagram of the arithmetic, or Pascal, triangle (used to determine the binomial coefficients) and has interesting studies of arithmetic and geometric progressions and series.

Chu-shu chi-nien: *see* Bamboo Annals.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Chu Shun-shui, Pinyin ZHU SHUNSHUI (b. 1600, China—d. 1682, Mito fief, Hitachi province, Japan), noted Chinese patriot who fled China after the destruction of the Ming dynasty (1368–1644). Arriving in Japan, he became one of the primary compilers of the *Dai Nihon shi* ("History of Great Japan"), a comprehensive rewriting of Japanese history, which served to reawaken nationalistic feelings as well as to develop a sense of loyalty to the emperor.

Chu was originally an official of the Ming dynasty, which was overthrown by the Manchu forces of Manchuria (Northeast Provinces), who established the Ch'ing dynasty (1644–1911/12). Chu not only refused to serve the new rulers, he also attempted to raise an army against them. His efforts to enlist Japanese support for his cause were fruitless, and in 1659 he decided to settle in Nagasaki. There Tokugawa Mitsukuni, a member of the shogun's family and a great feudal lord in his own right, invited Chu to aid him in the historical project he had begun. Chu agreed in 1665, resettling in Mitsukuni's Mito fief, where he helped structure the *Dai Nihon shi.* Although the project was not actually completed until two centuries after Chu's death, his influence was decisive in establishing the

general outlines of the work as well as in making its paramount theme that of patriotism and loyalty to the throne. Chu's unswerving loyalty to the Ming dynasty provided a model for Chinese students in Japan who, late in the 19th century, returned home to lead the struggle that overthrew the Ch'ing dynasty in the Chinese Revolution of 1911–12.

Chu Ta, Pinyin ZHU DA, original name PA-TA SHAN-JEN (b. *c.* 1625, Nan-ch'ang, Kiangsi Province, China—d. *c.* 1705), a Buddhist monk and, with Shih-t'ao, one of the most famous Individualist painters of the early Ch'ing period, in contrast to painters of the orthodox school (*e.g.,* Wang Hui).



"Fish," ink on paper by Chu Ta; in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

Details of Chu Ta's life are scanty, but he is known to have been a descendant of the Ming Imperial line, to have had a classical education, and to have become a Buddhist monk in 1648, after the collapse of the Ming dynasty. Possibly the fall of that dynasty and the death of his father at about the same time caused him some psychic disturbance, and he may have hovered between real insanity and impassioned creativity. He eventually left the Buddhist cloister and exhibited wildly erratic behaviour—such as writing the character for "dumb" (*ya*) and attaching it to his door, after which he never spoke but only laughed and drank. In his paintings, usually in ink monochrome, such creatures as birds and fishes are given a curious, glowering, or even perverse personality with an abbreviated, wet style filled with tensions. He also painted landscapes inspired by the 10th-century masters Tung Yüan and Chü-jan. Unlike most Chinese painters, he does not easily fit into any traditional category; in character and personality he is the complete eccentric and "individualist."

Chu Teh (Chinese military leader): *see* Zhu De.

Chu Van Tan (b. *c.* 1915, Phu Thuong village, Vietnam), military and political leader who played an important part in winning Vietnam's independence from France.

Chu Van Tan became chieftain of the Tho, a tribal ethnic minority in the mountainous regions of northern Vietnam near the China border. Before World War II, Chu Van Tan organized his people into a revolutionary militia to resist the French. By 1940–41 he had formed an effective fighting force, the Vietnam National Salvation Army, and won a victory over French-directed troops in the Red River Delta. Joining forces with the Vietnam League for Independence (Viet Minh) under Ho Chi Minh, Chu integrated his tribal platoons with those of General Vo Nguyen Giap in 1941 and formed the Revolutionary Military Committee of North Vietnam. After a successful uprising in August 1945, Ho Chi Minh declared an independent Democratic Republic of Vietnam (DRV) on Sept. 2, 1945; Chu Van Tan was named minister of defense. During the war against France (1946–54), Chu's army formed the nucleus of the People's Army, which in 1954 defeated the French decisively at Dien Bien Phu.

In 1947 Chu Van Tan was named president of the Military Committee of Viet Bac region and given charge of ethnic minority affairs. He eventually became responsible for preserving tribal autonomy and protecting tribal interests within the framework of the North Vietnamese government. In the mid-1970s he was made secretary-general of the Standing Committee of the National Assembly.

Chu Wen, Pinyin ZHU WEN, also called (Wade–Giles romanization) CHU CH'ÜAN-CHUNG, or CHU HUANG, temple name (HOU LIANG) T'AI TSU (b. 852, Yang-shan, Honan Province, China—d. 912, Kai-feng), Chinese general who usurped the throne of the last emperor of the T'ang dynasty (618–907) and proclaimed himself the first emperor of the Later Liang dynasty (907–923).

Originally, Chu Wen was a follower of the great T'ang rebel Huang Ch'ao (d. 884), but at an opportune time he surrendered his forces to government troops and was rewarded with the governorship of the strategic region around K'ai-feng, in central China. After the defeat of Huang Ch'ao, there ensued a struggle for control of North China between Chu Wen and the Turkish general Li K'o-yung (d. 908), who had defeated Huang Ch'ao. Chu Wen emerged victorious and forced the T'ang emperor, Chao Tsung, to move the capital from Ch'ang-an to Chu's own residence at Loyang. In 904 he murdered the emperor and all his sons with the exception of a boy of 13, who was placed on the throne as Ai Ti and forced to abdicate to Chu in 907. Chu then proclaimed himself first emperor of the Later Liang dynasty. Five years later he was murdered by his own eldest son, who succeeded him on the throne.

Chu Yu-chiao (Chinese emperor): *see* T'ien-ch'i.

Chu Yü-chien, Pinyin ZHU YUJIAN, also called PRINCE OF T'ANG, reign title (Wade–Giles romanization) LUNG-WU (b. May 25, 1602, Nan-yang, Honan Province, China—d. 1646, China), ruler of Fukien Province in southern China after the Manchu forces of Manchuria captured the Ming capital at Peking and established the Ch'ing dynasty (1644–1911/12). He was also a claimant to the Ming throne.

A Ming prince, Chu was a direct descendant of the first Ming dynasty emperor, Hung-wu (reigned 1368–98). Upon the fall of the Ming capital, Peking, to the Manchu armies, Chu obtained the support of the pirate leader and freebooter Cheng Chih-lung and in August 1645 proclaimed himself Ming emperor with the reign title of Lung-wu. He reigned for about 13 months, holding court in Fukien Province. When the Ch'ing armies began to advance into southern China, Cheng Chih-lung withdrew his protection of Chu, who was then captured and executed.

Chu Yu-chien (Chinese emperor): *see* Ch'ung-chen.

Chu Yu-lang, Pinyin ZHU YOULANG, reign title (Wade–Giles romanization) YUNG-LI, also called PRINCE OF KUEI (b. November 1623, Peking—d. June 1662, Yünnanfü), claimant to the Ming throne after the Manchu forces of Manchuria captured the Ming capital at Peking and established the Ch'ing dynasty (1644–1911/12).

A grandson of the 13th Ming emperor, Wan-li (reigned 1573–1620), Chu was given the title of the prince of Kuei. After the prince of T'ang (1602–46), another claimant to the throne, was captured and executed by the Manchus in 1646, Chu fled to Chao-ch'ing, in South China, and was proclaimed the new Ming emperor with the reign title of Yung-li. Chu's forces make a stand at the city of Kuei-lin in Kwangsi Province; his armies, using Western cannon, were at first successful, and by 1648 seven provinces were under his nominal control. But in 1649 the Manchus recouped their losses, and Chu was driven by a series of military defeats into southwest China and in 1659 was forced to flee into Burma. Ch'ing forces pursued him into that country, and he was captured, taken back to China, and executed.

All the members of Chu's household were Christian converts. During the fighting, the empress dowager, baptized Helena, sent a letter to Pope Innocent X asking for his prayers for the Ming cause. By the time the Vatican's reply arrived several years later, Chu and Helena were dead.

Ch'ü Yüan, Pinyin QU YUAN (b. *c.* 343 BC, state of Ch'u, central China—d. *c.* 289, Ch'u), one of the greatest poets of ancient China and the earliest known by name. Ch'ü Yüan's highly original and imaginative verse had an enormous influence over early Chinese poetry.

He was born a member of the ruling house of Ch'u, a large state in the central valley of the Yangtze River. Ch'ü Yüan was appointed while still in his 20s as a trusted, favoured counselor of his kinsman Huai Wang, the ruler of Ch'u. Ch'u Yüan advocated the unpopular policy of resistance to Ch'in, the most powerful of the Warring States, causing his rival courtiers to intrigue successfully against him. Estranged from the throne through the malice of his rivals, Ch'ü Yüan was banished to the south of the Yangtze River by Huai's successor, Ching Hsiang.

In despair over his banishment Ch'ü Yüan wandered about southern Ch'u, writing poetry and observing the shamanistic folk rites and legends that greatly influenced his works. He eventually drowned himself in despair in the Mi-lo River, a tributary of the Yangtze. The famous Dragon Boat Festival, held on the fifth day of the fifth month of the Chinese lunar year, originated as a search for the poet's body.

The works of Ch'ü Yüan have survived in an early anthology, the *Ch'u tz'u* ("Elegies of Ch'u"), much of which must be attributed to later poets writing about the legendary life of Ch'ü Yüan. The anthology begins with



Ch'ü Yüan, portrait by an unknown artist; in the National Palace Museum, Taipei

By courtesy of the Collection of the National Palace Museum, Taipei, Taiwan, Republic of China

the long melancholic poem "Li sao" ("On Encountering Sorrow"), Ch'ü Yüan's most famous work.

Chu Yüan-chang (Chinese emperor): *see* Hung-wu.

Chu Yün-wen (Chinese emperor): *see* Chien-wen.

Chu-zhou (China): *see* Ch'ü-hsien.

Chua Hien (Vietnamese ruler): *see* Hien Vuong.

Ch'üan-chou, also spelled CHÜAN-CHOW, Pinyin QUANZHOU, port and city, eastern coastal Fukien *sheng* (province), China. Ch'üan-chou is situated on the north bank of the Hsi River at the head of Chin River, facing the Taiwan Strait.

A Ch'üan-chou prefecture was established in 618 much farther north. The only sizable settlement in the present area was Nan-an county—some 12.5 miles (20 km) up the Hsi River valley—which had been set up in the 6th century by the Ch'en regime (557–589). The present Ch'üan-chou was founded in 700 as Wu-jung-chou, changed its name to Ch'üan-chou in 711, and was established as a county seat; it was a convenient administrative centre for the scattered Chinese settlements in the area, under the name Chin-chiang, in 718. The prefecture of Ch'üan-chou was promoted to a superior prefecture under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties. After 1911, under the Chinese republic, it reverted to county status under its old name Chin-chiang. Although Chin-chiang remains the name of the modern prefecture, centred on Ch'üan-chou (now a county-level municipality), the seat of Chin-chiang county has been transferred to the small town of Chin-chiang (Ch'ing-yang), some 7.5 miles (12 km) to the south.

During the later part of the T'ang period (618–907), Ch'üan-chou began to develop into a major seaport and a centre of foreign trade, rivaling Canton and Hanoi. Many Persians and Arabs settled there. During the 10th century, first under the independent Fukienese kingdom of Min (909–944), then under local warlords (944–960), and finally under the reunified empire of Sung (960–1279), Ch'üan-chou remained a centre of foreign trade and of building oceangoing ships, which gradually enabled Chinese from Fukien to replace Arabs as chief carriers in the trade with the Middle East. Between 742 and 1162, Ch'üan-chou's population increased more than 10-fold, and it soon outstripped Canton in the volume of trade. By the 13th century the city was said to have 500,000 inhabitants, including numerous Arabs, who had their own merchant quarter on the waterfront. Under the Yüan (Mongol) dynasty (1279–1368) it was China's greatest port and was renowned throughout the world, being known to the 13th-century Venetian traveler Marco Polo and to the 14th-century Muslim traveler Ibn Baṭṭūṭah as Zaytūn, a rendering of the common name for the city, Tz'u-t'ung-ch'eng.

After the beginning of the 15th century, however, when the Chinese withdrew from long-range trade and when the attacks of Japanese pirates put the Ming (1368–1644) dynasty on the defensive, Ch'üan-chou was deeply affected. At the same time the harbour began to silt up, and in the 17th century Fu-chou and, more particularly, the nearby port of Amoy began to rival it in both coastal and foreign trade. It gradually declined into a secondary coastal port, most of whose commerce was with Taiwan. Many people from this area emigrated either to Taiwan or elsewhere in Southeast Asia. Ch'üan-chou is now a regional market and commercial centre to a large extent economically dependent upon Amoy. Its role receded still further when Amoy's rail link with the interior was completed in 1956.

The city is a collection centre for local agricultural products, such as sugarcane, jute, fruit, and peanuts (groundnuts), and is a distribution centre for manufactures imported through Amoy. There is some small-scale industry, including the manufacture of porcelain, farm implements, and fertilizer, and food processing, such as sugar refining, flour milling, and oil extraction.

Ch'üan-chou retains many relics of its medieval prosperity. An 11th-century stone bridge, 272 feet (83 m) long and 23 feet (7 m) wide, spans the mouth of the Chin River. Twin stone pagodas (1228–38) follow the design of wooden ones first built in 865 and 916. An ancient mosque and the tombs of early Muslim missionaries are preserved. A wooden ship, dating from the 12th or 13th century and excavated in 1974, occupies a special exhibition hall in the city.

The Overseas Chinese University, specializing in engineering, serves students from various neighbouring countries. Pop. (1989 est.) 172,200.

Chuang, Pinyin ZHUANG, highly Sinicized ethnic minority of South China, chiefly the Kwangsi Chuang Autonomous Region, who speak Northern Tai dialects. Characteristic cultural traits of the traditional Chuang included a preference for valley lands adjacent to streams, wet-rice cultivation with the use of buffalo or oxen, and platform houses on pilings. Social customs differing from Chinese customs included premarital sexual freedom and free marriage without middlemen, the bride staying at home with her parents until the birth of the first child (the marriage then being considered consummated). Magical rites, sorcery with human figurines, and the ancestral cult were other distinguishing elements.

The Chuang or Tai culture appears to have had its maximum geographic spread during the early period of its contact with Han Chinese culture about 2,500 years ago, evolving in the regions of Szechwan and the lower Yangtze River valley. The advance of the Han Chinese culture and empire pushed the Tai culture and its exponents southward. Today, the cultural heirs of these early people include the Thai of Thailand, the Lao of Laos, the Shan of Myanmar (Burma), and the South China tribes of Pa-yi, T'ai-lu, and T'ai-noi in Yunnan, of Puyi (Chung-chia) in Kweichow, and of Chuang in Kwangsi. These different groups still retain strong linguistic and cultural affinities.

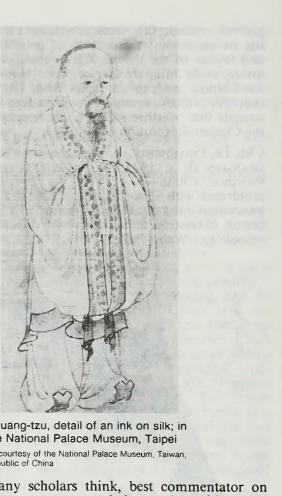
Within China, in 1953, the communist regime organized the tribespeople, where locally dominant, into so-called autonomous minority prefectures or regions. Thus, there came into being a Tai autonomous prefecture in Yunnan province and Kwangsi Chuang Autonomous Region. People of this ethnic group in the early 1990s were reported to number about 15,000,000.

Chuang Autonomous Region of Kwangsi (China): *see* Kwangsi.

Chuang-lieh-min (Chinese emperor): *see* Ch'ung-chen.

Chuang-tzu, Pinyin ZHUANGZI, personal name (Wade-Giles romanization) CHOU (b. *c.* 369 BC—d. 286 BC), the most significant of China's early interpreters of Taoism, whose work (*Chuang-tzu*) is considered more definitive and more comprehensive than the *Tao-te Ching,* which is attributed to Lao-tzu, the first major patriarch of Taoism. Chuang-tzu's teachings also influenced the development of Chinese Buddhism and had considerable effect on Chinese landscape painting and poetry.

Reported facts about Chuang-tzu's life. Kuo Hsiang (d. AD 312), the first and, many scholars think, best commentator on Chuang-tzu, secured the sage's position as a primary source for Taoist thought. Buddhist scholars, especially those of the Ch'an (Zen) school, also drew heavily from Chuang-tzu's works. In spite of his importance, details of Chuang-tzu's life are unknown. The "Grand Historian" of the Han dynasty, Ssu-ma Ch'ien (d. *c.* 85 BC), incorporated in his biographical sketch of Chuang-tzu only the most meagre information. It indicates that Chuang-tzu was a native of the state of Meng, that his personal name was Chou, and that he was a minor official at Ch'i-yüan in his home state. He lived during the reign of Prince Wei of Ch'u (d. 327 BC) and was therefore a contemporary of Mencius, an eminent Confucian scholar known as China's Second Sage. According to Ssu-ma Ch'ien, Chuang-tzu's teachings were drawn primarily from the sayings of Lao-tzu, but his perspective was much broader. His literary and philosophical skills were used to refute the Confucianists and Mohists (followers of Mo-tzu, who advocated universal love). In addition, he is reported to have written "The Old Fisherman," "Robber Chi," and "Opening Trunks," all attacks on Confucianism, and *Wei lei hsü* and *Keng san tzu,* which are imaginative fictions.



Chuang-tzu, detail of an ink on silk; in the National Palace Museum, Taipei
By courtesy of the National Palace Museum, Taiwan, Republic of China

Chuang-tzu is best known through the book that bears his name, the *Chuang-tzu,* also known as *Nan-hua chenching* ("The Pure Classic of Nan-hua"). It is composed of 33 chapters, and evidence suggests that there may have been as many as 53 chapters in copies of the book circulated in the 4th century AD. Numerous editions of the text have appeared since then, and variant readings have obscured the original content. It is generally agreed that the first seven chapters, the "inner books," are, for the most part, genuine, whereas the "outer books" (chapters 8–22) and the miscellany (chapters 23–33) are largely spurious, even though some passages reflect Chuang-tzu's own hand. The more vivid descriptions of Chuang-tzu's character come from the anecdotes about him in the later chapters of the book, which are reputedly apocryphal.

Character according to anecdotal accounts. Chuang-tzu appears in these passages as an unpredictable eccentric sage, who seems careless about personal comforts or public esteem. His clothing is shoddy and patched, and his shoes have to be tied to his feet with string in order to keep them from falling apart. Nevertheless, he does not consider himself to be

miserable, only poor. When his good friend Hui Shih comes to console him upon the death of his wife, he finds the sage sitting on a mat, singing and beating on a basin. Hui Shih reprimands him, pointing out that such behaviour is improper at the death of someone who has lived and grown old with him and has borne him children.

> When she died, how could I help being affected? But as I think the matter over, I realize that originally she had no life; and not only no life, she had no form; not only no form, she had no material force (*ch'i*). In the limbo of existence and non-existence, there was transformation and the material force was evolved. The material force was transformed to be form, form was transformed to become life, and now birth has transformed to become death. This is like the rotation of the four seasons, spring, summer, fall, and winter. Now she lies asleep in the great house (the universe). For me to go about weeping and wailing would be to show my ignorance of destiny. Therefore I desist.

When Chuang-tzu himself was at the point of death, his disciples began to talk about an elaborate burial for him. Chuang-tzu immediately stopped the discussion by declaring that he did not need the paraphernalia of a great funeral, that nature would be his inner and outer coffin, and the sun and the moon his jade rings, the stars and the planets his jewelry. All creation would make offerings and escort him. He needed no more. Somewhat taken aback, his disciples declared that they were afraid that the crows and the buzzards might eat him. To this Chuang-tzu replied,

> Above the ground it's the crows and the kites who will eat me; below the ground it's the worms and the ants. What prejudice is this, that you wish to take from the one to give to the other?

Chuang-tzu's eccentricities stem directly from his enlightened fatalism. Enlightenment for Chuang-tzu comes with the realization that everything in life is One, the Tao.

View of the Tao. Chuang-tzu taught that what can be known or said of the Tao is not the Tao. It has no beginning or end, no limitations or demarcations. Life is subject to the eternal transformation of the Tao, in which there is no better or worse, no good or evil. Things should be allowed to follow their own course, and men should not value one situation over another. A truly virtuous man is free from the bondage of circumstance, personal attachments, tradition, and the need to reform his world. Chuang-tzu declined an offer to be prime minister of the state of Ch'u because he did not want the entanglements of a court career.

The complete relativity of his perspective is forcefully expressed in one of the better-known passages of the *Chuang-tzu.*

> Once I, Chuang Chou, dreamed that I was a butterfly and was happy as a butterfly. I was conscious that I was quite pleased with myself, but I did not know that I was Chou. Suddenly I awoke, and there I was, visibly Chou. I do not know whether it was Chou dreaming that he was a butterfly or the butterfly dreaming that it was Chou. Between Chou and the butterfly there must be some distinction. This is called the transformation of things.

The relativity of all experience is in constant tension in the *Chuang-tzu* with the unity of all things. When asked where the Tao was, Chuang-tzu replied that it was everywhere. When pushed to be more specific, he declared that it was in ants and, still lower, in weeds and potsherds; furthermore, it was also in excrement and urine. This forceful statement of the omnipresence of the Tao had its parallels in later Chinese Buddhism, in which a similar figure of speech was used to describe the ever-present Buddha. Chuang-tzu was par excellence the philosopher of the unattached man who is at one with the Tao. (J.H.Wa.)

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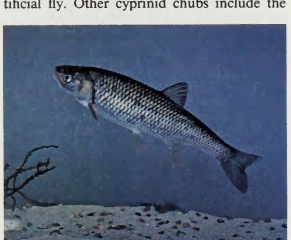
chub, any of several freshwater fishes of the carp family, Cyprinidae, common in Europe and North America. Chubs are good bait fish, and large specimens are caught for sport or food.

The European chub (*Leuciscus cephalus*) is a popular, though not especially palatable, game fish found in Europe and Great Britain, primarily in rivers. A large-mouthed fish with large, black-edged scales, it attains a maximum length and weight of about 60 cm (2 feet) and 7–8 kg (15–18 pounds). It is voracious and preys on insects, plants, and other fish.

In North America the name chub is applied to many cyprinids, among them the abundant, widely distributed creek and hornyhead chubs (*Semotilus atromaculatus* and *Nocomis,* sometimes *Hybopsis, biguttata*). The creek chub is found in quiet streams in eastern and central North America. Bluish above and silvery below, with a dark spot at the base of the dorsal fin, it grows to about 30 cm (1 foot). It is also called the horned dace, for the hornlike projections that develop on the head of the male during the breeding season. The hornyhead chub is blue-backed with greenish sides and a light belly. It lives in clear streams and is about 15–24 cm (6–9 inches) long. Some chubs will take a fisherman's artificial fly. Other cyprinid chubs include the



European chub (*Leuciscus cephalus*)
W.S. Pitt—Eric Hosking

western North American fishes of the genera *Gila* (of which several species are endangered) and *Siphateles* and the more characteristically eastern species of the genus *Hybopsis.*

Many other unrelated fishes are also called chubs. Certain deepwater lake fishes of the genus *Leucichthys,* in the family Coregonidae, are called chub; these chubs are found in the Great Lakes region and are often smoked and sold for food. The rudderfish is also sometimes called a chub, as is *Scomber japonicus,* the chub mackerel found in both the Pacific and Atlantic oceans.

Chūbak, Ṣādeq-i, also spelled ṢĀDIQ CHŪBAK (b. Aug. 5, 1916, Bushire, Iran), author of short fiction, drama, and novels, one of the leading 20th-century writers of Iran. Chūbak's short stories are characterized by their intricacy, economy of detail, and concentration upon a single theme, causing some to compare them to Persian miniature paintings.

Chūbak grew up in Shīrāz, Iran, and graduated from the American College of Tehrān in 1937. His literary mentor, Ṣādeq Hedāyat, a well-known Iranian author, influenced him, as did the writings of American authors Henry James, William Faulkner, and Ernest Hemingway. Chūbak developed a style of his own, however. Writing in the colloquial language, he captured moods successfully and told his tales with unmistakable realism.

Chūbak's best-known works include *Khaymah-i shabbāzī* (1945; "Puppet Show"), a volume of short stories that is divided into 11 sections, each of which portrays an aspect of daily life; *Antarī kih lūṭiyash murda būd* (1949; "The Monkey Whose Master Died"); the satirical play *Tūp-i lāstīkī* (1962; "The Rubber Ball"); and two novels, *Tangsīr* (1963) and *Sang-i ṣabūr* (1967; "The Patient Stone"). Chūbak also translated a number of works from English into Persian, including Lewis Carroll's *Alice in Wonderland* and *Through the Looking Glass.*

Chubb, Charles (d. May 16, 1845, Islington, London, Eng.), British inventor and entrepreneur, founder of the locksmith firm of Chubb & Son (now Chubb & Son PLC), which in the 20th century became a major corporation manufacturing and distributing locks, safes, alarms, fire extinguishers, security systems, surveillance equipment, and other products.

Beginning the hardware trade in Winchester, Hampshire, Chubb moved first to nearby Portsea and then to London, where he founded Chubb & Son, initially in the area of St. Paul's Churchyard. There he worked to improve the "detector" lock originally patented in 1818 by his brother Jeremiah Chubb of Portsea. This "Chubb lock" had tumblers and, in addition, a lever called a detector, which made the bolt immovable when someone inexpertly tried to pick the lock. He took out further patents in 1824, 1828, and 1833 and also patented fireproof and burglarproof safes.

His son John Chubb (1816–72) took out more patents on locks and safes and greatly expanded the business, which was carried on by John's three sons, John C. Chubb, George H. Chubb, and Henry W. Chubb.

Chubb, Thomas (b. Sept. 29, 1679, East Harnham, Wiltshire, Eng.—d. Feb. 8, 1747, Salisbury, Wiltshire), self-taught English philosopher and proponent of Deism, regarded by Voltaire as one of the most logical of his school.

The son of a maltster, Chubb was apprenticed to a glovemaker and later worked for a tallow chandler. He read widely and began to write on rationalism in the early 1700s; his first publication was an essay, "The Supremacy of the Father Asserted," written in 1715 in response to the Arian controversy. He then went to London to live for a time, apparently as a servant, in the house of the master



Thomas Chubb, detail of an oil painting by George Beare, 1747; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

of the rolls, Sir Joseph Jekyll, but eventually returned to Salisbury. Chubb's other works, which include *Discourse Concerning Reason* (1731), *The True Gospel of Jesus Christ Vindicated* (1739), and *Discourse on Miracles* (1741), betray the deficiencies of his being self-taught, and he was often treated disparagingly by more erudite theological controversialists. His tracts tended to limit the Christian religion to three fundamental tenets: belief in the divinely ordained moral law, belief in the need of sincere repentance for sin, and belief in future rewards and punishments. The *Discourse on Miracles* took the position that miracles provide merely a "probable proof" of revelation. His *Posthumous Works,* in two volumes, appeared in 1748.

Chubb Crater (Canada): *see* Ungava-Quebec Crater.

Chūbu, *chihō* (region), central Honshu, Japan, embracing the *ken* (prefectures) of Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi. Its name is derived from its location in the central part (*chūbu*) of Japan. Chūbu region occupies 25,783 square miles (66,777 square km) between Kantō region (east) and Kinki region (west).

Although there is no core to unite the Chūbu region into a single functional unit, it constitutes a coherent geomorphological whole. Its major configuration is formed by the overlapping of the Northeast, Southwest, and Shichito-Mariana mountain arcs. The mountains, lowlands, and volcanic zones intersect the general trend of Honshu almost at right angles. Structural examples are the trend of the Akaishi, Kiso, and Hida (Japanese Alps) ranges; the lowland of the Fossa Magna rift; and the Fuji Volcanic Zone. Honshu attains its greatest width of 174 miles (280 km) in the Fossa Magna and its greatest height of 12,388 feet (3,776 m) in Mount Fuji.

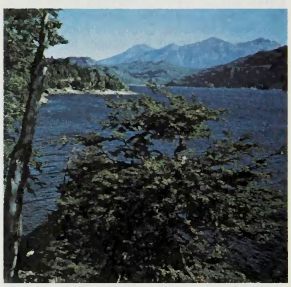
Chūbu region may be divided into three distinct subregions. The Hokuriku area along the Sea of Japan includes Niigata, Toyama, Ishikawa, and Fukui prefectures. It is generally referred to as Ura Nihon ("Reverse Japan") because of the gloom and snow of its winter weather. Industrial developments include aluminum smelting and fertilizer production.

Tosan—consisting of the inland prefectures of Yamanashi, Nagano, and Gifu—was the sericultural (silkworm-raising) centre of Japan before World War II. In addition to rice, fruit and mulberry trees are grown; the major manufactures are precision instruments. The area's high mountains and deep gorges are a source of hydroelectric power and an attraction to tourists.

Tokai, or Omote Nihon ("Obverse Japan"), is composed of Shizuoka and Aichi prefectures. The climate contrasts with that of Hokuriku, being characterized by windy, bright winters. Since the early 20th century the area has experienced rapid industrial and urban growth under the influence of Ōsaka, supported by the establishment of a modernized transportation system. Its phenomenal growth is typified by that of Nagoya, the capital of Aichi prefecture and one of Japan's leading industrial centres. Pop. (1990) 21,020,552.

Chubut, *provincia,* southern Argentina, part of the region known as Patagonia, bounded by the Atlantic Ocean (east) and Chile (west) and having an area of 86,751 square miles (224,686 square km). To the west, the forested, fertile Andean foothills are interspersed with lakes. The Los Alerces National Park (463,400 acres [187,500 hectares]) includes glaciated mountains, alpine lakes, rivers, and forests. To the east are isolated mountain ranges, salt flats, and salt lakes. Chubut River crosses the province west to east. The Valdés Peninsula juts into the Atlantic in northeast Chubut province, separating the San José (north) and Nuevo (south) gulfs. San José Gulf was officially decreed a wildlife sanctuary in 1974 in an attempt to protect the breeding, calving, and mating areas of the right whales, orcas, and elephant seals.

The area, largely colonized by Welsh immigrants, was organized in 1884 as the Chubut National Territory. It was accorded the rank of province in 1955. Puerto Madryn, Trelew, and Rawson (*q.v.*), the provincial capital, were early Welsh settlements.



Lake Puelo in the Andean foothills, Chubut *provincia,* Argentina
Plessner International

Sheep raising and wool production, the predominant activities, originated with the Welsh colonizers. Oil has become an important source of income, with one of the nation's largest oil fields situated in the south of the province, near Comodoro Rivadavia. It produces about one-fifth of Argentina's petroleum. Pop. (1991 prelim.) 356,445.

Chubut River, Spanish RÍO CHUBUT, river in southern Argentina, rising in the Andes Mountains south of San Carlos de Bariloche in Río Negro *provincia.* It flows southward and then eastward, emerging from the Andes in northwestern Chubut province. It then flows generally southeastward to the Pass of Indios, where it continues east-northeastward across Patagonia and past Las Plumas, Trelew, and Rawson. It empties into the Atlantic Ocean at Punta Castro. The river, 503 miles (810 km) long, is not navigable, but its lower course irrigates the adjacent valley (producing apples and cherries).

Chuck-a-Luck, dice game played with three dice, a layout numbered from one to six, and a wire cage or cone-shaped chute. The chute, called a "horn," is made of leather or metal. The phrase "tinhorn gambler" derived from gamblers who set up games of Chuck-a-Luck with little money and a metal chute, which was cheaper than a leather one. Other rules are similar to those of Grand Hazard (*q.v.*).

chuck-will's-widow (species *Caprimulgus carolinensis*), nocturnal bird of the family Caprimulgidae, found in the swamps, rocky uplands, and pine woods of the southeastern United States, migrating to the West Indies, Central America, and northwestern South America. This nightjar is named for its call (second and third syllables accented, first syllable weak), which it may repeat 800 times without stopping. It lays two eggs on the ground; if threatened, the parent may carry away an egg in its huge mouth. Often confused with the whippoorwill, the chuck-will's-widow is larger (to 30 cm [12 inches]) and reddish brown, with little or no white in the tail.

chuckwalla (species *Sauromalus obesus*), stocky, slightly flattened lizard belonging to the family Iguanidae, found on arid, rocky hills of southwestern North America. It grows up to 50 cm (20 inches) long.

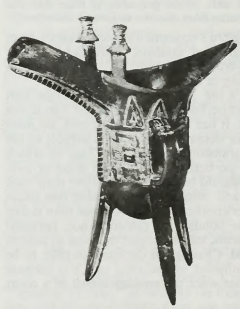


Chuckwalla (*Sauromalus obesus*)
Willis Peterson

The chuckwalla is dull-coloured but sometimes has red blotches or a dark-banded tail. It eats creosote leaves and takes shelter in rock crevices, where, if disturbed, it may inflate its lungs, increasing its body size by over half and making it difficult to dislodge.

Chudskoye Ozero (Russia): *see* Peipsi, Lake.

chüeh, Pinyin JUE, type of Chinese bronze vessel produced during the Shang (18th–12th century BC) and early Chou (1111–*c.* 900 BC) dynasties. It is a small pitcherlike container for



Bronze *chüeh,* late Shang dynasty (18th–12th century BC); in the Freer Gallery of Art, Washington, D.C.
By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

wine with an especially elegant and dynamic shape. The *chüeh* is much like the *chia* (*q.v.*) except for the rim, which has been drawn into a large, projecting, U-shaped spout (with capped pillars at the base) on one side and a pointed tail, or handle, flaring out from the opposite side.

A *t'ao-t'ieh* (*q.v.*), or monster mask, is commonly found on either side of the body, much like the *chia.* There may be certain crude prototypes for the *chüeh* in Neolithic (*c.* 3000–1500 BC) pottery, but generally it is found in developed form only in the bronze ritual vessels of the Shang and early Chou.

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Chugach Mountains, segment of the Pacific Coast Ranges of western North America, extending eastward along the coast for about 300 miles (500 km) from Turnagain Arm of the



Chugach Mountains north of Prince William Sound, Alaska
Bradford Washburn

Cook Inlet (Gulf of Alaska) to Cape Yakataga in southern Alaska, U.S. Many peaks exceed 11,000 feet (3,400 m), with Mount Marcus Baker (13,176 feet [4,016 m]) the highest. The south slope of the mountains, which were named after an Eskimo tribe, lies within the Chugach National Forest.

Chūgoku Range, Japanese CHŪGOKU-SAMMYAKU, mountain range, in Chūgoku ("China") *chihō* (region), western Honshu, Japan. It forms the major mountain system of Yamaguchi, Hiroshima, Shimane, Okayama, and Tottori *ken* (prefectures) and extends to the fault scarp of the Hira Range along Lake Biwa. The mountains to the east of the Kako and Yura river valleys in Hyōgo prefecture and Kyōto *fu* (urban prefecture) of Kinki region, however, are generally considered a separate formation, the Tamba Plateau.

The Chūgoku Range consists of three landforms—the Backbone Range, the Kibi Plateau, and the Iwami Plateau. The Backbone Range constitutes a sharp divide between the Sea of Japan and the Inland Sea, broken only by the gorge of the Gōno River in the west. The Gōno River has been bordered by an important highway since ancient times. The Kammuri Mountains to the west of the gorge are sometimes considered to be an independent unit. Only a few peaks of the Chūgoku Range exceed 3,300 feet (1,000 m); the Kammuri block, however, rises to 4,393 feet (1,339 m).

To the south, the Backbone Range descends abruptly in a steep escarpment to the Kibi Plateau. The plateau, at an elevation between 660 and 1,970 feet (200 and 600 m), is composed of eroded hilly land surfaces, separated by steep, younger gorges. Between the Kibi Plateau and the range, a row of intermontane basins is followed by the east-west inland rail lines. Major basins are those of Tsuyama, Niimi, and Miyoshi.

The Iwami Plateau, lying to the north of the Backbone Range, is narrower and more dissected than the Kibi Plateau, except in the Akiyoshi Plateau area in the west, where karst topography occurs in some places. Numerous semicircular depressions have been buried by lava-dome volcanoes, including Mount Dai, which rises to 5,673 feet (1,729 m) in Tottori prefecture.

Chuikov, Vasily Ivanovich (b. Feb. 12 [Jan. 31, Old Style], 1900, Serebryannye Prudy, near Moscow, Russian Empire—d. March 18, 1982, Moscow, Russia, U.S.S.R.), Soviet general (and later marshal) who in World War II commanded the defense at the Battle of Stalingrad, joined in turning Adolf Hitler's armies back, and led the Soviet drive to Berlin.

The son of peasants, Chuikov worked as a mechanic apprentice from the age of 12. At the age of 18, after the Russian Revolution, he joined the Red Army. His first taste of battle in the Civil War occurred at Tsaritsyn (later named Stalingrad; now Volgograd), and by the following year, in 1919, he was a member of the Communist Party and a regimental commander. He graduated from the M.V. Frunze Military Academy in 1925, took part in the Soviet invasion of Poland (1939) and in the Russo-Finnish War (1939–40), and had just finished serving as military attaché in China when he was called to Stalingrad to command that city's defense.

In August 1942 the Germans launched a direct attack against Stalingrad, committing up to 22 divisions with more than 700 planes, 500 tanks, 1,000 mortars, and 1,200 guns. Chuikov, in response, allegedly declared, "We shall hold the city or die here." Much of the fighting in the city and on its perimeters was at close quarters, with bayonets and hand grenades. About 300,000 Germans were killed or captured in the course of the campaign; Soviet casualties totaled more than 400,000. In November the Soviet forces began to counterattack and by the end of the year were on the offensive. General Chuikov subsequently led his forces into the Donets Basin and then into the Crimea and north to Belorussia before spearheading the Soviet drive to Berlin. Chuikov personally accepted the German surrender of Berlin on May 1, 1945.

After the war he served with the Soviet occupation forces in Germany (1945–53), commanding those forces from 1949. He headed the Kiev military district from 1953 to 1960 and thereafter held a variety of military assignments in Moscow. He was a candidate member of the Communist Party's Central Committee from 1952 to 1961 and a full member from 1961 until he died.

chukar, popular small game bird, a species of partridge (*q.v.*).

Chukarin, Viktor Ivanovich (b. November 9, 1921, Krasnoarmeyskoye, Ukraine, U.S.S.R.—d. August 25, 1984, Lviv, Ukraine), first of the great Soviet gymnasts, who won 11 medals in international competition.

Chukarin graduated in 1950 from the Institute of Physical Culture in Lvov (now Lviv), where in 1963 he became an assistant professor. In the 1952 Olympic Games at Helsinki, Fin., he won gold medals as a member of the gymnastic team and for the long horse, the side horse, and individual combined events. In the 1956 Olympic Games at Melbourne, Australia, he again won gold medals with his team and for the parallel bars and individual combined events. He also won silver medals for the rings and parallel bars in the 1952 games and for the floor exercises in the 1956 games. He was U.S.S.R. gymnastics champion (1949–51, 1953, and 1955) and won single events in 1948, 1952, 1954, and 1956.

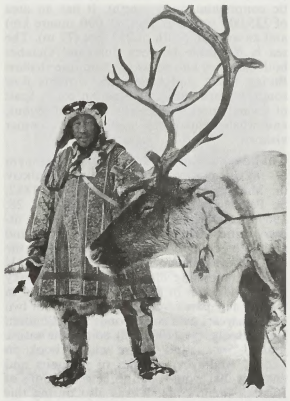
Chukarin served as coach of the gymnastics team of Armenia from 1961 and of Ukraine from 1972. He became a member of the Communist Party in 1951. His book *Put K Vershinam* ("The Road to the Peaks") was published in 1955.

Chukchi, also spelled CHUKCHEE, also called LUORAWETLAN, people inhabiting the northeasternmost part of Siberia, the Chukchi autonomous *okrug* (district) in Russia. They numbered 14,000 in the late 20th century and are divided into two chief subgroups, reindeer Chukchi and maritime Chukchi. The reindeer Chukchi inhabit the interior of the easternmost portion of the *okrug,* the Chukchi Peninsula, and its Siberian hinterland; the maritime Chukchi inhabit the Arctic and Bering coasts. Both speak a Luorawetlan language of the Paleosiberian language group and are linguistically and culturally related to the Koryak and Kamchadal (Itelmen).

The reindeer Chukchi formerly lived mainly off of domesticated herds of reindeer. These herds supplied them with means of transport, milk and meat for food, and pelts for clothing and shelter. The maritime Chukchi lived by hunting Arctic sea mammals, chiefly walrus, seals, and whales, and by fishing.

Their traditional dwellings varied according to their subsistence pattern. Maritime Chukchi lived in fixed villages; their houses were semisubterranean. Reindeer Chukchi were nomadic and lived in tents, changing residence according to seasonal change in pasture. Transportation depended on sledges pulled by reindeer or dogs harnessed in pairs. The maritime Chukchi traveled in boats with wooden frames and skin covers. The basic socioeconomic unit of the maritime Chukchi was the boat team of several related families; it sometimes included neighbours. The village was a territorial association of related and unrelated families. Among the reindeer Chukchi, the encampment of families who herded together was the basic economic unit.

According to Chukchi religion, invisible spirits populate the universe. Sacrifices were



Chukchi reindeer herder in Siberia
Sovfoto

an important aspect of the major festivals. Shamanist ceremonies were conducted for divination and healing.

After the Russian Revolution the Chukchi were settled on collective farms. Technical improvements and new economic activities have been introduced among them.

Chukchi, also spelled CHUKCHEE, also called CHUKOTKA, autonomous *okrug* (district), Russia, in the extreme northeastern portion of Siberia. Apart from the basin of the Anadyr River, most of the *okrug* is mountainous or hilly. Almost everywhere a severe Arctic climate permits only tundra vegetation, with some stunted forest in the south. The *okrug* was formed in 1930 for the Chukchi (*q.v.*)

people, but they, together with small numbers of Evenk, Koryak, and Yakut, were outnumbered by Russian settlers. The *okrug* is the leading Siberian gold area. Centres of gold production include the northern coast around



Apartment housing at Bilibino, Chukchi, Russia
© Bryan and Cherry Alexander

and to the east of Cape Shmidta and the Bilibino area. There is also mining of tin, tungsten, and mercury in the north and some coal near the capital, Anadyr (*q.v.*). Area 284,800 square miles (737,700 square km). Pop. (1993 est.) 124,300.

Chukchi Sea, also spelled CHUKCHEE, Russian CHUKOTSKOYE MORE, part of the Arctic Ocean, bounded by Wrangel Island (west), northeastern Siberia and northwestern Alaska (south), the Beaufort Sea (east), and the Arctic continental slope (north). It has an area of 225,000 square miles (582,000 square km) and an average depth of 253 feet (77 m). The sea is navigable between July and October both eastward and westward from the shallow Bering Strait, and ice-bearing currents flow southeastward along the Siberian coast. Seals of several species and walrus are indigenous, and whales and many seabirds are summer visitors.

Chukovsky, Korney Ivanovich, pseudonym of NIKOLAY VASILYEVICH KORNEYCHUKOV (b. March 31 [March 19, Old Style], 1882, St. Petersburg, Russian Empire—d. Oct. 28, 1969, Moscow, Russia, U.S.S.R.), Russian literary critic, language theorist, translator, and author of children's books, often called the first modern Russian writer for children.

After completing his education, Chukovsky pursued a career in journalism, writing for an Odessa newspaper from 1901 to 1905, for two of those years as a correspondent in London. He subsequently (1905–08) edited the satiric journal *Signal* and began, with a book on Leonid Andreyev, a series of memoirs and analyses that would span three generations of Russian literary life. It was also during this period that he began making translations of works by English and American authors, notably Charles Dickens, Mark Twain, and Walt Whitman.

While his translations and criticism, particularly his lifelong study of the 19th-century poet Nikolay Nekrasov, were highly esteemed, Chukovsky's larger reputation rests on his writings for and about children. A number of his verse tales, including *Krokodil* (1917; "The Crocodile"), *Moydodyr* (1923; "Wash 'Em Clean"), and *Tarakanishche* (1923; "The Giant Roach"), are regarded as classics of the form; their clockwork rhythms and air of mischief and lightness in effect dispelled the plodding stodginess that had characterized prerevolutionary children's poetry. The conventional themes of cooperative action and social responsibility are always subordinate to the vivid stories themselves, which are generally fantasies based on everyday situations or on creatures familiar to children. Adaptations of these tales for the theatre, motion pictures, and even opera and ballet (Sergey Prokofiev produced several of them) remained perennially popular throughout the 20th century. Chukovsky's study of the language of children, *Ot dvukh do pyati* (1933; "From Two to Five"), became a favourite guidebook for parents of small children and appeared in more than 20 editions.

Chūkyō Industrial Zone, Japanese CHŪKYŌ KŌGYŌ CHITAI, industrial region centring on Nagoya, Japan, and comprising portions of the *ken* (prefectures) of Aichi, Gifu, and Mie; Chūkyō is neither an administrative nor a political entity. Bordered by Ise Bay on the south, the region is drained by the Ibi River, Kiso River, and Nagara River through a terrain consisting of lowlands and hills. Chūkyō occupies an important place in Japan's industrial scene because of its high standing in the production of textiles, ceramics, and motor vehicles.

During the Tokugawa period (1603–1867), the region produced cotton textiles; woolens were introduced after the Russo-Japanese War (1904–05). Unlike the Keihanshin (Kyōto-Ōsaka-Kōbe) Industrial Zone, which was developed by government investment in heavy industries, Chūkyō developed spontaneously from local entrepreneurs' investment in the production of consumer goods. During World War II, however, heavy war industries were settled in Chūkyō. These were converted to peacetime production after the war, and further industrial development occurred during the 1950s and '60s. Major cities in Chūkyō, after Nagoya, include Toyota and Yokkaichi. Nagoya manufactures printed materials and nonferrous metals. Toyota, named for Toyoda Sakichi, the inventor of an automatic weaving machine, beside whose textile mills the manufacture of automobiles was begun in 1936, is a leading producer of motor vehicles. During the 1920s, Yokkaichi began producing chemicals, and oil refineries have operated there since the '40s. Smaller industrial districts within Chūkyō include the Ise Bay Coast District, encompassing the cities of Nagoya, Yokkaichi, Tsu, and Matsuzaka and the Chita Peninsula District. West Mikawa District focuses on Toyota, and Bisa District is centred on Ichinomiya, a textile centre. Airline, railway, shipping, and highway connections are extensive. Air pollution and the scarcity of land and water are ongoing concerns for the Chūkyō region.

To make the best use of the Britannica, consult the INDEX *first*

Chula Vista, city, San Diego county, southern California, U.S., on the east shore of San Diego Bay, south of San Diego, and just north of Tijuana, Mex. Laid out in 1888 by the Santa Fe Railroad and named for its "pretty view," it developed as a citrus centre, later turning to truck gardening. Development of the aircraft industry in the San Diego area contributed to the city's residential growth. Southwestern College was established there in 1961. Inc. 1911. Pop. (1993 est.) 146,232.

Chulalongkorn, also called PHRACHUNLACHOMKLAO, posthumous name RAMA V (b. Sept. 20, 1853, Bangkok, Siam [now Thailand]—d. Oct. 23, 1910, Bangkok), king of Siam who avoided colonial domination and embarked upon far-reaching reforms.

Chulalongkorn was the ninth son of King Mongkut, but since he was the first to be born to a royal queen, he was recognized as heir to the throne. He was only 15 years old when his father died in October 1868, and he succeeded to the throne under the regency of Somdet Chao Phraya Si Suriyawong (*q.v.*). Over the next five years he was prepared to assume his duties by observing court business and by travels to British Malaya and the Dutch East Indies in 1871 and to Malaya, Burma (Myanmar), and India in 1871–72.

Following his coronation in November 1873, the young king enacted a series of ambitious reforms, beginning with the abolition of slavery, the improvement of judicial and financial institutions, and the institution of appointed legislative councils. His commitment to reforms patterned on Western models, which he considered vital to Siam's survival, antagonized conservative factions at court and precipitated a political crisis early in 1875. Rebuffed by the older generation, the king instituted no further reforms for the next decade, but he slowly built up a corps of able, trusted administrators with whom he began from the mid-1880s to overhaul Siam's antiquated administration. These steps culminated in 1892 with the creation of 12 ministries functionally organized on Western lines, responsible for such functions as provincial administration, defense, foreign affairs, justice, education, and public works. He thereby drastically curbed arbitrary administration, ended the autonomy of outlying provinces, instituted the rule of impersonal law, and laid the foundations of modern Thai citizenship through compulsory primary education and universal military conscription.



Chulalongkorn
BBC Hulton Picture Library

Internal reforms were undertaken both because the liberal king believed them to be right and because he recognized that he had to show the colonial powers that Siam was "civilized" in order to avoid the fate of neighbouring countries that fell under colonial rule. Even so, old Siam did not survive intact. The French provoked war with Siam in 1892, and by treaties with France up to 1907 Siam had to give up its rights in Laos and western Cambodia. In 1909 Siam ceded to Great Britain the four Malay states of Kelantan, Trengganu, Kedah, and Perlis, and this brought some moderation of the system of extraterritoriality—which ended only two decades later. In relations with the West, Chulalongkorn evenhandedly balanced the colonial powers against one another and consistently sought to have Siam treated as an equal among nations. During tours of Europe in 1897 and 1907, he was received as an equal by Western monarchs. When Chulalongkorn died in 1910, following the longest reign in Thai history, he bequeathed to his son Vajiravudh a modern, independent kingdom.

Chulym River, river in Krasnoyarsk *kray* (region) and Tomsk *oblast* (province), Russia, and the longest right-bank tributary of the Ob River; it is 1,118 miles (1,799 km) long and has a basin of 53,400 square miles (134,000 square km). The Chulym, formed by the convergence

of the Bely and Chyorny Iyus, rises on the northeastern slopes of the Kuznetsky Alatau Mountains. It flows northward through the mountains and then westward and northwestward across the West Siberian Plain to join the Ob. In its lower course, which is navigable, it is characterized by numerous lakes and meanders. Its main tributaries are the Serezh, Uryup, Kiya, Bolshoy Uluy, and Kemchug.

chum salmon, also called CALICO SALMON, or DOG SALMON (*Oncorhynchus keta*), lightly speckled North Pacific fish, family Salmonidae, weighing about 3.6 kg (8 pounds).



Chum salmon (*Oncorhynchus keta*)

During the spawning season in autumn, it runs more than 3,200 km (2,000 miles) up the Yukon. The young enter the sea in spring, a few weeks after hatching. (*See also* salmon.)

Chumash, any of several related Indian groups speaking a Hokan language and originally living in the California coastlands and adjacent inland areas from Malibu northward to Estero Bay. Chumash also occupied the three northern channel islands off Santa Barbara. The major Chumash groups were the Obispeño, Purismeño, Ynezeño, Barbareño, and Ventureño (named after the Franciscan missions San Luis Obispo de Tolosa, La Purísima Concepción, Santa Ynez, Santa Barbara, and San Buenaventura, respectively), the inland Emigdiano and Cuyama, and the islanders. The Chumash were among the first native Californians to be encountered by the Spanish-sponsored explorer Juan Rodríguez Cabrillo, who visited the channel islands in 1542–43.

The bulk of the Chumash population was concentrated along the seashores and relied for food largely on fish, mollusks, and sea mammals and birds. Their houses were dome-shaped and large; normally each served as a communal abode for several families and had several rooms. There was also a community sweat house. Villages formed the basis of Chumash political and social organization. The Chumash were particularly skilled artisans. Using asphalt for caulking, they made wooden-plank canoes. They fashioned vessels of soapstone, made a variety of tools out of wood, whalebone, and other materials, and engaged in basketry; they also did rock painting. The Chumash were purveyors of clamshell-bead currency for southern California. Fewer than 100 Chumash descendants remained in the late 20th century.

Chumnus, Nicephorus (b. 1250—d. Jan. 16, 1327, Constantinople [now Istanbul, Tur.]), Byzantine scholar and statesman who left a number of writings, some still unpublished, including letters and orations on occasional philosophical and religious topics, some of which are also of historical value.

Chumnus went at an early age to Constantinople, where he was educated by George (Gregory) of Cyprus. He held imperial office, rose to be prefect of the secretariat, and became chief minister of Andronicus II. Toward the end of 1309 he became governor of Thessalonica, but his influence seems to have been overshadowed by Theodore Metochites. He took the monastic habit and name of Nathaniel shortly before his death.

Chumnus was deeply tied to the classical tradition, insofar as it did not conflict with Christian teaching. In the lively intellectual controversies of his day he sided with the "ancients" against the "moderns"; this led to a rift with Theodore Metochites, whose ardent pursuit of mathematics and astronomy he bitterly attacked. A man of letters rather than of learning, he was typical of the more conservative element in cultured court circles of late-13th-century Byzantium.

Ch'un-ch'iu (Chinese: "Spring and Autumn [Annals]"), Pinyin CHUN QIU, the first Chinese chronological history, said to be the traditional history of Lu, as revised by Confucius. It is one of the Five Classics (*Wu Ching*) of Confucianism. The name, actually an abbreviation of "Spring, Summer, Autumn, Winter," derives from the old custom of dating events by season as well as by year. The work is a complete—though exceedingly sketchy—month by month account of significant events that occurred during the reign of 12 rulers of Lu, the native state of Confucius. The account begins in 722 BC and ends shortly before Confucius' death (479 BC). The book is said to pass moral judgment on events in subtle ways, as when Confucius deliberately omits the title of a degenerate ruler.

Among many who sought to discover profound meanings in the text was Tung Chung-shu (*c.* 179–*c.* 104 BC), a great Han-dynasty Confucianist, who claimed that the natural phenomena recorded in the book (*e.g.*, eclipse of the sun, shower of stars at night, drought) were intended as unmistakable warnings to future leaders of what happens when rulers prove unworthy. Since Confucian scholars were the official interpreters of this and the other classics, the book was a means for imposing Confucian ideals on government.

The fame of *Ch'un-ch'iu* is mainly due to *Tso chuan* (*q.v.*), a commentary (*chuan*) by a scholar named Tso whose dates and identity are even more uncertain than his name (probably Tso-ch'iu Ming, or Tso Ch'iu-ming). Two other commentaries on *Ch'un-ch'iu* further added to its fame. Like *Tso chuan, Kung-yang chuan* and *Ku-liang chuan* carry the name of the authors. All three commentaries are listed among the alternative lists of the Nine, Twelve, and Thirteen Classics of Confucianism.

Chun Doo Hwan (b. Jan. 18, 1931, Haechonri, Korea [now in South Korea]), Korean general who, from Aug. 27, 1980, to Feb. 25, 1988, was president of South Korea.

Born into a peasant family, Chun graduated from Taegu technical high school (1951), after which he entered the Korean Military Academy. Following his graduation in 1955, he became an infantry officer and in 1958 married Lee Soon Ja, daughter of Brigadier General Lee Kyu Dong. Although he never saw action in the Korean War, Chun commanded a South Korean division in South Vietnam during the Vietnam War. He rose rapidly through the ranks. After Park Chung Hee seized power in 1961, Chun served as domestic-affairs secretary for the junta (1961–62), then as chief of personnel of the Korean Central Intelligence Agency (KCIA; 1963). He served in various official posts and was made a general in 1978.

After the assassination of President Park in 1979, Chun took charge of the investigation of his death. He arrested several suspects, including his rival, Army Chief of Staff General Chung Sŭng-hwa (December 1979), and purged many of Chung's supporters in a virtual coup by one military faction against another. Although the official president was Choi Kyu-hah, Chun emerged as the real authority, and in April 1980 Chun became head of the KCIA. In May the military dropped all pretense of civilian rule and declared martial law.

After President Choi resigned on August 16, Chun resigned from the army and on August 27 became president. With the country still under martial law, Chun pushed through a new constitution in late 1980 that allowed him to rule with a firm hand.

Chun's rule was punctuated by several crises; a financial scandal in 1982 forced him to replace half his Cabinet, and an assassination attempt by North Korean agents in 1983 resulted in the deaths of several other top aides and ministers. As president, Chun devoted his efforts to maintaining economic growth and political stability. South Korea continued its export-led economic growth under Chun, and the nation industrialized rapidly.

With Chun unable to serve more than one seven-year term as president under his 1980 constitution, in 1987 he picked Roh Tae Woo to be the candidate of Chun's ruling Democratic Justice Party. Political unrest forced Chun in 1988 to apologize for abuses of power during his presidency. Vowing to donate his personal wealth to the state, he entered a Buddhist monastery.

Chun-ko-erh P'en-ti (China): *see* Dzungarian Basin.

Ch'un-ti (Chinese emperor): *see* Ch'ien-lung.

chün-t'ien (ancient Chinese agency): *see* equal-field system.

Chün ware, Pinyin JUN, Chinese stoneware of the Northern Sung period (960–1126), from Chün-chou in northern Honan. One class of these glazed wares consists mostly of opalescent blue pieces (ranging from grayish blue to a plum colour), many strikingly splashed or mottled in purple or crimson; the glazes are generally crackled. Another well-known class



Chün dish, Northern Sung period (AD 960–1126); in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, Wilfrid Walter

has a type of red, or flambé, glaze and consists of flowerpots, bulb bowls, elegant shallow dishes, waterpots, and small boxes.

Ch'unch'ŏn, city and provincial capital, Kangwŏn *do* (province), northern South Korea. It is in the basin formed by the confluence of the North Han and the Soyang rivers. During the Korean War (1950–53), Ch'unch'ŏn sustained heavy damage, but after the war it was reconstructed as a modern city. The city is a rail terminus from Seoul and is a road junction with river transport facilities. It is the market centre for agricultural products (rice, millet, soybeans) produced in the vicinity. After 1960, with the construction of hydroelectric plants in nearby areas, light industry developed rapidly in Ch'unch'ŏn. The city is the home of Ch'unch'ŏn National College of Agriculture, Ch'unch'ŏn Junior Teachers' College (1962), and Sŏngsim Women's College (1964). Pop. (1990 prelim.) 174,153.

chung, Pinyin ZHONG, bronze, clapperless bell produced in China mainly during the late

Chou (*c.* 600–255 BC) dynasty. The lower lip of the *chung* often arcs somewhat between slight points at either side of the elliptical section of the bell; the sides are slightly convex or flat in profile and slope gently to a flat top, where a lug (ear-shaped protuberance) of greater or lesser elaboration is placed.

The *chung* originally would have been arranged in a series, according to size and tone, suspended on a wooden frame from the lug at the top, and sounded by striking the surface with a mallet. Examples of similar bells are known from the Shang dynasty (18th–12th century BC), but generally the bells known as *chung* come from the late Chou period, when the exterior surfaces are embellished with densely patterned designs and bosses.

chung ch'ao, Pinyin ZHONG CHAO (Chinese: "inner court"), in imperial China, the group of advisers and attendants (often extended family members and eunuchs) with direct access to the emperor. The inner court's authority was established during the Han dynasty (206 BC–AD 220), when it was customary for the emperor to bestow honorary titles upon his favourites. At first, these titled individuals had no special duties or privileges. Some were later given minor responsibilities, however, and, because they could approach the emperor directly, their influence increased until they had more power than even the chief ministers of the outer court, as the official civil service came to be known.

Ch'ung-chen, Pinyin CHONGZHEN (reign name, or *nien-hao*), personal name (*hsing ming*) CHU YU-CHIEN, posthumous name (*shih*) CHUANG-LIEH-MIN, temple name (*miao-hao*) (MING) SSU-TSUNG or (MING) I-TSUNG (b. Feb. 6, 1611, Peking, China—d. April 25, 1644, Peking), 16th and last emperor of the Ming dynasty (1368–1644).

Ch'ung-chen ascended the throne at the age of 16 on the death of his brother, T'ien-chi (reigned 1620–27), and tried to revive the deteriorating Ming government. He banished Wei Chung-hsien, the powerful eunuch who had dominated his brother's reign, and he eliminated some of the more corrupt officials. He could not, however, quell partisan strife within the bureaucracy and the army. The imperial generals were frequently more interested in quarreling with one another than in putting down rebellions or halting the incursions of the Manchu tribes on the northeast border of the empire.

The corruption of previous reigns had so depleted the imperial treasuries that Ch'ung-chen was unable to supply his armies, and his troops frequently joined enemy forces. In desperation, Ch'ung-chen demanded more taxes and conscripts from the already overly oppressed population. Unable to bear this extra burden, the people joined the rebel bands in increasing numbers.

Finally, in 1644 several of Ch'ung-chen's eunuch generals betrayed him, and Li Tzu-ch'eng (1605?–45), one of the rebel leaders, captured the capital city, Peking. As Li's forces approached the city, the emperor struck a bell, signaling his ministers to appear for a conference. When no one came, he climbed to the top of Coal Hill, next to his palace, and hanged himself.

Chung-chia (people): *see* Puyi.

Ch'ung-ch'ing (China): *see* Chungking.

Chung-fu (Chinese Communist leader): *see* Ch'en Tu-hsiu.

Chung-hsing Hsin-ts'un (Chinese: "Chung-hsing New Village"), town, Nan-t'ou *shih* (municipality), Nan-t'ou *hsien* (county), west-central Taiwan, and, since 1958, the administrative seat of the Taiwan Provincial Government. It is situated in a fertile plain just west of the Chung-yang Mountain Range; rice, sugarcane, sweet potatoes, and pineapples are grown nearby. A freeway connects the town to T'ai-chung city, 13 miles (21 km) north, and Nan-t'ou city, 4 miles (6 km) south.

Ch'ung hsü chih te chen Ching (Chinese classic): *see* Lieh-tzu.

Chung-hua Jen-min Kung-ho-kuo, also called CHUNG-KUO: *see* China.

Chung-hua Min-kuo: *see* Taiwan.

Chung-li, *shih* (municipality), T'ao-yüan *hsien* (county), northwestern Taiwan, about 5 miles (8 km) southwest of T'ao-yüan city, in the northern coastal uplands. Situated on the western bank of Hsin-chieh River, Chung-li flourished in the late 17th century as the collecting centre for a fertile agricultural region of northern Taiwan that today produces rice, tea, and sweet potatoes. Sugar and rice milling and textile manufacturing are the major industries. Chung-li is connected to Taipei, Taiwan's capital, 21 miles (34 km) northeast, by the Chung-shan freeway and the West Line railway, which also connects the west-coast cities with the port of Kao-hsiung 200 miles (322 km) to the south. Chung-li is the seat of the National Central University (founded 1968) and Chung Yuan Christian University (founded 1955). Pop. (1991 est.) 269,804.

Chung-li Ch'üan, Pinyin ZHONGLI QUAN, in Chinese mythology, one of the Pa Hsien (*q.v.*), the Eight Immortals of Taoism. A wine-drinking recluse in quest of immortality, he is often depicted as a potbellied, bearded old man holding a fan with a tassel of horse



Chung-li Ch'üan, wood sculpture, 18th century; in the Musée Guimet, Paris
By courtesy of the Musee Guimet, Paris

hairs. Occasionally he is depicted as a military man and is credited with unusual knowledge of alchemy. His primacy among the Eight Immortals is challenged by a tradition that makes him an ascetic convert of Li T'ieh-kuai, another Immortal. An alternate name, Han Chung-li, indicates that he probably lived during the Han dynasty (206 BC–AD 220).

Chung Ling Soo, original name WILLIAM ELLSWORTH CAMPBELL (b. 1861, New York, N.Y., U.S.—d. March 23, 1918, London, Eng.), American conjurer who gained fame in England by impersonating a Chinese magician, both on and off the stage.

He began performing in the United States using the stage name William E. "Billy" Robinson. While in England in 1900, he modeled himself after Ching Ling Foo, an authentic Chinese conjurer who had recently made a successful American tour. Accused by Ching in 1904 of being an imposter, Chung admitted the masquerade, but his public admired him even more for his clever impersonation. Campbell was still playing Chung Ling Soo in 1918, when he was accidentally shot to death while doing a bullet-catching trick.

Ch'ung-ming Island, Chinese (Wade-Giles) CH'UNG-MING TAO, or (Pinyin) CHONGMING DAO, large island in the mouth of the Yangtze River, Chekiang *sheng* (province), China. It is part of Shanghai *shih* (municipality).

The island has been built up by the silt carried down by the river from its middle and upper course. It was first mentioned in the 7th century AD, when it seems to have consisted of three large sandbanks in the estuary. These gradually formed an island, and in the early 10th century a garrison, called Ch'ung-ming, was established on the western sandbank as an outpost of Hai-men county on the north bank of the estuary. In 1222 a salt directorate was established on the island, under the Huai-tung salt administration. Under the Mongol dynasty (1279–1368), Ch'ung-ming was raised to prefectural status in 1348; its administrative seat on the Yao-liu sandbank was transferred in 1352 to the eastern sandbank. With the accession of the Ming dynasty (1368–1644), it was demoted to county status in 1369 and placed under the administration first of Su-chou and after 1497 of T'ai-ts'ang district to the south of the estuary. The island suffered greatly from flooding, and protective dikes had to be built to prevent inundations. Before World War II the population, once considerable, had dwindled and barely eked out a living by fishing and cultivating soybeans.

After 1949 a determined effort was made first to repair the sea defenses and plant protective belts of trees and then to restore the island to productivity. But the main development occurred after the island was organized into communes in 1958. The larger scale of operations that this made possible led to an ambitious plan to increase the island's productivity and to reclaim a number of the surrounding mud flats. Beginning in 1959–60, extensive areas were diked and provided with irrigation and drainage ditches. Care was taken to guard against excessive alkalinity; the land brought under cultivation was first planted with cotton, which is highly resistant to alkaline conditions. After cotton has been grown for about five years, the land can be used for grain cultivation. It also supports fruits, vegetables, and poultry for the urban market of nearby Shanghai. With completion of the original plan, similar reclamation work was carried out on neighbouring mud flats such as the Hsin-an, the Pai-wan, and the Holung.

Chung-ni: *see* Confucius.

Chung-shan, formerly called SHIH-CH'I, Pinyin ZHONGSHAN or SHIQI, city in central Kwangtung *sheng* (province), China. Located in the central southern Pearl River delta, Chung-shan has a network of waterways connecting it with all parts of the delta and stands on a highway running north to Shun-te and Canton and south to the Portuguese overseas province of Macau. Chung-shan is the marketing and commercial centre of one of the most prosperous and densely peopled areas in China. Great quantities of agricultural produce are collected for shipment to Canton, and it is the main distribution point for manufactured goods, also mostly from the Canton area.

Chung-shan was first founded as a market town in the 11th century. It became the seat of a county, subordinate to Canton, in 1162. The area was one of the first to become subject to influence from Western contacts, and many

of its inhabitants were prominent in overseas trade and in the first modernizing ventures in China during the 19th century. The county is famous for having been the birth place of Sun Yat-sen, also known as Sun Chung-shan, the leading figure in the Chinese revolution of 1911. Pop. (1985 est.) 208,900.

Ch'ung-te (Chinese ruler): *see* Abahai.

Chung-yang Range, Chinese (Wade-Giles) CHUNG-YANG SHAN-MO, English CENTRAL RANGE, mountain group, eastern Taiwan. It trends north–south and consists of three main ranges (respectively, from east to west): the Chung-yang Range, Yü Mountains, and A-li Mountains. The Chung-yang Range traverses the length of the island, extending about 170 miles (270 km) in length and up to 50 miles (80 km) in width, with some 27 peaks rising more than 9,850 feet (3,000 m). Mount Yü (also called Mount Hsin-kao, formerly Mount Morrison) is the highest peak, at 13,114 feet (3,997 m).

The range is composed mainly of schists, quartzites, and gneisses and is terminated very abruptly by the T'ai-tung rift valley on the east and more gradually by a hilly region leading down to Taiwan's fertile coastal plain on the west. Much of the A-li range is faulted, giving rise to structural depressions, in one of which lies Jih-yüch T'an ("Sun Moon Lake"), site of a major hydroelectric plant. Rainfall on the mountain slopes is abundant, usually exceeding 150 inches (3,800 mm), and the range gives rise to the Cho-shui, Ta-chia, Kao-p'ing, and Hsin-Wu-lü rivers. Forests of broad-leaved trees predominate at lower elevations, giving place to mixed forests at higher elevations and finally, above 6,000–8,000 feet (1,800–2,400 m), to coniferous forests. The region is sparsely settled except for scattered groups of aborigines.

Chung yung (Chinese: "Centre," or "Unchangeable"), Pinyin ZHONG YONG, one of four Confucian texts that, when published together in 1190 by Chu Hsi, a great Neo-Confucian philosopher, became the famous *Ssu shu* ("Four Books"). *Chung yung* was chosen by Chu Hsi for its metaphysical interest, which had already attracted the attention of Buddhists and earlier Neo-Confucianists. In his preface, Chu Hsi attributed authorship of the treatise (which was actually a chapter from *Li chi,* one of the Five Classics of antiquity) to Tzu Ssu (K'ung Chi), a grandson of Confucius (551–479 BC).

Tzu Ssu presented *Chung yung* as the central theme of Confucian thought. The two Chinese characters *chung yung* (often translated "doctrine of the mean") express a Confucian ideal that is so broad and so all-embracing as to encompass virtually every relationship and every activity of man's life. In practice, *chung yung* means countless things: moderation, rectitude, objectivity, sincerity, honesty, truthfulness, propriety, equilibrium, and lack of prejudice. For example, one must be to a friend what a friend should be: neither too close nor too remote. Neither in grief nor in joy should one be excessive, for unregulated happiness can be as harmful as uncontrolled sorrow. One must adhere unswervingly to the mean, or centre course, at all times and in every situation. Such behaviour conforms to the laws of nature, is the distinctive mark of the superior man, and is the essence of true orthodoxy. *See also* Ssu shu.

Ch'ungch'ŏng-nam, English SOUTH CH'UNG-CH'ŎNG, *do* (province), west-central South Korea. Facing the Yellow Sea to the west, it is bounded on the north by Kyŏnggi *do,* on the east by Ch'ungch'ŏng-puk *do,* and on the south by Chŏlla-puk *do.*

With one-third of its 3,417-square-mile (8,851-square-kilometre) area under cultivation, it is one of the best granaries in the country, producing rice, ginseng, tobacco, and peppermint. Its 2,000-mile (3,200-kilometre) coastline includes more than 250 islands attached to the province, and its seashore area supports the culture of marine products such as shellfish and ear shell (abalone). The province has 55,000 acres (22,250 hectares) of exposed beach, which has been used to manufacture salt by solar evaporation. Cattle grazing to produce beef and milk is carried on in the low, hilly terrain. Although the province's most important mineral products have traditionally been gold, alluvial gold, silver, and coal, the discovery of monazite (a thorium-bearing rare-earth mineral) and zircon fields have attracted attention. The famous native ramie cloth (Hansan-Mosi) is produced in the Hansan area.

Mount Gyeryŏng (2,717 feet [828 m]) is in a national park in the province that features unique rock and stone formations as well as a number of old temples. Various native religious groups assemble there. Sŏsan Shore National Park includes some of the best bathing beaches in the country. Taejŏn, an industrial city, serves as the provincial capital. The other city in the province is Ch'ŏnan. Pop. (1989 est.) 3,008,000.

Ch'ungch'ŏng-puk, English NORTH CH'UNG-CH'ŎNG, *do* (province), central South Korea. The only province of South Korea with no seacoast, it is bordered by the provinces of Kangwŏn (north), Kyŏngsang-puk (east), Chŏlla-puk (southwest), Ch'ungch'ŏng-nam (west), and Kyŏnggi (northwest). Its area is 2,871 square miles (7,437 square km). Mostly mountainous, its basin plain lies between the Noryŏng Mountains to the north and the Sobaek Mountains to the east; through the basin the Namhan River, a tributary of the Han, flows toward the north, and the Kŭm River and its tributary the Mi-ch'ŏn flow toward the south and west.

The province's plain is one of the nation's important granaries. In addition to rice, barley, beans, and sweet potatoes, the province's special agricultural products include ginseng, yellow-leaf tobacco (transplanted from Virginia, U.S., in 1912), and apples. Mineral reserves include gold, iron, coal, high-grade steatite, fluorite, molybdenum, marble, graphite, and limestone, with cement manufacturing flourishing in the northern area. There is some tobacco manufacturing and some silk weaving and other home industries. Mount Songni (3,468 feet [1,057 m]) in the Sobaek Mountains to the south is a national park and the site of Pobju-sa, one of the oldest temples in the country. Cities in the province are Ch'ŏngju, the provincial capital, and Ch'ungju. Pop. (1989 est.) 1,356,000.

Ch'ungju, city, Ch'ungch'ŏng-puk *do* (province), central South Korea. Connected with Seoul by water transport on the Han River, it was the administrative and economic centre of the province until the provincial government was removed to Ch'ŏngju in 1909. Although traditionally an agricultural centre, the city began to develop industrially in the 1950s with the construction of a fertilizer plant. Pop. (1985) 113,331.

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Chungking, Chinese (Wade-Giles) CH'UNG-CH'ING, or (Pinyin) CHONGQING, largest city of Szechwan *sheng* (province), China. Chungking (meaning "Double-Blessed") is the principal river port and industrial centre of southwestern China.

A brief treatment of Chungking follows. For full treatment, *see* MACROPAEDIA: Chungking.

The old city of Chungking occupies a historically strategic location on a promontory, the Chin-pi Mountain, at the confluence of the Yangtze River on the north and the Chialing River on the south and east, 1,400 miles (2,250 km) inland from the East China Sea. Chungking is shielded from cold northern winds by the Tsinling Mountains; the city has a mild climate and has little frost or ice in winter. The summer is hot and humid. Between October and April the city is blanketed by fog.

Once a congested city of narrow and irregular streets, Chungking changed greatly as a result of a vigorous modernization program introduced during World War II, when it became the Nationalist capital. Sections west of the Old City expanded rapidly. Heavy aerial bombardment by the Japanese in 1938–42 destroyed much of the city and led to a reconstruction program that continued in the decades after the war. Numerous industrial towns and suburban communities have extended the city limits and relieved some of the crowding of the Old City. Modern Chungking is a city of contrasts, with architecturally modern apartment buildings and commercial structures standing side by side with houses of traditional design.

The foundations of Chungking's modern industry were laid between 1938 and 1945. Its industries include iron and steel production; coal mining; manufacture of machines, farm tools, munitions, and trucks; and production of chemicals and fertilizers. The city is a leader in light industries, including the production of cotton, silk, and paper; dyeing, food processing, and handicrafts also are important. It is the focal point of trade and transport not only of Szechwan but also of the adjoining provinces of Shensi, Yunnan, and Kweichow and of eastern Tibet.

Chungking University and numerous other institutes offer training in the professions and the arts. The Chungking Library and the Chungking Municipal Museum are among the leading cultural centres in the city.

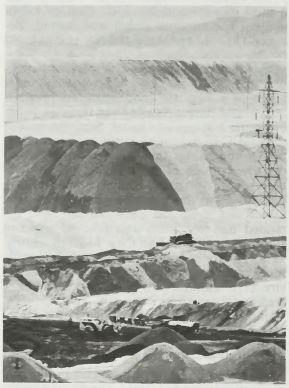
The principal means of transport in the city are pedicabs, bicycles, and buses. Cable tramways climb the steep hills. The city's port accommodates heavy river traffic. Several rail lines and an extensive highway network link the city with other cities and provinces. Chungking's airport handles domestic service. Pop. (1988 est.) 2,179,000.

Ch'ungmu, city, Kyŏngsang-nam *do* (province), southeastern South Korea. Until it was made a municipality in 1955, it was called T'ongyŏng, deriving its name from T'ongjeyŏng, which in old Korean means "headquarters." During the Yi dynasty (1392–1910) it was the headquarters of the Korean navy. The city has many historical remains. The port's deep water and large islands such as Kŏje, Hansan, and Mirŭk, which screen the winds and waves, have made it a good harbour from early times. Ch'ungmu is a junction and port of call for regular shipping lines. The city's principal industry is fishing, which is supported by the manufacture of marine products and by canning, shipbuilding, and net making. The city is also famous for its traditional lacquerwork inlaid with mother-of-pearl. The cultivation of pearl shellfish began in 1964. Hanryŏsudo National Park, which includes islands as well as mainland areas, is located nearby. Pop. (1985) 87,459.

chuppah (Judaism): *see* ḥuppa.

Chuquicamata, mining and smelting centre, Antofagasta region, northern Chile. It lies at 8,860 feet (2,700 m) above sea level. The open-pit mine, which is more than 2 miles (3 km) long and 980 feet (300 m) deep, was started in 1915 and taps one of the world's largest-known copper deposits. It produces

three-fourths of the nation's copper, which is carried by rail to Antofagasta, 140 mi southwest, for export. Flotation and smelting facilities were installed in 1952; and an expansion of refining facilities in 1968 made possible



Copper mine at Chuquicamata, Chile
Georg Gerster—Rapho/Photo Researchers

500,000 tons annual copper production in the late 1970s. Ore bodies at nearby Sagasca and Exótica are also being mined. Control of these mines passed from foreign to Chilean hands in 1969. Pop. (1983 prelim.) 29,959.

Chuquisaca, department, southeastern Bolivia, bounded on the east by Paraguay. Created in 1826, its territory of 19,984 sq mi (51,524 sq km) includes portions of both the Andean Cordillera Oriental and the eastern lowlands. The highlands are drained by the southeastward-flowing Río Pilcomayo; the plains are subject to annual inundations followed by periods of extreme aridity. During the colonial era the region rose to prominence because of its main city, Sucre (*q.v.*), then called Chuquisaca. Livestock grazing and the cultivation of cereals are the principal highland occupations. Corn (maize), rice, tobacco, and tropical fruits are grown in the lowlands. Mineral resources include gold, silver, iron, and copper. Railroads and roads link the main towns, and Sucre, which is the departmental capital and also the legal capital of Bolivia, has an airport. (The national capital is La Paz, where the executive and legislative bodies sit.) Pop. (1984 est.) 454,573.

Chuquitanta (South America): *see* El Paraíso.

Chur (German), French COIRE, Italian COIRA, Romansh CUERA, capital, Graubünden (Grisons) canton, eastern Switzerland, on the Plessur River, in the Rhine Valley. The meeting point of roads from Italy over several Alpine passes, it was important in Roman times as Curia Raetorum, the centre of the Roman province of Raetia Prima. First mentioned in 452 as the seat of a bishopric, it was ruled in the Middle Ages by its bishops, who became princes of the Holy Roman Empire in 1170. Chur was the centre of the Gotteshausbund (League of the House of God) against the power of the prince bishops and the Habsburgs in 1367, and it became the capital of the new canton of Graubünden in 1803. Notable landmarks include the Catholic Cathedral of St. Lucius (1175–1282), the Episcopal Palace (rebuilt 1728–37), the Protestant Church of St. Martin (8th century, rebuilt 1476–91), the Raetian Museum, and the cantonal museum.

Chur's main industry is tourism, but it is also an important trading centre, especially for Valtelline wines, and synthetic ammonia is manufactured at the Ems works on the Rhine above the town. The population is mainly German speaking with a small Protestant majority. Pop. (1983 est.) 31,758.

church, in Christian doctrine, the Christian religious community as a whole, or a body or organization of Christian believers.

The Greek word *ekklēsia,* which came to mean church, was originally applied in the Classical period to an official assembly of citizens. In the Septuagint (Greek) translation of the Old Testament (3rd–2nd century BC), the term *ekklēsia* is used for the general assembly of the Jewish people, especially when gathered for a religious purpose such as hearing the Law (*e.g.,* Deut. 9:10, 18:16). In the New Testament it is used of the entire body of believing Christians throughout the world (*e.g.,* Matt. 16:18), of the believers in a particular area (*e.g.,* Acts 5:11), and also of the congregation meeting in a particular house—the "house-church" (*e.g.,* Rom. 16:5).

After the Crucifixion and Resurrection of Jesus Christ, his followers went forth according to his mandate to preach the Gospel and developed facilities for those who were converted. Rebuffed by the Jewish authorities, the Christians established their own communities, modelled on the Jewish synagogue. Gradually, the church worked out a governmental system based on the office of the bishop (episcopacy).

Various controversies threatened the unity of the church from its earliest history, but, except for small sects that did not ultimately survive, it maintained unity for several centuries. Since the separation of the Eastern and Western churches in 1054 and the disruption of the Western Church during the 16th-century Protestant Reformation, however, the church has been split into various bodies, most of which consider themselves either the one true church or at least a part of the true church.

A traditional means of discussing the nature of the church has been to consider the four marks, or characteristics, by which the church is distinguished in the Nicene Creed: one, holy, catholic, and apostolic. The first, that of oneness or unity, appears to be contradicted by the divisions in the church. It has been held, however, that since Baptism is the rite of entry into the church, the church must consist of all baptized people, who form a single body irrespective of the denomination to which they belong. The holiness of the church does not mean that all its members are holy but derives from its creation by the Holy Spirit. The term catholic originally meant the universal church as distinct from the local congregations, but it came to imply the Church of Rome. Finally, apostolic implies that, in both its church and ministry, the church is historically continuous with the Apostles and thus with the earthly life of Jesus.

The fact that many Christians hold nominal beliefs and do not act like followers of Christ has been noted since the 4th century, when the church ceased to be persecuted. To account for this, St. Augustine proposed that the real church is an invisible entity known only to God. Martin Luther used this theory to excuse the divisions of the church at the Reformation, holding that the true church has its members scattered among the various Christian bodies but that it is independent of any organization known upon Earth. Many Christians, however, believing that Jesus intended to found one visible church here upon Earth, have worked to restore the unity of the church in the ecumenical movement. Evangelical Christians believe that for church unity to come to pass, fidelity to apostolic doctrine and practice must be restored.

church, in architecture, a building designed for Christian worship.

The earliest churches were based on the plan of the pagan Roman basilica (*q.v.*), or hall of justice. The plan generally included a nave (*q.v.*), or hall, with a flat timber roof, in which the crowd gathered; one or two side aisles flanking the nave and separated from it by a row of regularly spaced columns; a narthex (*q.v.*), or entrance vestibule at the west end, which was reserved for penitents and unbaptized believers; and an apse (*q.v.*) of either semicircular or rectangular design, located at the east end of the church and reserved for the clergy (*see* orientation).

During a later period, a transept was added to the basilican plan in the form of a wing aligned perpendicular to the nave on a north–south axis and projecting from the boundaries of the nave to form the cruciform, or Latin cross, plan. Auxiliary altars, dedicated to particular saints, were often erected at each end of the transept. Some medieval English cathedrals (*e.g.,* Canterbury, Lincoln, and Salisbury) have a second, smaller transept to the east of the main transept.

In Byzantium, Asia Minor, and eastern Europe, where the Orthodox Church flourished, a plan known as the Greek cross dominated ecclesiastical building. In contrast to the long, timber-roofed nave crossed at one end by a shorter transept, Eastern churches had four wings of equal size projecting from a central, square, domed crossing area. A notable example is Hagia Sophia (6th century AD), Constantinople (modern Istanbul).

Elaboration of Western Christian services was paralleled toward the end of the 11th century by increasing complexity in the basilican plan. Choir space was defined, usually east of the transept but occasionally in the nave proper, as in Westminster Abbey. Whereas in early basilican churches the clergy had been seated in the apse, they now occupied an area called the presbytery (*q.v.*); the term chancel, originally referring to the area directly behind the cancelli, or rails, separating nave from apse, now included that part of the church occupied by altars, officiating clergy, and singers. The term choir is sometimes used interchangeably with chancel for this area.

In France the eastern end of the church was elaborated into a structure known as a chevet, which is fully developed in many 12th-century Romanesque churches; *e.g.,* Notre-Dame-du-Port in Clermont-Ferrand, Fr. The term applies equally to an eastern termination consisting of multiple apses or to a single apse surrounded by an ambulatory and radiating chapels; it was designed to place as many subsidiary altars as possible close to the high altar. The radiating chapels (*see* chapel) were usually uneven in number, with the central one dedicated to the Virgin Mary and known as the Lady chapel (*q.v.*), a feature of both French and English cathedrals.

It was, however, in Italy, between the end of the 14th century and the first quarter of the 16th, that the most significant innovation in European church architecture appeared, in the form of the hall church. Designed on the rising crest of the Counter-Reformation, which understood well the importance of preaching to reclaim errant congregations, hall churches minimized the long space from entrance to altar, thus placing the worshipper much closer to the proceedings. This was accomplished by introducing pulpits midway down the nave and by adding major side chapels at midpoint, in which additional masses could be conducted simultaneously. The developed form of the hall church can be seen in the Gesù (1568, Rome) by Giacomo da Vignola.

Both the basilican and hall church plans dominated western European and American church design until the mid-20th century. The modernization of rituals in the Roman Catholic Church and the innovative spirit of

many Protestant denominations have rested in experimentation with new architectural forms. Designers have invented variations on the Greek cross plan or have departed completely from traditional forms.

Church, Frederic Edwin (b. May 4, 1826, Hartford, Conn., U.S.—d. April 7, 1900, near New York City), American Romantic landscape painter who was one of the most prominent members of the Hudson River school.

Church studied with the painter Thomas Cole at his home in Catskill, N.Y., and remained a close friend. Developing unusual technical dexterity, Church from the beginning sought for his subjects such marvels of nature as Niagara Falls, volcanoes in eruption, and icebergs. He was greatly influenced by the writings of Alexander Humboldt, the German naturalist; and in 1853, while he was in Ecuador, he stayed in the house where Humboldt had lived. He portrayed the beauties of the Andes and tropical forests with great skill. In the management of light, colour, and the natural phenomena of rainbow, mist, and sunset his renderings were plausible and effective. In their time these paintings received great admiration and sold for high prices—collectors in the United States and in Europe sought them eagerly. Enthusiasm for Church's works was rekindled in the late 20th century, when he was considered one of the foremost American landscape painters. Church's long-lost masterpiece "Icebergs" (1861) was rediscovered in 1979.

In 1849 Church was made a member of the National Academy of Design. Among his other major works are "Niagara" (1857), "Andes of Ecuador" (1855), and "Cotopaxi" (1862). Church traveled widely in Europe and the Middle East, but after 1877 he was compelled to abandon painting because of crippling rheumatism in his hands. He died at Olana, his house on the Hudson River, now a museum.

Church, Sir Richard (b. 1784, Cork, County Cork, Ire.—d. March 30, 1873, Athens), British soldier and Philhellene, commander of the Greek forces during the War of Greek Independence.

The second son of a Quaker merchant, he ran away from school to join the army, becoming an ensign in the 13th (Somersetshire) Light Infantry and serving under Sir Ralph Abercromby in Egypt in 1801. He accompanied the expedition (1809) to the Ionian Islands, where he met Theódoros Kolokotrónis and other Greeks in exile. Already sympathetic toward ideas of Greek independence, he afterward obtained permission to form two Greek regiments in English pay in order to give the Greeks military training, but the regiments were later disbanded. In vain, Church pleaded the Greek cause not only in London but at the Congress of Vienna (1814–15). He was knighted in 1822. In March 1827 he went to Greece to fight in the war of independence and in the following month was appointed commander in chief of the Greek forces. In 1829, after his campaigns in western Greece, Church resigned his command because he opposed the government of Count Kapodistrias. Later appointed confidential adviser to Sir Edmund (later Baron) Lyons, first British minister to Greece, he also played a conspicuous part in the revolution of 1843.



Sir Richard Church, detail of a print

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

church and state, the concept, largely Christian, that the religious and political powers in society are clearly distinct, though both claim the people's loyalty.

A brief treatment of church and state follows. For full treatment, *see* MACROPAEDIA: Christianity.

Before the advent of Christianity, separate religious and political orders were not clearly defined in most civilizations. People worshipped the gods of the particular state in which they lived, religion in such cases being but a department of the state. In the case of the Jewish people, the revealed Law of the Scripture constituted the Law of Israel. The Christian concept of the secular and the spiritual is founded on the words of Jesus: "Render unto Caesar the things that are Caesar's, and to God the things that are God's" (Mark 7:17). Two distinct, but not altogether separate, areas of human life and activity had to be distinguished; hence, a theory of two powers came to form the basis of Christian thought and teaching from earliest times.

During the 1st century AD the Apostles, living under a pagan empire, taught respect for and obedience to the governing powers so long as such obedience did not violate the higher, or divine, law, which superseded political jurisdiction. Among the Church Fathers, who lived in a period when Christianity had become the religion of the empire, the emphasis on the primacy of the spiritual was even stronger. They insisted upon the independence of the church and the right of the church to judge the actions of the secular ruler.

With the decline of the Roman Empire in the West, civil authority fell into the hands of the only educated class that remained—the churchmen. The church, which formed the only organized institution, became the seat of temporal as well as spiritual power. In the East the civil authorities, centred in Constantinople, dominated the ecclesiastical throughout the Byzantine period.

In 800, under Charlemagne, the empire was restored in the West, and by the 10th century many secular rulers held power throughout Europe. A period of political manipulation of the church hierarchy and a general decline in clerical zeal and piety brought vigorous action from a line of reforming popes, the most famous of whom was Gregory VII.

The following centuries were marked by a dramatic struggle of emperors and kings with the popes. During the 12th and 13th centuries, papal power greatly increased. In the 13th century, however, the greatest scholar of the age, St. Thomas Aquinas, borrowing from Aristotle, aided in raising the dignity of the civil power by declaring the state a perfect society (the other perfect society was the church) and a necessary good. The medieval struggle between secular and religious power came to a climax in the 14th century with the rise of nationalism and the increased prominence of lawyers, both royalist and canon. Numerous theorists contributed to the atmosphere of controversy, and the papacy finally met with disaster, first in the removal of the popes to Avignon under French influence and second with the Great Schism attendant upon an effort to bring the popes back to Rome. Church discipline was relaxed, and church prestige fell in all parts of Europe.

The immediate effect of the Reformation was to diminish the power of the church even further. Christianity in its fractured condition could offer no effective opposition to strong rulers, who now claimed divine right for their positions as head of church and state. John Calvin's assertion of ecclesiastical supremacy in Geneva was an exception of the day. Many Lutheran churches became, in effect, arms of the state. In England Henry VIII ended ties with Rome and assumed the headship of the Church of England.

In the 17th century there were few who believed that diversity of religious belief and a church unconnected with the civil power were possible in a unified state. Common religious standards were looked upon as a principal support of the political order. When the notions of diversity of belief and toleration of dissent did start to grow, they were not generally seen to conflict with the concept of a state church. The Puritans, who fled religious persecution in England in the 17th century, enforced rigid conformity to church ideas among settlers in the American colonies.

The concept of secular government as expressed in the First Amendment to the U.S. Constitution reflected both the influence of the French Enlightenment on colonial intellectuals and the special interests of the established churches in preserving their separate and distinct identities. The Baptists, notably, held the separation of church and state powers as a principle of their creed.

The great wave of migration to the United States by Roman Catholics in the 1840s prompted a reassertion of the principle of secular government by state legislatures fearing allocation of government funds to parochial educational facilities. The 20th century saw the First and Fourteenth amendments to the Constitution applied with considerable strictness by the courts in the field of education. Late in the century, conservative Christian groups in the United States generated considerable controversy by seeking textbook censorship, reversal of court prohibition of school prayer, and requirements that certain Biblical doctrines be taught in contradistinction to scientific theories.

Church Army, organization of lay evangelists within the Church of England, founded on the model of the Salvation Army for evangelistic purposes in the slums of London in 1882 by Wilson Carlile. Later it became primarily concerned with social work and rehabilitation. After a two-year residential course of training, students are commissioned as officers of the Church Army; the men are called captains and the women sisters. Officers either serve parish churches in England as specialists in evangelism or serve in specialized ministries to children, the elderly, drug or alcohol addicts, the poor, the armed forces, and prisoners and their families. They also serve as missionaries in other countries. Autonomous societies exist in the United States, Canada, New Zealand, Australia, the Caribbean, and East Africa.

Church Commissioners, in the Church of England, organization established in 1947 by the amalgamation of two corporations, Queen Anne's Bounty and the Ecclesiastical Commissioners; it helps with the expenses of poor parishes.

The Governors of the Bounty of Queen Anne for the Augmentation of the Maintenance of the Poor Clergy was established by Queen Anne in 1703. Into this corporation were paid the first fruits (annates) and tenths (decimae) of the annual profits, originally paid by clergy to the papal exchequer and later appropriated for the crown by King Henry VIII. The income was used primarily for the upkeep of parish houses.

The Ecclesiastical Commissioners were created by act of Parliament in 1836. Subsequent legislation greatly extended their administrative powers and also vested in them a great deal of church property. The income from the

property was primarily used to augment the clergy's income.

The Church Commissioners took over all the rights, functions, and funds of the two corporations.

Church Father, any of the great bishops and other eminent Christian teachers of the early centuries whose writings remained as a court of appeal for their successors, especially in reference to controverted points of faith or practice. *See* patristic literature.

Church Missionary Society (CMS), society founded in London in 1799 as the Society for Missions in Africa and the East, by Evangelical clergy of the Church of England (those who stressed biblical faith, personal conversion, and piety). In 1812 it was renamed the Church Missionary Society for Africa and the East.

During its first 10 years it sent only five missionaries to work among non-Christians, but it gradually gained support, and its work expanded. Various CMS areas, including Canada, became independent provinces of the Anglican Communion. CMS's in Australia, New Zealand, and South Africa are associated but fully autonomous.

church mode, also called ECCLESIASTICAL MODE, in music, any one of eight scalar arrangements of whole and half tones, derived by medieval theorists, most likely from early Christian vocal convention.

The Eastern church was doubtless influenced by ancient Hebrew modal music. Its basic chant formulas were codified as early as the 8th century into a system known as *oktō-ēchos,* first suggested by St. John of Damascus (d. 749), according to the Byzantine treatise *Hagiopolites* ("From the Holy City"). The Byzantine arrangement of four authentic and four plagal *ēchoi* was probably inspired by an even earlier Syrian *oktōēchos:* whether the latter was, as some assert, a direct outgrowth of the ancient Greek modes remains uncertain, although the concept of mode itself had certainly been handed down from antiquity.

The Western church, too, retained certain Greek musical concepts for its own purposes. Unable to make use of the ancient octave species with its descending tetrachords, that church nevertheless integrated the tetrachordal principle into the doctrine of ascending church modes, based on the constituent pitches of the tetrachord d–e–f–g, which furnishes the first step, or *finalis,* for each of the four modal pairs, authentic and plagal. Whereas authentic modes begin and end with the *finalis,* their plagal partners range from the fourth below to the fifth above the *finalis.* Each mode, however, is characterized not only by its *finalis* but also by a unique recitation tone, tenor or *confinalis*—the upper fifth for authentic modes and the third for plagal (except where other considerations, such as the avoidance of intonation problems, prevail). Originally, the church modes were known by their respective numbers. The application, or rather misapplication, of the Greek names dates from a 9th-century treatise attributed to the monk Hucbald.

Schematically, the mature modal system may be represented as follows (with the finals underlined and the confinals or tenors in lowercase letters):

Dorian	D E F G a B C D
Hypodorian	A B C D E f G A
Phrygian	E F G A B c D E
Hypophrygian	B C D E F G a B
Lydian	F G A B c D E F
Hypolydian	C D E F G a B C
Mixolydian	G A B C d E F G
Hypomixolydian	D E F G A B c D

Though responsive primarily to melodic rather than harmonic needs, modality, for reasons of an essentially philosophical nature (modality purity), retained its hold upon composers well beyond the era of monophonic chant proper. By the same token, Renaissance polyphony turned to various subterfuges in order to preserve the integrity of traditional modality, while acknowledging the harmonically generated mandate to provide for the necessary leading tones (cadential halftone steps). Musica falsa and musica ficta were contrived as means of circumventing the modal image offered by the musical text through the addition of accidentals, according to certain generally accepted rules. In the later 16th century the Swiss humanist Glareanus, yielding to the musical realities of his day, proposed two new pairs of modes, Aeolian (corresponding to natural minor) and Ionian (identical with the major scale), for a total of 12 modes (hence the title of his book, *Dodekachordon*).

After more than two centuries of primarily didactic significance, modality attracted renewed attention in the late 19th and early 20th centuries, not only because it served the purposes of composers of neo-medieval or neo-Renaissance persuasion but also because it allowed purely melodic forces to reassert themselves at a time when functional harmony in the West appeared to have reached its zenith and when, moreover, previously unexploited folk traditions had begun to influence academic music. Precisely because, unlike the diatonic major and minor scales, the church modes are fundamentally impervious to the dictates of Western harmony, they have continued to dominate any number of folk-music strains, including that of the Anglo-American ballad.

church music: *see* liturgical music.

Church of ———: *see under* substantive word or words (*e.g.,* Scotland, Church of), except as below.

Church of Christ, Scientist: *see* Christian Science.

Church of France: *see* Reformed Church of France.

Church of Hungary: *see* Reformed Church of Hungary.

Church of Jesus Christ of Latter-day Saints, the largest denomination of the Mormon religion. *See* Mormon.

Church School: *see* Sunday school.

Church Slavonic language (liturgical language): *see* Old Church Slavonic language.

church sonata, Italian SONATA DA CHIESA, a type of trio sonata (*q.v.*).

Church States, Italian STATI DELLA CHIESA: *see* Papal States.

Church World Service, worldwide relief and rehabilitation agency, from 1951 to 1963 a department of the National Council of the Churches of Christ in the U.S.A., and from 1964 incorporated in the Division of Overseas Ministries of the council. Organized in 1946 as an independent agency, it took over and integrated the work of three relief organizations established earlier by U.S. Protestant churches. It provides emergency and rehabilitation aid to those in need outside the United States and helps to resettle displaced persons in that country.

church year, annual cycle of seasons and days observed in Christian churches in commemoration of the life, death, and Resurrection of Jesus Christ and of the virtues derived from him as exhibited in the lives of the Christian saints.

A brief treatment of the church year follows. For full treatment, *see* MACROPAEDIA: Christianity.

The church year represents the sanctifying of the seasons for the purposes of Christian worship. Though based on the weekly Lord's day, it is generally thought of in terms of the annual festivals. Its structure is formed by the six festivals of Christmas, Epiphany, Good Friday, Easter, Ascension, and Pentecost or Whitsunday. The first five of these commemorate events in the earthly life of Jesus Christ; the last commemorates the descent of the Holy Spirit upon the Apostles, which began the work of the church.

As the earliest members of the church were Jews, they naturally kept the Jewish liturgical year, with its ordered series of festivals and holy seasons. Of these, the chief was the Passover, which Christian Jews undoubtedly associated not only with the deliverance of the Jews from Egypt but also with the deliverance of Jesus from death. Similarly, the Jewish Pentecost, a harvest festival celebrating also the revelation of the Law to Moses, acquired Christian associations with Jesus' ascension and the descent of the Holy Spirit.

The Early Christian celebrations of Passover (Greek: Pascha; the three-day festival commemorating the death and resurrection of Jesus) and Pentecost were movable feasts, as Good Friday, Easter, Pentecost, and Ascension still are; *i.e.,* they are not kept on a fixed day of the calendar but vary in date from year to year depending on the incidence of the first full moon after the vernal equinox. Christmas and Epiphany, the other two festivals that form the structure of the church year, were not taken over from Judaism and are fixed to certain dates in the calendar. The older of them, Epiphany, on January 6, is first known to have been kept in the 3rd century, though it may be older. It celebrated the manifestation (Greek *epiphaneia*) of God to the world in Jesus Christ.

The evolution of Good Friday and Easter out of the earlier Pascha took place at Jerusalem, probably in the third quarter of the 4th century. In the second quarter of the same century, the birth of Christ was already being kept on December 25 in Rome. Before the end of the century its relationship to and distinction from Epiphany had been worked out in the eastern half of the empire, notably in Constantinople, Cappadocia, and Antioch. It was probably in this same area that Ascension became detached from Pentecost and kept on its own, 40 days after Easter. Thus, by the end of the 4th century, the basic pattern of the church year had been established.

The Eastern Orthodox church regards the church year as beginning with Easter, the greatest of the festivals, commemorating the victory of Christ over sin and death. Lent, the period of fasting and prayer in preparation for Easter, thus comes at the end of the year, which concludes with the Easter vigil. Christmas and Epiphany, always on December 25 and January 6, respectively, are not part of this series; they are found in the Menaion, which contains the readings for each fixed holy day from September 1 (the beginning of the Byzantine civil year) to August 31 and corresponds to the Western Proper of the Saints.

It was the Jerusalem system, with its cycle from the Nativity to Pentecost, that was taken over by the Western church as its Proper of the Time (*i.e.,* temporal cycle) and later underwent modifications and additions. Important developments were the addition of the two seasons of Advent (penitential season of four weeks before Christmas) and Septuagesima (the two and a half weeks before Lent), and the inclusion of five saints' days after Christmas in the Proper of the Time. The other saints' days form a separate list, the Proper of the Saints, which includes also the festivals of Christ unconnected with the main cycle of the church year; *e.g.,* the Transfiguration (August 6) and the Exaltation of the Cross (September 14). The increase in number and importance

of saints' days of various times has threatened to obscure the cycle of the church year, and prunings periodically have had to be made. Saints' days are transferred if in any year they fall on the same day as a major festival. The Roman Catholic calendar was revised in 1969. In the revision, the season of Septuagesima was eliminated and the Sundays "after Epiphany" and "after Pentecost" were renumbered as Sundays in Ordinary Time. These changes led to revisions in Lutheran and Anglican service books, and other Protestant denominations that had discarded much of the traditional church year during the Reformation showed interest in recovering some of the major feasts and seasons.

Churchill, northernmost seaport of Canada, in northeastern Manitoba. It lies on the west coast of Hudson Bay at the mouth of the Churchill River. It was named after John Churchill, 1st Duke of Marlborough, who was governor of the Hudson's Bay Company (1685–91). The company's original wooden Fort Churchill, built on the site in 1688, burned in 1689 and was replaced in 1718; it was superseded (1731–71) by the stone Fort Prince of Wales (partly restored as a national historic site). After completion in 1931 of the Hudson Bay Railway from The Pas (550 miles [885 km southwest]) to Churchill, it became a major grain-exporting port (July–October) with the advantage of a short sea route to Europe. Fort Churchill military base, used by Canada and the United States to engineer test equipment under Arctic conditions, is located to the southeast. Akudlik, a community of Eskimos, was established nearby in 1955. Churchill has no road links and can be reached only by rail, air, and sea. Its Eskimo Museum houses one of Canada's finest collections of Eskimo art. Pop. (1991) 1,143.

Churchill, Charles (b. February 1731, London, Eng.—d. Nov. 4, 1764, Boulogne, France), English poet noted for his lampoons and polemical satires written in heroic couplets.

Churchill was educated at Westminster School. Although he was delayed in taking orders by an early and imprudent marriage, he was ordained in 1756 and, in 1758, on his father's death, succeeded him as curate of a Westminster parish. In 1761 or 1762 he became friends with the champion of liberty of the press, John Wilkes, and his collaboration with Wilkes thereafter earned him an honourable place in the history of parliamentary democracy and civil liberties. But he won his fame independently in 1761 with *The Rosciad,* a satire on the London stage that named every prominent actor of the day unfavourably, except David Garrick; the brilliant and immediate success of this poem brought recognition and money to the bankrupt parson, and Churchill launched himself on the town and indulged his profligate tastes. By June 1762 he was separated from his wife.



Charles Churchill, detail of a portrait by J.S.C. Schaak; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He resigned his clerical position and in 1763 published *The Prophecy of Famine,* the first of several political satires attacking the government; a quarrel with the artist William Hogarth produced Churchill's *Epistle to William Hogarth* in June 1763. He gave new cause for scandal that year by an elopement. In 1764, when Wilkes was outlawed and in France, Churchill defended him in *The Duellist* and wrote *The Candidate* and other poems. He traveled to Boulogne to join Wilkes but, weakened by disease and dissipation, fell ill and died there.

Churchill, John: *see* Marlborough, John Churchill, 1st Duke of.

Churchill, Lord Randolph (Henry Spencer) (b. Feb. 13, 1849, Blenheim Palace, near Woodstock, Oxfordshire, Eng.—d. Jan. 24, 1895, London), British politician, a precociously influential figure in the Conservative Party and the father of Winston Churchill. He became leader of the House of Commons and chancellor of the Exchequer in 1886, at the age of 37, and seemed certain to be prime minister in due course, but his own miscalculation ended his political career before the year was over.

The third son of the 7th Duke of Marlborough, Lord Randolph married a famous beauty, Jeanette ("Jennie") Jerome (1854–1921) of Brooklyn, N.Y., U.S., in 1874, the same year in which he entered the House of Commons. Until 1880 he exercised his talent for satirical oratory against the Conservative government of Benjamin Disraeli, Earl of Beaconsfield. During William Ewart Gladstone's Liberal ministry of 1880–85, he joined three other Conservatives—Sir Henry Drummond Wolff, John Eldon Gorst, and Arthur James Balfour—in forming what became known as the Fourth Party, which advocated a set of views announced as "Tory Democracy."

Having served as unofficial private secretary to his father, lord lieutenant (viceroy) of Ireland from 1876 to 1880, Churchill was especially interested in the Irish problem. Though opposed to national Home Rule for Ireland, he favoured self-government on the local level and blamed shortsighted British officials for the Irish crisis of the 1880s. The majority of the Conservative Party agreed with the Liberal government's coercion policy toward Ireland, but Lord Randolph allowed the Irish nationalists, led by Charles Stewart Parnell, to understand that the Conservatives would oppose coercion in return for Irish votes in the general election of 1885. It was said that the Liberals underwent a forced conversion to Home Rule to counteract that promise.

Throughout this period, Churchill attempted to create a new Conservatism with a truly popular appeal and to secure power for the rank-and-file constituency representatives in the party's central organization. Older Conservative leaders, especially Robert Cecil, 3rd Marquess of Salisbury, rejected his approach, and the party split in 1884 over Churchill's election as chairman of the National Union of Conservative Associations. Lord Salisbury and Churchill both made concessions, however, and the reunited party won the vote of confidence of June 1885, Salisbury becoming prime minister. Appointed secretary of state for India, Churchill, who had attacked British imperialism in Egypt and elsewhere, ordered the Third Anglo-Burmese War (November 1885), leading to the annexation of all of Burma (Myanmar). He left office with Salisbury on Feb. 1, 1886, after a rupture between the Conservatives and Irish nationalists led to the Conservatives' loss of most of the votes of the Irish bloc in the House of Commons.

When the Conservatives returned to power on July 25, 1886, Salisbury appointed Churchill to the Exchequer and the Commons leadership. Evidently wishing to be the actual head of the government, Churchill alienated most of his colleagues; unable to effect a reconciliation, Salisbury waited for Churchill to defeat himself. He did so with his first budget, which, because it reduced the service estimates, was unacceptable to W.H. Smith, the secretary of state for war. On Dec. 20, 1886, Churchill sent Salisbury his resignation contingent on the prime minister's choice between the policies



Lord Randolph Henry Spencer Churchill

BBC Hulton Picture Library

of the Exchequer and the War Office. When the prime minister backed Smith, Churchill published his resignation in *The Times* of London on December 23. He may have expected a popular outcry in his favour, but none was heard; since the budget struggle had been kept secret, the public considered his action pointless.

Although he remained in the House of Commons until his death, Churchill lost interest in politics and devoted much time to horse racing. His last years were tragic, a general syphilitic paresis deranging his mind and killing him slowly and painfully.

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Churchill, Randolph (Frederick Edward Spencer) (b. May 28, 1911, London, Eng.—d. June 6, 1968, East Bergholt, Suffolk), English author, journalist, and politician, the only son of British prime minister Winston Churchill.

Churchill was a popular journalist in the 1930s and thrice failed to enter Parliament before becoming Conservative member for Preston (1940–45). During World War II he served as an intelligence officer in the Middle East and Yugoslavia. He was unsuccessful in parliamentary elections in 1945, 1950, and 1951.

His books on controversial topics included *What I Said About the Press* (1957), *The Rise and Fall of Sir Anthony Eden* (1959), and *The Fight for the Tory Leadership* (1964). He wrote a historical study, *Lord Derby: King of Lancashire* (1960), and by his death had published two volumes of a definitive biography of his father, *Youth, 1874–1900* (1966) and *Young Statesman, 1901–1914* (1967).

Churchill, Sir Winston (Leonard Spencer) (b. Nov. 30, 1874, Blenheim Palace, Oxfordshire, Eng.—d. Jan. 24, 1965, London), British statesman and author who as prime minister (1940–45, 1951–55) rallied the British people during World War II and pursued a global war strategy in concert with President Franklin D. Roosevelt of the United States.

A brief treatment of Sir Winston Churchill follows. For full treatment, *see* MACROPAEDIA: Churchill.

After graduation from the Royal Military

College at Sandhurst and service as a subaltern (1895–99) and war correspondent in Cuba, India, and South Africa, Churchill entered politics as a Conservative and won a seat in Parliament (1900). In 1904, however, he broke with his party over the tariff question, joined the Liberals, and in 1906 became under secretary of state for the colonies in a Liberal government. In 1908 he became a member of the Cabinet, first holding the post of president of the Board of Trade and later that of home secretary. Transferred to the Admiralty in 1911, he strengthened the British navy. But after World War I broke out, and after the failure of the Dardanelles expedition (which he had promoted), he resigned from his post with the Admiralty and served as an active military officer (1915–16). He returned to Parliament as a private member in 1916, then as minister of munitions (1917–18).

After the war, Churchill, while serving as secretary of war (1919–21), as head of the Colonial Office (1921–22), and chancellor of the Exchequer (1924–29), became increasingly conservative in his political views. Although he remained outside the government from 1929 to 1939, he continued to hold a seat in Parliament and repeatedly warned of the menace of Hitler's Germany. In 1939 he was reappointed to leadership of the Admiralty, and, after Germany invaded the Low Countries, he was installed as prime minister. He rallied his people to resist despite the fall of France, and he led them, fighting at the side of the United States and the Soviet Union, to ultimate triumph.

In the postwar world Churchill's Conservative Party was voted out of power in a Labour sweep in 1945 but was returned to power, with Churchill its prime minister, in 1951. He resigned in 1955.

For his many writings, especially *The Second World War*, 6 vol. (1948–53), he was awarded the Nobel Prize for Literature (1953). He was knighted in 1953 and was made an honorary U.S. citizen (1963) by Act of Congress.

Churchill, Winston (b. Nov. 10, 1871, St. Louis, Mo., U.S.—d. March 12, 1947, Winter Park, Fla.), American author of historical novels of wide popularity.



Winston Churchill, 1900
Brown Brothers

Graduated from the U.S. Naval Academy in 1894 and having private means, he soon devoted himself to writing. His first novel, *The Celebrity*, appeared in 1898. His next, *Richard Carvel* (1899), a novel of Revolutionary Maryland in which the hero serves as a naval officer under John Paul Jones, sold nearly 1,000,000 copies. Then followed another great success, *The Crisis* (1901), a novel of the American Civil War, in which the heroine is a descendant of Richard Carvel; and *The Crossing* (1904), which tells of Kentucky pioneers during the American Revolution. These romantic tales of America's past were Churchill's most popular works. His later work consisted chiefly of novels dealing with political, religious, or social problems. In 1899 he moved to New Hampshire, where he lived for almost 50 years. From 1903 to 1905 he served in the state legislature and in 1912 was a Progressive candidate for the governorship.

Churchill Falls, formerly GRAND FALLS, part of a series of cataracts and rapids on the Churchill River, southwest of Michikamau Lake in west Labrador, Newfoundland, Canada. Lying 250 miles (400 km) from the river's mouth, the falls drop 245 feet (75 m), forming part of the river's 1,100-foot (335-



Churchill Falls, Labrador, Newfoundland
George Hunter

metre) descent within a 16-mile (26-kilometre) stretch. The falls plunge into the McLean Canyon, which is bounded by sheer cliffs several hundred feet high. An average water discharge of 30,000 to 40,000 cubic feet (850 to 1,100 cubic m) per second accounts for the development of a large hydroelectric station near the falls; it is one of Canada's most important hydroelectric resources.

Visited in 1839 by John McLean of the Hudson's Bay Company, the cataracts were called Grand Falls until 1965, when both falls and river were renamed in honour of Sir Winston Churchill, who died that year.

Churchill River, formerly HAMILTON RIVER, largest river of Labrador, Newfoundland, Canada. It is formed from several river-lakes on the central plateau of western Labrador (a region of extensive iron-ore development) and meanders more than 200 miles (300 km) to Churchill Falls. There, the course is broken by a series of cataracts, one of the greatest hydroelectric-power sources in Canada. Beyond the falls, the Churchill flows through a deep canyon, 800 feet (250 m) below the level of the surrounding plateau, for the remaining 250 miles (400 km) past the lower Churchill



Section of the Churchill River, Labrador, Newfoundland
Malak, Ottawa

Falls (near Goose Bay) to its mouth on Lake Melville (Hamilton Inlet). It drains a basin of about 25,000 square miles (65,000 square km). Originally named in 1821 for Sir Charles Hamilton, Newfoundland's first colonial governor, the river was renamed in 1965 after Sir Winston Churchill. Several hydroelectric plants, including one at Menihek (1954) on the Ashuanipi (a source stream) and the giant Churchill Falls Power Project (1974), supply power for nearby mining establishments.

churchwarden, in the Church of England, one of the lay guardians of a parish church. The office dates from the 14th century, but the original duties of maintaining the edifice and goods of the church, with the financial obligations involved, were transferred to the parochial councils in 1921. Duties that remain are the provision of necessaries for divine service, the allocation of seats, and the keeping of order during services. Churchwardens are appointed after elections, one by the incumbent and one by the parishioners, in each parish.

In other parts of the Anglican Communion, churchwardens discharge much the same duties as in England, but their financial responsibilities are often greater.

Churchyard, Thomas (b. *c.* 1520, Shrewsbury, Shropshire, Eng.—d. 1604, London), English writer who won brief fame through his occasional verse, pamphlets on wartime experiences, pageants for Queen Elizabeth I, and historical and antiquarian works—all reflecting aspects of a crowded career. His works have never been completely printed, and copies are rare. Churchyard's earliest work was *A Myrrour for Man* (about 1552), reflections on the estate of man. His prolific output included "The Legend of Shore's Wife," his most popular poem, and *The Worthiness of Wales* (1587), in prose and verse.

After serving in the household of Henry Howard, Earl of Surrey, Churchyard became a mercenary, for 30 years fighting in almost every campaign in Scotland, Ireland, the Low Countries, and France under various banners. Later, at court, he devised pageants for Queen Elizabeth's progresses to Bristol (1574) and Norwich (1578), but a passage in his *Generall rehearsall of warres* (1579) offended Elizabeth, and Churchyard fled to Scotland. He was restored to favour about 1584 and received a small pension in 1593.

churinga (religion): *see* tjurunga.

Chūritsurōren, English LIAISON COUNCIL OF NEUTRAL LABOUR UNIONS, Japanese trade-union federation (1961–87) whose members were primarily employed in private enterprise. Although some of the individual member unions were identified with political parties, the federation itself was independent. Chūritsurōren often cooperated with the General Council of Japanese Trade Unions, Sōhyō, in economic matters; Sōhyō, which had ties to the Japan Socialist Party, was dissolved in 1989, when the entire labour movement was restructured.

churl (English peasant): *see* ceorl.

churn, device for making butter. The earliest churns were goatskins or other primitive containers in which cream could be agitated. The dash churn, familiar to farm homes for centuries, consisted of a tall, narrow, nearly cylindrical stone or wood tub fitted with a wooden cover; the cream was agitated by a hand-operated vertical wooden plunger, or dash. Another type, widely used in the 19th century, was shaped like a small barrel and mounted in a framework. Operation of a hand crank caused the barrel to revolve end over end.

Modern industrial churns are large, barrel-shaped, revolving containers in which the cream is agitated until the microscopic fat globules clump together. The liquid (butter-

milk) is drained, and the butter is washed with sterilized water. Continuous churns, developed in Europe in the 1930s, can produce a ton of butter per hour.

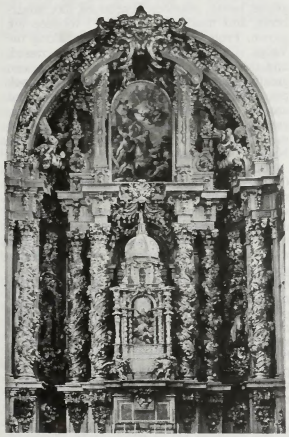
churning of the milky ocean, in Hindu mythology, one of the central events in the ever-continuing struggle between the *devas* (gods) and the *asuras* (demons, or titans). The gods, who had become weakened as a result of a curse by the irascible sage, Durvāsas, invited the *asuras* to help them recover the elixir of immortality, the *amṛta,* from the depths of the cosmic ocean.

Mt. Mandara, a spur of the world axis, Mt. Meru, was torn out to use as a churning stick and was steadied at the bottom of the ocean by Vishnu in his aspect as the tortoise Kūrma. The *asuras* held the head of the *nāga* (serpent) Vāsuki, who was procured for a churning rope, and the gods held his tail. When Vāsuki's head hit the rocks and he vomited forth poison that threatened to fall into the ocean and contaminate the *amṛta*, the god Śiva took it and held it in his throat, a feat that turned his throat blue.

In the churning of the ocean many wonderful treasures that became the prototypes for their earthly and heavenly counterparts were brought up from the depths: (1) Candra, the moon; (2) *pārijāta*, a beautiful and fragrant tree now planted in Indra's heaven; (3) the four-tusked elephant Airāvata, Indra's mount; (4) Kāmadhenu, the cow of plenty; (5) Madirā, the goddess of wine, who became Vāruṇī, the wife of Varuṇa; (6) Kalpavṛkṣa, the wish-fulfilling tree; (7) the *apsaras* (nymph) Rambhā; (8) the celestial horse Uccaiḥśravas; (9) the goddess Lakṣmī, who became the wife of Vishnu; (10) Pāñcajanya, Vishnu's conch; (11) Gadā, Vishnu's mace, and Dhanus, his magic bow; (12) Ratna (various gems); (13-14) Dhanvantari, the physician of the gods, who rose up out of the waters carrying in his hands the supreme treasure, the *amṛta.*

When the *amṛta* appeared, the gods and the *asuras* fought over its possession, though they had originally agreed to share it equally. After many adventures, it was finally consumed by the gods, who were thus restored in strength.

Churriguera FAMILY, a Spanish architectural family prominent during the last years of the 17th century and the first quarter of the 18th. The chief members of the family were three brothers, sons of a Barcelona altarpiece maker, all active at the same time. Often they and their four sons worked together on projects. The family has become identified with the Spanish late-Baroque style. The term Churrigueresque denotes a style that is visually frenetic and exuberantly detailed.



High altar retable, church of San Estéban, Salamanca, Spain, by José Benito Churriguera, 1693–1700

Archivo Mas, Barcelona

It is frequently difficult to distinguish the work of the various family members. José Benito (1665–1725) is recognized as the head of the family and as an important architect in his own right. His brother Joaquín (1674–1720) is remembered for his work at the Salamanca cathedral (1714–24; dismantled after 1755) and at the Colegio de Calatrava (Salamanca, begun 1717). Another brother, Alberto (1676–1750), designed the handsome Plaza Mayor in Salamanca.

José moved with his brother Joaquín from Barcelona to Madrid in the early 1670s to continue the family trade. He achieved recognition in 1689 by winning a competition for a catafalque for the tomb of Queen Marie-Louise d'Orléans, the first wife of Charles II, and in 1690 he was appointed to a court position under Philip V. Following disagreements with his rival at court, Teodoro Ardemáns, he was dismissed from his post and went to Salamanca. Named *maestro mayor* of the cathedral, he began the work that within 50 years turned Salamanca into a Churrigueresque city. He designed a palace in Madrid for his patron, the banker Juan de Goyeneche (1715, altered in 1773 in a Neoclassical style by Diego de Villanueva), which today is the Academia de San Fernando; he also designed Nuevo Baztán, a new town, near Aranjuez, a centre for manufacturing of glass (1709–13).

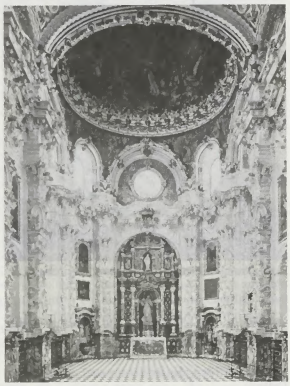
José's brothers and the pupils of the family are primarily responsible for more exuberantly lavish Churrigueresque style; the art of José himself is marked by more restraint and shows the influence of Andrea Palladio and Juan de Herrera. Unlike other Churrigueresque architects, he does not permit the sculptural qualities of his work to be hidden behind stucco decoration, as is evident in his masterpiece, the altar in the church of San Estéban, Salamanca (1693).

Churrigueresque, Spanish CHURRIGUERESCO, Spanish Rococo style in architecture, historically a late Baroque return to the aesthetics of the earlier Plateresque (*q.v.*) style. In addition to a plethora of compressed ornament, surfaces bristle with such devices as broken pediments, undulating cornices, reversed volutes, balustrades, stucco shells, and garlands. Restraint was totally abandoned in a conscious effort to overwhelm the spectator. Although the name of the style comes from the family name of José Benito Churriguera, an architect, the Churriguera family members are not the most representative masters of the style.

The "Transparente" (completed 1732), designed by Narciso Tomé for the cathedral in Toledo, is among the masterpieces of Churrigueresque. Tomé created an arrangement in which the Holy Sacrament could be placed within a transparent vessel that was visible from both the high altar and the ambulatory, seen both by the congregation and the pilgrim. Sculpted clouds, gilded rays, a massing of carved angels, and architecturally directed natural light combine to produce a mystical and spiritual effect.

In the sacristy of the Cartuja of Granada (1727–64), Luis de Arévalo and Francisco Manuel Vásquez created an interior that, if not as delicate or as ingenious as that designed by Tomé, is as typically Churrigueresque. The architects drew from other sources for the thick moldings, undulating lines, and repetition of pattern.

In Spanish America tendencies from both the native art of the Americas and the ever-present Mudéjar (Moorish art) have been incorporated, further enriching the style, and the Churrigueresque column, which was shaped like an inverted cone, became the most common motif. The Mexico cathedral (1718),



Churrigueresque sacristy of the Cartuja, Granada, Spain, by Luis de Arévalo and Francisco Manuel Vásquez, 1727–64

A Gutierrez/Ostman Agency

Santa Prisca at Taxco (1758), and San Martín at San Luis Potosí (1764) are excellent examples of Churrigueresque in Mexico.

Consult the INDEX *first*

Churu, town, administrative headquarters of Churu district, Rājasthān state, northwestern India. The town is a local market for wool, millet, gram (chick-pea), cattle, and salt and has cottage industries that include handloom weaving and pottery and leather manufacture. Founded *c.* 1620 by Churru, a chieftain of the Jāṭs (an agricultural people of northern India), the town has a hospital and a college affiliated with the University of Rājasthān.

Churu district (6,498 sq mi [16,829 sq km]) comprises a semi-arid sandy plain watered only by the Katli River in the northeast. The rolling sand hills of the district's southwest portion form part of the Bagar tract, where the breeding of sheep, cattle, and camels is extensive. Bajra (pearl millet), gram, and pulses are the chief crops; gypsum deposits are worked. Pop. (1981) town, 61,811; metropolitan area, 62,070; district, 1,179,466.

Churubusco, neighbourhood of the Federal District of Mexico, lying on the Río Churubusco; it was formerly a southeastern suburb of Mexico City until its annexation in 1970. Known as Huitzilopocho by the Aztecs, it was a town of considerable importance before the Spanish conquest. It contains a massive stone convent built by the Franciscans in 1768 on the site of an Aztec temple. Mexican forces under Gen. A.L. de Santa Anna and U.S. forces under Gen. Winfield Scott fought at Churubusco on Aug. 20, 1847. The U.S. forces overcame the stubborn Mexican resistance after a bloody three-hour battle.

Churubusco has been the centre of Mexico's motion-picture industry and is the home of the Churubusco Country Club, sometimes



Main altar in the Franciscan convent, Churubusco, Mexico
De La Torre—Plessner International

known as the Mexico City Country Club, which has an excellent golf course and tennis courts. Pop. (1970) 11,573.

Churún Merú, Salto (Venezuela): *see* Angel Falls.

Chusan Archipelago (China): *see* Choushan Archipelago.

Chūshingura, in full KANADEHON CHŪSHINGURA (Japanese: "Copybook of the Treasury of Loyal Retainers"), also called THE LOYAL FORTY-SEVEN RŌNIN, classic play cycle of the Japanese kabuki theatre. The kabuki drama was adapted from an original written in about 1748 for the puppet theatre (*bunraku*) by Takeda Izumo with Namiki Sōsuke (Senryū) and Miyoshi Shōraku. In 11 acts it dramatizes the incidents that took place from 1701 to 1703, when 47 *rōnin* (masterless samurai) waited two years before avenging themselves on a man who had forced their overlord to commit suicide. Because of the great length of the drama, many shorter versions have been produced. It has also been the basis of a number of popular films. A translation by Donald Keene was published in 1971.

Consult the INDEX *first*

chusimp'o style (Korean: "column-head bracket system"), Korean adaptation of the Chinese architecture of the T'ang period (AD 618–907). T'ang architecture was first introduced into Korea in the middle of the Koryŏ period (935–1392). In southern China, particularly in Fukien province, the T'ang architectural style underwent certain changes in details during the Sung period (960–1279), and the style was introduced to Koryŏ probably about the 12th century as a result of cultural and trading activities.

The main features of the style are as follows: (1) bracket complexes are employed only on top of columns; (2) a bracket complex is placed directly on the column head without an additional lateral beam connecting the columns; (3) a square piece is placed on top of a column as a cushion for a bracket complex, and other, smaller square cushion pieces function as upper arms, with their sides carved out in an S-like silhouette; (4) the bracketing is made of transverse members only, except for a single spreader at the top to carry the eaves purlin; and (5) because of the absence of a coffered ceiling, girder beams and eaves purlins are exposed.

Chusovoy, city, Perm *oblast* (province), west-central Russia. It is situated in the mid-Ural Mountains along the Chusovaya River at the inflow of the Usva. Founded in 1879 as an ironworks, it became a city in 1933. Ironworks and steelworks are located there, and ferroalloys and high-quality steels are produced. Since 1936 the city has also specialized in the production of vanadium steels. There is a medical college in the town. Pop. (1987 est.) 59,000.

chutney, relish that accompanies an Indian meal. Chutneys may be highly spiced or bland and may be prepared from fruits, vegetables, or herbs. The commercially made chutneys of Great Britain, which have remained popular since the height of the Empire, are usually stewed from mangoes or other fruits, onions, raisins, sugar, and spices. Indian curry (*q.v.*) dishes are accompanied by one or more chutneys, and in the West chutneys are also eaten with cold meats.

Chuuk Islands, formerly TRUK ISLANDS, or HOGOLEU, cluster of 11 much-eroded high volcanic islands enclosed within an encircling barrier bank composed of some 69 sand and coral islets, in the eastern Caroline Islands and part of the Federated States of Micronesia, in the western Pacific Ocean. The bank (often referred to as a reef) encloses a lagoon of 822 square miles (2,129 square km) in area and has a diameter of more than 40 miles (65 km). Chief islands of the group are Wenn (Moen), Dublon, Fefan, Uman, Udot, and Tol, and the total land area is 38.5 square miles (100 square km).

Observed by the Spaniard Álvaro Saavedra in 1528, Chuuk was visited occasionally by 19th-century traders and whalers and was included in the German purchase of parts of Micronesia from Spain (1899). Annexed by Japan (1914) and strongly fortified for World War II, the islands (then known as Truk) were heavily attacked, bypassed, and blockaded by the Allies during the war. Chuuk, together with the other islands in what are now the Federated States of Micronesia, was part of the U.S.-administered United Nations Trust Territory of the Pacific Islands from 1947 to 1986.

The high islands of the Chuuk group have mangrove swamps along their coasts and rain forests in the central mountainous areas. The native people are Micronesians, living mostly in traditional villages, who fish and raise pigs, poultry, taro, breadfruit, yams, and bananas. Copra is the chief cash crop. Chuuk has a commercial dock at Wenn and an international airport. Pop. (1980) 28,328.

Chuvash, ethnic minority in western Russia who constitute the majority of the population of Chuvashiya. Another 850,000 Chuvash are found in other parts of Russia.

The Chuvash speak a Turkic language and claim to be descended from the Bulgarians who in the 4th century AD migrated from Central Asia to the region west of the Volga River. It is not unlikely that they represent an amalgamation of Bulgarians with the tribes then living in the area. Their language is very different from other Turkic languages. Their religion also isolates them from the other Turkic peoples, since they were converted to Russian Orthodoxy.

Chuvash language, member of the Turkic subfamily or family of Altaic languages, spoken in Chuvashiya and nearby regions along the middle course of the Volga River, in the central part of European Russia. Constituting a separate and distinct branch of the Turkic languages, Chuvash was more closely related to an extinct Turkic or Altaic language, Volga Bulgar, than to the so-called Common Turkic languages. Formerly, scholars considered Chuvash not properly a Turkic language at all but, rather, the only surviving representative of a separate subdivision of the Altaic languages probably spoken by the Huns. The distinct character of Chuvash is also indicated by its lack of mutual intelligibility with the other Turkic languages. *See also* Turkic languages.

Chuvashiya, republic in western Russia that is inhabited mainly by the Chuvash people. Chuvashiya occupies the right (southwest) bank of the middle Volga River and is drained by tributaries of that river—the Sura in the west, the Bolshoy Tsivil and Maly Tsivil in the centre, and the Kubnya in the east. Most of the area consists of the so-called Chuvash Plateau—low, gently rolling hills, much cut up by ravines—which forms the extreme northern end of the Volga Upland and drops gradually to the terraces and floodplain of the Volga. In the west, along the Sura River, are alluvial sands of ancient origin.

The boundary between the forest and forest-steppe natural zones crosses the republic. The Sura sands are densely forested with pine, while in the north are areas of mixed and deciduous forests. Much of Chuvashiya's original forest cover has been removed by overcutting, and about half of the land area is cultivated. In the east and southeast are patches of black-earth soils, almost all of which are tilled. Along the Volga and Sura rivers are floodplain meadows. The climate is moderately continental, with warm summers and long, cold winters. Rainfall is low, 16–20 inches (400–500 mm) a year.

The Chuvash, a Turkic people, were settled agriculturists when their domain was annexed by the Russians in the 16th century. The republic was first formed as an autonomous *oblast* (province) in 1920, becoming an autonomous republic in April 1925; from 1929 to 1936 it formed part of Gorky *kray* (region). The urban population of Chuvashiya numbers about three-fifths of the total. The major cities and urban settlements include Cheboksary (*q.v.*), Alatyr, Kanash, Shumerlya, and Novocheboksarsk.

The republic is predominantly agricultural: grains, hemp, potatoes, vegetables, flax, sugar-beets, and makhorka ("coarse") tobacco are grown. Fruit growing is important along the Volga. Cattle, pigs, and sheep are raised, and the acreage under fodder crops has been greatly increased. The numbers of livestock per 100 acres (40 hectares) of agricultural land are far above the average for the central regions of European Russia. Dairy produce and meat are supplied to the Moscow area and to Nizhny Novgorod.

Industry, little of which existed before the October Revolution in 1917, developed considerably after World War II. Cheboksary, which is also a river port, produces electrical equipment, machine parts, iron castings, textiles, alcohol, and leather goods. It also has a Chuvash regional museum. Alatyr, a grain-growing centre, has locomotive and automobile works as well as an electromechanical plant. Shumerlya, developed during the 1930s, produces furniture, veneers, flooring, and tannin from local oaks. Mariinsky Posad, with shipbuilding, and Kozlovka are the chief timber centres along the Volga River, producing prefabricated houses, railroad ties, and matchwood. Food processing and textile and leather manufacture are widespread. A chemical industry has developed at Vurnary, based on wood chemicals and supplies of phosphorites from Buinsk. Shale oil from Buinsk and Ibresi and peat from the Volga floodplain are the only local fuels, but a large hydroelectric plant was under construction at Novocheboksarsk in the 1980s.

Besides the Volga, the main Trans-Siberian Railroad (from Moscow) traverses the area, with branches from Kanash to Cheboksary and to Saransk and Penza. Motor roads link Cheboksary to the Russian cities of Nizhny Novgorod, Kazan, and Simbirsk. Area 7,066 square miles (18,300 square km). Pop. (1990 est.) 1,340,000.

Chūzenji Lake, also called SEA OF HAPPINESS, Japanese CHŪZENJI-KO, or SATSU-NO-UMI, lake, lying within Nikkō National Park, Tochigi *ken* (prefecture), north-central Honshu, Japan. Situated at an elevation of 4,060 feet (1,237 m), it is a resort site noted for its shrines, yachting, trout fishing, and skiing. Volcanic Mount Nantai towers to 8,169 feet (2,490 m) above the lake's northern shore; lower mountains surround most of the irregular 14-mile (23-kilometre) shoreline. Fed by



Chūzenji Lake and Kegon Falls, Japan
S.E Hedin—Ostman Agency

small rivers in the west and northwest, the lake occupies a structural depression that has been deepened to 558 feet (170 m) by a lava obstruction at its eastern end. The Daiya River, its sole outlet, emerges from the lake in the east and drops 316 feet (96 m) over Kegon Falls. The falls have been a frequent location for suicide among Japanese youths.

chyle, lymph laden with fat that has been absorbed into the bloodstream from the small intestine. The fat globules, which give chyle a milky appearance, have a thin protein coating and are a micron or less in size (there are about 25,000 microns in an inch). After a meal it takes two to three hours for fat to be absorbed from the small intestine, travel through ever larger lymph channels until it reaches the thoracic duct (one of the two main lymphatic trunks), and enter the bloodstream by way of an opening from the duct into the left brachiocephalic vein. (This vein collects blood from the left arm, the neck, and the head.)

chyme, a thick semifluid mass of partially digested food and digestive secretions that is formed in the stomach and intestines during digestion. In the stomach, digestive juices are formed by the gastric glands; these secretions include the enzyme pepsin, which breaks down proteins, and hydrochloric acid. Once food is in the small intestine, secretions from the pancreas, gallbladder, liver, and glands in the intestinal wall add to the total volume of chyme.

Muscular contractions of the stomach walls help to mix food and digestive substances together in forming chyme. As particles of food become small enough, they are passed at regular intervals into the small intestine. Once in the intestine, more enzymes are added and mixing continues. When food particles are sufficiently reduced in size and composition, they are absorbed by the intestinal wall and transported to the bloodstream. Some food material is passed from the small intestine to the large intestine, or colon. In the colon, chyme is acted upon by bacteria that break down the proteins, starches, and some plant fibres not totally digested by the other organs. In both the small and the large intestines, water is normally absorbed from chyme so that it gradually gets thicker. As chyme passes through the stomach and intestines, it picks up cellular debris and other types of waste products. When the intestines have absorbed all the nutrients from chyme, the remaining waste material passes to the end of the large intestine, the sigmoid colon and rectum, to be stored as fecal matter until it is ready to be excreted from the body.

chyn (musical instrument): *see* ch'in.

Chytridiomycetes, a class of fungi (kingdom Fungi) distinguished by having zoospores (motile cells) with a single, posterior, whiplash structure (flagellum). Species are microscopic in size, and most are found in freshwater or wet soils. Most are parasites of algae and animals or live on organic debris (as saprobes).

Allomyces, a genus of six species of the order Blastocladiales, is especially widespread in tropical soils. *Coelomomycetes* contains parasites of mosquito larvae. A few species in the order Chytridiales cause plant disease.

CIA: *see* Central Intelligence Agency.

ciaconne (dance): *see* chaconne.

Ciano, Galeazzo, COUNT (conte) DI CORTELLAZZO (b. March 18, 1903, Livorno, Italy—d. Jan. 11, 1944, Verona), Italian statesman and diplomat who became one of the key figures in the fascist regime of Benito Mussolini after his marriage to Mussolini's daughter Edda (1930). He was especially influential in bringing about Italy's entry into World War II after the fall of France (June 1940).

Young Ciano took part in the fascist March on Rome in 1922 and then studied law at the University of Rome. After working briefly as a journalist, he entered the diplomatic corps, holding posts in Rio de Janeiro and Buenos Aires and serving as consul general in Shanghai and as minister to China. After his marriage to Edda Mussolini, he rose rapidly through the ranks: chief of the press bureau (1933), under secretary of state for press and propaganda (1934), and member of the Fascist Grand Council, the inner group that determined party policy. An avid aviator, he led a bomber squadron in the war against Ethiopia (1935–36) and, on his return to Rome, became minister of foreign affairs (June 9, 1936). He was regarded by many as a likely successor to Mussolini.

Although he had repeatedly advocated the Italo-German alliance, Ciano became wary of Adolf Hitler when Germany invaded Poland (September 1939) without first consulting Italy, in direct violation of an agreement given to Ciano in May by the German foreign minister, Joachim von Ribbentrop. At first Ciano persuaded Mussolini to adopt a policy of nonbelligerence, but, when France fell, he urged entry into the war.

After several Axis defeats in 1942, Ciano became one of many fascist proponents of a separate peace with the Allies. The suspicious Mussolini dismissed his entire Cabinet (Feb. 5, 1943), and Ciano was appointed ambassador to the Vatican. Nonetheless, Ciano and other leading fascists retained enough power at the historic meeting of the Grand Council (July 24/25, 1943) to force Mussolini's resignation. When the new government was preparing charges of peculation against him, the immensely rich Ciano fled Rome. He was captured by pro-Mussolini partisans and Germans in northern Italy. On Mussolini's orders, he was brought to trial on a charge of treason, found guilty, and executed by a shot in the back.

Ciano's diaries from 1939 to 1943 were published in English in 1946.

Ciaozuo (China): *see* Chiao-tso.

Ciaran OF CLONMACNOISE, SAINT, Latin QUERANUS, also called KIERAN THE YOUNGER (b. *c.* 516, Ire.—d. *c.* 549, Clonmacnoise, Ire.; feast day September 9), abbot who was one of the most illustrious founders of monasticism in Ireland.

With Saints Columba and Brendan, Ciaran was educated by Abbot St. Finnian at the celebrated monastery of Clonard. From there he went to the island of Aranmore, in Galway, off the western coast of Ireland, where he became the most famous disciple of Abbot St. Enda. Ciaran later traveled to central Ireland, visited several monasteries, and settled with eight companions at Clonmacnoise, where in 548 he founded an abbey that subsequently developed into one of the most famous Irish monastic cities; by the 9th century it was a great centre of learning. So influential was Ciaran's establishment that more than half the monasteries in Ireland reportedly followed its severely ascetic rule, traditionally attributed to Ciaran.

There is an annual pilgrimage to Clonmacnoise on Ciaran's feast day. His four extant biographies record his numerous alleged miracles. Ciaran's holiness and monastic activity led to his being ranked among the Twelve Apostles of Ireland. He has often been confused with the 5th/6th-century St. Ciaran of Saighir (designated "the Elder" or sometimes called "of Ossory"), who is traditionally honoured as Ossory's first bishop.

Ciardi, John, in full JOHN ANTHONY CIARDI (b. June 24, 1916, Boston, Mass., U.S.—d. March 30, 1986, Edison, N.J.), American poet, critic, and translator who contributed to making poetry accessible to both adults and children.

Educated at Bates College, Lewiston, Maine, Tufts University (A.B., 1938), and the University of Michigan (M.A., 1939), Ciardi served in the U.S. Army Air Corps (1942–45) and then taught at universities until 1961. Thereafter he devoted himself full-time to literary pursuits. He served as poetry editor of the *Saturday Review* from 1956 to 1972. He felt that interaction between audience and author was crucial, and he generated continuous controversy with his critical reviews.

Ciardi's first volume of poetry, *Homeward to America,* appeared in 1940. His *How Does a Poem Mean?* (1960; rev. ed., with Miller Williams, 1975) found wide use as a poetry textbook in high schools and colleges. His other books of poetry include *Person to Person* (1964), *The Little That Is All* (1974), and *For Instance* (1979). He also wrote many books of prose and verse for children.

His translation of Dante's *Divine Comedy* (*The Inferno,* 1954; *The Purgatorio,* 1961; *The Paradiso,* 1970) was highly acclaimed. Rather than following Dante's rhyme scheme, Ciardi attempted to capture the feeling of the original in a tense and economical modern verse idiom.

Ciardi's writings were characterized by clarity, immediacy, and an effort to make poetry more accessible to the public. His later works included two books written with Isaac Asimov: *Limericks, Too Gross* (1978) and *A Grossery of Limericks* (1981). Ciardi also wrote *A Browser's Dictionary and Native's Guide to the Unknown American Language* (1980) and

A Second Browser's Dictionary and Native's Guide to the Unknown American Language (1983).

Čiatura (Georgia): *see* Chiatura.

CIBA-GEIGY AG, Swiss multinational holding company created in 1970 in the merger of two concerns headquartered in Basel—Ciba AG and J.R. Geigy SA. The group consists of affiliates in some 50 countries and is engaged in the manufacture and marketing of dyes and chemicals; pharmaceuticals; plastics and additives; agricultural chemicals and fertilizers; photographic products; and household and garden products and toiletries.

Ciba developed from a small silk-dyeing business owned by Alexander Clavel, who began manufacturing the synthetic dye fuchsine in 1859. In 1864 he transferred his factory to Klybeck, then outside Basel, and in 1873 sold his business to a partnership, Bindschedler & Busch, which expanded the range of dyestuffs produced. In 1884 the firm was transformed into a limited-liability company, Gesellschaft für Chemische Industrie Basel (Society of Chemical Industry in Basel), the last words of which produced the acronym Ciba, which became its familiar name. (In 1945 the company's name legally became Ciba AG.) The company became known for diverse products, such as pharmaceuticals, introduced in 1889, and such chemical products as cosmetics and plastics, introduced after World War I.

Geigy dates to 1758, when Johann Rudolf Geigy set up shop in Basel as a chemist and druggist; his son and grandson branched into dyes for the textile industry. In the 1850s the Geigy family established a factory and mill on the Richen Canal and in 1859 transferred management to J.J. Müller-Pack. Stewardship returned to the Geigys in 1868, when the founder's great-grandson, Johann Rudolf Geigy-Merian, assumed command, creating a flourishing dyestuff company that went public in 1901 and was named J.R. Geigy SA in 1914. In the 1930s and '40s it branched into agricultural chemicals and pharmaceuticals. One of Geigy's researchers, Paul Müller, won a Nobel Prize for his development of the insecticide DDT.

Even before 1900, both Ciba and Geigy had begun establishing manufacturing units and marketing operations abroad; in the 20th century they each established or acquired factories in various European countries and in the United States, India, and elsewhere around the world.

From 1918 to the eve of World War II, Ciba, Geigy, and a third world chemical concern in Basel, Sandoz, were joined in a cartel. Though each retained its legal autonomy, the companies by signed agreement entered into a division of markets and some joint manufacturing. Dissolution of the cartel was prompted partly by regard for U.S. antitrust legislation.

Cibao Valley, Spanish VALLE DEL CIBAO, valley in the northern Dominican Republic. It extends about 145 miles (235 km), from Manzanillo Bay in the west to Samaná Bay in the east. The mountain ranges of the Cordillera Septentrional and the rugged Cordillera Central bound the Cibao Valley on north and south, respectively. It has two climatic zones: the drier western section, traversed by the Yaque del Norte River, has savanna vegetation, with patches of low, thorny bushes; the east, watered by the Yuna River, is the humid, fertile La Vega Real region, a name given it by Christopher Columbus. Chief crops are, in the west, wheat and, with modern irrigation, rice and bananas; in La Vega Real, coffee, tobacco, cacao, corn (maize), and rice are grown. The Cibao Valley is the country's most densely settled region. European colonization began there in 1494, when Columbus searched for gold in La Vega Real on his second voyage.

Cibber, Caius Gabriel, Cibber also spelled CIBERT (b. 1630, Flensburg, Den.—d. 1700, London), Danish-born English sculptor known for his Baroque architectural and garden sculpture. He was the father of the English actor, dramatist, and poet laureate Colley Cibber.

The son of the Danish king's cabinetmaker, Cibber was sent to Italy at royal expense to study art. Before 1660 he was in England, working as foreman to John Stone (1620–67). Among his works are the famous statues of "Raving Madness" and "Melancholy Madness" (1670s) for the gate of Bedlam Hospital (they are now in the Guildhall Museum) and a tomb (1677) at Withyham, Sussex, for the Sackville family, considered one of the finest examples of English sculpture in the 17th century.

Between 1688 and 1691 he was working at Chatsworth, Derbyshire, where he made figures for the house, chapel, and garden. He was employed by Sir Christopher Wren to carve the pediment on the eastern park front of Hampton Court and executed some of the architectural detail at St. Paul's Cathedral. He died before his work on the latter was completed. His work shows the influence of Dutch and Roman Baroque sculpture and is often cited as being competent but provincial.

Cibber, Colley (b. Nov. 6, 1671, London—d. Dec. 11, 1757, London), English actor, theatre manager, playwright, and poet laureate of England, whose play *Love's Last Shift; or, The Fool in Fashion* (1696) is generally considered the first sentimental comedy, a form of drama that dominated the English stage for nearly a century. His autobiography, *An Apology for the Life of Mr. Colley Cibber* (1740), contains the best account of the theatre of his day and is an invaluable study of the art of acting as it was practiced by his contemporaries.

A well-educated son of the sculptor Caius Gabriel Cibber, he began his acting career in 1690 with Thomas Betterton's company at the Drury Lane Theatre, London. Marrying three years later and finding his earnings as an actor inadequate, he wrote *Love's Last Shift* to provide himself with a role; the play established his reputation both as actor and as playwright. The playwright Sir John Vanbrugh honoured it with a sequel, *The Relapse: or, Virtue in Danger* (1696), in which Cibber's character Sir Novelty Fashion has become Lord Foppington, a role created by Cibber. In 1700 Cibber produced his famous adaptation of Shakespeare's *Richard III,* which held the stage as the preferred acting version of that play until the original version was restored by the actor Henry Irving in 1871. Cibber's adaptation was notable for such Shakespearean-sounding lines as "Off with his head—so much for Buckingham!" and "Conscience, avaunt, Richard's himself again!" Cibber also wrote other comedies of manners, including *She wou'd, and She wou'd not* (1702) and *The Careless Husband* (1704).



Colley Cibber, engraving by E. Fisher, 1758, after a painting by J.-B. Van Loo, 1740

Reproduced by courtesy of the trustees of the British Museum: photograph, J.R. Freeman & Co., Ltd.

At this time Cibber entered upon a series of complex intrigues to obtain a position in theatre management. By 1710 he was, with Robert Wilks and Thomas Doggett (the latter soon to be replaced by Barton Booth), one of a famous "triumvirate" of actor-managers under which Drury Lane Theatre conspicuously prospered.

After the death of Queen Anne, Cibber entered the political arena, writing and adapting plays (notably *The Non-Juror,* in 1717, from Molière's *Tartuffe*) in support of the Whig cause, with a skill and energy that in 1730 led to his appointment as poet laureate. In 1728 he completed *The Provok'd Husband,* a play left unfinished by Vanbrugh at his death in 1726. Anne Oldfield, Cibber's leading actress, died in 1730; and Wilks, his first partner in management, died in 1733. The next year Cibber announced his retirement from management. Nevertheless, he did not make his final stage appearance until Feb. 15, 1745, when he played in his own adaptation of Shakespeare's *King John.*

Tactless, rude, and supremely self-confident, Cibber was the target of many attacks, both personal and political. In the 1743 edition of Pope's satirical poem *The Dunciad,* Cibber was elevated to the doubtful eminence of hero. He responded with spirit, publishing three letters attacking Pope that, according to Dr. Johnson, caused the latter poet to writhe in anguish.

Cibber, Theophilus (b. Nov. 26, 1703—d. 1758, at sea), actor and playwright, a figure of general disrepute in the English theatre.



Theophilus Cibber, detail from an engraving, 1720

By courtesy of the Victoria and Albert Museum, London

The son of Colley Cibber, he made his first appearance on the stage in 1721. In 1731 and 1732 he acted for his father as manager of Drury Lane, serving also as actor-manager of the Haymarket in 1734. He was a capable actor, his best role being Pistol in *Henry IV,* but the plays he wrote are worthless. There is perhaps no contemporary reference to Cibber that does not set him down as a scoundrel. He traded dishonestly on his father's name and engaged in blackmail, in shameless plagiarism, and in scandalous lawsuits to obtain money. He died in a shipwreck while on his way to play in Dublin.

His wife, Susanna Maria (1714–66), whom he married in 1734, had been a singer at the Haymarket and was given training in acting by his father. Strife with Kitty Clive over the lead in *The Beggar's Opera* and scandal over a liaison forced on her by her husband caused her temporary retirement. She returned later and for some time was a leading lady to David Garrick at Drury Lane Theatre.

Cibo, Giovanni Battista (pope): *see* Innocent VIII.

Cíbola, Seven Golden Cities of, Spanish LAS SIETE CIUDADES DORADAS DE CÍBOLA, legendary cities of splendour and riches sought in the 16th century by Spanish conquistadores in North America. The fabulous cities were first reported by Alvar Núñez Cabeza de Vaca who, after being shipwrecked off Florida in 1528, had wandered through what later became Texas and northern Mexico before his rescue in 1536. The viceroy of New Spain, Antonio de Mendoza, sent an expedition in 1539 under Estêban, a black slave who had been shipwrecked with Cabeza de Vaca, and Fray Marcos de Niza to verify de Vaca's reports. Fray Marcos, assured of the cities' existence by an Indian informant, claimed to have seen them in the distance. In 1540 Mendoza dispatched Francisco Vázquez de Coronado to search for the cities; he found only a group of Zuni pueblos, although he had explored as far north as modern Kansas.

Ciboney, extinct Indian people of the Greater Antilles in the Caribbean Sea. By the time of European contact they had been driven by their more powerful Taino Arawak neighbours to a few isolated locales on western Hispaniola (Haiti) and Cuba. The name Ciboney comes from the Arawak for cave dweller, and many of the Cuban Ciboney appear to have lived in caves at least part of the time. Other typical Ciboney dwelling sites were small offshore islets and swamp hammocks. The linguistic affiliations of the Ciboney are unknown, as are their origins; certain features of Ciboney culture point to Florida, others to Central or South America.

The Ciboney of Cuba and Hispaniola differed greatly from one another in the material base of their cultures. While both were primarily hunters and gatherers, the technology of the Ciboney of Cuba, called variously Cayo Redondo or Guayabo Blanco, was based on shell, while that of the Haitian Ciboney was based on stone. The typical artifact of Cayo Redondo was a roughly triangular shell gouge made from the lip of a strombus shell, a tool also quite common in sites of the Glades culture in Florida. The Couri style of Haiti, on the contrary, was characterized by chipped stone, especially the so-called Couri dagger, flaked on one face and with a flat back. Both groups apparently subsisted primarily on shellfish; some bones of hutia (agouti), turtle, and manatee have also been found. Settlements were small, comprising one or two families. Within a century after European contact the Ciboney were extinct.

ciborium (architecture): *see* baldachin.

ciborium, plural CIBORIA, or CIBORIUMS, in religious art, any receptacle designed to hold the consecrated Eucharistic bread of the Christian church. The ciborium is usually shaped like a rounded goblet, or chalice, having a dome-shaped cover. Its form originally developed from that of the pyx, the vessel containing the consecrated bread used in the service of the Holy Communion. Medieval ciboria were small and often had spire-shaped covers above a cylindrical bowl. After the Reformation, ciboria became larger and gradually acquired their present rounded form. The ciborium is not a consecrated vessel and needs only a blessing before it is first used. The vessel can be made of either silver or gold, but the interior of the cup must be lined with gold.

cicada, any medium to large (2 to 5 cm [0.8 to 2 inches]) insects of the order Homoptera, with two pairs of membranous wings, prominent compound eyes, and three simple eyes (ocelli). Most of the species belong to the family Cicadidae, but the family Tettigaretidae consists of two species of hairy cicadas found only in Southeastern Australia, including Tasmania. Male cicadas produce loud noises by vibrating membranes (timbals) near the base of the abdomen. Most North American cicadas produce rhythmical ticks, buzzes, or whines, although in some species the "song" is musical. Eggs are usually laid in woody tissues; newly hatched nymphs burrow into the ground where they suck juices from roots of perennial plants. Nymphs usually undergo five molts during the several years required to reach maturity. Although not ordinarily considered a pest, the females, if numerous, may damage young saplings during their egg laying.

About 1,500 species of cicadas are known; most are tropical and occur in deserts, grasslands, and forests. In addition to the dog-day cicada (*Tibicen* and others) that appears yearly in midsummer, there are also periodic cicadas. Among the most fascinating and best-known are the 17-year cicada (often erroneously called the 17-year locust) and the 13-year cicada (*Magicicada*). These species occur in large numbers in chronologically and geographically isolated broods.

The several species are easily recognized by differences in songs, behaviour, and morphology. Males of each species have three distinct



Newly emerged adult cicada (*Tibicen pruinosa*)
Richard Parker

sound responses: a congregational song that is regulated by daily weather fluctuations and by songs produced by other males; a courtship song, usually produced prior to copulation; and a disturbance squawk produced by individuals captured, held, or disturbed into flight.

Cicadas have been used in folk medicines, as religious and monetary symbols, and as an important source of food. Their song once was considered to forecast weather changes. In China, male cicadas were caged for their song. The cicada appears in the mythology, literature, and music of many cultures.

cicada-killer wasp (*Sphecius speciosus*), insect belonging to the family Sphecidae (order Hymenoptera). These large wasps are black or rusty in colour with yellow abdominal bands. They range in size from 2.5 to 3.8 cm (1 to 1.5 inches). Larvae feed on cicadas stored by adult wasps in underground burrows.

cicatrization, also called SCARIFICATION, type of body decoration involving the production of raised scars (keloids), usually in decorative patterns. *See* body modifications and mutilations.

cicely (*Myrrhis odorata*), perennial herb of the family Apiaceae (Umbelliferae). It has a leafy hollow stem 60 to 90 cm (2 to 3 feet) high; much-divided leaves, whitish beneath; a large sheathing base; and terminal clusters of small white flowers, of which only the outer ones are fertile. The fruit is dark brown, 1.9 to 2.5 cm (0.7 to 1 inch) long, narrow, and beaked. The plant, native to central and southern Europe, is found in parts of England and Scotland in pastures, usually near houses.



Cicely (*Myrrhis odorata*)
Heather Angel

It has aromatic and stimulant properties and was once used as a potherb.

Cicero, pseudonym of ELYESA BAZNA (b. 1904, Albania?—d. Dec. 21, 1970, Munich, Ger.), one of the most famous spies of World War II, who worked for Nazi Germany in 1943–44 while he was employed as valet to Sir Hughe Montgomery Knatchbull-Hugessen, British ambassador to neutral Turkey from 1939. He photographed secret documents from the embassy safe and turned the films over to the former German chancellor Franz von Papen, at that time German ambassador in Ankara. For this service the Hitler government paid Cicero large sums in British money, most of it counterfeited in Germany. Despite the evident authenticity of the films, the Nazi officials in Berlin mistrusted Cicero and are said to have disregarded his information (some of which dealt with plans for the Allied invasion of Normandy on D-Day, June 6, 1944).

He spent his last years as a night watchman in Munich. *Der Fall Cicero* (1950; *Operation Cicero*) was written by L.C. Moyzisch, who transmitted all communications between Cicero and Papen. A motion picture, *Five Fingers* (1952), was based on this book. *Ich war Cicero* (1962; *I Was Cicero*) was written by Bazna himself (under his real name) in collaboration with Hans Nogly.

Cicero, city, western suburb of Chicago, Cook county, northeastern Illinois, U.S. First settled in the 1830s, it was named for Cicero, N.Y. Its development was stimulated when the Chicago, Burlington and Quincy Railroad was built through the site (1864) and by the arrival of land speculators and farmers after the American Civil War. Economic growth continued, but Cicero lost territory to Chicago and to the formation (1901) of Berwyn and Oak Park. The city developed as a manufacturing centre. Morton (junior) College was founded (1902) in the city. In the 1920s Al Capone, the gangster, made Cicero the headquarters of his speakeasies and gambling enterprises. Inc. town, 1867; city, 1869. Pop. (1990) 67,436.

Cicero, Marcus Tullius, English byname TULLY (b. 106 BC, Arpinum, Latium [now Arpino, Italy]—d. Dec. 7, 43 BC, Formiae, Latium [now Formia]), Roman statesman, lawyer, scholar, and writer who vainly tried to uphold republican principles in the final civil wars that destroyed the republic of Rome. His writings include books of rhetoric, orations, philosophical and political treatises,

and letters. He is remembered in modern times as the greatest Roman orator and innovator of what became known as Ciceronian rhetoric.

Cicero was the son of a wealthy family of Arpinium. Admirably educated in Rome and in Greece, he did military service in 89 under Pompeius Strabo (the father of Pompey) and made his first appearance in the courts defending Quinctius in 81. His brilliant defense, in 80 or early 79, of Sextus Roscius against a fabricated charge of parricide established his reputation at the bar, and he started his public career as quaestor (an office of financial administration) in western Sicily in 75.

As praetor, a judicial officer of great power at this time, in 66 he made his first important political speech, when, against Catulus and leading Optimates (the conservative element in the Senate), he spoke in favour of conferring on Pompey command of the campaign against Mithradates, king of Pontus. His relationship with Pompey, whose hatred of Marcus Licinius Crassus he shared, was to be the focal point of his career in politics. His election as consul for 63 was achieved through Optimates who feared the revolutionary ideas of his rival, Catiline.

In the first of his consular speeches, he opposed the agrarian bill of Servilius Rullus, in the interest of the absent Pompey; but his chief concern was to discover and make public the seditious intentions of Catiline, who, defeated in 64, appeared again at the consular elections in 63 (over which Cicero presided, wearing armour beneath his toga). Catiline lost and planned to carry out armed uprisings in Italy and arson in Rome. Cicero had difficulty in persuading the Senate of the danger, but the "last decree" (*Senatus consultum ultimum*), something like a proclamation of martial law, was passed on October 22. On November 8, after escaping an attempt on his life, Cicero delivered the first speech against Catiline in the Senate, and Catiline left Rome that night. Evidence incriminating the conspirators was secured and, after a senatorial debate in which Cato spoke for execution and Caesar against, they were executed on Cicero's responsibility. Cicero, announcing their death to the crowd with the single word *vixerunt* ("they are dead"), received a tremendous ovation from all classes, which inspired his subsequent appeal in politics to *concordia ordinum*, "concord between the classes." He was hailed by Catulus as "father of his country." This was the climax of his career.

At the end of 60, Cicero declined Caesar's invitation to join the political alliance of Caesar, Crassus, and Pompey, which he considered unconstitutional, and also Caesar's offer in 59 of a place on his staff in Gaul. When Publius Clodius, whom Cicero had antagonized by speaking and giving evidence against him when he was tried for profanity early in 61, became tribune in 58, Cicero was in danger, and in March, disappointed by Pompey's refusal to help him, fled Rome. On the following day Clodius carried a bill forbidding the execution of a Roman citizen without trial. Clodius then carried through a second law, of doubtful legality, declaring Cicero an exile. Cicero went first to Thessalonica, in Macedonia, and then to Illyricum. In 57, thanks to the activity of Pompey and particularly the tribune Milo, he was recalled on August 4. Cicero landed at Brundisium (Brindisi) on that day and was acclaimed all along his route to Rome, where he arrived a month later.

In winter 57–56 Cicero attempted unsuccessfully to estrange Pompey from Caesar. Pompey disregarded Cicero's advice and renewed his compact with Caesar and Crassus at Luca in April 56. Cicero then agreed, under pressure from Pompey, to align himself with the three in politics, and he committed himself in writing to this effect (the "palinode"). The speech *De provinciis consularibus* marked his new alliance. He was obliged to accept a number of distasteful defenses, and he abandoned public life. In the next few years he completed the *De oratore* (55) and *De republica* (started in 54, finished in 52) and began the *De legibus* (52). In 52 he was delighted when Milo killed Clodius but failed disastrously in his defense of Milo (later written for publication, the *Pro Milone*).

In 51 he was persuaded to leave Rome to govern the province of Cilicia, in south Asia Minor, for a year. The province had been expecting a Parthian invasion, but it never materialized, although Cicero did suppress some brigands on Mt. Amanus. The Senate granted a *supplicatio* (a period of public thanksgiving), although Cicero had hoped for a triumph, a processional return through the city, on his return to Rome. All admitted that he governed Cilicia with integrity.

By the time Cicero returned to Rome, Pompey and Caesar were struggling for complete power. He was in the outskirts of Rome when Caesar crossed the Rubicon and invaded Italy in January 49. Cicero met Pompey outside Rome on January 17 and accepted a commission to supervise recruiting in Campania. He did not leave Italy with Pompey on March 17, however. His indecision was not discreditable, though his criticism of Pompey's strategy was inexpert. In an interview with Caesar on March 28, Cicero showed great courage in stating his own terms—his intention of proposing in the Senate that Caesar should not pursue the war against Pompey any further—though they were terms that Caesar could not possibly accept. He disapproved of Caesar's dictatorship; yet he realized that in the succession of battles (which continued until 45) he would have been one of the first victims of Caesar's enemies, had they triumphed. This was his second period of intensive literary production, works of this period including the *Brutus, Paradoxa, Orator* in 46; *De finibus* in 45; and *Tusculanae disputationes, De natura deorum,* and *De officiis,* finished after Caesar's murder, in 44.

Cicero was not involved in the conspiracy to kill Caesar on March 15, 44, and was not present in the Senate when he was murdered. On March 17 he spoke in the Senate in favour of a general amnesty, but then he returned to his philosophical writing and contemplated visiting his son, who was studying in Athens. But instead he returned to Rome at the end of August, and his 14 Philippic orations (so called in imitation of Demosthenes' speeches against Philip II of Macedonia), the first delivered on Sept. 2, 44, the last on April 21, 43, mark his vigorous reentry into politics. His policy was to make every possible use of Caesar's adopted son Octavian, whose mature intelligence he seriously underestimated, and to drive the Senate, against its own powerful inclination toward compromise, to declare war on Antony, who had controlled events immediately following Caesar's death and who now was pursuing one of the assassins in Cisalpine Gaul. No letters survive to show how Octavian deceived Cicero in the interval between the defeat of Antony in Cisalpine Gaul on April 14 and Octavian's march on Rome to secure the consulship in August. It was in May that Octavian learned of Cicero's unfortunate remark that "the young man should be given praise, distinctions—and then be disposed of." The triumvirate of Octavian, Antony, and Lepidus was formed at the end of October, and Cicero was soon being sought for execution. He was captured and killed near Caieta on December 7. His head and hands were displayed on the *rostra,* the speakers' platform at the Forum, at Rome.

In politics Cicero constantly denigrated his opponents and exaggerated the virtues of his friends. As a "new man," a man without noble ancestry, he was never accepted by the dominant circle of Optimates, and he attributed his own political misfortunes after 63 partly to the jealousy, partly to the spineless unconcern, of the complacent Optimates. The close political association with Pompey for which he longed was never achieved. He was more ready than some men to compromise ideals in order to preserve the republic, but, though he came to admit in the *De republica* that republican government required the presence of a powerful individual—an idealized Pompey perhaps—to ensure its stability, he showed little appreciation of the intrinsic weaknesses of Roman republican administration.

From Cicero's correspondence between 67 and July 43 BC more than 900 letters survive, and, of the 835 written by Cicero himself, 416 were addressed to his friend, financial adviser, and publisher, the knight Titus Pomponius Atticus, and 419 to one or other of some 94 different friends, acquaintances, and relatives. The number obviously constitutes only a small portion of the letters that Cicero wrote and received. Many letters that were current in antiquity have not survived; for instance, the account of the suppression of Catiline's conspiracy, mentioned in the *Pro Sulla* and *Pro Plancio,* which Cicero sent to Pompey at the end of 63; Pompey hardly as much as acknowledged it, and Cicero was mocked about it in public later. Many letters were evidently suppressed for political reasons after Cicero's death.

There are four collections of the letters: to Atticus (*Ad Atticum*) in 16 books; to his friends (*Ad familiares*) in 16 books; to Brutus; and, in 3 books, to his brother (*Ad Quintum fratrem*). The letters constitute a primary historical source such as exists for no other part of the ancient world. They often enable events to be dated with a precision that would not otherwise be possible, and they have been used, though with no very great success, to discredit the accuracy of Caesar's commentaries on the civil war. On the other hand, his reporting of events, naturally enough, is not objective, and he was capable of misremembering or misrepresenting past events so as to enhance his own credit.

Cicero is a minor but by no means negligible figure in the history of Latin poetry. His best known poems (which survive only in fragments) were the epics *De consulatu suo (On His Consulship)* and *De temporibus suis (On His Life and Times),* which were criticized in antiquity for their self-praise. Cicero's verse is technically important; he refined the hexameter, using words of two or three syllables at the end of a line, so that the natural word accent would coincide with the beat of the metre, and applying rhetorical devices to po-



Cicero, detail of a marble bust; in the Capitoline Museum, Rome

By courtesy of the Musei Capitolini, Rome; photograph, Oscar Savio

etry; he is one of those who made possible the achievement of Virgil.

Cicero made his reputation as an orator in politics and in the law courts, where he preferred appearing for the defense and generally spoke last because of his emotive powers. Unfortunately, not all his cases were as morally sound as the attack on the governor of Sicily, Gaius Verres, which was perhaps his most famous case. In his day Roman orators were divided between "Asians," with a rich, florid, grandiose style, of which Quintus Hortensius was the chief exponent, and the direct simplicity of the "Atticists," such as Caesar and Brutus. Cicero refused to attach himself to any school. He was trained by Molon of Rhodes, whose own tendencies were eclectic, and he believed that an orator should command and blend a variety of styles. He made a close study of the rhythms that were likely to appeal to an audience, especially in the closing cadences of a sentence or phrase. His fullness revolutionized the writing of Latin; he is the real creator of the "periodic" style, in which phrase is balanced against phrase, with subordinate clauses woven into a complex but seldom obscure whole. Cicero's rhetoric was a complex art form, and the ears of the audience were keenly attuned to these effects. Of the speeches, 58 have survived, some in an incomplete form; it is estimated that about 48 have been lost.

Cicero in *Brutus* implicitly gives his own description of his equipment as an orator—a thorough knowledge of literature, a grounding in philosophy, legal expertise, a storehouse of history, the capacity to tie up an opponent and reduce the jury to laughter, the ability to lay down general principles applicable to the particular case, entertaining digressions, the power of rousing the emotions of anger or pity, the faculty of directing his intellect to the point immediately essential. This is not an unjust picture. It is the *humanitas* of the speeches that turns them from an ephemeral tour de force into a lasting possession. His humour is at its best in his bantering of the Stoics in *Pro Murena* in order to discredit Cato, who was among the prosecutors, and at its most biting when he is attacking Clodia in *Pro Caelio.* His capacity for arousing anger may be seen in the opening sentences of the first speech against Catiline and, for arousing pity, in the last page of *Pro Milone.* His technique in winning a case against the evidence is exemplified by *Pro Cluentio,* a speech in an inordinately complex murder trial; Cicero later boasted of "throwing dust in the jurymen's eyes."

Cicero studied philosophy under the Epicurean Phaedrus (*c.* 140–70 BC), the Stoic Diodotus (d. *c.* 60 BC), and the Academic Philo of Larissa (*c.* 160–80 BC), and thus he had a thorough grounding in three of the four main schools of philosophy. Cicero called himself an Academic, but this applied chiefly to his theory of knowledge, in which he preferred to be guided by probability rather than to allege certainty; in this way, he justified contradictions in his own works. In ethics he was more inclined to dogmatism and was attracted by the Stoics, but for his authority he looked behind the Stoics to Socrates. In religion he was an agnostic most of his life, but he had religious experiences of some profundity during an early visit to Eleusis and at the death of his daughter in 45. He usually writes as a theist, but the only religious exaltation in his writings is to be found in the "Somnium Scipionis" ("Scipio's Dream") at the end of *De republica.*

Cicero did not write seriously on philosophy before about 54, a period of uneasy political truce, when he seems to have begun *De republica,* following it with *De legibus* (begun in 52). These writings were an attempt to interpret Roman history in terms of Greek political theory. The bulk of his philosophical writings belong to the period between February 45 and November 44. His output and range of subjects were astonishing: the lost *De consolatione,* prompted by his daughter's death; *Hortensius,* an exhortation to the study of philosophy, which proved instrumental in St. Augustine's conversion; the difficult *Academica* (*Academic Philosophy*), which defends suspension of judgement; *De finibus,* or *The Supreme Good* (Is it pleasure, virtue, or something more complex?); and *De officiis* (*Moral Obligation*). Except in the last book of *De officiis,* Cicero lays no claim to originality in these works. Writing to Atticus, he says of them "They are transcripts; I simply supply words, and I've plenty of those." His aim was to provide Rome with a kind of philosophic encyclopaedia. He derived his material from Stoic, Academic, epicurean, and Peripatetic sources. The form he used was the dialogue, but his models were Aristotle and the scholar Heracleides Ponticus rather than Plato. Cicero's importance in the history of philosophy is as a transmitter of Greek thought. In the course of this role, he gave Rome and, therefore, Europe its philosophical vocabulary.

(J.Fe./J.P.V.D.B./Ed.)

MAJOR WORKS. *Speeches. Pro Quinctio* (81), *Pro Roscio Amerino* (80 or early 79), *Pro Roscio Comoedo* (77?), *In Caecilium divinatio, In Verrem actio* I, *actio* II, 1–5 (70) *Pro Tullio, Pro Fonteio, Pro Caecina* (69), *Pro Lege Manilia, Pro Cluentio* (66), *Contra Rullum* I–III, *Pro Rabirio, In Catilinam,* I–IV, *Pro Murena* (63), *Pro Sulla, Pro Archia* (62), *Pro Flacco* (59), *Post reditum ad Quirites* and *Post reditum in Senatu, De domo sua* (57), *De haruspicum responso, Pro Sestio, In Vatinium, Pro Caelio, De provinciis consularibus, Pro Balbo* (56), *In Pisonem* (55), *Pro Plancio, Pro Rabirio Postumo* (54), *Pro Milone* (52), *Pro Marcello, Pro Ligario* (46), *Pro rege Deiotaro* (45), *Philippicae* I–XIV (44–43).

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Ciceronian period, first great age of Latin literature, from approximately 70 to 43 BC; together with the following Augustan Age (*q.v.*), it forms the Golden Age (*q.v.*) of Latin literature. The political and literary scene was dominated by Cicero (*q.v.*), a statesman, orator, poet, critic, and philosopher who perfected the Latin language as a literary medium, expressing abstract and complicated thoughts with clarity and creating the important quantitative prose rhythm. Cicero's influence on Latin prose was so great that subsequent prose, not only in Latin but in later vernacular languages up to the 19th century, was either a reaction against or a return to his style. Other outstanding figures of the Ciceronian period are Julius Caesar, notable for political oratory and vivid military narratives; Marcus Terentius Varro, who wrote on topics as varied as farming and the Latin language; and Sallust, who opposed Cicero's style and espoused one later imitated by Seneca, Tacitus, and Juvenal. Among Ciceronian poets are Catullus, the first master of the Latin love lyric, and Lucretius (*q.v.*), who contemplated the origins of the universe and the scientific and philosophical laws that govern it in the long didactic poem *De rerum natura* ("On the Nature of Things").

cichlid, any of more than 600 species of fishes of the family Cichlidae (order Perciformes), many of which are popular aquarium fishes. Cichlids are primarily freshwater fishes and are found in tropical America, Africa and Madagascar, and southern Asia. The majority of species are African, appearing in great diversity in the major African lakes.

Cichlids are rather deep-bodied and have one nostril (rather than the usual two) on each side of the head. They generally have rounded tails and, though sizable for aquarium fishes, usually do not grow longer than about 30 centimetres (12 inches). In many species, the rear edges of the dorsal and anal fins are pointed



Cichlid (*Tilapia mossambica*)
By courtesy of the New York Zoological Society

and the pelvic fins are elongated.

Depending on the species, cichlids range from vegetarian to carnivorous. They are noted for their complex mating and breeding behaviour. This usually involves courtship and preparation, maintenance, and defense of the nest and protection of the new young. In certain species, however, known as mouthbreeders, the eggs are not placed in a nest but are carried in the mouth of the parent until hatched. This mouthbreeding behaviour is common to many species of the genus *Tilapia* and also to certain other Old World genera.

Among the better known of the many popular aquarium cichlids are the firemouth (*Cichlasoma meeki*), a fish with bright red in its mouth and on its throat and chest; the Jack Dempsey (*C. biocellatum*), a rather large, dark fish spotted with blue green: the oscar (*Astronotus ocellatus*), an attractive fish with an orange-ringed black spot on its tail base; and the discus (*Symphysodon discus*), a very deep bodied fish streaked with blue. Another popular aquarium fish of this group is the

angelfish (*q.v.*), or scalare (*Pterophyllum*). A notable cichlid is *Tilapia mossambica*, a prolific African species that is now cultivated in many regions as a source of food.

cicim, cicim also spelled JIJIM, ruglike spread or hanging handmade in Anatolia, composed of variously coloured strips woven in ordinary cloth weave on a narrow loom and sewn together. The patterns are usually provided by brocading while on the loom, but certain details may be embroidered later. Peculiar el-



Detail of a *cicim*, late 19th century; in the Textile Museum, Washington, D.C.

Textile Museum Collection, Washington, D.C., gift of W.R. Pickering, photograph, Otto E. Nelson—EB Inc.

ements, such as feathers, may be incorporated in the brocading.

Unless silk is used in the decoration, *cicims* are normally all wool. They do not predate the 19th century.

ciconiiform (order Ciconiiformes), any member of five or six families of long-legged, long-necked, long-footed storklike birds adapted to wading in shallow water. The order comprises herons and bitterns (Ardeidae), shoebills (sole species of the Balaenicipitidae), hammerheads (sole species of the Scopidae), storks (Ciconiidae), ibis and spoonbills (Threskiornithidae). Some authorities also include flamingos (Phoenicopteridae).

A brief treatment of ciconiiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

Birds of this order tend to be large, and many species possess spectacular powers of flight, occasionally migrating across the lengths of two continents. They are also noted for their graceful shape and movement. They are found all over the world except in the polar regions, though most species are concentrated in warm climates. With some exceptions, the preferred habitat is near an expanse of freshwater. For the most part they eat other animals, usually fish, but they also prey upon small mammals, birds, reptiles, amphibians, and a number of invertebrates, including mollusks, crustaceans, insects, and worms. Some species, such as the marabou, are known to be both predators and carrion eaters, while the cattle egret feeds on insects. The flamingos are exceptions to many general rules applied to other ciconiiforms. Their chief food is minute algae, which they capture by flushing water through fine, hairlike plates in their mandibles, rather like the way certain whales use baleen to catch small crustaceans.

Most ciconiiforms are silent birds, making few cries, though some storks make a noisy clatter by snapping their mandibles together. The large bittern makes a booming cry in spring. Many species are markedly gregarious, often forming flocks numbering hundreds of thousands. Indeed, lesser flamingos have been known to gather in assemblies of more than 1,000,000 on a single African lake. Even those ciconiiforms which, because of their feeding habits, must separate during the day commonly reassemble at dusk to fly to a communal roost.

Most species breed in large, often enormous, colonies that may include a mixture of species. Most species are arboreal nesters and the nest sites are often at great height. The white storks nest in a variety of sites and quite often in close association with humans. The nests are usually composed of loosely assembled sticks and stems.

Though they can run rapidly when the need arises, most ciconiiforms move with a deliberate, long-legged gait. Their wings are broad and strong for flying. Many of the larger storks take advantage of thermal air currents to rise to great heights and perform prodigious feats of soaring. In direct flight, flocks are often seen in a V-formation.

The plumage of herons tends toward blue, gray, and white patterns, while storks often have contrasting areas of white and black. A few ciconiiform birds are brilliantly plumed, notably the flamingos and the scarlet ibis. During the mating season herons develop long plumes which hang from the head, neck, breast, or back. In many species the colour of the bills, irises of the eyes, legs, and bare patches of skin become brighter, usually redder, during the period of sexual display, and there may even be an intensification of the colour in moments of excitement.

Cid, the, Spanish EL CID, also called EL CAMPEADOR ("the Champion"), byname of RODRIGO, or RUY, DÍAZ DE VIVAR (b. *c.* 1043, Vivar, near Burgos, Castile [Spain]—d. July 10, 1099, Valencia), Castilian military leader and national hero. His popular name, El Cid (from Spanish Arabic *as-sid,* "lord"), dates from his lifetime.

Early life. Rodrigo Díaz' father, Diego Laínez, was a member of the minor nobility (*infanzones*) of Castile. But the Cid's social background was less unprivileged than later popular tradition liked to suppose, for he was directly connected on his mother's side with the great landed aristocracy, and he was brought up at the court of Ferdinand I in the household of that king's eldest son, the future Sancho II of Castile. When Sancho succeeded to the Castilian throne (1065), he nominated the 22-year-old Cid as his standard-bearer (*armiger regis*), or commander of the royal troops. This early promotion to important office suggests that the young Cid had already won a reputation for military prowess. In 1067 he accompanied Sancho on a campaign against the important Moorish kingdom of Saragossa (Zaragoza) and played a leading role in the negotiations that made its king, al-Muqtadir, a tributary of the Castilian crown.

Ferdinand I, on his death, had partitioned his kingdoms among his various children, leaving Leon to his second son, Alfonso VI. Sancho began (1067) to make war on the latter with the aim of annexing Leon. Later legend was to make the Cid a reluctant supporter of Sancho's aggression, but it is unlikely the real Cid had any such scruples. He played a prominent part in Sancho's successful campaigns against Alfonso and so found himself in an awkward situation in 1072, when the childless Sancho was killed while besieging Zamora, leaving the dethroned Alfonso as his only possible heir. The new king appears to have done his best to win the allegiance of Sancho's most powerful supporter. Though the Cid now lost his post as *armiger regis* to a great magnate, Count García Ordóñez (whose bitter enemy he became), and his former influence at court naturally declined, he was allowed to remain there; and, in July 1074, probably at Alfonso's instigation, he married the king's niece Jimena, daughter of the Count de Oviedo. He thus became allied by marriage to the ancient royal dynasty of Leon. Very little is known about Jimena. The couple had one son and two daughters. The son, Diego Rodríguez, was killed in battle against the Muslim Almoravid invaders from North Africa, at Consuegra (1097).

The Cid's position at court was, despite his marriage, precarious. He seems to have been thought of as the natural leader of those Castilians who were unreconciled to being ruled by a king of Leon. He certainly resented the influence exercised by the great landed nobles over Alfonso VI. Though his heroic biographers would later present the Cid as the blameless victim of unscrupulous noble enemies and of Alfonso's willingness to listen to unfounded slanders, it seems likely that the Cid's penchant for publicly humiliating powerful men may have largely contributed to his downfall. Though he was later to show himself astute and calculating as both a soldier and a politician, his conduct vis-à-vis the court suggests that resentment at his loss of influence as a result of Sancho's death may temporarily have undermined his capacity for self-control. In 1079, while on a mission to the Moorish king of Seville, he became embroiled with García Ordóñez, who was aiding the king of Granada in an invasion of the kingdom of Seville. The Cid defeated the markedly superior Granadine army at Cabra, near Seville, capturing García Ordóñez. This victory prepared the way for his downfall; and when, in 1081, he led an unauthorized military raid into the Moorish kingdom of Toledo, which was under Alfonso's protection, the king exiled the Cid from his kingdoms. Several subsequent attempts at reconciliation produced no lasting results, and after 1081 the Cid never again was able to live for long in Alfonso VI's dominions.

Service to the Muslims. The exile offered his services to the Muslim dynasty that ruled Saragossa and with which he had first made contact in 1065. The king of Saragossa, in northeastern Spain, al-Mu'tamin, welcomed the chance of having his vulnerable kingdom defended by so prestigious a Christian warrior. The Cid now loyally served al-Mu'tamin and his successor, al-Musta'in II, for nearly a decade. As a result of his experience he gained that understanding of the complexities of Hispano-Arabic politics and of Islāmic law and custom that would later help him to conquer and hold Valencia. Meanwhile, he steadily added to his reputation as a general who had never been defeated in battle. In 1082, on behalf of al-Mu'tamin, he inflicted a decisive defeat on the Moorish king of Lérida and the latter's Christian allies, among them the count of Barcelona. In 1084 he defeated a large Christian army under King Sancho Ramírez of Aragon. He was richly rewarded for these victories by his grateful Moorish masters.

In 1086 there began the great Almoravid invasion of Spain from North Africa. Alfonso VI, crushingly defeated by the invaders at Sagrajas (Oct. 23, 1086) suppressed his antagonism to the Cid and recalled from exile the Christians' best general. The Cid's presence at Alfonso's court in July 1087 is documented. But shortly afterward, he was back in Saragossa, and he was not a participant in the subsequent desperate battles against the Almoravids in the strategic regions where their attacks threatened the whole existence of Christian Spain. The Cid, for his part, now embarked on the

lengthy and immensely complicated political maneuvering that was aimed at making him master of the rich Moorish kingdom of Valencia.

Conquest of Valencia. His first step was to eliminate the influence of the counts of Barcelona in that area. This was done when Berenguer Ramón II was humiliatingly defeated at Tébar, near Teruel (May 1090). During the next years the Cid gradually tightened his control over Valencia and its ruler, al-Qādir, now his tributary. His moment of destiny came in October 1092 when the *qāḍī* (chief magistrate), Ibn Jaḥḥāf, with Almoravid political support rebelled and killed al-Qādir. The Cid responded by closely besieging the rebel city. The siege lasted for many months; an Almoravid attempt to break it failed miserably (December 1093). In May 1094 Ibn Jaḥḥāf at last surrendered, and the Cid finally entered Valencia as its conqueror. To facilitate his takeover he characteristically first made a pact with Ibn Jaḥḥāf that led the latter to believe that his acts of rebellion and regicide were forgiven; but when the pact had served its purpose, the Cid arrested the former *qāḍī* and ordered him to be burnt alive. The Cid now ruled Valencia directly, himself acting as chief magistrate of the Muslims as well as the Christians. Nominally he held Valencia for Alfonso VI, but in fact he was its independent ruler in all but name. The city's chief mosque was Christianized in 1096; a French bishop, Jerome, was appointed to the new see; and there was a considerable influx of Christian colonists. The Cid's princely status was emphasized when his daughter Cristina married a prince of Aragon, Ramiro, lord of Monzón, and his other daughter, María, married Ramón Berenguer III, count of Barcelona.

Aftermath. The great enterprise to which the Cid had devoted so much of his energies was to prove totally ephemeral. Soon after his death Valencia was besieged by the Almoravids, and Alfonso VI had to intervene in person to save it. But the king rightly judged the place indefensible unless he diverted there permanently large numbers of troops urgently needed to defend the Christian heartlands against the invaders. He evacuated the city and then ordered it to be burned. On May 5, 1102, the Almoravids occupied Valencia, which was to remain in Muslim hands until 1238. The Cid's body was taken to Castile and reburied in the monastery of San Pedro de Cardeña, near Burgos, where it became the centre of a lively tomb cult.

The Cid's biography presents special problems for the historian because he was speedily elevated to the status of national hero of Castile, and a complex heroic biography of him, in which legend played a dominant role, came into existence; the legend was magnified by the influence of the 12th-century epic poem of Castile, *El cantar de mío Cid* ("The Song of the Cid") and later by Pierre Corneille's tragedy *Le Cid,* first performed in 1637. For authentic information historians have to rely mainly on a few contemporary documents, on the *Historia Roderici* (a reliable, private 12th-century Latin chronicle of the Cid's life), and on a detailed eyewitness account of his conquest of Valencia by the Arab historian Ibn 'Alqāmah. (P.E.R.)

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Cidenas (astronomer): *see* Kidinnu.

cider, the expressed juice of apples, used as a beverage or for making other products (such as applejack, vinegar, or apple butter). In most European countries the name is restricted to fermented juice. In North America, the freshly expressed juice that has not been subjected to any permanent preservative treatment is generally called sweet cider, whereas juice that has been permitted to undergo some natural fermentation is designated hard cider. The expressed juice of apples that has been treated by some method to prevent spoilage while in hermetically sealed cans or bottles is marketed as apple juice in most countries.

Apple juice or cider is relatively low in content of protein, fat, ascorbic acid (vitamin C), and vitamin A and contains a moderate amount of carbohydrates. However, about 75 percent of the carbohydrates consists of sugars that are readily assimilated by humans. Ascorbic acid, too, is easily added.

In the making of cider, the apples are ground into a fine pulp or pomace and then pressed. For hard cider, the extracted juice is conveyed directly into fermenting vats or casks. If the fermented cider is to be sweet, the juice must be filtered at an early stage to make possible the retention of the desired percentage of unfermented sugar. If a dry cider is desired, fermentation must proceed until all or most of the sugar is converted into alcohol. Natural fermentation resulting from the wild yeasts present on the apples is the usual practice, but some makers pasteurize the fresh juice and then add pure cultures of selected yeasts. After about three months the juice is subjected to filtration to remove sedimentation and the look of turbidity. Flavour is improved by aging hard cider for a few months, or even two or three years, after filtration. Some hard cider is carbonated.

In the making of sweet cider or apple juice, the apples are ground and pressed in much the same manner as for making alcoholic cider. Europeans prefer a juice that is mellowed by holding it for a few months in large tanks under pressure supplied by introducing carbon dioxide into the tanks. Americans generally prefer freshly pressed juice.

The usual processing procedure for making a clear juice is to clarify and filter the juice, flash-pasteurize it, fill the juice into metal or glass containers, close the containers, and cool immediately. If an unclarified or cloudy juice is to be packed, the apples are often sprayed with ascorbic acid when they are ground to prevent darkening of the juice by oxidation and to reduce the amount of sedimentation in the finished product.

Of all countries, France has the largest production of cider. Cider manufactured in France must be produced by the fermentation of the juice of fresh apples or a mixture of apples and pears and must conform to specific standards for the different kinds, designated by different names. English and American cider has been extremely variable because of a lack of legal standards, except for those regulations relating to contamination.

Ciechanów, *województwo* (province), northeast-central Poland, comprising an area of 2,456 square miles (6,362 square km). It is bordered by the provinces of Olsztyn on the north, Ostrołęka on the east, Warsaw on the south, Płock on the southwest, and Włocławek and Toruń on the west. The economy of the northern part of the province depends on food production (rye, potatoes, sugar beets) and food processing and electrical-machinery manufacturing; in the southern part of the province, wood pulp is processed, building materials are manufactured, and chemicals are produced. The largest river is the Wkra, which flows the length of the province from north to south; other rivers include the Narew (in the extreme southeast), the Sona, the Mławka, the Orzyc, the Łydynia, and the Działdówka. The main railroad line from Warsaw to Gdańsk spans the province, and there is a major transportation and rail centre in Ciechanów (*q.v.*) city, the provincial capital. Pop. (1989 est.) 424,100.

Ciechanów, city, capital of Ciechanów *województwo* (province), east-central Poland. It is located in the central Ciechanów Highlands part of the province on the Łydynia waterway, the Wkra River inlet, and the Warsaw-Gdańsk railway line, in a fertile agricultural area that produces wheat, rye, sugar beets, and potatoes. The capital, a walled city since the 11th century, was one of the Christian Polish communities placed under the protection of the Teutonic Mazovian Knights early in the 13th century. Pop. (1989 est.) 42,200.

Ciego de Ávila, *provincia,* central Cuba, bordered on the north by the Old Bahama Channel and by the *provincia* of Sancti Spíritus on the west, Camagüey on the east, and on the south by the Gulf of Ana María, an inlet of the Caribbean Sea. It has an area of 2,668 square miles (6,910 square km). Its northern coast consists of large cays constituting the western part of the Sabana-Camagüey Archipelago. The gently rolling savannas of the mainland give way to swamps along the southern coast of the province. Sugarcane, tobacco, and citrus fruits are grown, and cattle are raised. In the north, coffee and cacao are also harvested. Industry, including sugar refineries, sawmills, distilleries, and bottling plants, centres on Ciego de Ávila (*q.v.*) city, the provincial capital. Pop. (1989 est.) 358,100.

Ciego de Ávila, city, capital of Ciego de Ávila *provincia,* east-central Cuba. It is a major commercial, manufacturing, and transportation centre for the surrounding agricultural and pastoral lands, which are known primarily for sugarcane, although tropical fruits, beeswax and honey, molasses, and cattle are also produced. The city contains sawmills, distilleries, bottling plants, and factories producing dried, salted beef. Sugar refineries and a thermal power plant are located nearby. Ciego de Ávila lies on the central highway and a major railroad; its port, Júcaro, lies 15 miles (24 km) south-southwest on the Caribbean Sea. Pop. (1989 est.) 86,100.

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Ciénaga, in full SAN JUAN DE CIÉNAGA, city, Caribbean port, Magdalena *departamento,* northern Colombia, at the foothills of the Santa Marta Mountains. First called Aldea Grande ("Large Village") by Fernandez Enciso in 1518, it was renamed for the nearby Great Swamp (Ciénaga Grande) of Santa Marta, a Caribbean inlet in the alluvial lowlands of the lower Río Magdalena, in whose waters a Spanish fleet was destroyed in 1820.

Economic activities include shipping, fishing, marble quarrying, and agriculture (coffee, tobacco, sugarcane, African palms, bananas, cacao, and cotton). Pop. (1985) 56,860.

Cienfuegos, *provincia,* south-central Cuba, bounded by the *provincias* of Villa Clara to the northeast, Matanzas to the west, Sancti Spíritus to the southeast, and to the south by the Caribbean Sea. The territory of 1,613 square miles (4,178 square km) consists of a fertile coastal plain, indented by the excellent harbour formed by the Cienfuegos Bay. In the southeast, the Sierra de Trinidad rises to San Juan Peak, 3,793 feet (1,156 m) above sea level. Sugarcane is grown in much of the province; rice cultivation is centred near Aguada de Pasajeros. The province also produces coffee, tobacco, henequen, fruits, and cattle. Sugar refineries, coffee- and tobacco-processing plants, and distilleries are the main industries, centring on Cienfuegos (*q.v.*) city, the provincial capital and major national export and fishing port. Pop. (1989 est.) 358,600.

Cienfuegos, city, capital of Cienfuegos *provincia,* central Cuba; one of the nation's

chief ports, it stands on a broad, level peninsula opposite the narrow entrance to the sheltered Bahía (bay) de Cienfuegos. It is built on a rectangular pattern with wide streets, numerous parks and promenades, and attractive buildings. The bay was visited by Christopher Columbus in 1494 but attracted no permanent settlement until 1738; the Castillo (castle) de Jagua fortress was completed in 1745 at the entrance to the bay as protection against pirates. The city was actually founded in 1819 as Fernandina de Jagua by French colonists. Destroyed by a storm in 1825, the settlement was rebuilt and renamed in honour of a participant in its founding. Now serving as the trading centre for the fertile lands of the southern province, it has become one of the most prosperous and modern cities of Cuba.

In addition to large quantities of sugarcane, the hinterland produces significant amounts of coffee, tobacco, henequen, rice, fruit, and livestock. A major part of Cuba's shrimp trawlers operate out of Cienfuegos. The main industries in the city are coffee- and tobacco-processing plants, distilleries, and fish canneries. Cienguegos also has a fertilizer factory and a thermoelectric plant. Sugar and molasses are the principal exports, the city's port handling the bulk of the nation's sugar exports. Cienfuegos is well served by railways, highways, and domestic airlines. Pop. (1981 prelim.) 107,396.

científico (Spanish: "scientist"), member of a group of officials, serving from the early 1890s in Porfirio Díáz' regime (1876–1911) in Mexico, who were influenced by Positivism, the philosophy of the Frenchman Auguste Comte. Rejecting metaphysics, theology, and idealism as means of solving national problems, the *científicos* advocated what they considered to be the practical application of scientific methods, specifically those of the social sciences, to problems of finance, industrialization, and education. The founders of the group were Rosenda Pineda and Romero Rubio. In 1895 José Yves Limantour, the son of a French immigrant and finance minister since 1893, became leader of the circle. He pressed government officials to concentrate on efficiency and did much himself to improve the financial footing of the country. The learned Justo Sierra became minister of education and continued the educational reforms according to Positivist principles initiated in the 1870s by Gabino Barreda, a student of Comte and member of Benito Juárez' government. In 1910 Sierra reopened the National University for the first time in almost a century of national independence. The *científicos* furnished Díaz' dictatorship, which they upheld as a bulwark against anarchy, with a prestigious facade, as the army and the *rurales* (federal police) provided it with its foundation. Díaz, however, had little rapport with these intellectuals. Because of their influence, wealth, and favouritism toward foreign capitalists, the *científicos* were objects of popular disfavour, while Díaz himself tried to cultivate the confidence of the uneducated masses. These *científicos* were eclipsed when the Díaz regime fell in the Revolution of 1911.

During the ascendancy of Plutarco Elías Calles, both as president and former president (1924–34), another group, also called *científicos,* came to power; they advocated the use of modern business methods to benefit both themselves and the nation, while stressing self-enrichment.

The Positivist movement also took root in other Latin-American countries, influencing government and education in Brazil, Argentina, and Chile in the late 19th and early 20th centuries.

Cierva (Codorniu), Juan de la (b. Sept. 21, 1895, Murcia, Spain—d. Dec. 19, 1936, London), aeronautical engineer who invented the autogiro, an aircraft in which lift is provided by a freely rotating rotor and which served as the forerunner of the helicopter.

Although trained as a civil engineer, Cierva became interested in aviation early in his youth. Between 1912 and 1919 he designed and built gliders and airplanes. The crash of his trimotor plane in 1919 led him to develop the autogiro as a more stable form of aircraft. In 1923 at Getafe, Spain, he made his first successful flight in an autogiro, and in 1925 he went to England to continue his work. Cierva-type autogiros were used widely in France, Germany, Japan, and the United States prior to World War II, when they were supplanted by helicopters. Cierva was killed in an airliner crash at the Croydon aerodrome, near London.

Cieszyn (duchy, eastern Europe): *see* Teschen.

Cieszyn, German TESCHEN, Czech TĚŠÍN, city, Bielsko-Biała *województwo* (province), southwestern Poland, on the Olza River in the foothills of the Carpathian Mountains. Situated on the Polish–Czech border, the city is essentially divided by the Olza; the newer Czech side is known as Český Těšín. A primary Polish Silesian stronghold in the 12th century, Cieszyn, with the other Silesian Piast principalities, was attached to Bohemia in the 14th century. Bohemia, in turn, passed to the Austrian Habsburg dynasty in 1526; the last Piast prince of Cieszyn died in 1625. The settlement of territorial disputes after World War I awarded Cieszyn to Poland. The whole region was annexed by Germany in 1939, but at the end of World War II Cieszyn was returned to Poland. Cieszyn manufactures metallurgical and electrotechnical products, as well as clockworks and paper. It has a regional museum containing a fine collection of ethnic costumes. Pop. (1982 est.) 34,600.

cigar, cylindrical roll of tobacco for smoking, consisting of cut tobacco filler formed in a binder leaf and with a wrapper leaf rolled spirally around the bunch. Wrapper leaf, the most expensive leaf used in cigars, must be strong, elastic, silky in texture, and even in colour; it must have a pleasant flavour and good burning properties.

Columbus and the explorers who followed him in Cuba, Mexico, Central America, and Brazil found that the Indians of those regions smoked a long, thick bundle of twisted tobacco leaves wrapped in a dried palm leaf or corn (maize) husk. A pottery vessel discovered at Uaxactún, Guatemala, dating from the 10th century AD or earlier, shows the figure of a Maya smoking a string-tied roll of tobacco leaves. The Spanish word *cigarro,* from which "cigar" is derived, probably was an adaptation of *sik'ar,* the Mayan term for smoking. By 1600 the cigar had been introduced into Spain, where it was a symbol of conspicuous wealth for two centuries before it was widely used in other European countries. The use of cigars in New England probably followed closely the settlement of Connecticut in 1633.

Modern cigars are described by their size and shape as follows: corona is a straight-shaped cigar with rounded top (the end placed in the mouth), about 5½ inches (14 centimetres) long; petit corona, or corona chica, is about 5 in. long; tres petit corona is about 4½ in. long; half a corona is about 3¾ in. long; Lonsdale is the same shape as a corona, about 6½ in. long; ideales is a slender, torpedo-shaped cigar, tapered at the lighting end, about 6½ in. long; bouquet is a smaller, torpedo-shaped cigar; Londres is a straight cigar about 4¾ in. long. These descriptive terms appear after the brand name. A panatela is a thin cigar open at both ends, usually about 5 in. long with a straight shape but sometimes having a shoulder, or drawn-in portion, at the mouth end; originally it had a finished top that had to be cut off before smoking. A cheroot is a thin cigar, open at both ends, usually thicker and stubbier than a panatela, and sometimes slightly tapered. The name whiff, used in Britain, refers to a small cigar open at both ends, about 3½ in. long.

The main colour classifications of cigars are claro (CCC), light; colorado-claro (CC), medium; colorado (C), dark; colorado-maduro (CM), very dark; and maduro (M), exceptionally dark. The last two are seldom seen in the United Kingdom or the United States. The colour of the wrapper is no indication of the strength of a cigar, but considerable care is given to the matching of colours. Good-quality cigars may be sorted into as many as 20 different shades to ensure that all cigars in a box have a uniform appearance.

Cigars should be kept in a fairly dry and warm, not hot, atmosphere at constant conditions. The temperature should be 64° to 67° F (18° to 19° C), with a relative humidity of about 53 to 57 percent.

In modern packaging, a band is placed on the cigar or printed on the protective covering, usually cellophane. The covering, applied by machine, preserves the natural humidostatic condition of the cigar. Selectors and packers, working under suitable lighting, arrange the cigars according to colour and perfection of wrapper and place them in boxes made of wood, metal, paper, or glass.

cigar-box cedar, also called SPANISH CEDAR or WEST INDIAN CEDAR (*Cedrela odorata*), tropical American timber tree, of the mahogany family (Meliaceae), prized for its aromatic wood, hence its name. Its small flowers are borne in branched clusters, and each fruit is a capsule containing many winged seeds. Other species of the genus *Cedrela* such as toon (*C. toona*) and *C. sinensis* are cultivated as ornamentals.

cigarette, paper-wrapped roll of finely cut tobacco for smoking; modern cigarette tobacco is usually of a milder type than cigar tobacco.

The Aztecs smoked a hollow reed or cane tube stuffed with tobacco. Other natives of Mexico, Central America, and parts of South America crushed tobacco leaves and rolled the shreds in corn (maize) husk or other vegetable wrappers. But it was the cigar rather than this prototype of the cigarette that the conquistadors brought back to Spain as a luxury for the wealthy.

Early in the 16th century beggars in Seville began to pick up discarded cigar butts, shred them, and roll them in scraps of paper (Spanish *papeletes*) for smoking, thus improvising the first cigarettes. These poor man's smokes were known as *cigarrillos* (Spanish: "little cigars"). Late in the 18th century they acquired respectability and their use spread to Italy and Portugal; they were carried by Portuguese traders to the Levant and Russia. French and British troops in the Napoleonic Wars became familiar with them; the French named them cigarettes. Forty years later another generation of French and British troops, fighting in the Crimean War, made the acquaintance of Turkish cigarettes. At the same time, cigarettes were becoming popular in the U.S. British taste later switched to cigarettes filled with unmixed Virginia tobacco, but the U.S. market developed a preference for a blend including some Turkish tobacco.

At first, all cigarettes were made by hand either by the smoker or in factories. The factory process consisted of hand rolling on a table, pasting, and hand packaging. In 1880, James A. Bonsack was granted a U.S. patent for a cigarette machine in which tobacco was fed onto a continuous strip of paper and was automatically formed, pasted, closed, and cut to lengths by a rotary cutting knife. The Bonsack machine was imported to England in 1883.

In the next few years the cigarette industry developed in several European countries.

Improvements in cultivation and processing that lowered the acid content of cigarette tobacco and made it easier to inhale contributed to a major expansion in cigarette smoking during the first half of the 20th century. During World War I the prejudice against smoking by women was broken, and the practice became widespread among women in Europe and the United States in the 1920s.

In the 1950s and '60s research produced medical evidence that linked cigarette smoking with health hazards, especially with lung cancer, emphysema, and heart disease. In some nations, notably the United Kingdom and the United States, measures were taken to discourage the use of cigarettes. In the 1980s and '90s, despite growing awareness of the health risks involved, smoking continued to increase, with greater consumption in Third World countries offsetting the effects of anti-smoking sentiment elsewhere.

Cignani, Carlo (b. May 15, 1628, Bologna, Papal States [Italy]—d. Sept. 6, 1719, Forlì), last important painter to carry on the Bolognese Baroque tradition in his use of ample, generalized forms, fluent compositions, deep colours, and blended contrasts of light and shadow. Although trained in Bologna, mainly under Francesco Albani, he was chiefly influenced by Correggio. Cignani's masterpiece, a fresco of the "Assumption of the Virgin" in the cupola of Forlì Cathedral, is closely based on Correggio's cupola painting in Parma Cathedral.

Cigoli, Ludovico, in full LUDOVICO CARDI DA CIGOLI (b. Sept. 21, 1559, Cigoli [Italy]—d. June 8, 1613, Rome), Italian painter, architect, and poet whose work reflected the many crosscurrents in Italian art between the decline of Michelangelesque Mannerism and the beginnings of the Baroque.

Cigoli worked both in Florence and in Rome. There are few consistent characteristics in his earlier work beyond some northern Italian strength of colour and lighting. He was an innovator in sentiment rather than in style and foreshadowed Baroque emotionalism. From 1595 onward he was influenced by the new realistic tendencies. These qualities are well illustrated in his "Ecce Homo" (*c.* 1607; Pitti Palace, Florence). His architecture (*e.g.,* the court of the Palazzo Nonfinito, Florence, 1604) shows Palladian elements.

Cilacap, also spelled CHILACHAP, or TJILATJAP, port and *kabupaten* (regency), Jawa Tengah *provinsi* ("province"), Indonesia, on the southern coast of Java. Its harbour is formed by the long, narrow Kambangan Island, which affords protection from the monsoon seas and swells of the Indian Ocean. Wharves accommodate vessels drawing up to 23 feet (7 m). The harbour was used during the Battle of the Java Sea in 1942. Cilacap has road and rail connections to the rest of Java. Main exports are copra, rubber, tea, and cassava. Pop. (1980) regency, 1,333,211.

Cilea, Francesco (b. July 26, 1866, Palmi, Italy—d. Nov. 20, 1950, Varazze, near Genoa), Italian composer whose operas are distinguished by their melodic charm.

While studying at the Naples Conservatory, Cilea produced an opera, *Gina,* which secured for him a commission from a publisher. His first important work, *L'Arlesiana* (1897), after Alphonse Daudet, was the vehicle for the tenor Enrico Caruso's first success. Cilea's best-known work, *Adriana Lecouvreur,* followed in 1902. Cilea was director of the Naples Conservatory from 1916 to 1935. In addition to operas he composed some chamber music.

cilia (biology): *see* cilium.

ciliaris muscle, muscle of the ciliary body of the eye, between the sclera (white of the eye) and the fine ligaments that suspend the lens. It is composed of both longitudinal and circular fibres and serves to change the shape of the lens, enabling the eye to focus upon near or distant objects.

ciliate, or CILIOPHORAN, any member of the protozoan phylum Ciliophora, of which there are some 8,000 species; ciliates are generally considered the most evolved and complex of protozoans. Ciliates are single-celled organisms that, at some stage in their life cycle, possess cilia, short hairlike organelles used for locomotion and food gathering.

The cilia are usually arranged in rows, known as kineties, on the pellicle (cell covering), but they may fuse together near the cytostome (cell mouth) of some species to form membranelles or undulating membranes (various sheetlike or fan-shaped groupings of cilia); elsewhere on the pellicle, cilia may form limblike tufts called cirri. Most ciliates have a flexible pellicle and contractile vacuoles, and many contain toxicysts or other trichocysts, small organelles with thread- or thorn-like structures that can be discharged for anchorage, for defense, or for capturing prey.

Ciliates have one or more macronuclei and from one to several micronuclei. The macronuclei control metabolic and developmental functions; the micronuclei are necessary for reproduction.

Reproduction is typically asexual, although sexual exchange occurs as well. Asexual replication is usually by transverse binary fission or by budding (*q.v.*). Sexual phenomena include conjugation (genetic exchange between individuals) and autogamy (nuclear reorganization within an individual). Sexual reproduction does not always result in an immediate increase in numbers; however, conjugation is often followed by binary fission.

Although most ciliates are free-living and aquatic, such as the *Paramecium* (*q.v.*), many are ectocommensals, dwelling harmlessly on the gills or integument of invertebrates, and some, such as the dysentery-causing *Balantidium* (*q.v.*), are parasitic. For information on representative ciliates, *see* peritrich; spirotrich; suctorian.

Cilicia, ancient district of southern Anatolia, bounded on the north and west by the Taurus Mountain Range, on the east by the Anti-Taurus, and on the south by the Mediterranean Sea. It is geographically divided into two contrasting regions, the western portion being wild and mountainous and the eastern consisting of rich plainland. In ancient times the only route from Anatolia to Syria passed through Cilicia.

During the 14th and 13th centuries BC, eastern Cilicia was at first independent but subsequently became a vassal of the Hittites. About 1000 BC Mycenaean settlers arrived along the coast, and in the 8th century Cilicia was subject to the Assyrians. Under the Persians (from the 6th to the 4th century) the district enjoyed semiautonomous status; in the 4th century it came successively under Macedonian and Seleucid rule. The Seleucids founded, among other cities, Seleucia (Silifke) on the Calycadnus River, later renowned for its culture. In the 1st century BC Cilicia became a Roman province.



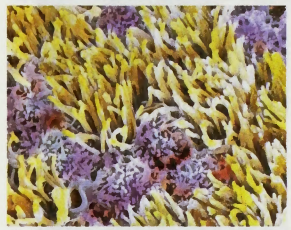
Cilicia under the Roman Empire

From W. Shepherd, *Historical Atlas,* Harper & Row, Publishers (Barnes & Noble Books), New York: revision copyright © 1964 by Barnes & Noble, Inc.

St. Paul visited Cilicia, and the district is rich in early Christian monuments. Muslim Arabs occupied eastern Cilicia from the 7th century AD until 964, when Nicephorus II Phocas reconquered it for Byzantium. In 1080 emigrating Armenians established in the Taurus a principality that was later enlarged and became a kingdom, called Cilician, or Lesser, Armenia. It fell in 1375 to the Egyptian Mamlūks and in 1515 to the Ottoman Turks. After World War I, part of Cilicia was awarded to French Syria by the Treaty of Sèvres, but, in the face of stubborn Turkish resistance, France in 1921 abandoned its claims.

ciliophoran: *see* ciliate.

cilium, plural CILIA, short eyelashlike filament that is numerous on tissue cells of most animals and provides the means for locomotion of protozoans of the phylum Ciliophora. Cilia may be fused in longitudinal rows to form membranes, in shorter transverse rows to form membranelles, or in tufts to form cirri. Capable of beating in unison, cilia move mammalian ova through oviducts, generate water currents to carry food and oxygen past the gills of clams, carry food through the digestive systems of snails, circulate cerebrospinal fluid of animals, and clean debris from the


Cilia (yellow) in the oviduct of a rabbit; a false-colour scanning electron micrograph at 3,550 magnification

© Professor P. Motta, Dept. of Anatomy, University "La Sapienza," Rome/ Science Photo Library—Photo Researchers

respiratory systems of mammals. In modified form, cilia trigger the discharge of stinging devices in jellyfish and give rise to the light-sensitive rods of the mammalian retina.

A cilium, like a flagellum (*q.v.*), is composed of a central core (the axoneme), which contains two central fibres that are surrounded by an outer ring of nine double fibres. The fibres are covered by a membrane continuous with the cell membrane; movement is controlled by the basal body (or kinetostome) that is located just inside the cell surface at the base of the cilium. Beneath the surface of some cells there is a network of fibrous rootlets or microtubular bundles that may provide support for the epithelium or coordinate ciliary beating in protozoans.

Cill Chaoil (Northern Ireland): *see* Kilkeel.

Cill Dalua (Ireland): *see* Killaloe.

Cima, Victoria López (singer): *see* Ángeles, Victoria de los.

Cima da Conegliano, Giovanni Battista (b. *c.* 1459, Conegliano, near Venice [Italy]—d. 1517/18, Conegliano), Italian painter of the Venetian school whose style was marked by its use of landscape and by airy, luminous colour. Probably a pupil of Bartolomeo Montagna, a minor painter of Vicenza, he was later influenced by the poetic and colouristi-

cally sensitive style of Giovanni Bellini, the great Venetian master of the late 15th and early 16th centuries. Cima's fully developed style is evident in his earliest dated picture, an altarpiece done in 1489 (Museo Civico of Vicenza). In 1492 Cima settled in Venice and in that year was commissioned to paint an altarpiece for the cathedral of Conegliano. According to contemporary records he was still in Venice in 1516 but must have returned to Conegliano shortly thereafter.

Cimabue, original name BENCIVIENI DI PEPO, modern Italian BENVENUTO DI GIUSEPPE (b. before 1251—d. 1302), painter and mosaicist, the last great Italian artist in the Byzantine style, which had dominated early medieval painting in Italy. Among his surviving works



"Sta. Trinita Madonna," painted wood panel by Cimabue, *c.* 1290; in the Uffizi, Florence
Alinari—Art Resource/EB Inc

are the frescoes of New Testament scenes in the upper church of S. Francesco, Assisi; the "Sta. Trinita Madonna" (*c.* 1290; Uffizi, Florence); and the "Madonna Enthroned with St. Francis" (*c.* 1290–95; lower church of S. Francesco).

Cimabue's style provided the firm foundation upon which rested the art of Giotto and Duccio in the 14th century, although he was superseded in his own lifetime by these artists, both of whom he had influenced and perhaps trained. His great contemporary, Dante, recognized the importance of Cimabue and placed him at the forefront of Italian painters. Giorgio Vasari, in his *Lives of the Most Eminent Italian Painters, Sculptors, and Architects* . . . (1550), begins his collection of biographies with the life of Cimabue. Art historiographers from the 14th century to the present have recognized the art and career of Cimabue as the dividing line between the old and the new traditions in western European painting.

The earliest biography of Cimabue, by Vasari, states that he was born in 1240 and died in 1300. The dates can only be approximations, for it is documented that Cimabue was alive and working in Pisa in 1302. The only other document relative to his life identifies him as a master painter and witness to a document signed in Rome in 1272. From this it can be concluded that he was born prior to 1251. Other documents indicate that he was christened Bencivieni di Pepo, or Benvenuto di Giuseppe in modern Italian. Cimabue was a nickname that through an error later became a family name.

Nothing is known of his early training. Vasari's assertion that he was apprenticed to Greek Byzantine painters living in Italy is probably an attempt to explain both the style and the sudden emergence of this genius. He was certainly influenced by the Italo-Byzantine painter Giunta Pisano and by Coppo di Marcovaldo and may have been an apprentice to Coppo.

Cimabue's character may be reflected in his name, which can perhaps best be translated as "bullheaded." An anonymous commentator in a work on Dante written in 1333–34 said that Cimabue was so proud and demanding that if others found fault with his work, or if he found something displeasing in it himself, he would destroy the work, no matter how valuable. It is perhaps significant that in the *Divine Comedy* Dante places Cimabue among the proud in Purgatory. And the poet refers to him to illustrate the transience of earthly fame: "Cimabue thought to hold the field in painting, and now Giotto hath the cry." But pride in his own accomplishments and a high personal standard of excellence separated Cimabue from the anonymous artists of the Middle Ages.

Only Cimabue's last work, the mosaic of "St. John the Evangelist," in the Duomo of Pisa, is dated (1301–02). The large "Crucifix," in S. Domenico, Arezzo, is generally accepted as his earliest work and datable before 1272. The frescoes in the upper church of S. Francesco, Assisi, were probably executed between 1288 and 1290. The period 1290–95 includes the large "Crucifix" for Sta. Croce in Florence—about 70 percent destroyed in the floods of 1966, though restoration has been completed; the "Sta. Trinita Madonna," an altarpiece now in Florence's Uffizi; and the "Madonna Enthroned with St. Francis," in the lower church of S. Francesco at Assisi.

Despite the small number of Cimabue's works that have survived, they fully support the reputation that the artist has acquired. In certain formal or more "official" commissions, such as crucifixes and large altarpieces, Cimabue adhered closely to the formal vocabulary of the Byzantine tradition. And yet he breathes new emotive content into the abstract or stylized forms. In the fresco cycle at Assisi, Cimabue found an especially receptive patron, for the art commissioned by the Franciscans from Cimabue's time on is generally characterized by a dramatic and emotive narrative.

Along with the traditional stylization of the human form, Cimabue seems to have been among the first to return to a close observation of nature. In a highly formal altarpiece such as the "Sta. Trinita Madonna," he introduces at the base of the throne four prophets who are modelled through light and dark in a highly sculptural manner that seems far in advance of its date. Cimabue seems also to have been one of the first to recognize the potentialities of painted architecture, which he introduced into his scenes to give an indication of place and a heightened sense of three-dimensionality. The fresco "The Four Evangelists," in the vault of the crossing of the upper church at Assisi, is sculpturally conceived, but its solidity and bulk are heightened by the crystalline city views that accompany each of the figures. The view of Rome that accompanies St. Mark, for example, is not only one of the earliest recognizable views of the city but is also one of the first in which the buildings seem solid and separated one from the other by a clearly defined space. This concern with the illusion of space and with a three-dimensional form occupying that space is rarely met with in medieval painting prior to Cimabue, but it is highly characteristic of Cimabue's leading student and rival, Giotto.

In Cimabue's more formal works he follows tradition closely, but he brings to that tradition a heightened sense of drama. After him the Byzantine tradition in Italy died out, partly because it had been superseded by a new style, but also because he had exhausted all the possibilities inherent in the tradition. In his less formal works he was able to exploit a growing interest in narrative that had been inherent in the Byzantine tradition but never fully developed. Finally, he brought to Italian painting a new awareness of space and of sculptural form. By his own personality and by his contributions to painting he merits Vasari's characterization of him as the first Florentine painter and the first painter of "modern" times. (J.R.Sp.)

MAJOR WORKS. "Crucifix" (S. Domenico, Arezzo); frescoes of the upper church (S. Francesco, Assisi), including four Evangelists in the vaults, "Great Crucifixion" in the left (or south) transept, scenes from the Apocalypse in the lunettes and wall area of the left transept, scenes from the life of the Virgin in the apse, and "St. Peter Healing the Lame" and "St. Peter Healing the Sick" in the right transept—all the frescoes except the four Evangelists are in poor condition. "Crucifix" for Sta. Croce (Museo di Sta. Croce, Florence); "Sta. Trinita Madonna" (an altarpiece of Madonna and Christ Child enthroned with angels and four prophets; Uffizi, Florence); "Madonna Enthroned with St. Francis" (fresco, lower church of S. Francesco, Assisi); "St. John the Evangelist" (mosaic; Cathedral, Pisa). The following works have been attributed to Cimabue, but opinion is not as unanimous as it is with the above. "Joseph Sold into Egypt" (mosaic; Baptistery, Florence); "Madonna and Child Enthroned with Angels" (from Pisa; Louvre, Paris); "Madonna and Child Enthroned with Two Angels," known as "The Servi Madonna" (Sta. Maria dei Servi, Bologna).

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Cimarosa, Domenico (b. Dec. 17, 1749, Aversa, Kingdom of Naples—d. Jan. 11, 1801, Venice), one of the principal Italian composers of comic operas.

He was born of a poor family, and his parents, anxious to give him a good education, moved to Naples, where they sent him to a free school. Beginning in 1761 he studied for 11 years at the conservatory of Sta. Maria di Loreto.

He began his career with the comic opera *Le Stravaganze del conte,* performed at the Teatro de' Fiorentini at Naples in 1772. Its success was followed by that of *L'Italiana in Londra* (Rome, 1778), a work still performed in Italy. From 1784 to 1787 Cimarosa lived in various Italian cities, composing both serious and comic operas that were produced in Rome, Naples, Florence, Vicenza, Milan, and Turin. In 1787, at the invitation of Catherine II, he went to St. Petersburg as court musician, replacing Giovanni Paisiello. He pro-

duced two operas in St. Petersburg in 1788 and 1789 and in 1791 proceeded to Vienna at the invitation of Leopold II. There, at the Burgtheater on Feb. 7, 1792, he produced his masterpiece, *Il matrimonio segreto* (*The Secret Marriage*), one of the highest achievements in comic opera and the work upon which his reputation rests. In 1793 he returned to Italy, where *Il matrimonio segreto* and many others of his works were enthusiastically received. New works of this period included *Le astuzie femminili* (Naples, 1794) and his tragic masterpiece, *Gli orazi e i curiazi* (Venice, 1796).

He lived mainly in Naples, and during its occupation by the French Republican troops in 1799, Cimarosa openly showed his republican sympathies, so that on the return of the Bourbons he was imprisoned. After being released, he left Naples in broken health. His death from an intestinal disorder led to the rumour of his having been poisoned by his enemies; a formal inquest proved the charge to be unfounded.

Cimarosa was a prolific composer whose music abounds in fresh and never-failing melody. His numerous operas are remarkable for their apt characterizations and abundant comic life. He wrote many choral works, including the cantata *Il maestro di cappella*, a popular satire on contemporary operatic rehearsal methods. Among his instrumental works, which, like his operas, have been successfully revived, are many sparkling harpsichord sonatas and a concerto for two flutes.

Cimarron River, river rising in northeastern New Mexico, U.S., near Capulin Mountain National Monument and flowing 698 mi (1,123 km) to enter the Arkansas River near Tulsa, Okla. From its source, the Cimarron flows east past Black Mesa, a peak 4,973 ft (1,516 m) high, through the northern Oklahoma Panhandle and bends northward through the southeastern corner of Colorado and the southwestern corner of Kansas. The riverbed in this area is dry except during spring and early summer or during occasional floods. South of Coldwater, Kan., the Cimarron reenters Oklahoma as a permanent stream.

The river probably derives its name from *cimarrón*, Spanish for "wild." Although unnavigable, it has played an important part in the history of the western United States. The direct route of the Santa Fe Trail coursed along its valley for 100 mi in southwestern Kansas, and travellers knew the Oklahoma Panhandle as the "Cimarron Cutoff."

There are no cities of any size on the river, but near its banks are Guthrie, Kingfisher, Fairview, Cushing, and Yale, in Oklahoma, and Folsom, in New Mexico. Chief tributaries are North Fork and Crooked Creek.

cimbalom, stringed instrument, an elaborate dulcimer used in small musical ensembles by central European gypsies. It has a chromatic compass of four octaves and, unlike other dulcimers, has a pedal mechanism for damping the strings. Each note has three to five metal strings, some "bridged" into two or three parts. The strings are struck by small, spoon-shaped wooden hammers covered on each side with hard and soft leather to produce two distinct tone qualities. The instrument body is a trapezoid in shape and stands on four legs.



Man playing a cimbalom
By courtesy of John Leach, photograph, C. Brunel

Cimbalom players perform mainly by ear and add to the effect of a small orchestra with florid extemporization. The cimbalom was used by Kodály in *Háry János* and by Stravinsky in *Ragtime* and *Le Renard*.

Cimbri, a Germanic tribe whose military incursion into Roman Italy was thrust back in 101 BC. Forced out of what is now Denmark by overpopulation and the encroaching sea, the Cimbri pushed southward, eventually swelling in numbers by the addition of their allies the Teutoni and other tribes. They scored victories over the Romans in 113, 109, and 107. Following a particularly devastating Roman defeat in 105 at Arausio (Orange, Fr.), command of the Romans was assumed by Gaius Marius. In 102 Marius destroyed the Teutoni at Aquae Sextiae (Aix-en-Provence), and in 101 he combined forces with Quintus Lutatius Catulus to annihilate, at Campi Raudii near Vercellae (Vercelli), the entire Cimbri army.

Čimkent (region and city, Kazakhstan): *see* Chimkent.

Cimmerian, member of an ancient people living north of the Caucasus and the Sea of Azov, driven by the Scythians out of southern Russia, over the Caucasus, and into Anatolia toward the end of the 8th century BC. Ancient writers sometimes confused them with the Scythians. Most scholars now believe that the Cimmerians assaulted Urartu (Armenia) about 714 BC, but in 705, after being repulsed by Sargon II of Assyria, they turned aside into Anatolia and in 696–695 conquered Phrygia. In 652, after taking Sardis, the capital of Lydia, they reached the summit of their power. Their decline soon began, and their final defeat may be dated from 637 or 626, when they were routed by Alyattes of Lydia. Thereafter, they were no longer mentioned in historical sources but probably settled in Cappadocia, as its Armenian name, Gamir, suggests.

The origin of the Cimmerians is obscure. Linguistically they are usually regarded as Thracian or as Iranian, or at least to have had an Iranian ruling class. They probably did live in the area north of the Black Sea, but attempts to define their original homeland more precisely by archaeological means, or even to fix the date of their expulsion from their country by the Scythians, have not so far been completely successful. One theory identifies them with what is known to archaeologists as the "Catacomb" culture. This culture was ousted from southern Russia by the "Srubna" culture advancing from beyond the Volga just as the Cimmerians were ousted by the invading Scythians, but that upheaval took place in the second half of the 2nd millennium BC, and a gap of several centuries separates it from the appearance of historic Cimmerians in Asia. Some authorities identify them with "Thraco-Cimmerian" remains of the 8th–7th century BC found in the southwestern Ukraine and in central Europe; these may perhaps be looked upon as traces of the western branch of the Cimmerians, who, under fresh Scythian pressure, eventually invaded the Hungarian plain and survived there until about 500 BC.

Cimon (b. *c.* 510 BC—d. *c.* 451, Cyprus), Athenian statesman and general who played an active part in building up the Athenian empire in the period following the Greco-Persian Wars and whose conservatism and policy of friendship with Sparta were opposed to the policy of Pericles. His greatest military victory was the defeat of a Persian fleet (manned by Phoenicians) at the mouth of the River Eurymedon in Pamphylia in 466 BC.

Cimon was the son of Miltiades, of an aristocratic Athenian family, and a Thracian princess. Miltiades, who defeated the Persians in the Battle of Marathon (490), died in disgrace the next year, unable to pay a large fine imposed on him for allegedly misconducting a subsequent operation; but Cimon, after arranging the marriage of his sister to the richest man in Athens, was able to discharge the debt. His conspicuous valour in the victorious sea fight with the Persians at Salamis (480) led soon to his election as strategus—one of Athens' 10 annual war ministers and generals—and he was apparently reelected every year until his ostracism in 461. In 478 he helped the Athenian statesman and general Aristides to secure the transference from Sparta to Athens of the leadership of the Greek maritime states, which had been recently liberated from Persia, and he became the principal commander of the Delian League thus formed.

He first expelled from Byzantium the Spartan general Pausanias, who had been dismissed on suspicion of treasonable dealings with Persia, and he drove the Persians from most of their strongholds on the Thracian coast. Next he subdued the pirates of the island of Scyros and replaced them with Athenian settlers and transported back to Athens in triumph the supposed remains of Theseus, the ancient king of Athens, who was said to have been buried there. Cimon gained his greatest victory (*c.* 466) when, as leader of an allied fleet of 200 ships, he routed the much larger Phoenician fleet near the mouth of the River Eurymedon in Pamphylia and subsequently defeated the King's forces on land, thus gravely weakening Persian control over the eastern Mediterranean.

Cimon now returned to the Aegean and drove the Persians out of the Thracian Chersonese (Gallipoli). When the rich island of Thasos seceded from the Delian League, Cimon defeated the Thasians at sea, and after a blockade of two years, they surrendered to him (463). Back in Athens, however, he was charged by Pericles and other democratic politicians with having been bribed not to attack the King of Macedonia (who may have been suspected of covertly helping the Thasian rebels).

Though Cimon was acquitted, his star was no longer in the ascendant. The aristocratic faction, which he led, was losing influence; its support rested on the well-to-do citizens who fought as hoplites (heavy armed infantry) and who admired the conservative land power of Sparta. Cimon was personally popular because of his victories and because he spent the wealth those victories brought him on the adornment of the city and the entertainment of the citizens. But the victories were achieved mainly by the fleet, which was manned by the poorer Athenians, who were less well disposed toward Sparta. Elated by their successes and beginning to feel their power, the sailors looked to other leaders, Ephialtes and Pericles, who shared their distrust of Sparta and promised them a larger share in the government.

Those new leaders soon came into their own. When, in 462, the Spartans were vainly endeavouring to reduce the mountain stronghold of Mt. Ithome in Messenia, where a large force of rebellious helots (state-owned serfs) had taken refuge, they asked all their erstwhile allies of the Persian wars, including the Athenians, to help. Cimon urged compliance, comparing Athens and Sparta to a yoke of oxen working together for the good of Greece. Al-

though Ephialtes maintained that Sparta was Athens' rival for power and should be left to fend for herself, Cimon's view prevailed, and he himself led 4,000 hoplites to Mt. Ithome. But after an attempt to storm the place had failed, the Spartans began to wonder if they could trust the Athenians not to take the helot side and, retaining their other allies, sent Cimon and his men home. This insulting rebuff caused the immediate collapse of Cimon's popularity at Athens: at the next opportunity an ostracism, or vote for the exile of the most unpopular citizen, was held; Cimon headed the poll and had to leave Athens for 10 years (461).

The end of his ascendancy was marked by democratic reforms and the renunciation of the alliance with Sparta. Soon the two states were at war. In 457 their land armies met at Tanagra in Boeotia. Cimon presented himself to the Athenian generals and begged leave to fight in the ranks but was refused. He adjured his personal followers, suspected like him of favouring the Spartans, to fight bravely, and they all perished in the battle.

Perhaps this caused a revulsion of feeling. At any event, Pericles himself proposed and obtained an abbreviation of Cimon's exile. On his return he worked for peace with Sparta. When, eventually, peace came (451), he was allowed to lead a big, new naval expedition against Persia, despite the disastrous failure of the previous Greek enterprise in Egypt (459–454). He took 200 ships to Cyprus, detaching 60 to help the Egyptian nationalists, but during the siege of the Phoenician city of Citium, he died of sickness or a wound.

Cimon was tall and handsome, open and affable in manner, and straightforward in action, a natural leader and perhaps the best general Athens ever had. He married twice, a woman from Arcadia and Isodice, of the noble Athenian family of the Alcmaeonids. Of his six sons, three were named after the peoples of Sparta, Elis, and Thessaly, whose interests he represented at Athens. He was no less determined than Pericles to maintain Athenian naval supremacy in the Aegean but differed from him in upholding the leadership of Sparta on the Greek mainland.

(T.J.C.)

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Cimon OF CLEONAE (fl. *c* 525–500 BC), Greek painter said to have invented foreshortened or "three-quarter views," to have introduced depiction of wrinkles and folds in drapery, and to have represented human beings in different attitudes (*e.g.*, looking upward, downward, backward, etc.). He was a native of Cleonae, a city between Corinth and Argos.

Although Cimon has been dated to the 8th century BC, the fact would seem to be that foreshortening did not appear in Greek art until the end of the 6th century. Moreover, Cimon is mentioned in two epigrams datable to the last part of the 6th century.

Cîmpulung, town, Argeş *judeţ* (district), south central Romania, on the Tîrgului River at the foot of the Iezer and Păpuşa mountains. Originally it was a frontier post on a strategic road (now a national route) that crossed the Carpathians through Bran Pass in Transylvania. Cîmpulung was the first capital of the feudal state of Walachia until succeeded by Curtea de Argeş in the 14th century. Vestiges of its history are the Negru Vodă monastery, built in 1215 and reconstructed several times; the Prince's House, built in 1635 by Prince Matei Basarab; the Gothic-spired Bărăţia church, dating from the 14th century; and the Cross of the Oath in the town square, on which are inscribed the privileges granted the citizens by a prince in 1674. Cîmpulung is a centre of automotive production (including jeeps and spare parts) and of metalworking and woodworking. Pop. (1982 est.) 39,471.

Cinchona, genus of about 40 species of plants, mostly trees, in the madder family (Rubiaceae), native to the Andes of South America. The flowers are small and usually creamy-white or rose in colour.



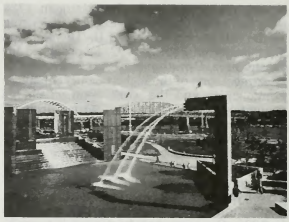
Cinchona nitida
W.H. Hodge

Four species of *Cinchona* were cultivated for many years, especially in Java, India, and Ceylon (now Sri Lanka). Their bark was processed to obtain the drugs known as quinine and quinidine, which are used in the treatment of malaria, disorders of cardiac rhythm, and for fever and pain.

cinchonine, one of a series of alkaloids derived from cinchona bark. It is chemically similar to the alkaloid quinine and has a weak antimalarial activity. Cinchonine, which was isolated from cinchona bark in 1811, is one-fifth as active as quinine in combatting the growth and reproduction of the malarial parasites (*Plasmodium* species).

Cincinnati, city, seat of Hamilton county, southwestern Ohio, U.S., on the Ohio River (bridged) opposite Covington and Newport, Ky., 15 mi (24 km) east of the Indiana border. It is Ohio's third largest city, after Cleveland and Columbus. Picturesquely situated between the Little Miami and Great Miami rivers at their influx into the Ohio, it is encircled by hills rising 400–600 ft (120–180 m). It is the hub of a seven-county, three-state metropolitan area that includes Hamilton County in Ohio and Campbell and Kenton counties in Kentucky.

Columbia, the first settlement, was founded near the mouth of the Little Miami in 1788. Another settlement was laid out and called Losantiville. Ft. Washington was built near the site in 1789. In the following year, Gen. Arthur St. Clair, newly appointed governor of the Northwest Territory, renamed Losantiville to honour the Revolutionary War Officers' Society of the Cincinnati and made it the county seat. Growth began after Gen. Anthony Wayne's victory (1794) at Fallen Timbers lessened the threat of Indian attacks. Cincinnati emerged as a river port after 1811



Yeatman's Cove Park, on the Ohio River, Cincinnati, Ohio
© Leeanne Schmidt—DPI, inc.

when the first steamboat on western waters, the "New Orleans," arrived on its downriver voyage from Pittsburgh. The Miami and Erie Canal was completed to Dayton in 1832, and the first section of the Little Miami Railway was laid in 1843. River commerce, which reached its height in 1852, stimulated steamboat building and industry. At that time, because of its renown as a pork-packing centre, the city was often called "Porkopolis."

In 1842 Cincinnati was one of the few U.S. cities admired by the British author Charles Dickens, and in 1854 it was called "Queen of the West" in a poem by Longfellow. During the Civil War, Cincinnati sided with the North despite its location on the Mason and Dixon Line and its close commercial and cultural ties with the South.

Manufactures, now highly diversified, include machine tools, soap products, playing cards, organs, chemicals, clothing, building materials, furniture, cosmetics, printing, jet engines, and packaged meats. The city is also one of the nation's largest inland coal ports.

A noted cultural centre, the city has a symphony orchestra, opera and ballet companies, and museums of art and natural history and is the seat of the University of Cincinnati (1819) and of Cincinnati Technical College (1966). Within the city are three Roman Catholic institutes of higher education—Xavier University (1831), College of Mt. St. Joseph on the Ohio (1906), and Edgecliff College (1935). Other religious institutions include The Athenaeum of Ohio (1829; in suburban Norwood), Hebrew Union College–Jewish Institute of Religion (1875; the oldest rabbinic college in the United States), and Cincinnati Bible Seminary (1924). Also of interest are the birthplace of Pres. William Howard Taft (at Mount Auburn, now a national historic site), the Harriet Beecher Stowe House State Memorial, and the Tyler-Davidson Fountain (1871) by the sculptor August von Kreling. The city's zoo, second oldest in the United States, holds world records for successful gorilla births in captivity. North of Cincinnati is Kings Island, a theme amusement park. Riverfront Stadium, completed in 1970, is the home of the Cincinnati Reds (1869; the nation's oldest professional baseball team) and Bengals (football). The city is the home port for the renovated stern-wheelers "Delta Queen" and "Mississippi Queen." The birthplace of Gen. Ulysses S. Grant (restored as a museum) is at Point Pleasant, a few miles southeast. Inc. town, 1802: city, 1819. Pop. (1990) city, 364,040; Cincinnati PMSA, 1,452,645; Cincinnati-Hamilton CMSA, 1,744,124.

Cincinnati, Society of the, hereditary, military, and patriotic organization formed in May 1783 by officers who had served in the U.S. War of Independence. Its objectives were to promote union and national honour, maintain their war-born friendship, perpetuate the rights for which they had fought, and aid members and their families in case of need. The society took its name from the Roman citizen-soldier

Lucius Quinctius Cincinnatus. With membership open to Revolutionary officers and their eldest male descendants, branches of the society were organized in each of the 13 states; Gen. George Washington was elected its first president. Through failure of heirs, most state societies were dormant by 1835, but a revival was effected at the end of the 19th century. The city of Cincinnati, Ohio, was named in honour of the society in 1790.

Cincinnati Arch, geologic anticlinal (arch-like) structure influential during the Paleozoic Era; it existed as a persistent low-lying land area flanked by seas covering a large part of the continent while connected with the ocean. The axis of the Cincinnati Arch extends southward from Ohio to Tennessee. Separated by a structural saddle, its southward extension is known as the Nashville Dome. On the north the Cincinnati Arch has two branches; one, trending west-northwest, is known as the Kankakee Arch. The other branch, trending north-northeast, is known as the Findlay Arch.

Ordovician rocks occur on the crest of the Cincinnati Arch, whereas Pennsylvanian strata can be found in the flanking basinal areas.

The Cincinnati Arch began to form during the Middle Ordovician and was distinctive by the Silurian. Uplift occurred in Middle Devonian time, during which considerable erosion took place. Broad doming and uplift again occurred in post-Mississippian time, after which the arch was again submerged. Uplift once again affected the arch in post-Pennsylvanian time.

Cincinnati Zoo, zoological park owned by the city of Cincinnati, Ohio, U.S. It maintains one of the largest animal collections in the United States, with more than 6,000 specimens representing in excess of 625 species. Often called the "gorilla capital of the world," the zoo holds the record for the most births (10, as of the early 1980s) of lowland gorillas in captivity. The gorillas are displayed in a naturalistic setting. Other outstanding exhibits include those featuring the white Bengal tiger and insects. The zoo, founded in 1875 by the Zoological Society of Cincinnati, occupies a 22-hectare (54-acre) site within the city.

Cincinnatian Series, uppermost rocks of the Ordovician System, defined on the basis of exposures seen around the region of Cincinnati, Ohio, where they consist of numerous limestone formations that are richly fossiliferous. (The Ordovician Period began about 500,000,000 years ago and lasted about 70,000,000 years.) To the south and west of Cincinnati, the deposits are fragmentary, whereas deposits found in the Appalachian region are thick and consist of sandstones, shales, and conglomerates.

The shaly limestones of the type area have long attracted students of ancient animal life; specimens, excellently preserved, often are weathered free of their matrix. A number of great U.S. paleontologists began as amateur collectors of Cincinnatian fossils in Ohio.

Cincinnatus, Lucius Quinctius (b. 519? BC), Roman statesman who gained fame for his selfless devotion to the republic in times of crisis and for giving up the reins of power when the crisis was over. Although he was a historical figure, his career has been much embellished by legend. The core of the tradition holds that in 458 Cincinnatus was appointed dictator at Rome in order to rescue a consular army that was surrounded by the Aequi on Mt. Algidus. At the time of his appointment he was working a small farm. He is said to have defeated the enemy in a single day and celebrated a triumph in Rome. Cincinnatus maintained his authority only long enough to bring Rome through the emergency. He then resigned and returned to his farm. Most scholars see no factual truth in the further tradition that Cincinnatus was given a second dictatorship in 439 to check the monarchical ambitions of Spurius Maelius. Once again he is supposed to have ceded his power after ending the crisis.

Cinclidae (bird family): *see* dipper.

cinder cone, also called ASH CONE, deposit around a volcanic vent, formed by pyroclastic rock fragments (formed by volcanic or igneous action), or cinders, which accumulate and gradually build a conical hill with a bowl-shaped crater at the top. Cinder cones develop from explosive eruptions of mafic (heavy, dark ferromagnesian) and intermediate lavas and are often found along the flanks of shield volcanoes. The outside of the cone is often inclined at 35°, an angle determined by the slope at which the loose cinder can stand in equilibrium. Cinder cones may be only a few tens of feet high, or they may grow to a height of several hundred metres (several thousand feet), like that of Paricutín in Mexico. Lava flows may break out of or breach the cone, or they may flow from under the cone through tunnels. Cinder cones are numerous in nearly all volcanic districts. Although they are composed of loose or only moderately consolidated cinder, many of them are surprisingly enduring features of the landscape because rain falling on them sinks into the highly permeable cinder instead of running off down their slopes to erode them.

Cinderella, heroine of a European folktale, the theme of which appears in numerous stories worldwide; more than 500 versions of the story have been recorded in Europe alone. Its essential features are a youngest daughter who is mistreated by her jealous stepmother and elder stepsisters or a cruel father; intervention of a supernatural helper on her behalf; and the reversal of fortune brought about by a prince who falls in love with her and marries her. One of the oldest known literary renderings of the theme is a Chinese version of the 9th century AD.

The familiar English version is a translation of Charles Perrault's "Cendrillon," which appeared in his influential collection of fairy tales, *Contes de ma mere l'oye* (1697; *Tales of Mother Goose*, 1729). Some of the features of Perrault's version, such as the fairy godmother, are uncharacteristic. Usually, the supernatural helper is the girl's dead mother or an animal agent sent by her. The prince's recognition of the cinder maiden by the token of a "glass" slipper is unique in Perrault. In other versions of the story the test of recognition is often a golden or silver slipper or a ring.



Cinderella being fitted with the glass slipper, engraving by Gustave Doré
J.R. Freeman & Co. Ltd.

ciné-club, a group formed to study the art of the cinema through discussion or the actual making of films. In England and the United States such clubs, or film societies, are chiefly interested in film making, while in other countries they concentrate on viewing censored, foreign, or experimental films.

Enthusiasts formed the first *ciné-clubs* in England in the mid-1920s to discuss the new Soviet realistic movement represented by films such as *Potemkin* (1925), *The End of St. Petersburg* (1927), and *Earth* (1930). Later such clubs were significant in popularizing the documentary film developed in Great Britain in the 1930s and in providing a forum for viewing and discussing other films. In the early 1960s, one of the largest contemporary *ciné-clubs* was the American Cinema 16, established in 1947.

Cineas (fl. 3rd century BC), Thessalian who served as chief adviser to Pyrrhus, king of Epirus in Greece. In 281 Cineas attempted, without success, to dissuade Pyrrhus from invading Italy. After Pyrrhus defeated the Romans at Heraclea in Lucania (280), Cineas was sent to Rome to negotiate a peace. According to the 2nd-century-AD Greek historian Appian, he demanded that the Romans halt their aggression against the Greeks of southern Italy and restore the lands they had taken from the Bruttii, Apulians, and Samnites. The Romans rejected his demands, but two years later Cineas was sent to renew negotiations on easier terms. These talks, too, were inconclusive. Cineas then crossed to Sicily to prepare for Pyrrhus' Sicilian campaign. Nothing is known of his career thereafter. Cicero referred to Cineas as the author of a treatise entitled *De re militari* ("On Military Affairs").

Cinecittà, largest and most complete motion-picture studio in Italy; the centre of national cinematography. Located outside Rome, Cinecittà was constructed in 1935–36 from the ruins of Cines, an important early studio. It was the focus of the Italian movie industry during World War II, when bombings almost completely destroyed its facilities.

The studios were rebuilt after the war, and, by 1950, Cinecittà was once again in full production. For the next 10 years Cinecittà set cinema trends through the early work of such leading directors as Michelangelo Antonioni, Vittorio De Sica, and Federico Fellini. The growth of private studios, however, and the decline in the quality of Cinecittà's films diminished its prestige in later years.

cinéma vérité (French: "truth cinema"), French film movement of the 1960s that showed people in everyday situations with authentic dialogue and naturalness of action. Rather than following the usual technique of shooting sound and pictures together, the film maker first tapes actual conversations, interviews, and opinions. After selecting the best material, he films the visual material to fit the sound, often using a hand-held camera. The film is then put together in the cutting room.

British documentaries in the 20th century, the neorealist movement of post-World War II Italy, and the British "free" documentaries of the 1950s that dealt with the significance of ordinary situations influenced the development of the French *cinéma vérité*. The movement was criticized for too often degenerating into reportage rather than artistic expression. Nevertheless, it continued the movement toward greater realism in films and demonstrated a different approach to documentary film making. Outstanding examples of French *cinéma vérité* are Jean Rouch's *Chronique d'un été* (1961; *Chronicle of a Summer*) and Chris Marker's *Le Joli Mai* (1962).

The invention of relatively inexpensive,

portable, but thoroughly professional 16-millimetre equipment—and the synchronous sound recorder—facilitated the development of a similar movement in the United States at just about the same time. Sometimes called *cinéma vérité,* sometimes simply "direct cinema," its goal was essentially the capturing of the reality of a person, a moment, or an event without any rearrangement for the camera. Leading American practitioners were Ricky Leacock (*Primary,* 1960), Frederick Wiseman (*Titicut Follies,* 1967), Donn Pennebaker (*Monterey Pop,* 1968), and the Maysles brothers (*Salesman,* 1969).

CinemaScope, film-making process in which a motion picture is projected on a screen, with the width of the image two and a half times its height. The French physicist Henri Chrétien (1879–1956) invented the technique in the late 1920s by which a camera, with the addition of a special lens, can "squeeze" a wide picture onto standard 35-millimetre film. Then, by the use of a special projection lens, the image is restored to clarity and expanded onto a wide screen without distorting the proportions. The invention was ignored until the increasing incursion of television into the film-viewing market in the 1940s and '50s forced the industry to find new means of attracting audiences.

Twentieth Century-Fox Film Corporation acquired the rights to CinemaScope and introduced it in its adaptation of the American author Lloyd C. Douglas' best-seller *The Robe* (1953). It used a three-track stereophonic sound system along with the wider screen. Other studios subsequently used the same basic technique under names such as SuperScope, WarnerScope, and Panavision. By the late 1950s most films released by the major film studios were filmed for projection on a wide screen, and most theatres were equipped to show these films.

Cinématographe, first motion-picture apparatus, used as both camera and projector. The invention of Louis and Auguste Lumière, manufacturers of photographic materials of Lyon, Fr., it was based in part on the Kinetoscope of Thomas A. Edison in the United States and in part on the Théâtre Optique of Émile Reynaud in Paris. From Edison's invention the Lumières took the idea of a sprocket-wound film and from Reynaud that of projecting the successive frames on a screen. The Cinématographe also functioned as a camera and could be used to make extra prints of the film. The Lumières slowed the rate of exposure in projection from the 46 frames a second used by Edison to 16 frames, a rate still used. The first public demonstration of the Cinématographe took place at the Grand Café, Boulevard des Capucines, Paris, on Dec. 28, 1895; within months the device was being used throughout Europe and North America.

cinematography, the art and technology of motion-picture photography. It involves such techniques as the general composition of a scene; the lighting of the set or location; the choice of cameras, lenses, filters, and film stock; the camera angle and movements; and the integration of any special effects. All these concerns may involve a sizable crew on a feature film, headed by a person variously known as the cinematographer, first cameraman, lighting cameraman, or director of photography, whose responsibility is to achieve the photographic images and effects desired by the director.

The earliest motion pictures were filmed as if they were stage plays, using just one or a few cameras in static frontal photography. By the second and third decades of the 20th century, however, in the hands of such cameramen as Billy Bitzer (working with director D.W. Griffith) the camera was doing close-ups, shooting from moving vehicles, employing backlighting and other lighting effects, and generally being used in ways that separated the motion picture from theatrical tradition. With the coming of sound, the inventive motion was interrupted when the noisy cameras were perforce made stationary in sound-proof enclosures not easily moved, but the development of silent cameras again made cinematography flexible. The development of the camera crane (first used in 1929) also expanded the camera's vision, as did the use of wider-angle lenses to achieve a greater depth of field (as Gregg Toland did in the impressive scenes of *Citizen Kane* [1941]).The two most important events in cinematography after the coming of sound were undoubtedly colour and wide-screen processes. Also important are advances in special effects, as developed in Stanley Kubrick's *2001: A Space Odyssey* (1968), with cameraman Geoffrey Unsworth, and in George Lucas' *Star Wars* (1977), with cinematographers Gilbert Taylor and (for special effects) John Dykstra.

The differences between photography and cinematography are many. A single photograph may be a complete work in itself, but a cinematographer deals with relations between shots and between groups of shots. A main character, for instance, may initially come on screen unrecognizable in shadows and near-darkness (as Orson Welles did in *The Third Man* [1949]); as a single shot, it might be poor photography, but cinematographically it leads into other shots that reveal the man and give the movie style and integration. Cinematography is also far more collaborative than photography. The cinematographer must plan his work with the producer, the director, the designer, the sound technicians, and each of the actors. The camera crew itself may be complex, especially in a feature film; the chief cinematographer supervises a second cameraman (or camera operator), who handles the camera; an assistant operator (the focus-puller), whose main function is to adjust the focusing; an assistant known as the clapper-loader, or clapper boy, who holds up the slate at the beginning of the shot, loads the magazines with film, and keeps a record of the footage and other details; and the "grips," who carry or push around equipment and lay tracks for the camera dolly. The cinematographer may also be in charge of the gaffer, or chief electrician (a lighting technician), who is assisted by one or more "best boys." A big-budget film may have additionally a special-effects crew and sometimes a whole second unit of cinematographer and assistants.

Cinerama, in motion pictures, a process in which three synchronized movie projectors each project one-third of the picture on a wide, curving screen. Many viewers believe that the screen, which thus annexes their entire field of vision, gives a sense of reality unmatched by the flat screen. Invented by the New York City photographer Fred Waller, the first Cinerama movie, *This Is Cinerama,* was presented in New York City in 1952. It was soon presented in theatres across the country that leased the necessary equipment from the privately owned Cinerama, Inc. For 10 years Cinerama films were mainly travelogues, but in 1962 the first Cinerama story film, *How the West Was Won,* was released.

Cinerama was a popular film novelty, but its costs were prohibitive, and the process was abandoned in the 1960s. What was later referred to as Cinerama was essentially a one-projector 70-mm variant on the anamorphic CinemaScope process.

cineraria, any of several ornamental plants that have been developed by florists from species of the genus *Senecio* of the composite family (Asteraceae). There are two distinct types: the garden species, especially dusty miller (*S. cineraria*); and the greenhouse varieties of *S. cruentus,* commonly referred to simply as cinerarias.



Cineraria (*Senecio cruentus*)
Sven Samelius

Greenhouse cinerarias may be dwarf, compact-growing plants with large flowers in dense clusters, or taller plants with larger, more spreading clusters of small star-shaped (stellate) flowers. Both types are easily grown from seed and are sold commercially as potted plants in a variety of colours.

Cingalese language: *see* Sinhalese language.

Cinna, Gaius Helvius (fl. 1st century BC), Roman poet who wrote a mythological epic poem *Smyrna.* He was a friend of the poet Catullus. The early Christian-era historians Suetonius, Valerius Maximus, Appian, and Dio Cassius all state that at Caesar's funeral (44 BC) a certain Helvius Cinna was killed by mistake for Cornelius Cinna, the conspirator. The last three writers identify him as a tribune of the people, while Plutarch states that he was a poet. On the other hand, two lines in the 9th eclogue of Virgil, supposed to have been written in 41 or 40 BC, seem to imply that Helvius Cinna was then alive.

Apart from his epic the *Smyrna,* Cinna is credited with having written a *Propempticon Pollionis,* a poem in the form of a "send-off" to his friend Asinius Pollio. In both these poems, the language of which was so obscure that they required special commentaries, his model appears to have been Parthenius of Nicaea, the Greek poet and teacher of Virgil.

Cinna, Lucius Cornelius (d. 84 BC), leader of the Marian party in Rome who opposed Lucius Cornelius Sulla.

After serving in the Social War (90–88), Cinna became consul in 87. When Sulla left Rome to fight Mithradates VI, king of Pontus, in the East, Cinna repealed Sulla's laws and threatened him with prosecution. Cinna's proposed revival of a bill of Publius Sulpicius Rufus (for the equal distribution of the newly enfranchised Italians among all the 35 tribes) caused riots and led to his expulsion from the city. He collected an army and, together with Marius, captured Rome. Executions of Sulla's supporters followed.

The death of Marius in January 86 left Cinna in control, and he remained consul, with Lucius Valerius Flaccus in 86 and with Gnaeus Papirius Carbo in 85–84. During this period Cinna enacted economic reforms and began enforcement of the Sulpician voting rights measure. In 84 he prepared to cross to Dalmatia but was killed in a mutiny. Cinna's daughter Cornelia married Julius Caesar.

cinnabar, mercury sulfide (HgS), the chief ore mineral of mercury. It is commonly encountered with pyrite, marcasite, and stibnite in veins near recent volcanic rocks and in hot-springs deposits. The most important deposit is at Almadén, Spain, where it has been mined



Cinnabar from Red Devil Mine, north of Homer, Alaska

By courtesy of the MacFall Collection; photograph, Mary A. Root—EB Inc.

for 2,000 years. Other deposits are in Huancavelica, Peru; Iudrio, Italy; and the Coast Ranges of California, U.S. Metacinnabar, the isometric (cubic) form of cinnabar, transforms to cinnabar upon heating to 400°–550° C (750°–1,020° F). For detailed physical properties, *see* sulfide mineral (table).

cinnamon (species *Cinnamomum zeylanicum*), bushy evergreen tree of the laurel family (Lauraceae) native to Sri Lanka (Ceylon), the neighbouring Malabar Coast of India, and Myanmar (Burma) and also cultivated in South America and the West Indies for the spice consisting of its dried inner bark. The spice is light brown in colour and has a delicately fragrant aroma and warm, sweet flavour. Cinnamon was once more valuable than gold. In Egypt it was sought for embalming and witchcraft; in medieval Europe for religious rites and as a flavouring. Later it was the most profitable spice in the Dutch East India Company trade. In modern times, cinnamon is used to flavour a variety of foods, from confections to curries; in Europe and the United States it is especially popular in bakery goods.

The Sri Lanka cultivator harvests his main crop in the wet season, cutting the shoots close to the ground. In processing, the shoots are first scraped with a semicircular blade, then rubbed with a brass rod to loosen the bark, which is split with a knife and peeled. The peels are telescoped one into another forming a quill about 107 cm (42 inches) long and filled with trimmings of the same quality bark to maintain the cylindrical shape. After four or five days of drying, the quills are rolled on a board to tighten the filling and then placed in subdued sunlight for further drying. Finally, they are bleached with sulfur dioxide and sorted into grades.

Cinnamon contains from 0.5 to 1 percent essential oil, the principal component of which is cinnamic aldehyde. The oil is distilled from the fragments for use in food, liqueur, perfume, and drugs. The aldehyde can also be synthesized.

cinnamon stone: *see* hessonite.

Cinnamus, John, Greek IOÁNNIS KÍNNAMOS (fl. 2nd half of the 12th century), Byzantine historian, probably imperial secretary (*basilikos grammatikos*) to the emperor Manuel I Comnenus, whom he accompanied on campaigns in Europe and Asia Minor. Cinnamus' history of the period 1118–76, continuing the *Alexiad* of Anna Comnena, covers the reigns of John II and Manuel I, down to the unsuccessful campaign against the Turks of Iconium when the Byzantines were routed (1176) at Myriocephalon. Cinnamus was probably an eyewitness to the events of the last 10 years of the period he describes. The work breaks off abruptly and appears to be incomplete. The author's hero is Manuel, but, in spite of his conviction that the Greek East was superior to the Latin West and his opposition to papal claims, he retains considerable objectivity.

Cino DA PISTOIA, original name CINO DEI SIGHIBULDI (b. *c.* 1270, Pistoia, near Florence [Italy]—d. 1336/37, Pistoia), Italian jurist, poet, and prose writer whose poetry, written in the *dolce stil nuovo* ("sweet new style"), was admired by Dante and was a great influence on Petrarch.

Born into an aristocratic Pistoian family, Cino studied law at the University of Bologna. He became involved in Pistoian politics and was exiled for six years, after which he became ambassador to Florence. A supporter of Henry VII on his coming to Italy in 1310 to be crowned Holy Roman emperor, Cino returned to law studies when Henry died in 1313. With the completion of his highly praised Latin commentary, *Lectura in Codicem* ("Studies on the Code"), on the first nine books of Justinian's Codex Constitutionum, Cino received his doctorate in law (1314) at the University of Bologna and then taught law at the universities of Siena, Bologna, Florence, Perugia, and Naples. In 1334 he returned to Pistoia, where he spent the rest of his life.

One of the most prolific of the *dolce stil nuovo* (*q.v.*) poets, Cino is generally considered inferior to others of the school, such as his close friends Guido Cavalcanti and Dante, despite the fact that in *De vulgari eloquentia* ("Of Eloquence in the Vulgar Tongue") Dante calls him the best Italian love poet, a judgment not held by later critics. Some of his poems are biographical, such as his canzoni to Dante on the death of Beatrice. Most of them, however, have been praised for their gracefulness rather than for their content or emotional depth. Petrarch called Cino his master, wrote a poem mourning his death, and, most important, used some of his themes as starting points for his own verse.

Cinq-Mars, Henri Coiffier de Ruzé, marquis de (b. 1620—d. Sept. 12, 1642, Lyon, Fr.), favourite of King Louis XIII of France



Cinq-Mars, engraving by Jean Daret

By courtesy of the Bibliotheque Nationale, Paris

who led the last and most nearly successful of the many conspiracies against the king's powerful first minister, the Cardinal de Richelieu.

Cinq-Mars was the son of the marshal Antoine Coiffier-Ruzé, marquis d'Effiat, a close friend of Richelieu, who took the boy under his protection on his father's death in 1632. Richelieu introduced him to Louis XIII, and by 1639 he had become the king's favourite, with the title *maître de la garde robe* ("master of the robes"). Although Louis was devoted to Cinq-Mars, the young man provoked quarrels with him that ended in fawning reconciliations. Cinq-Mars's extravagance, arrogance, and libertine behaviour soon alarmed Richelieu, and Cinq-Mars, recognizing that the Cardinal intended to prevent him from gaining political influence, decided to get rid of him. His participation in the Count de Soissons's abortive conspiracy against Richelieu in 1641 escaped detection. He then devised his own plot, involving the king's brother, Gaston, Duke d'Orléans, and other high nobles, who planned to raise revolts and throw open the frontiers to the Spaniards, with whom France was at war. On March 13, 1642, Cinq-Mars signed with the Spanish king Philip IV a secret treaty by which Philip promised to aid the rebellion with arms and troops. A copy of the document fell into Richelieu's hands on June 11, and two days later Cinq-Mars was arrested. He was convicted of treason and beheaded.

Cinque Ports (French: "Five Ports"), medieval confederation of English Channel ports in southeastern England, formed to furnish ships and men for the king's service. To the original five ports—Hastings, New Romney, Hythe, Dover, and Sandwich—were later added the "ancient towns" of Winchelsea and Rye with the privileges of "head ports." More than 30 other towns in the counties of Kent and Sussex were also attached. Until the 14th century the Cinque Ports provided the permanent nucleus of the royal fleet. They were probably first associated in the reign (1042–66) of Edward the Confessor for the defense of the coast and cross-channel passage. After the Norman Conquest of 1066, their importance grew, and, in return for ship service, their privileges were increased to reach their zenith in the 13th and 14th centuries. They were first jointly granted liberties by charter in 1278. After the 14th century they lost their monopoly, and, although they continued to contribute to the navy, this function was unimportant by the time of the threat of invasion by the Spanish Armada in 1588. Their decline was accelerated by encroachment by the sea on the coastline and silting at other places, and today only Dover remains an important port.

Most of their peculiar jurisdiction was abolished in 1855, and only jurisdiction in Admiralty survives. In addition to the towns named above, the other members of the confederation (known as limbs) are Lydd, Faversham, Folkestone, Deal, Tenterden, Margate, and Ramsgate, all in the county of Kent. The highest officer of the Cinque Ports is the lord warden, who is also constable of Dover Castle and has Walmer Castle as his official residence.

cinquefoil (genus *Potentilla*), any of many flowering plants of the rose family (Rosaceae), comprising about 500 species of herbs and shrubs. The common name, which means "five-leaved," refers to the number of leaflets in the compound leaf; some species, however, have three or seven leaflets. Most of the species



Common cinquefoil (*Potentilla simplex*)

Arthur W. Ambler from The National Audubon Society Collection/Photo Researchers—EB Inc.

are native to the North Temperate Zone and the Arctic and are chiefly perennial. The stems are creeping or erect. The leaves are digitate (the leaflets arising from a common centre) or pinnate (feather-formed). The solitary, five-petaled flowers are usually yellow, sometimes white or red in horticultural varieties. *P. fruti-*

cosa has provided many dwarf shrubs used in landscaping.

Cintra (Portugal): *see* Sintra.

Cinzio: *see* Giraldi, Giambattista.

CIO: *see* American Federation of Labor–Congress of Industrial Organizations.

Ciocchi del Monte, Giovanni Maria (pope): *see* Julius III.

Ciokwe (people): *see* Chokwe.

Ciompi, Revolt of the (1378), insurrection of the lower classes of Florence that briefly brought to power one of the most democratic governments in Florentine history. The *ciompi* ("wool carders") were the most radical of the groups that revolted, and they were defeated by the more conservative elements in Florentine society.

A struggle between factions within the major ruling guilds triggered the uprising. Members of the lower classes, called upon to take part in the revolt in late June, continued to agitate on their own during the month of July. They presented a series of petitions to the Signoria (executive council of Florence) demanding a more equitable fiscal policy and the right to establish guilds for those groups not already organized. Then, on July 22, the lower classes forcibly took over the government, placing one of their members, the wool carder Michele di Lando, in the important executive office of *gonfaloniere* of justice. The new government, controlled by the minor guilds, was novel in that for the first time it represented all the classes of society, including the *ciompi*, who were raised to the status of a guild.

But the *ciompi* were soon disillusioned. Their economic condition worsened, and the new government failed to implement all their demands. Conflicting interests of the minor guilds and the *ciompi* became evident. On August 31 a large group of the *ciompi* that had gathered in the Piazza della Signoria was easily routed by the combined forces of the major and minor guilds. In reaction to this revolutionary episode, the *ciompi* guild was abolished, and within four years the dominance of the major guilds was restored.

Cioni, Andrea di Michele di Francesco (sculptor): *see* Verrocchio, Andrea del.

Cionn tSáile (Ireland): *see* Kinsale.

cipher, any method of transforming a message to conceal its meaning. The term is also used synonymously with ciphertext or cryptogram in reference to the encrypted form of the message.

A brief treatment of ciphers follows. For full treatment, *see* MACROPAEDIA: Cryptology.

All ciphers involve either transposition or substitution, or a combination of these two mathematical operations—*i.e.,* product ciphers. In transposition cipher systems, elements of the plaintext (*e.g.,* a letter, word, or string of symbols) are rearranged without any change in the identity of the elements. In substitution systems, such elements are replaced by other objects or groups of objects without a change in their sequence. In systems involving product ciphers, transposition and substitution are cascaded; for example, in a system of this type called a fractionation system, a substitution is first made from symbols in the plaintext to multiple symbols in the ciphertext, which is then superencrypted by a transposition. All operations or steps involved in the transformation of a message are carried out in accordance to a rule defined by a secret key known only to the sender of the message and the intended receiver.

Cipher devices or machines have commonly been used to encipher and decipher messages. The first cipher device appears to have been employed by the ancient Greeks around 400 BC for secret communications between military commanders. This device, called the scytale, consisted of a tapered baton around which was spirally wrapped a piece of parchment inscribed with the message. When unwrapped the parchment bore an incomprehensible set of letters, but when wrapped around another baton of identical proportions, the original text reappeared. Other simple devices known as cipher disks were used by European governments for diplomatic communications by the late 1400s. These devices consisted of two rotating concentric circles, both bearing a sequence of 26 letters. One disk was used to select plaintext letters, while the other was used for the corresponding cipher component.

In 1891 Étienne Bazeries, a French cryptologist, invented a more sophisticated cipher device based on principles formulated by Thomas Jefferson of the United States nearly a century earlier. Bazeries's so-called cylindrical cryptograph was made up of 20 numbered rotatable disks, each with a different alphabet engraved on its periphery. The disks were arranged in an agreed-upon order on a central shaft and rotated so that the first 20 letters of the message plaintext appeared in a row; the ciphertext was then formed by arbitrarily taking off any other row. The remaining letters of the message were treated in the same way, 20 letters at a time.

Advances in radio communications and electromechanical technology in the 1920s brought about a revolution in cryptodevices—the development of the rotor cipher machine. One common type of rotor system implemented product ciphers with simple monoalphabetic substitution ciphers as factors. The rotors in this machine consisted of disks with electrical contacts on each side that were hardwired to realize an arbitrary set of one-to-one connections (monoalphabetic substitution) between the contacts on opposite sides of the rotor.

The rotor cipher machine was used extensively by both the Allied and the Axis powers during World War II. The application of electronic components in subsequent years resulted in significant increases in operation speed though no major changes in basic design. Since the early 1970s, cryptologists have adapted major developments in microcircuitry and computer technology to create new, highly sophisticated forms of cryptodevices and cryptosystems, as exemplified by the Fibonacci generator and the implementation of the Data Encryption Standard (DES) through the use of microprocessors.

Cipriani, Giovanni Battista (b. 1727, Florence [Italy]—d. Dec. 14, 1785, London, Eng.), painter who was the first exponent in England of Neoclassicism and who played an important part in directing 18th-century English artistic taste.

Cipriani was a pupil of the Anglo-Florentine painter Ignazio Hugford. In 1750 he went to Rome, where he encountered nascent Neoclassicism and met members of the English colony there. The architect Sir William Chambers and the painter Joseph Wilton took him to England in 1755. His work there largely consists of illusionistic murals for the decoration of private residences—*e.g.,* the library ceiling at Buckland House, Berkshire (after 1757). He was also a prolific draftsman of classical and allegorical subjects.

circadian rhythm stress, also called SYNCHRONIZATION STRESS, temporary maladjustment caused by rapid change in the cyclical 24-hour period of human biological activity.

Within the circadian (24-hour) cycle a person usually sleeps approximately 8 hours and is awake 16. During the wakeful hours, mental and physical functions are most active and tissue-cell growth increases. During sleep, voluntary muscle activities nearly disappear and there is a decrease in metabolic rate, respiration, heart rate, and blood pressure. The activity of the digestive system increases during the resting period, but that of the urinary system decreases. Hormones secreted by the body, such as the stimulant epinephrine (adrenaline), are released in maximal amounts about two hours before awakening so that the body is prepared for activity. The controlling mechanism for these cyclic activities, thought to be a region of the brain known as the hypothalamus, seems to be the master centre for integrating rhythmic information and establishing patterns. Body temperature patterns and the effectiveness of some drugs vary at different hours of the circadian cycle. The timing of administration of hormonal drugs so as to be in accord with their natural circadian production pattern seems to place less stress on the body and produce more effective medical results.

The natural time signal for the circadian pattern is the change from darkness to light. Where daylight patterns are not consistent, as in outer space, regimented cycles are established to simulate the 24-hour day. If one tries to break the circadian rhythm by ignoring sleep for a number of days, psychological disorders begin to arise. The human body can learn to function in cycles ranging between 18 and 28 hours, but any variance greater or less than this usually causes the body to revert to a 24-hour cycle. Even in totally lighted areas such as the subpolar twilight zone, the body has regular cycles of sleep and wakefulness once the initial adjustment has been made.

Any drastic shift in the circadian cycle requires a certain period for readjustment. Each individual reacts to these changes differently. With the advent of jet air travel, time changes present a much greater problem than ever before. Jet travel between Tokyo and New York City creates a time difference of 10 hours; it usually takes several days for the body to readjust to the new day-night pattern. Too-frequent shifts in circadian patterns, such as several transoceanic flights a month, can lead to mental and physical fatigue. Preflight or postflight adaptation can be achieved by gradually changing one's sleeping patterns to simulate those that will be necessary in the new environment.

Astronauts first encounter rapid changes in the day-night cycle while in Earth's orbit. Beyond this, the void becomes a constant blackness. Ability to adapt to differing day and night cycles will undoubtedly be an important factor in future space travel.

Circaeum Promontorium (Italy): *see* Circeo, Mount.

Circassian, Russian CHERKES, or CHERKESS, plural CHERKESY, member of a Caucasian people speaking a northwest Caucasian language (*see* Kabardian language).

From ancient times Circassia, comprising roughly the northwestern region of the Caucasus, acquired the exotic reputation common to lands occupying a crucial area between rival empires. The early history of the Circassian peoples is fairly obscure. Though no Greek colonies were established in Circassia proper, the Greeks are known to have established colonies and carried out extensive trade on the Circassian coast of the Black Sea, and their influence is clear. The successive influence or outright control of the Romans, Khazars, Mongols, Crimean Tatars, Turks, and Russians was to follow.

The area remained fairly autonomous until the 12th and 13th centuries, when Georgian princes succeeded in reducing it to the condition of a province. In 1234 the Caucasus region was overrun by Mongol hordes, and the region soon passed under the rule of the Crimean Tatars. During the mid-16th century and again (on several occasions) in the 17th century, the Caucasian rulers were

constrained to ask for Russian help against Persian and Turkish invasions. The Russians themselves seemed little interested in subjugating the region until the rule of Peter I the Great; by 1785 the northern Caucasus had been designated a Russian province. In the great territorial wars that ensued between Russia, Persia, and Turkey, the Caucasus region was hotly contested. The Circassians carried out a notably fierce and protracted resistance to Russian domination, and when they were finally defeated in 1864, some 400,000 among them—almost the entire population—chose to emigrate rather than to live in subjection.

Of the two main groups of Circassians, the Adyghians (Circassians proper, or Lower Circassians), who numbered about 165,000 in the late 20th century, live mostly in the republics of Adygea and Karachay-Cherkessia in Russia. The Kabardians (or Upper Circassians) number about 345,000 and live mostly in the republic of Kabardino-Balkaria, Russia. Circassian communities also exist in Anatolian Turkey (150,000) and Syria (35,000), with smaller groups in Jordan, Iraq, and Iran.

Many Circassians live in the plain immediately to the north of the Caucasus, others live in the mountain piedmont, and a few live in the upland and mountainous regions. Their traditional economy is based on mixed pastoralism and farming, supplemented by fruit growing. In their traditional social organization, princes and nobles controlled the herds and soil. The mass of people were organized in a complex system of subordinate ranks. Slavery was maintained until recent times, and women occupied a low position in Circassian society.

Officially the Circassians are Sunnīte Muslims. Ancient cults associated with thunder, fertility rites, and sacred groves, however, were reported in modern times.

Circassian language: *see* Kabardian language.

Circe, in Greek legend, a sorceress, the daughter of Helios, the sun god, and of the ocean nymph Perse. She was able by means of drugs and incantations to change humans into wolves, lions, and swine. The Greek hero Odysseus visited her island, Aeaea, with his companions, whom she changed into swine. But Odysseus, protected by the herb moly (a gift from Hermes), compelled her to restore them to their original shape. He stayed with her for one year before resuming his journey. Greco-Roman tradition placed her island near Italy or located her on Mount Circeo.

To make the best use of the Britannica, consult the INDEX *first*

Circeo, Mount, Italian MONTE CIRCEO, Latin CIRCAEUM PROMONTORIUM, isolated promontory, Latina *provincia,* Lazio (Latium) *regione,* on the southwestern coast of Italy on the Tyrrhenian Sea, just northwest of the Gulf of Gaeta. It consists of a conspicuous ridge of limestone, 3.5 miles (6 km) long by 1 mile (1.6 km) wide, rising to a height of 1,775 feet (541 m) and connected with the mainland by a low saddle of alluvial deposits. About 33 square miles (86 square km) are preserved as a national park that is notable for its flora. From the sea Mount Circeo bears the appearance of an island, and it has been associated with the legend of the sorceress Circe since classical times. The numerous coastal grottoes have yielded many traces of Stone Age settlement. The modern village of San Felice Circeo, toward the eastern end of the promontory, occupies the site of the ancient Circeii, a fortress of the ancient Volsci people that became a Roman colony in 393 BC and a popular summer residence in the Roman imperial period. During the Middle Ages the castle of San Felice frequently changed hands, and it was twice totally destroyed—by the Saracens in 846 and by King Alfonso V of Aragon in 1441. Its principal function was that of a papal outpost against attack by sea.

There are remains of a Roman acropolis high up on the mountain.

circling disease: *see* listeriosis.

circuit, electric: *see* electric circuit.

circuit rider, Methodist ministerial role that was originated in England by John Wesley. The first of the American circuit riders was Robert Strawbridge, who arrived in the colonies in 1764. A few years later Wesley sent missionaries to the American colonies, but most of them departed when revolution threatened. One who remained was Francis Asbury, who, as Wesley's general assistant, was responsible for organizing the circuits.

Each circuit of congregations—sometimes comprising as many as 25 or 30 meeting places—was under the supervision of a Methodist conference preacher who might have several lay assistants. Any young man who could preach and was willing to ride a horse for weeks over wild country might become an assistant and finally a circuit rider. Circuit riders numbered about 100 by the end of the American Revolution. The salary was $64 a year until 1800, when it was raised to $100, with the horse furnished. There were few actual meetinghouses; church services usually were held in cabins, in barrooms, or outdoors.

Circuit riders were a religious and moral force along the frontier and in rural areas of the South, and they were largely responsible for the propagation of Methodism throughout the United States. The practice was soon adopted by other denominations, too.

BIBLIOGRAPHY. Peter Cartwright, *Autobiography of Peter Cartwright* (1856, reissued 1986), is a good source on the circuit rider's life.

circular motion, uniform: *see* uniform circular motion.

circulation, the process by which nutrients, respiratory gases, and metabolic products are transported throughout a living organism.

A brief treatment of circulation follows. For full treatment, *see* MACROPAEDIA: Circulation and Circulatory Systems.

For a depiction of some of the structures that make up the human circulatory system, shown in relation to other parts of the gross anatomy, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

In unicellular and small multicellular organisms, simple diffusion across the cell membranes often suffices to carry oxygen and carbon dioxide, and a streaming movement of the cell substance (cytoplasm), called cyclosis, serves to conduct larger molecules like sugars, fats, and proteins to different parts of the cell. In more complex organisms, however, specialized systems have developed to provide adequate circulation to all tissues.

Sponges and cnidarians (*e.g.,* jellyfish and hydras) circulate water from the surrounding medium through internal spaces in their bodies. Cells in contact with the water take up food and oxygen directly from it; these materials then pass to other cells largely by diffusion. In the flatworm, which has no organized circulatory structure, a fluid carrying nutrients bathes the animal's tissues while moving passively through the spaces between its component cells. Oxygen is taken up directly from the environment at the animal's surface.

Some invertebrates, such as arthropods and most mollusks, have open circulations, in which the heart pumps blood into a rudimentary network of vessels that open into one or more interior body cavities (sinuses), where the blood washes all of the animal's tissues. Blood is then channeled back to the heart through a series of collecting vessels or sinuses. The heart in some invertebrates may be little more than a muscular swelling along the blood vessels, and there may even be additional swellings, or "hearts," at the entry to long or broad appendages, such as insect wings or antennae.

Invertebrates with a true circulatory system have a closed circulation, as do all vertebrates. In a closed system, blood remains within a network of vessels. Oxygenated blood is carried away from the heart through arteries, and deoxygenated blood is returned to the heart by way of veins. In most vertebrates, the large arteries that exit the heart branch into progressively smaller channels, ultimately reaching a network of microscopic vessels called the capillaries, across the walls of which the exchange of nutrients and waste takes place. The capillaries then coalesce into veins.

All vertebrate embryos display the same basic circulatory system. In this embryonic system, venous blood returns to the central heart through a series of veins emptying into the sinus venosus, the first of four embryonic heart chambers. Blood then passes in turn into the atrium, the ventricle, and the bulbus cordis, from which it exits into the arterial system through a large artery, the aorta. The ventricle is the chief muscular pump forcing blood throughout the body. The arteries may be distinguished from veins by the presence of smooth muscle and elastic fibres that help to absorb the surges of blood from the heart.

Among adult vertebrates, the basic circulatory model is progressively modified to meet respiratory requirements. Fish exchange respiratory gases through their gills and have retained, for the most part, the embryonic pattern of the circulatory system. In the fishes the four embryonic heart chambers remain intact.

The whole circulatory system of fishes is a one-way arrangement. The heart pumps deoxygenated blood to the gills, where it is oxygenated and distributed to the body. Except for sharks, most fishes have developed a swim bladder (the structure from which lungs developed), which controls buoyancy and often acts as an oxygen reserve.

Adult amphibians have a dual circulation. The amphibian heart is a tripartite structure in which the atrium is partitioned by a wall, but the ventricle is not physically divided and some mixing of the pulmonary and systemic circulation takes place. But because most adult amphibians exchange oxygen and carbon dioxide through their moist skin as well as through their lungs, respiratory exchange takes place in both the pulmonary and systemic circulation. As a result, there is less need to avoid mixing of the blood in the heart.

Reptiles rely exclusively on lungs for respiratory exchange and therefore have a more complete separation of the pulmonary and systemic circulation than is found in amphibians. In the reptile heart the sinus venosus is comparatively small, the atrium is completely divided, and a muscular wall extends across part of the ventricle. This partial wall tends to keep blood from the left atrium (oxygenated) from mixing with that from the right atrium (deoxygenated). The conus arteriosus has disappeared, and in its place three vessels lead directly from the ventricle—the pulmonary artery and the left and right systemic trunks. Temporary closure of a muscular flap directs at least a portion of the deoxygenated blood into the cavum pulmonale (part of the ventricle) and from there into the pulmonary artery leading to the lung.

In both birds and mammals there is a complete separation of both ventricle and atrium into a two-sided heart. The conus arteriosus is absent, and only two vessels leave the heart: the aorta from the left ventricle, supplying fresh blood to the rest of the body, and the

pulmonary artery from the right ventricle, carrying spent blood to the lungs for oxygenation. The sinus venosus is also eliminated, and blood returns directly to the atria. In mammals, venous blood from the rest of the body empties into the right atrium through the superior and inferior venae cavae, and freshly oxygenated blood enters the left atrium through four pulmonary veins.

circumcision, the operation of cutting away all or part of the foreskin (prepuce) of the penis. The origin of the practice is unknown. The widespread ethnic distribution of circumcision as a ritual and the quite widely preferred use of a stone knife rather than a metal one suggest a great antiquity of the operation. Wherever the operation is performed as a traditional rite, it is done either before or at puberty and sometimes, as among some Arab peoples, immediately before marriage.

Among the ancient Egyptians, boys were generally circumcised between the ages of 6 and 12 years. Among the Ethiopians, the Jews, the Muslims, and a few other peoples, the operation is performed shortly after birth (among Jews, on the eighth day after birth) or perhaps a few years after birth. Among most other peoples who practice it ritually the operation is performed at puberty. At any age the ritual operation is regarded as of the profoundest religious significance. For the Jews it represents the fulfillment of the covenant between God and Abraham (Genesis 17:10-14), the first divine command of the Pentateuch, that every male child shall be circumcised. That Christians were not obliged to be circumcised was first recorded biblically in Acts 15. The operation at puberty represents a beginning of the initiation into manhood and the leaving behind of childhood.

From the medical aspect the operation consists in the cutting of the foreskin to allow its free retraction behind the glans penis (the conical head). The foreskin consists of a double layer of skin that, without circumcision, more or less completely covers the glans penis. Under the inner layer of foreskin there are situated a number of glands that secrete a cheeselike substance called smegma. Accumulation of smegma beneath the foreskin may result in great discomfort and may serve as the source of a rather penetrating odour, if cleanliness and hygiene are not observed. Studies have indicated that uncircumcised men have a higher incidence of AIDS, syphilis, and other sexually transmitted diseases than circumcised men, and it has been speculated that the foreskin might allow viruses and other microorganisms to survive longer on the skin and thus give the organisms more time to enter the body. Moreover, cancer of the penis is rare in circumcised males and in uncircumcised males with high standards of hygiene. Overall, the physiological value of circumcision may be highest in countries and regions where poverty and endemic disease make high standards of hygiene difficult or nearly impossible. In Western countries, in any event, the operation has been widely practiced as a hygienic procedure. In many hospitals it has been routinely performed upon the newborn unless there is some objection.

For female circumcision, *see* clitoridectomy.

circumstance, extenuating (law): *see* extenuating circumstance.

circumstantial evidence, in law, evidence not drawn from direct observation of a fact in issue. If a witness testifies that he saw a defendant fire a bullet into the body of a person who then died, this is direct testimony of material facts in murder, and the only question is whether the witness is telling the truth. If, however, the witness is able to testify only that he heard the shot and that he arrived on the scene seconds later to see the accused standing over the corpse with a smoking pistol in his hand, the evidence is circumstantial; the accused may have been shooting at the escaping killer or merely have been a bystander who picked up the weapon after the killer had dropped it.

The notion that one cannot be convicted on circumstantial evidence is, of course, false. Most criminal convictions are based on circumstantial evidence, although it must be adequate to meet established standards of proof. *See also* hearsay.

circus, an entertainment or spectacle usually consisting of animal acts and human feats of daring, usually presented in a circular performance area called the ring, and frequently including other attractions such as parades, menageries, pantomimes, and sideshows.

A brief treatment of circus follows. For full treatment, *see* MACROPAEDIA: Circus.

The circus (in the modern sense) was founded in 1768, when an English trick rider named Philip Astley discovered that, because of centrifugal force, it was fairly easy to stand on his horse's back while it galloped in circles around a ring. He exploited his discovery, building seating stands and a roof for his performance ring, in order to attract audiences. One of his riders, Charles Hughes, established his own ring nearby in 1782 and called it the Royal Circus, the first modern use of the name.

Astley traveled widely in Europe, spreading the idea of the circus and building many himself. In France he influenced a Venetian expatriate, Antonio Franconi, who with his sons, Laurent and Henri, established the circus in France and set what became the standard diameter for the circus ring at about 42 feet (13 m). Circuses were opened in Philadelphia and New York City by John Bill Ricketts in 1793, about the same time that Hughes was introducing them in Russia. During the first 80 years of its history, the circus was dominated by equestrian acts, including trick riding, exhibitions by riderless horses (called liberty horses), and scenic riding, or the performance of a pantomime while on horseback. Acts such as these remain a staple of the circus today.

The first use of the circus tent seems to have been in the United States in 1825, when it was employed by the American showman J. Purdy Brown. The first circus tents were rather small, but they grew in size as circuses began to perform simultaneously in two or three rings.

In the early part of the 19th century, Isaac A. Van Amburgh established wild-animal acts as a part of the circus and is believed to have been the first man to put his head in a lion's mouth. In the United States, animal acts tended to present beasts *en ferocité,* as untamed and dangerous, which entailed much pistol shooting and whip cracking. Europeans preferred presentation *en douceur,* showing the beasts as obedient and docile, with only a sign of ferocity now and then. Lions, tigers, bears, and elephants have traditionally been the most popular circus animals.

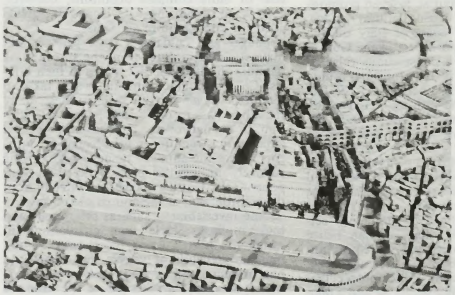
Jules Léotard invented the familiar flying trapeze in 1859, and Charles Blondin revived public interest in rope walking—which dates back to ancient Greece—with his famous tightrope walk over Niagara Falls. Aerial acts, performed on the high wire, trapeze, or as aerial ballet, became one of the most thrilling entertainments of the circus repertoire and produced such famous performers as the Wallenda family in the 20th century.

The sizes of circuses have varied. Europeans tended to favour the single-ring format, but, in the United States, spectacle and size were primary, giving rise to the three-ring circus. In North America the archetypal circus is perhaps the train circus. With the use of railroads in the 1870s, traveling circuses were able to expand dramatically. At its peak, in 1941, the Ringling Bros. and Barnum & Bailey Combined Circus traveled on four separate trains with as many as 107 70-foot (21-metre) cars.

The traditional circus event began with the advance agents who made arrangements and started promotional campaigns. Before circus day, trains would arrive first with a cookhouse, animal facilities, and calliope; then came the canvas and lumber for the tents and, finally, the show itself. On circus day the traditional parade would proceed down the main thoroughfare to attract townspeople for the night's performance. At the circus grounds, customers first wandered through the sideshows (P.T. Barnum's idea), which contained such exotics as sword swallowers, bearded ladies, giants, and midgets. The main attraction consisted of spectacles, feats of skill, and pageants, interspersed with the comic relief of clowns, all to the accompaniment of music.

The contemporary circus preserves much of this tradition. The chief difference is in size and mobility. Many smaller troupes have had to combine to make fewer but larger circuses. Traveling is often by truck and has been highly curtailed. It is more profitable for circuses to visit large population centres for longer stays than to move between smaller communities. As a result, permanent buildings—such as New York City's Madison Square Garden or the Moscow Circus building in the Russian capital—are frequently used. One advantage to this regimen is that circuses can be active during inclement seasons of the year, whereas they were previously forced to retire to winter quarters.

Circus Maximus, largest of the Roman hippodromes and one of the largest sports arenas



Model of Circus Maximus (foreground) and surrounding area of Rome as it was *c.* 4th century AD; in the Museo della Civiltà Romana, Rome

A. Trapani—M. Grimoldi

ever built. A U-shaped structure with seats on three sides and a low wall running down the middle of the arena around which the chariots raced, it was rebuilt in the time of Julius Caesar (1st century BC) to seat an estimated 150,000 spectators. Enlarged by later emperors, it reached a maximum size under Constantine (4th century AD) of about 2,000 by 600 feet (610 by 190 metres), with a seating capacity of possibly 250,000, greater than that of any subsequent stadium. Nothing but the site, between the Palatine and Aventine hills, remains today.

cire-perdue (metal casting): *see* lost-wax process.

Cirebon, also spelled CHEREBON, or TJIREBON, *kotamadya* (city) and *kabupaten* (regency), located in northeastern Jawa Barat *propinsi* (West Java province), Indonesia, on the Java Sea. For centuries a centre of Islām, the regency generated much of the opposition to Dutch rule. The northern half of the regency is often flat and marshy, while the southern half is mountainous. Southwest of the city the huge volcano Gunung (mount) Ciremay rises to 10,098 ft (3,078 m). Sulfur and hot springs occur on the volcano's slopes. The regency grows tea, rice, tobacco, essential oils, sugarcane, cinchona, cassava, peanuts (groundnuts), and pulses; cigars, machine tools, chemicals, and textiles are manufactured there. Kuningan, famous for a breed of horses, is a hill resort at 2,200 ft.

The city has a good open roadstead, quays, and warehousing and is a railway hub with a small airport. In November 1946 the Dutch–Indonesian pact recognizing the original Republic of Indonesia was drafted at Linggadyati, a resort village just south of Cirebon. Pop. (1980) city, 223,776; regency, 1,331,896.

Cirenaica (North Africa): *see* Cyrenaica.

Cirencester, parish (town), Cotswold district, county of Gloucestershire, England, on the River Churn. Cirencester occupies the site of the Romano-British Corinium, capital city of the Dobuni tribe, at the junction of the important Roman and British routeways known as Fosse Way, Ermine Street, and Akeman Street. The walls enclosed a town of 240 ac (100 ha), and remains of a basilica, an amphitheatre, and many rich villas have been discovered. The town was the largest in Roman Britain after London and was probably a capital in the 4th century. The Corinium Museum houses a Roman collection. Saxons captured the town in 577, and it later became a royal demesne. Henry II (1154–89) leased the manor to the abbot of a local Augustinian foundation, who obtained charters for what became famous wool fairs in 1215 and 1253. The abbey was destroyed at the dissolution of the monasteries (1536–39) under Henry VIII, and an Elizabethan mansion was built on its site; the grounds are now a public park. A grammar school was founded in 1461; there is also the Royal Agricultural College. The parish church is mainly in Perpendicular style, although Norman in origin. Cirencester is now mainly an agricultural and tourist centre. Pop. (1981) 15,727.

cirque (French: "circle"), amphitheatre-shaped basin with precipitous walls, at the head of a glacial valley. It generally results from erosion beneath the bergschrund of a glacier. A bergschrund is a large crevasse that lies a short distance from the exposed rock walls and separates the stationary from the moving ice; in early summer it opens, exposing the rock at its base to diurnal changes of temperature. Frost action then causes rapid disintegration of lower rock, which causes the upper rock to avalanche and produce an almost vertical head wall. Resulting rock material is embedded in the glacier and scours a concave floor, which may contain a small



Cirque in Glacier National Park, Montana
By courtesy of the U.S. Geological Survey; photograph, M.R. Campbell

lake (tarn) if the glacier disappears. Expansion of neighbouring cirques produces sharp arêtes, cols, and horns. Because glaciers must originate above the snowline, a survey of the elevations of ancient cirques provides information on climatic change and on the former position of the snow line.

Where the same name may denote a person, place, or thing, the articles will be found in that order

cirrhosis, irreversible change in the normal liver tissue that results in the degeneration of functioning liver cells and their replacement with fibrous connective tissue. Cirrhosis can have a number of causes; the term is applied whenever the end result is scarring of the liver.

The most common type of cirrhosis is known as Laënnec's cirrhosis. Its primary causes are excessive and chronic alcohol consumption and malnutrition. The relationship between alcohol and cirrhosis is unquestioned, but the mechanism of injury remains unknown. Besides cirrhosis, the affected person may show jaundice, pneumonia, inflammation of the pancreas, or delirium. There is usually an increase in liver fat with this disease during the early stages; later there is little fat and total degeneration of the liver.

In the early stage, the disease can be stopped or reversed by abstention from alcohol consumption and an adequate diet. In this stage, the liver first enlarges; its outer capsule becomes smooth and stretched, and its colour is yellow because of fat droplets. Fibrous tissue and extra bile ducts may develop. In the next stage, the liver is still fatty, but the quantity of fibrous tissue has increased so that the liver is granular. The blood vessels thicken and their channels may become obliterated, which reduces blood flow in the organ. Some persons die at this stage from coma, jaundice, infection, high blood pressure, and hemorrhages. In the advanced stage, the liver shrinks and the surface usually has a roughened appearance. The normal structure of the internal tissue is lost; there is no longer fat but only nonfunctioning scar tissue.

There are several other types of cirrhosis. Postnecrotic cirrhosis is the result of viral infection or of toxins such as carbon tetrachloride. Necrosis—*i.e.*, death of areas of tissue—may develop quickly in these cases, a few weeks to months as opposed to years in Laënnec's disease. In pigmentary cirrhosis there is an increased amount of iron deposition in the liver cells because of a blood disorder, too much iron in the ducts, or an accumulation of iron from blood transfusions. The liver becomes granular and nodular, and its colour is dark brown. The iron particles may be so dense as to obscure the cell and its function. There is fibrosis and there are sometimes fatty changes. In Wilson's disease, a hereditary condition, there is excess copper in the liver. The liver usually turns green from bile in the tissue, and enlargement, fibrosis, fat changes, and abscesses occur when the disease is chronic. Syphilitic cirrhosis is indicated by large, soft lesions in the liver, which erode the tissue and eventually leave masses of scar tissue and fissures.

The final complications of cirrhosis are usually the same. There may be high blood pressure in the portal vein that can lead to hemorrhages in the spleen, liver, esophagus, and intestines; or hepatic coma may develop, in which the imbalance in blood chemicals from malfunctioning of the liver affects the brain. Hepatic coma usually starts with drowsiness and confusion and culminates in loss of consciousness. Jaundice may complicate any stage of cirrhosis. Edema—fluid retention in the tissues—and great abdominal swelling also are commonly seen.

Cirta (Algeria): *see* Constantine.

Cis-Sutlej states, Indian principalities, mostly Sikh, that became important in the early 19th century when their fate was in the balance between the British on the one hand and Ranjit Singh of the Sikhs on the other. They were called "cis" (Latin: "on this side of") by the British because they were on the British, or southern, side of the Sutlej River. They had grown up during "the time



The Cis-Sutlej states in 1805
Adapted from C.C. Davis, *An Historical Atlas of the Indian Peninsula* (1959); Oxford University Press

of troubles" in the Punjab after the collapse of Mughal authority and the withdrawal of the Afghan chief, Aḥmad Shāh Durrānī, in 1761.

Under the threat of absorption into Ranjit Singh's kingdom, they appealed to the British, who established dominance over them by the Treaty of Amritsar with Ranjit Singh (1809). They survived until the independence of India (1947), at which time they were organized into the Patiāla and East Punjab States Union (PEPSU). They subsequently were absorbed into the Indian states of the Punjab and Haryana. After 1846 there were nine states, later reduced to six, with full powers, of which Patiāla, 5,412 square miles (14,017 square kilometres) in area and with up to 2,000,000 inhabitants at the time of its absorption, was the chief.

Cisalpine Gaul, Latin GALLIA CISALPINA, in ancient Roman times, that part of northern Italy between the Apennines and the Alps settled by Celtic tribes. Rome conquered the Celts between 224 and 220 BC, extending its northeastern frontier to the Julian Alps.

When Hannibal invaded Italy in 218 BC, the Celts joined his forces, and Rome thereby lost this territory. It was recovered, however, during the final conquest of the Celtic Insubres and Boii between 198 and 191 BC. In 42 BC the province was incorporated into Italy.

Cisalpine Republic, French RÉPUBLIQUE CISALPINE, Italian REPUBBLICA CISALPINA, republic formed by General Napoleon Bonaparte in June 1797 in conquered territories centred in the Po River valley of northern Italy. Its territory first embraced Lombardy, then extended to Emilia, Modena, and Bologna (collectively known for some months previously as the Cispadane Republic; *q.v.*), and then drew from parts of the Venetian hinterland and from the Swiss cantons of the Valtellina. The republic was confirmed in the Franco-Austrian Treaty of Campo Formio (Oct. 17, 1797).

The Cisalpine Republic had a constitution and government modeled on that of the Directory in France. It was nominally independent, maintaining an embassy in Paris, but French troops and monthly subsidies tied it firmly to France. In 1801 it was reconstituted as the Italian Republic with Bonaparte as its dictatorial head, and it ceased existence altogether in 1805 in the creation of the Kingdom of Italy.

cisco, also called LAKE HERRING, herringlike type of whitefish (*q.v.*).

Ciskei, also called XHOSA-CISKEI, or XOSA-CISKEI, former republic (though never internationally recognized as such) that was inhabited principally by Xhosa-speaking people in southern Africa. It bordered the Indian Ocean on the southeast and was bounded by the Republic of South Africa on the southwest, northwest, and northeast. A fingerlike extension of South African territory on the northeast separated Ciskei from Transkei (another former Xhosa homeland that was declared independent by South Africa). Ciskei, which means "this side of the Kei," reflected the republic's location south of the Great Kei River, as compared with Transkei ("across the Kei") north of the river. The Great Fish River bounded Ciskei to the southwest.

Repeated incursions by Xhosa peoples from the area into territory settled by European farmers began in the late 18th century. An ensuing series of wars, the Cape Frontier Wars, resulted in the complete incorporation of the Ciskei region into the Cape Colony by the end of the 19th century. Ciskei became an administratively distinct territory within South Africa in 1961 and acquired a legislative assembly and an executive council 10 years later. In 1972 Ciskei was declared a self-governing black state, with its capital at Zwelitsha, and in 1981 it became (nominally) independent under an act passed by the South African Parliament. The new republic functioned as an official homeland for millions of Xhosa-speaking Africans in South Africa who were denied citizenship in that country under the laws of the apartheid system. Under the new South African constitution, which abolished the apartheid system, Ciskei in 1994 was reincorporated into South Africa as part of newly created Eastern Cape province.

Cispadane Republic, French RÉPUBLIQUE CISPADANE, Italian REPUBBLICA CISPADANA, state formed in December 1796 by General Napoleon Bonaparte out of the merger of the duchies of Reggio and Modena and the legate states of Bologna and Ferrara. By the Treaty of Tolentino (Feb. 19, 1797), the pope also ceded Romagna to the republic. Deputies from the constituent provinces were chosen to deliberate a constitution, but in June 1797 Bonaparte decided to merge the Cispadane provinces with provinces along the Po River to form a new Cisalpine Republic (*q.v.*).

Cissus, genus of about 350 species of tropical and subtropical, chiefly woody vines of the grape family (Vitaceae). The leaves are often fleshy and somewhat succulent. The species *C. incisa,* commonly known as ivy treebine, marine ivy, or grape ivy, is native to the southern and south-central United States. It grows up to 9 m (30 feet) long and has compound leaves with three leaflets. The black fruit is about 2 cm (0.78 inch) in diameter. *C. sicyoides,* known as waterwithe treebine or princess vine, is native from southern Florida to tropical America and is especially noted for its abundance of long, slender aerial roots.

C. rhombifolia, often called grape ivy, and *C. antarctica,* also known as kangaroo vine, are often grown as indoor vines.



Waterwithe treebine (*Cissus sicyoides*)
Phil Clark

Cistercian, byname WHITE MONK, or BERNARDINE, member of a Roman Catholic monastic order that was founded in 1098 and named after the original establishment at Cîteaux (Latin: Cistercium), a locality in Burgundy, near Dijon. The order's founding fathers, led by St. Robert of Molesme, were a group of Benedictine monks from the abbey of Molesme who were dissatisfied with the relaxed observance of their abbey and desired to live a solitary life under the guidance of the strictest interpretation of the Rule of St. Benedict. Robert was succeeded by St. Alberic and then by St. Stephen Harding, who proved to be the real organizer of the Cistercian rule and order. The new regulations demanded severe asceticism; they rejected all feudal revenues and reintroduced manual labour for monks, making it a principal feature of their life. Communities of nuns adopting the Cistercian customs were founded as early as 1120–30, but they were excluded from the order until about 1200, when the nuns began to be directed, spiritually and materially, by the White Monks.

Cistercian government was based on three features: (1) uniformity—all monasteries were to observe exactly the same rules and customs; (2) general chapter meeting—the abbots of all the houses were to meet in annual general chapter at Cîteaux; (3) visitation—each daughter house was to be visited yearly by the founding abbot, who should ensure the observance of uniform discipline. The individual house preserved its internal autonomy, and the individual monk belonged for life to the house where he made his vows; the system of visitation and chapter provided external means for maintaining standards and enforcing legislation and sanctions.

The Cistercians might have remained a relatively small family had not the fortunes of the order been changed by St. Bernard of Clairvaux, who joined Cîteaux as a novice, along with about 30 relatives and friends, in 1112 or 1113. In 1115 he was sent out as founding abbot of Clairvaux, and thenceforward the growth of the order was spectacular. No other religious body was increased so greatly in so brief a time. At St. Bernard's death the total number of Cistercian abbeys was 338, of which 68 were direct foundations from Clairvaux; and the order had spread from Sweden to Portugal and from Scotland to the countries of the eastern Mediterranean.

With compact broad estates and with a large, disciplined, unpaid labour force, the Cistercians were able to develop all branches of farming without the hindrances of manorial customs. In reclaiming marginal land and in increasing production, especially that of wool in the large pastures of Wales and Yorkshire, the Cistercians played a large part in the economic progress of the 12th century and in the development of the techniques of farming and marketing.

The golden age of the Cistercians was the 12th century. Even before its close, however, many abbeys were breaking some of the most essential statutes by accumulating wealth—by accepting churches, villeins, and tithes and by commercial transactions in wool and grain. Discipline, too, was allowed to decline. The phenomenal expansion of the order made it impossible to follow the regulations of annual chapter and annual visitations of daughter houses by abbots of the motherhouses. Moreover, the right of houses to elect their abbots was frequently superseded by a commendatory system, in which abbots, who were usually not members of the order and were often concerned only with the revenues of the abbeys, were appointed either by secular rulers or by the pope. After the Protestant Reformation the Cistercian monks disappeared from northern Europe, and, where they survived, abbeys struggled for existence.

Nevertheless, reform movements took place in France during the 16th and 17th centuries. The most noteworthy reform, because it resulted in a split observance that endures to this day, is traced especially to the efforts of Armand-Jean Le Bouthillier de Rancé, who became abbot of La Trappe in 1664. He was so successful in restoring a well-balanced rule of silence, prayer, manual labour, and seclusion from the world that the various attempts at a strict observance became popularly associated with the name Trappists. Before the modernizing reforms of the second Vatican Council, the monks of the Order of the Reformed Cistercians of the Strict Observance (O.C.S.O.) slept, ate, and worked in common in perpetual silence; they also observed strenuous fasts that demanded that they abstain from meat, fish, and eggs. Since the 1960s, however, these practices have been modified, and in many monasteries the monks no longer sleep in common dormitories or observe the fasts or perpetual silence. The modernization of the Roman Catholic church, which placed greater emphasis on individuality, has resulted in diversity among the various Trappist monasteries, whereas previously all abbeys observed a uniform set of rules and traditions.

Meanwhile, the original order, now known as the Cistercians of Common Observance (S.O.Cist.), after a more moderate reform begun in 1666, has continued with a quiet prosperity to increase. Some of its congregations differ little in their practices from the Strict Observance. In both orders there has been a revival of literary work.

Cistercian style, architecture of the Cistercian monastic order in the 12th century. The order was an austere community characterized by devotion to humility and to rigid discipline. Unlike most orders of the period, under which the arts flourished, the Cistercians exercised severe restrictions on their use of art. During

the course of the 12th century the sculptural decoration of churches, manuscript illumination, stone towers on churches, and stained glass were all successively proscribed. Reflecting this severity is the austerely impressive architecture of the more than 700 Cistercian monasteries that spread throughout Europe in the 12th century, most of them built in isolated places.

The 12th century was a period of transition between Romanesque art, characterized by massive, compartmentalized architecture with rounded arches and tunnel vaults, and Gothic art, with its lofty construction of pointed arches and vaults based on visual sensation as much as on structural necessity. Cistercian architecture exhibits characteristics of both modes. Although in most later Cistercian buildings the Romanesque rounded arch was replaced by the Gothic pointed arch, the ponderous construction of these churches still associates them closely with the Romanesque. Cistercian churches were built on a Romanesque plan that embellished, with vaulting and a multiplication of parts, that of the Early Christian basilica (longitudinal with side aisles, a raised nave, or centre aisle, and an apse, or semicircular projection of the wall, at the eastern, sanctuary end of the nave). Cistercian churches built in the 12th century were exceedingly plain, unadorned with either figural or decorative sculpture, and usually severely elegant. Their wide geographical spread was the principal means for the dissemination of the pointed arch, in anticipation of full-fledged Gothic construction. The major Cistercian buildings of the 12th century were Cîteaux (1125–93), the abbey of Clairvaux (1133–74), and the abbey church of Fontenay (begun 1139).

The simplicity and austerity that characterized the early Cistercians and their artistic production did not last. In the 13th century their architecture became far more similar to that of the nonmonastic cathedrals, with typical Gothic pointed rib vaulting, flying buttresses, and a complex of chapels radiating from the sanctuary. Even so, the Cistercian was generally a more severe, pristine variant of the dominant Gothic style.

cisticola, also called FANTAIL WARBLER, any of about 75 species of the genus *Cisticola,* belonging to the Old World warbler family, Sylviidae. They occur in grasslands, thorny



Stout cisticola (*Cisticola robusta*)
Painting by H. Douglas Pratt

scrub, and marshes, most numerously in Africa but also across southern Eurasia to Australia. Some are called cloud-scrapers, from the male's towering courtship-flight. Cisticolas are notoriously difficult to identify; some species may be distinguished only by the configuration of wing feathers. The plumage is chiefly brown, with or without streaking. The tail usually is broad and rather short and may be pale-tipped.

The most widespread example is the zitting cisticola, or common fantail warbler (*C. juncidis*), a reddish brown, streaky bird, 11 cm (4.5 inches) long, found from Europe and Africa to Japan and Australia. Like most cisticolas it makes a domed nest. The most common species from India to the Philippines and Australia is *C. exilis,* often called tailorbird, because it sews green leaves into its nest.

Citation (foaled 1945), American racehorse (Thoroughbred), winner of the 1948 Triple Crown—the Kentucky Derby, the Preakness Stakes, and the Belmont Stakes—and the first horse to win $1,000,000. In four seasons (1947–48, 1950–51) he won 32 of 45 races, finished second in 10 and third in 2. On June 3, 1950, at Golden Gate Fields, Albany, Calif., he set a world record (eventually broken) by running 1 mile in 1:33$^{3}/_{5}$. When he was retired to stud in 1952 at Calumet Farm, Lexington, Ky., he had earned $1,085,760. He died in 1970.

citation (law): *see* summons.

Cîteaux, Latin CISTERCIUM, village, site of a famous abbey in Côte-d'Or *département,* Burgundy *région,* France, south of Dijon. Founded in 1098 by St. Robert, abbot of Molesme, the abbey, largely through the activities of the 12th-century churchman and mystic St. Bernard of Clairvaux, became the headquarters of the Cistercian order, with abbeys scattered all over Europe. Only a part of a Gothic cloister and some 18th-century buildings remain of Cîteaux's great past, the abbey having been depopulated and largely destroyed during the Revolution. The buildings were occupied again by the Grand Chapter of the Cistercian order when the abbey was restored to it in 1898.

Cithaeron, Modern Greek KITHAIRÓN, mountain range in Greece, separating Boeotia from Megaris and Attica. Its western end reaches the Gulf of Corinth. The range has a maximum elevation of 4,623 feet (1,409 m). In ancient times, the road from Athens to Thebes crossed the range via the pass of Dryocephalae (modern Dhríos Kefáli). On the north slope of Mount Cithaeron is Plataea, site of one of the major battles of the Greco-Persian Wars (479 BC). Cithaeron is famous in Greek mythology. There Actaeon was changed into a stag, Pentheus was torn into pieces by the Bacchantes, and the infant Oedipus was left to die. It was the scene of the mystic rites of Dionysus and of the festival of the Daedala (*q.v.*), in honour of Hera.

cithara (musical instrument): *see* kithara.

Citicorp, formerly (1967–74) FIRST NATIONAL CITY CORPORATION, American holding company incorporated in 1967, with the City Bank of New York, National Association (a bank tracing to 1812), as its principal subsidiary. The latter's name changed successively to First National City Bank in 1968 and to Citibank, N.A. (*i.e.,* National Association), in 1976. Citicorp was the holding company's popular and trade name from its inception but became the legal name only in 1974. Headquarters are in New York City.

In 1811 the U.S. Congress refused to renew the charter of the First Bank of the United States, the country's central bank, which had branches in such cities as New York. Thus on June 16, 1812, some of the First Bank's New York shareholders and other investors secured state incorporation of the City Bank of New York, which was later established in the branch banking rooms of the old First Bank. The bank grew as New York City became the nation's commercial and financial capital, and in 1865 it was chartered under the National Bank Act and renamed the National City Bank of New York. In 1897 it became the first large American bank to open a foreign department, and in 1915 it became America's leading international banking upon the purchase of International Banking Corporation (founded 1902), which had 21 overseas offices in 13 countries and territories.

Other mergers and acquisitions in the United States and overseas expanded the bank. Notably, in 1931 it acquired the Bank of America, N.A. (another descendant of the First Bank of the United States and no relation to the California-based bank), and in 1955 it merged with the First National Bank of the City of New York (founded 1863). Upon this latter merger, the consolidated company took the name of First National City Bank of New York.

In 1967 the holding company Citicorp was created to hold the stock of the First National City Bank of New York—renamed City Bank of New York—and to hold the stock of subsidiaries to be newly acquired or split off from the bank, such as a finance company, a traveler's check company, and other related financial operations. The holding company setup improved the company's long-range conglomerating possibilities. In the late 1970s Citicorp pioneered the installation of a network of automated teller machines throughout its branch offices. The company secured an important share of the American credit card business by purchasing Carte Blanche Corporation in 1978 and Diners Club, Inc., in 1981. In 1982 and 1983 Citicorp made three major acquisitions—Fidelity Savings and Loan Association of San Francisco, First Federal Savings and Loan of Chicago, and New Biscayne Savings and Loan Association of Florida—which increased its assets by more than $8,500,000,000 and expanded its interstate banking operations significantly. By the late 20th century Citicorp was the largest American bank and one of the largest financial companies in the world, with about 3,000 branch offices worldwide.

Citium, Greek KITION, principal Phoenician city in Cyprus, situated on the southeast coast near modern Larnaca. The earliest remains at Citium are those of an Aegean colony of the Mycenaean Age (*c.* 1400–1100 BC). The biblical name Kittim, representing Citium, was also used for Cyprus as a whole. A Phoenician dedication to the god "Baal of Lebanon," found at Citium, suggests that the city may have belonged to Tyre; and an official monument of the Assyrian king Sargon II indicates that Citium was the administrative centre of Cyprus during the Assyrian protectorate (709–*c.* 668 BC). During the Greek revolts of 499, 386 and following years, and 353 BC, Citium led the side loyal to Persia. It remained an important city even after Alexander the Great conquered Persia. Citium suffered repeatedly from earthquakes, however, and in medieval times its harbour became silted and the population moved to Larnaca.

Citizen Genêt Affair (1793), incident precipitated by the military adventurism of Citizen Edmond Charles Genêt, a minister to the United States dispatched by the revolutionary Girondist regime of the new French Republic, which at the time was at war with Great Britain and Spain. His activities violated an American proclamation of neutrality in the European conflict and greatly embarrassed France's supporters in the United States.

Arriving in Charleston, S.C., on April 8, Genêt immediately began commissioning privateers and making plans to use U.S. ports for a campaign against British commerce. He also began organizing American-based expeditions intended to attack Spanish and British territories. Heartened by the warm pro-French sentiment he encountered en route to Philadelphia, Genêt was shocked to learn that President George Washington considered his privateering plans and other proposed military activities an infringement of U.S. national sovereignty.

Genêt promised that the privateers he had

commissioned would no longer send their prizes to U.S. ports and that they would leave American waters. When he broke his word by authorizing the arming and dispatching of the prize ship *Little Sarah* (refitted as *La Petite Démocrate*), Washington and his cabinet demanded Genêt's recall. With the radical Jacobins newly in power in France, his arrest was ordered, and he faced possible death if he returned home. Washington declined to extradite him, and in 1794 Genêt married a daughter of Governor George Clinton of New York. He subsequently became a U.S. citizen.

Citizen King: *see* Louis-Philippe.

citizens band radio, also called CB RADIO, short-range radio voice communications system used chiefly by private individuals in motor vehicles, homes, offices, and other locations where wireless telephone service is unavailable. A typical CB radio consists of a combined transmitter-receiver (a transceiver) and an antenna. In the United States 40 channels, at frequencies from 26.965 to 27.225 megahertz or in the UHF range of 460 to 470 megahertz, have been allocated to CB radio. A federal limitation of power (4 watts) and practical limitations of antenna height restrict the range of CB radios in motor vehicles to about 25 km (15 miles) and those in fixed locations to no more than 50 km (30 miles).

CB radio originated in the United States during the 1940s, when the Federal Communications Commission created the Citizens Radio Service for regulating remote-control units and mobile radiotelephones. The commission made CB radio a special class of the service in 1958 and permitted its use as a hobby in 1975. Several other nations, including Canada, Jamaica, and Germany, also allow CB communications.

citizenship, relationship between an individual and a state in which an individual owes allegiance to that state and in turn is entitled to its protection. Citizenship implies the status of freedom with accompanying responsibilities. Citizens have certain rights, duties, and responsibilities that are denied or only partially extended to aliens and other noncitizens residing in a country. In general, full political rights, including the right to vote and to hold public office, are predicated upon citizenship. The usual responsibilities of citizenship are allegiance, taxation, and military service.

Citizenship is the most privileged form of nationality (*q.v.*). This broader term denotes various relations between an individual and a state that do not necessarily confer political rights but do imply other privileges, particularly protection abroad. It is the term used in international law to denote all persons whom a state is entitled to protect. Nationality also serves to denote the relationship to a state of entities other than individuals; corporations, ships, and aircraft, for example, possess a nationality.

The concept of citizenship first arose in towns and city-states of ancient Greece, where it generally applied to property owners but not to women, slaves, or the poorer members of the community. A citizen in a Greek city-state was entitled to vote and was liable to taxation and military service. The Romans first used citizenship as a device to distinguish the residents of the city of Rome from those peoples whose territories Rome had conquered and incorporated. As their empire continued to grow, the Romans granted citizenship to their allies throughout Italy proper and then to peoples in other Roman provinces, until in AD 212 citizenship was extended to all free inhabitants of the empire. Roman citizenship conferred important legal privileges within the empire.

The concept of national citizenship virtually disappeared in Europe during the Middle Ages, replaced as it was by a system of feudal rights and obligations. In the late Middle Ages and the Renaissance, the holding of citizenship in various cities and towns of Italy and Germany became a guarantee of immunity for merchants and other privileged persons from the claims and prerogatives of feudal overlords. Modern concepts of citizenship crystallized in the 18th century during the American and French Revolutions, when the term citizen came to suggest the possession of certain liberties in the face of the coercive powers of absolutist monarchs.

In England the term citizen originally referred to membership of a borough or local municipal corporation, while the word subject was used to emphasize the individual's subordinate position relative to the monarch or state. The word subject is still used in preference to citizen in British common-law usage and nationality legislation, but the two terms are virtually equivalent, since the British constitutional monarchy is now a ceremonial one that has lost its former political powers over its subjects.

The principal grounds for acquiring citizenship (apart from international transactions such as transfer of territory or option) are birth within a certain territory, descent from a citizen parent, marriage to a citizen, and naturalization (*q.v.*). There are two main systems used to determine citizenship as of the time of birth: jus soli, whereby citizenship is acquired by birth within the territory of the state, regardless of parental citizenship; and jus sanguinis, whereby a person, wherever born, is a citizen of the state if, at the time of his birth, his parent is one. The United States and the countries of the British Commonwealth adopt the jus soli as their basic principle; they also recognize acquisition of nationality by descent but subject it to strict limitations. Other countries generally adopt the jus sanguinis as their basic principle, supplementing it by provisions for acquisition of citizenship in case of combination of birth and domicile within the country, birth within the country of parents born there, and so on. The provisions of nationality laws that overlap often result in dual nationality; a person may be a citizen of two countries. Alternatively, the lack of uniform rules on citizenship acquisition and loss have sometimes produced lack of citizenship (statelessness).

The acquisition of citizenship by a woman through marriage to a citizen was the prevailing principle in modern times until after World War I. Under this system, the wife and children shared the nationality status of the husband and father as head of the family. From the 1920s, under the impact of woman suffrage and ideas about the equality of men and women, a new system developed in which a woman's nationality was not affected by marriage. The resulting mixed-nationality marriages sometimes create complications, particularly in regard to the nationality status of the children, and accordingly various mixed systems have been devised, all stressing the woman's and child's freedom of choice.

See also alien; civitas.

Citlaltépetl, Spanish in full VOLCÁN CITLALTÉPETL, also called PICO DE ORIZABA, volcano on the Veracruz-Puebla border, south-central Mexico. It rises on the southern edge of the Mexican Plateau, 60 miles (100 km) east of the city of Puebla. At 18,406 feet (5,610 m) above sea level, Citlaltépetl's symmetrical, snowcapped cone is the third highest peak in North America after Mount McKinley, Alaska, and Mount Logan, Canada. The volcano has been dormant since 1687. Citlaltépetl was first climbed in 1848.

Citpāvan, also called KONKANASTH, caste of Brahmans in Konkan (the area of Goa) and Mahārāshtra state in western India. They rose to considerable eminence in Mahārāshtra as administrators during the rule of the peshwas of Poona (1713–1818), who belonged to that caste. The predominance among them of fair complexions and light-coloured eyes has given rise to the speculation that they are descended from shipwrecked European sailors. While many Citpāvan Brahmans continue the administrative tradition, others are active in the professions and in scholarship.

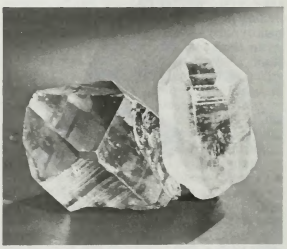
citral, a pale yellow liquid, with a strong lemon odour, that occurs in essential plant oils and is used in perfumes and flavourings and in the manufacture of other chemicals. Chemically, citral is a mixture of two aldehydes that have the same molecular formula, $C_{10}H_{16}O$, but different structures.

Lemongrass oil contains 70–80 percent citral, which may be isolated by distillation. Other natural sources include the oils of verbena and citronella. Citral can be synthesized from myrcene. Ionone and methylionone, made from citral, are used in perfumery; ionone is also converted into synthetic vitamin A.

citric acid, a colourless, crystalline organic compound belonging to the family of carboxylic acids, present in practically all plants and in many animal tissues and fluids. It is one of a series of compounds involved in the physiological oxidation of fats, proteins, and carbohydrates to carbon dioxide and water (*see* tricarboxylic acid cycle).

First isolated from lemon juice by a Swedish chemist, Carl Wilhelm Scheele, in 1784, citric acid is manufactured by fermentation of cane sugar or molasses in the presence of a fungus, *Aspergillus niger.* It is used in confections and soft drinks (as a flavouring agent), in metal-cleaning compositions, and in improving the stability of foods and other organic substances (by suppressing the deleterious action of dissolved metal salts).

citrine, transparent, coarse-grained variety of the silica mineral quartz (*q.v.*). Citrine is a semiprecious gem that is valued for its yellow to brownish colour and its resemblance to the rarer topaz. Colloidally suspended hydrous iron oxide gives citrine its colour. Natural citrine is rare compared to amethyst or smoky quartz, both of which are often heated to turn their natural colour into that of citrine. Citrine is often marketed under various names that confuse it with topaz to inflate its price. It may be distinguished from topaz by its inferior hardness and from decolorized amethyst



Citrine from Minas Gerais state, Brazil
Emil Javorsky

by its lack of reddish cast. Principal localities of occurrence are those of amethyst: Brazil, Uruguay, the Urals, Scotland, and North Carolina. Its physical properties are those of quartz (*see* silica mineral [table]).

Citrine (of Wembley), Walter McLennan Citrine, 1st Baron, also called (1935–46) SIR WALTER CITRINE (b. Aug. 22, 1887, Liverpool, Eng.—d. Jan. 22, 1983, Brixham,

Devon), English trade union leader and general secretary of the Trades Union Congress (TUC) from 1926 to 1946.

Born into a working-class family, Citrine began his career as an electrician and became active in the electrician's union of Liverpool. From 1914 to 1920 he was Mersey District secretary of the Electrical Trades Union. In 1920 Citrine became assistant secretary of the Electrical Trades Union and four years later took the position of assistant general secretary of the TUC. In 1926 he became the general secretary of the TUC. He also served as president of the International Federation of Trade Unions (1928–45) and chairman of the World Federation of Trade Unions (1945–46). In 1947 Citrine became Britain's first chairman of the Central Electricity Authority, a position which he held for 10 years.

As TUC general secretary, Citrine acquired a reputation as a precise and efficient administrator and a highly skilled organizer. Identified with the conservative wing of English labour, Citrine held to a firm anticommunist position in both domestic and international union affairs. He published a number of books, including *The Trade Union Movement of Great Britain* (1926). He was knighted in 1935 and raised to the peerage in 1946.

Citroën, major French automobile manufacturer, the founder of which, André-Gustave Citroën, introduced mass-production methods to the French auto industry. In 1976 the firm became a unit of Peugeot-Citroën SA, which was renamed Peugeot SA (*q.v.*) in 1979.

Citroën, André-Gustave (b. Feb. 5, 1878, Paris, France—d. July 3, 1935, Paris), French engineer and industrialist who introduced Henry Ford's methods of mass production to the European automobile industry.

Citroën graduated from the École Polytechnique in 1898 and thereafter worked as an engineer and an industrial designer. In 1908 he helped the Mors automobile firm increase



Citroën
H. Roger-Viollet

its production from 125 cars to 1,200 cars per year. At the outbreak of World War I Citroën persuaded the French army of the need to mass-produce munitions. In 1915 he built a munitions plant whose production of shells reached 55,000 per day. Upon this success he was given the responsibility of organizing the supplying of all French munitions plants with certain vital raw materials. After the war Citroën converted his original arms factory into a plant to mass-produce a small, inexpensive automobile; the first Citroën car came off the assembly line in 1919. New Citroën factories were constructed, and his firm became one of the largest auto-manufacturing companies in France. Refusing to retrench during the Great Depression, Citroën introduced the only popular front-wheel-drive car of its time, the Citroën Seven (1934), but he lost control of his company after it went bankrupt in 1934 and was reorganized in 1935.

Citroën financed various scientific expeditions, including one that traveled 8,000 miles (13,000 km) by car from Beirut to Peking (1931–32). The lighting of the Arc de Triomphe and of the Place de la Concorde were gifts from Citroën to the city of Paris.

citron (*Citrus medica*), small evergreen tree or shrub in the family Rutaceae, cultivated in Mediterranean countries and the West Indies. It grows to about 3.5 m (11.5 feet) high and has irregular, spreading, spiny branches. The leaves are large, pale green, broadly oblong, and slightly serrate with wingless petioles. The flowers of the acidic varieties, such as the Diamante, are purple on the outside and white on the inside, while those of sweet varieties, such as the Corsican, are creamy white. The oval or oblong fruit is protuberant at the tip, about 12 to 15 cm (5 to 6 inches) long, and furrowed. The inner portion of the adhesive rind is thick, white, and fleshy; the outer is thin, greenish yellow, and fragrant. The pulp is firm, either acidic or sweet, and used only for by-products. The thick peel is cured in



Citron (*Citrus medica*)
W.H. Hodge

brine, candied, and sold as a confection. The fruit of the Etrog variety of citron is used in Jewish religious rites.

citronella oil, member of a class of naturally occurring organic substances called terpenes. Citronella oil is obtained from leaves of the lemongrass, *Cymbopogon citratus,* and from *C. nardus* and *C. winterianus*. The oil has a wide range of uses, from medicines to perfumes for soaps. Two derivatives of citronella oil include the alcohol citronellol and the aldehyde citronellal.

Citrus, genus of plants belonging to the rue family (Rutaceae), and yielding pulpy fruits covered with fairly thick skins. Plants in this group include the lemon (*q.v.; C. limon*), lime (*q.v.; C. aurantifolia*), sweet orange (*C. sinensis*), sour orange (*C. aurantium; see* orange), tangerine (*q.v., C. reticulata*), grapefruit (*q.v.; C. paradisi*), citron (*q.v.; C. medica*), and shaddock (*q.v.; C. maxima,* or *C. grandis;* pomelo).

Città di Castello, town, Perugia *provincia,* Umbria *regione,* central Italy. It lies along the Tiber River, east of Arezzo. The town occupies the site of ancient Tifernum Tiberinum, which was devastated by Totila the Goth. Its Renaissance lords of the Vitelli family, known as patrons of the arts, were responsible for many architectural monuments. The Palazzo Vitelli della Cannoniera (1531–32), now an art gallery, and the Vitelli Chapel (1564) in the Church of San Francesco (1273) are both by Giorgio Vasari. The cathedral (1356, with a Renaissance interior) and the 14th-century Palazzo Comunale are also notable. Città di Castello's manufactures include steel furniture, textiles, machinery, and cement. Pop. (1993 est.) mun., 37,673.

Città Vecchia (Malta): *see* Mdina.

cittern, plucked stringed musical instrument that was popular in the 16th–18th century. It had a shallow, pear-shaped body with an asymmetrical neck that was thicker under the treble strings. Derived from the citole, a similar 14th- and 15th-century instrument with gut strings, the cittern had four unison courses of wire strings. Diapasons, additional courses to reinforce the basses of chords, were also common. The strings



Lady holding a cittern, detail from "The Letter," oil painting by Jan Vermeer, *c.*1666; in the Rijksmuseum, Amsterdam
By courtesy of the Rijksmuseum, Amsterdam

were hitched to the instrument end and passed over a violin-type, or pressure, bridge. Tuning of the principal strings was B–G–D–E (Italian) or A–G–D–E (French) in the octave below middle C.

Two bass variants of the cittern, the orpharion and the pandora, or bandore, appeared in the 17th century. The English guitar of the 18th and 19th centuries was a cittern with six courses of strings, the upper two double.

city, a relatively permanent and highly organized centre of population, of greater size or importance than a town or village.

A brief treatment of cities follows. For full treatment, *see* MACROPAEDIA: Cities.

The first cities appeared in Neolithic times when the development of agricultural techniques assured surplus crop yields large enough to sustain a permanent group of nonagricultural workers. Continuous settlement led to the use of more permanent building materials such as brick and stone. Larger populations led to the need for social control, transportation facilities, and rural hinterlands to sustain the urban population. Sizable cities were flourishing from about 3000 BC in Mesopotamia, in the Indus River valley, along the Yellow River, and along the Nile River.

The Hellenistic period saw the creation of the city-state. Greek city-states (*polis*) were governed by their citizens and dominated the surrounding rural areas, living in part from tribute extracted from rural surpluses. The beginnings of Western cultural and artistic life flourished in this setting. The growth of trade led to the foundation of Greek colony cities all over the Mediterranean.

The dominance of the city-states was ended by the Roman Empire, which had itself started in the Roman city-state. The growth of Rome as the empire's administrative and economic centre created vast new problems of urban provision and social control. Roman achievements in the building of aqueducts to ensure water supplies and paved roads to ensure the flow of resources were unsurpassed for centuries. Roman technology spread throughout Europe as Roman conquerors founded dependent settlements.

From very early periods cities were surrounded by walls to protect them from rivals

and nomadic marauders. As the Roman Empire—and the Pax Romana associated with its rule—disintegrated under pressure from successive waves of barbarian migrations and invasions, walled towns and cities provided some degree of local stability and defense. A strong civic culture developed in the medieval city. Some cities, such as the great Italian trading centres of Venice, Genoa, and Florence, even returned to the autonomous, flourishing self-sufficiency of the early city-states.

As Europe emerged from the Middle Ages the cities became the base for economic and commercial expansion. Market fairs, which had had only temporary significance in the medieval period, became established in cities, providing a base for a growing commercial class. At the same time, the growth of power of the nation-state led to the cities coming increasingly under the political control of centralized government. The city exchanged its independent political role for important administrative functions in the process of nation-state consolidation.

The Industrial Revolution transformed city life. It made possible the greater productivity that allowed Europe, and later other areas, to sustain far denser concentrations of people. Furthermore, the factory system, as the most important element in the industrialized production processes of the 18th and 19th centuries, required the concentration of the workforce near sources of power and transportation. Factory cities blossomed rapidly in England, northwestern Europe, and the northeastern United States. At the same time older, established cities greatly increased in size. In 1850 less than 7 percent of the world's population lived in urban centres of more than 5,000 inhabitants. By 1950, 30 percent did, and the figure was over 60 percent in the fully industrialized countries of Europe, Japan, and the United States.

Rapid industrial transformation and population growth have tended to overwhelm traditional urban society. Industrialized cities frequently suffer from lack of adequate housing, sanitation, and recreational space. Factories tend to pollute air and water resources. Migrants from rural areas (and in some cases from foreign countries) are not easily absorbed into the existing urban culture and institutions.

Twentieth-century transportation technology—in particular the automobile—has led to the creation of suburbs and residential districts where living conditions are less crowded and more removed from industrial pollution. However, this so-called urban sprawl has created a new set of problems, such as traffic congestion in the central city and pollution from automobile exhaust. Many factories and residences erected in earlier periods of industrial expansion have become aged and obsolete. Businesses and factories have moved to newer plants and offices in the suburbs, leaving certain segments of the inner city population stranded with high unemployment. Local governments have sought to alleviate these problems by planning and coordinating new construction as well as providing for maintenance of the urban infrastructure.

city, imperial, also called FREE IMPERIAL CITY: *see* imperial city.

City Dionysia (festival): *see* Great Dionysia.

city government, a system of governmental institutions that serve an urban area or urban municipality. Modern cities are almost always contained within the boundaries of national states, and their governments form parts of a larger constitutional regime that usually includes state or provincial governments and a national government.

A brief treatment of city government follows. For full treatment, *see* MACROPAEDIA: Cities.

A city government's most important functions are to provide law enforcement and fire prevention; elementary and secondary education; water supply, sewage, and refuse collection and disposal; construction, maintenance, and lighting of the streets; regulation of building safety and housing standards; the provision of public housing; various welfare services for the needy; health protection and, in some cases, medical care; and environmental services. Cities also provide museums, parks, playgrounds, and other cultural and recreational facilities. Public-utility services that supply water, electricity, gas, and public transport may be provided by a city government or by commercial companies that are closely regulated by the government.

City planning, which involves the coordination of all governmental activities that bear upon community growth and change, is another important function. City governments typically achieve their land-planning goals by enacting zoning laws that govern the use of land and buildings, the density of population, and the height, bulk, and spacing of structures. Planning also involves the use of subdivision controls, which subject the initial laying-out of vacant land to public regulation.

The mayor-and-council form is the oldest and most prevalent type of city government in the United States. Both the mayor and council are elected directly by the voters. The mayor typically has strong administrative and executive powers, and he presides over the council and can veto its legislative acts. A newer type, the city-manager system, typically consists of a small elected council that passes ordinances, decides the budget, sets rates of taxation, and appoints a manager, who is in turn responsible for the day-to-day administration of the government.

city manager, principal executive and administrative officer of a municipality under a council-manager system of local government. Under such a form the voters elect only the city council, which appoints a city manager to administer municipal affairs under its supervision. The council acts only collectively, and its individual members, including the mayor, have no administrative functions. The city manager, subject to the general supervision of the council, is in full charge of the administration of municipal affairs. He prepares the budget, appoints and dismisses personnel, directs the work of municipal departments, and attends council meetings in which he presents recommendations on municipal business and usually takes an active part in the discussions.

The council-manager plan was devised and first advocated in the United States by the National Short Ballot Organization, which proposed to improve local and state government by reducing the number of elected officials. In 1913 Dayton, Ohio, was the first large city to adopt the plan. It spread quickly after that as the plan was adopted in many cities in the United States and Canada as well as in Ireland, Norway, and Sweden.

Advantages of the council-manager plan are said to be that it provides for a shorter ballot by reducing the number of elected officials; that it unifies authority and political responsibility in the council; that it centralizes administrative responsibility in an administrator appointed by the council; and that it reduces the number of patronage jobs. Some criticisms of the plan are that the city manager usually comes from outside the city and is therefore unfamiliar with the problems of the city; that it places too much power in the hands of one person; that it promotes a middle-class orientation to efficiency rather than to need; and that the purely bureaucratic administration of the city may be unresponsive to the demands and problems of the people.

City of London: *see* London, City of.

City of Westminster (inner London borough): *see* Westminster, City of.

city-state, a political system consisting of an independent city having sovereignty over contiguous territory and serving as a centre and leader of political, economic, and cultural life. The term originated in England in the late 19th century and has been applied especially to the cities of ancient Greece, Phoenicia, and Italy and to the cities of medieval Italy.

The name was initially given to the political form that crystallized during the classical period of Greek civilization. The city-state's ancient Greek name, polis, was derived from the citadel (acropolis), which marked its administrative centre; and the territory of the polis was usually fairly limited. City-states differed from tribal or national systems in size, exclusiveness, patriotism, and passion for independence. The origin of city-states is disputed. It is probable that earlier tribal systems broke up during a period of economic decline and the splintered groups established themselves between 1000 and 800 BC as independent nuclei of city-states that covered peninsular Greece, the Aegean islands, and western Asia Minor. As they grew in population and commercial activity, they sent out bands of emigrants who created similar city-states on the coasts of the Mediterranean Sea and the Black Sea, mainly between 750 and 550 BC.

The thousands of city-states that sprang into existence during these centuries were remarkable for their diversity. Every variety of political experiment from monarchy to communism was practiced, and the fundamental principles of political life were formulated by their philosophers. The vigour and intensity of the citizens' experience were such that they made unparalleled advances in all fields of human activity, except industry and technology, and laid the basis of Greco-Roman civilization. The particularism of city-states was their glory and their weakness. Incapable of forming any permanent union or federation, they fell victim to the Macedonians, the Carthaginians, and the Roman Empire, under which they lived on as dependent privileged communities (*municipia*). Rome, which began its republican history as a city-state, pursued policies of foreign expansion and government centralization that led to the annihilation of the city-state as a political form in the ancient world.

The revival of city-states was noticeable by the 11th century, when several Italian towns had reached considerable prosperity. They were mostly in Byzantine territory or had maintained contact with Constantinople (Istanbul) and could thus take full advantage of the revival of eastern trade.

Foremost among them were Venice and Amalfi, the latter reaching the height of its commercial power about the middle of the century; others included Bari, Otranto, and Salerno. Amalfi, for a short time a serious rival of Venice, declined after having submitted to the Normans in 1073. Then Venice received, with the privilege of 1082, exemption from all customs duties within the Byzantine Empire. In the 11th century Pisa, the natural port of Tuscany, began to rise amid struggles with the Arabs, whom it defeated repeatedly; and Genoa, which was to be its rival for centuries, was following suit. Among the inland towns—as yet less conspicuous—Pavia, which had owed much of its early prosperity to its role as capital of the Lombard kingdom, was rapidly outdistanced by Milan; Lucca, on the Via Francigena from Lombardy to Rome and for a long time the residence of the margraves of Tuscany, was the most important Tuscan inland town.

The importance of fortified centres during the Hungarian and Arab incursions contributed to the development of towns. Town walls were

rebuilt or repaired, providing security both to citizens and to people from the country; and the latter found further places of refuge in the many fortified *castelli* with which the countryside began to be covered.

The Norman conquest of southern Italy put an end to the progress of municipal autonomy in that region. Whether it took the form of a conflict with the established authorities or of peaceful transition, the ultimate result of the communal movement in the north was full self-government. Originally the communes were, as a rule, associations of the leading sections of the town population; but they soon became identical with the new city-state. Their first opponents were often, but by no means always, the bishops; in Tuscany, where margravial authority was strong, the Holy Roman emperor Henry IV encouraged rebellion against his rival Matilda by granting extensive privileges to Pisa and to Lucca in 1081; and Matilda's death made it possible for Florence to achieve independence.

The first organs of the city-state were the general assembly of all its members (*parlamento, concio, arengo)* and the magistracy of the consuls. At an early date a council began to replace the unwieldy assembly for ordinary political and legislative business; and, with the growing complexity of the constitution, further councils emerged, conditions varying considerably from town to town. During the 12th century, the consular office was usually monopolized by the class that had taken the initiative in the establishment of the commune. This class was usually composed of small feudal or nonfeudal landowners and the wealthier merchants. In Pisa and Genoa the commercial element was predominant, while in parts of Piedmont the commune derived from the associations of the local nobility. Thus the early city-state was predominantly aristocratic. The fortified towers of the leading families, resembling the feudal castles of the countryside, were characteristic of these conditions. In Italy there had in fact never been the same separation between town and countryside as there had been, for instance, in northern France and in Germany; feudal society had penetrated into the towns, while nonnoble citizens were often landowners outside their walls. This link between town and country was to become stronger and more complex in the course of communal history.

From the beginning the conquest of the countryside (*contado*) became one of the main objectives of city-state policy. The small fortified townships (*castelli*) and the lesser rural places were now absorbed by the city-states. The divisions and subdivisions of feudal property, partly the result of the Lombard law of inheritance, weakened many feudal houses and thus facilitated the conquest, while the bishops could not prevent the extension of communal control to their lands. The members of the rural nobility were subjected one by one and often forced to become citizens; others did so voluntarily. Only a small number of the more powerful families, such as the house of Este, the Malaspina, the Guidi, and the Aldobrandeschi, succeeded in maintaining their independence—and that not without frequent losses and concessions.

City University of New York, The (CUNY), institution created in 1961 to combine New York City's 17 municipally supported colleges. The university includes a Graduate School and University Center; New York's four original liberal arts colleges (City College of New York [CCNY], Hunter College, Brooklyn College, and Queens College); six other four-year colleges; and seven two-year community colleges. The Mount Sinai School of Medicine is affiliated with CUNY. The four-year institutions are largely autonomous. An open-admissions policy inaugurated in 1970 made all New York City residents earning high school diplomas eligible for admission to a CUNY institution.

Oldest of the CUNY colleges is City College of New York, founded in 1847 by the New York City Board of Education as the Free Academy, "to extend the benefits of free higher education" and chartered as a college in 1866.

Hunter College, founded in 1870 as a teacher-training institution for women, added instruction at the college level in 1888, was fully accredited as a college in 1905, and turned coeducational in 1950. It includes schools of nursing, health sciences, and social work.

Brooklyn College, founded in 1930, and Queens College, founded in 1937, offer training in liberal arts and education and combined programs in engineering and health-related fields with CCNY and other institutions. The Graduate School and University Center is the only school in the CUNY system to offer the Ph.D. degree. It was founded in 1961.

Staten Island College, formed in 1976 by the merger of Richmond College (founded 1956) and Staten Island Community College, offers liberal arts and vocational programs. York College, which was founded in 1966, offers liberal arts; Lehman College, founded in 1931, formerly Hunter College's Bronx campus, offers liberal arts, education, business, and health programs.

Bernard M. Baruch College, founded 1919, formerly part of CCNY, specializes in business administration. John Jay College of Criminal Justice, founded in 1964, trains criminal justice agency personnel and public-service professionals; Medgar Evers College, founded in 1971, serves a predominantly black student body.

Ciudad, Juan: *see* John of God, Saint.

Ciudad Acuña, formerly LAS VACAS, or VILLA ACUÑA, city, northern Coahuila *estado* ("state"), northeastern Mexico. The city is on the Rio Grande (Río Bravo del Norte), just across the border from Del Rio, Texas. A port of entry, Ciudad Acuña is also a commercial and manufacturing centre for the agricultural hinterland. Wheat and nuts are the principal crops; cattle and sheep are also raised. A railroad and a highway connect Ciudad Acuña with other urban centres in Coahuila and Texas. The city is also served by domestic airlines. Pop. (1980) 38,898.

Ciudad Bolívar, city, capital of Bolívar *estado* ("state"), southeastern Venezuela. It lies on a small hill on the south bank of the Orinoco River, opposite Soledad on the north. Its elevation ranges from 85 to 246 feet (26 to 75 m) above sea level; the average annual temperature is 85° F (29° C). The town was founded in 1764 as San Tomás de la Nueva Guayana de la Angostura. In 1846 the name was changed to honour the Venezuelan liberator Simon Bolívar. Ciudad Bolívar has long been the commercial centre of the Llanos (plains), the huge, sparsely settled grassland region drained by the Orinoco. The limited commerce of the Llanos came to be concentrated in a few river ports, the chief of which was Ciudad Bolívar, lying at the head of navigation for large vessels, about 260 miles (420 km) from the delta. Principal exports include gold, diamonds, cattle, horses, hides, skins, and some timber. With the completion in 1967 of the Angostura Bridge, Venezuela's first span across the Orinoco, Ciudad Bolívar became a gateway to the rapidly growing industrial complex around Ciudad Guayana, 67 miles (108 km) downstream. Pop. (1990 est.) 266,561.

Ciudad Chetumal (Mexico): *see* Chetumal.

Ciudad del Este, formerly PUERTO PRESIDENTE STROESSNER, city, eastern Paraguay. Founded in 1957, the city is situated on the right bank of the Paraná River at the border with Brazil; it has been converted in only two decades from a tropical forest into Paraguay's second most important city after Asunción, the national capital. Ciudad del Este's economy is based on the ceramic industry and increasingly on the production of canned food, particularly sausages. The major reasons for the city's rapid growth are its commercial connection with Brazil, symbolized by the 1,600-foot (500-metre) Puente de la Amistad (Friendship Bridge; opened 1964), and its association with the nearby Itaipú Dam on the Paraguay-Brazil border, which is one of the largest hydroelectric facilities in the world. Tourism also plays an important role in the city, and the Itaipú Dam and Iquaçu Falls are popular attractions. Pop. (1990 est.) 110,584.

Ciudad de México: *see* Mexico City.

Ciudad Delicias, city, east-central Chihuahua *estado* ("state"), north-central Mexico, southeast of Chihuahua city, the state capital, and near the San Pedro River. It is a commercial and manufacturing centre for an irrigated agricultural area. Cotton, wheat, and wine grapes are the principal crops in the vicinity. The city contains cotton mills. The major highway and railroad linking Ciudad Juárez and Mexico City pass through Ciudad Delicias. Pop. (1980) 65,504.

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Ciudad Guayana, formerly SANTO TOMÉ DE GUAYANA, city and industrial port complex, northeastern Bolívar *estado* ("state"), Venezuela, at the confluence of the Caroní and Orinoco rivers in the Guiana Highlands. Taking its name from the Guiana (Guayana) region, the traditional designation of Bolívar state, it was founded by the state assembly in 1961, uniting Puerto Ordaz (the hub of the complex, 67 miles [108 km] east of Ciudad Bolívar), San Félix (a port on the Caroní), Matanzas (a steel centre), Caruachi, Castillito (the "iron zone," which includes El Pao, Cerro Bolívar, San Isidro, Palúa, and Ciudad Piar), El Callao gold mines, and the dams and hydroelectric plants of the Macagua and Guri rivers on the Caroní.

The area was first claimed for Spain by the explorer Diego de Ordaz (1532). The original settlement of Santo Tomé de Guayana was founded (1576) on the Chirica tableland, where the Republicans in the war for independence defeated Spanish Royalists at the Battle of San Félix (1817).

Ciudad Guayana was planned to accommodate separate residential, recreational, commercial, and industrial sectors, with facilities for expansion over an area with a 100-mile (160-kilometre) radius. In addition, 550 acres (223 hectares) between the great falls of the Caroní and the Macagua Dam were designated a natural park. The complex is administered by the Corporación Venezolana de Guayana (CVG), an economic planning commission established in 1960.

The Angostura Bridge (completed 1967) across the Orinoco at Ciudad Bolívar (67 miles [108 km] west of Ciudad Guayana) is an important link between the Guiana region and the rest of the country. Ciudad Guayana also has forestry, diamond mining, refractory brick, and paper and pulp enterprises and has attracted numerous small industries. Pop. (1990 est.) 536,506.

Ciudad Guzmán, city, south-central Jalisco *estado* ("state"), west-central Mexico, near Lake Zapotlán's south shore, between the Sierra Tapalpa and the Cerro del Tigre, at 4,944

feet (1,507 m) above sea level. Beans, corn (maize), wheat, and other products grown in the vicinity are processed in the city. Mercury ore is mined in the area. Ciudad Guzmán is on the highway linking Guadalajara, the state capital, 86 miles (138 km) to the north, with Colima, 83 miles (134 km) to the south-southwest. Pop. (1980) 60,938.

Ciudad Hidalgo, city, northeastern Michoacán state, west-central Mexico. It lies at an elevation of 7,740 feet (2,359 m) above sea level, near the Tuxpan River, about 40 miles (65 km) east of Morelia, the state capital. The city, formerly known as Villa Hidalgo, was founded on the site of the Tarascan Indian village of Taximaroa. It is the commercial and manufacturing centre for a hinterland that yields primarily corn (maize), wheat, avocados, and peaches. Among the city's industries are textile mills, tanneries, and potteries. Ciudad Hidalgo is on the Mexico City–Guadalajara highway, 132 miles (212 km) west-northwest of the federal capital. Pop. (1980) 32,311.

Ciudad Juárez (Mexico): *see* Juárez.

Ciudad Mante, city, southern Tamaulipas state, northeastern Mexico. Formerly known as Villa Juárez, it lies at 272 feet (83 m) above sea level just south of the confluence of the Tamesí and Mante rivers and almost due south of Ciudad Victoria, the state capital. In the heart of a sugar-producing region, it is the commercial and manufacturing centre for an area whose agriculture has been greatly expanded through irrigation. Principal crops include tomatoes, lemons, beans, cereals, and vast quantities of sugarcane. Livestock are also raised. The city contains tanneries, distilleries, and sugar refineries, one of which is among Mexico's largest. The region is known for its fishing, hunting, and swimming. Ciudad Mante can be reached by railroad, highway, and air. Pop. (1980) 70,647.

Ciudad Obregón, city, southern Sonora state, northwestern Mexico. It lies in the heart of the Yaqui Valley, at 330 feet (100 m) above sea level on the coastal plain, near the Yaqui River. The climate is hot and dry. With the completion in the 1950s of irrigation projects on the Yaqui, vast areas of farmlands have been brought under cultivation, and Ciudad Obregón has become an important commercial centre with modern buildings and streets, an airport, cotton gins, granaries, and packing plants. Cotton is the major crop in the area, but wheat, rice, sesame, and corn (maize) are also important. In one of Mexico's best hunting areas, it is a popular headquarters for duck hunters. The city houses the Regional Technical Institute of Sonora (1955). It is on the main highways and railroads from Mexicali and Nogales to Mexico City. It was named for the Mexican general and president Álvaro Obregón, who was born in Sonora. Pop. (1980) 165,572.

Ciudad Ojeda, city, Zulia state, northwestern Venezuela. Lying on the northeastern shore of Lake Maracaibo, Ciudad Ojeda is an important oil centre. Just to the south lies the Lagunillas oil field, the largest in Latin America. From derricks on land and in the water, oil is piped to refineries at Cabimas, approximately 20 miles (32 km) to the north, and on the Península de Paraguaná. Ciudad Ojeda is linked by highway to other oil centres on the lake shore and to Maracaibo, the state capital and the nation's second largest city, 40 miles (65 km) to the northwest across the lake. Pop. (1987 est.) 94,870.

Ciudad Real, province, in the Castile-La Mancha *comunidad autónoma* ("autonomous community"), south-central Spain, one of five provinces formed from the ancient Kingdom of New Castile. It has an area of 7,625 square miles (19,749 square km). In the east and centre, high plains form part of the flat, dry windmill region known as La Mancha, characterized in Cervantes' novel *Don Quixote.* The remainder of the province is mountainous, crossed by the Sierra Morena (south) and the Toledo Mountains (northwest). The Guadiana and Guadalquivir river systems drain the region.

Cereals, grapes, and olives are cultivated, and wine, especially that of Valdepeñas, is the region's main product. Sheep pasturing is carried on in La Mancha. Mercury is mined at Almadén and coal at Puertollano, near which a modern industrial complex has been built. Industrial development, however, apart from that based on agriculture, is slight and is concentrated in the provincial capital of Ciudad Real (*q.v.*). Other principal towns are Puertollano, Tomelloso, Valdepeñas, and Alcázar de San Juan. Pop. (1986 est.) 481,320.

Ciudad Real, city, capital of Ciudad Real province, in the Castile-La Mancha *comunidad autónoma* ("autonomous community"), south-central Spain, on a fertile plain watered by the Guadiana and Jabalón rivers. It was founded in 1255 by Alfonso X the Wise as Villa Real and was given the status of a *ciudad* (city) by John II in 1420. Late in the 15th century it became the seat of the Inquisition Tribunal, subsequently moved to Toledo, 65 miles (105 km) north. Notable landmarks include remains of the 14th-century walls; the mudejar Gate of Toledo (Puerta de Toledo; built 1328), a national monument; and the 15th-century Gothic Cathedral of Santa María del Prado. Ciudad Real is the focus of a road network and an agricultural processing and market centre; lumbering, flour milling, and liquor distilling are carried on. Pop. (1986 est.) 53,233.

Ciudad Rodrigo, city, Salamanca province, in the Castile-León *comunidad autónoma* ("autonomous community"), near the Portuguese border in western Spain. Named for Count Rodrigo González, who founded it in 1150, the city, situated on a rise above the Agueda River, was fortified and became a bishopric under Ferdinand II of León. In the Peninsular War it was besieged and captured by the French (1810) and later retaken by the British and Spanish guerrillas under Wellington (1812).

The whole urban area within the medieval walls has been declared a historic-artistic monument. Much of the architecture is in the richly ornate Plateresque, or Spanish Renaissance, style. Outstanding landmarks include a Roman bridge spanning the river, the 12th-century cathedral (completed 14th century; restored 1538), and the medieval castle (1382). It is a trade centre for the surrounding agricultural region; tourism is also economically important. Pop. (1981) 14,766.

Ciudad Universitaria, a northern sector of Madrid. The 16th-century Universidad de Madrid (then the Universidad de Alcalá de Henares) was moved to the San Bernardo neighbourhood of Madrid in 1836; it was again relocated in the late 1920s to its present site. Destroyed during the Spanish Civil War, it has since been rebuilt. Flanked by the Sierra de Guadarrama, the "city" includes the faculties of political science, economics and commerce, philosophy and letters, law, medicine, science, pharmacy, and veterinary medicine. Along the Calle (street) de la Princesa, leading from the university to the centre of Madrid, are student residences.



José Antonio College at Ciudad Universitaria, Madrid

Shostal—EB Inc

Ciudad Victoria, city, capital of Tamaulipas state, northeastern Mexico. It lies 1,053 feet (321 m) above sea level on the San Marcos River and is about 290 miles (470 km) north of Mexico City. The settlement was founded in 1750, and in 1825 it was named for the first president of Mexico, Guadalupe Victoria. Henequen (a source of hemp), fruits and vegetables, sugarcane, cereals, and livestock are processed in the city, and there is some lumbering and mining (silver, gold, lead, and copper). It is also a tourist centre and headquarters for hunting, fishing, and swimming. In 1956 the Autonomous University of Tamaulipas was established there. The city is a transportation hub, accessible by railroad, air, and several major highways. Pop. (1980) 140,161.

civet, also called CIVET CAT, any of a number of long-bodied, short-legged carnivores of the family Viverridae. There are about 15 to 20 species, placed in 10 to 12 genera. Civets are found in Africa, southern Europe, and



African palm civet (*Nandinia binotata*)

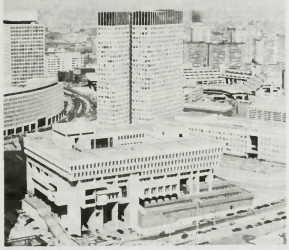
Robert C. Hermes from The National Audubon Society Collection/Photo Researchers—EB Inc

Asia. Rather catlike in appearance, they have thickly furred tails, small ears, and pointed snouts. The coloration varies widely among the species but commonly is buff or grayish with a pattern of black spots or stripes or both. Length ranges from about 40 to 85 cm (16 to 34 inches), with the tail accounting for another 13 to 66 cm (5 to 26 inches), and weight ranges from 1.5 to 11 kg (3.3 to 24 pounds). The anal glands of civets open under the tail into a large pouch in which a greasy, musklike secretion accumulates. This secretion, known as civet, is used by the animals in marking territories. The secretion of the lesser Oriental civet, or rasse (*Viverricula indica*), and of the Oriental and African civets (*Viverra*) is employed commercially in the manufacture of perfume.

Civets are usually solitary and live in tree hollows, among rocks, and in similar places, coming out to forage at night. Except for the arboreal palm civets, such as *Paradoxurus* (also known as toddy cat because of its fondness for palm juice, or "toddy") and *Nandinia,* civets are mainly terrestrial. The otter civet (*Cynogale bennetti*), African civet (*Viverra,* sometimes *Civetictis, civetta*), and the rare Congo water civet (*Osbornictis piscivora*) are semiaquatic. Civets feed on small animals and on vegetable matter. Their litters usually consist of two or three young.

The *Red Data Book* lists five civets considered to be in possible danger of extinction; among these are the Malagasy civet (*Fossa fossa*) and the otter civet.

civic centre, grouping of municipal facilities into a limited precinct often adjacent to the central business district. In smaller cities the civic centre is sometimes combined with the cultural centre. The civic centre has its ultimate base in the Hellenistic concept of an acropolis and in the Roman idea of a forum. As municipal functions grew in scope and personnel, the idea of a central location and arrangement became popular.



Government centre complex, Boston, with the City Hall in the foreground and the John F. Kennedy Federal Building (twin towers) at centre
Ewing Galloway

The site of a civic centre can be effectively located at the population centre, geographic centre, or the business centre of the locality. Of necessity, some municipal functions such as police, fire, and welfare agencies must be placed in each neighbourhood of the city or town. The headquarters for these services, however, are often located in the civic centre.

The size of the city served determines the range and number of the municipal services required, which, in turn, determine the size of the site. The program for a small civic centre includes a city hall, headquarters for police, fire, and welfare departments, courtrooms, post office, and possibly the central library. A large city will require public utility offices, public health facilities, and office space for county, state, and national government functions as well. It is also desirable to include parkland or at least open space in the plan. Toronto has an architecturally and spatially well-planned civic centre. One unfortunate aspect of this kind of inner urban planning is that the cities that have the means to build a civic centre frequently lack the necessary space, and cities that have enough space often lack the proper funds.

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civic theatre, professional or amateur theatre that is wholly or partly subsidized by the city in which it is located. The term is sometimes used interchangeably with community theatre, meaning a noncommercial, locally based group. European countries such as France, Denmark, and Germany have a long tradition of both national and municipal support for local theatre. In Great Britain, city governments are empowered to levy a tax to support theatrical productions. In contrast to the generally professional theatres of Europe, most civic theatres in the U.S. were at one time amateur, with a professional manager-director; later, the resident professional theatre became a civic theatre in effect. The first major U.S. civic theatre was Le Petit Théâtre de Vieux Carré, established in New Orleans in 1919. By the mid-20th century, civic theatres were an important part of cultural centres.

Cividale del Friuli, town, Udine province, Friuli-Venezia Giulia region, northeastern Italy, on the Natisone River just northeast of Udine city. Founded in Roman times as Forum Julii, perhaps by Julius Caesar, it gave its name to, and was the capital of, Friuli, the first Lombard duchy formed in Italy. From 730 to 1238 it was the residence of the patriarchs of Aquileia. It fell to Venice with the rest of Friuli in 1419–20. Paul the Deacon (*c.* 720–799) and the actress Adelaide Ristori (1822–1906) were born there. Cividale del Friuli has some interesting relics from the 8th century, including the octagonal baptistery, the chapel (Tempietto) of the nunnery of Sta. Maria in Valle, and the altar of the church of S. Martino. Other notable landmarks include the cathedral (rebuilt 1458 and 1502), the Ponte del Diavolo (Devil's Bridge; 1442) over the river, the national archaeological museum with Gothic and Lombard antiquities, and several medieval churches and palaces. Cividale del Friuli is a commercial centre with light manufactures. Pop. (1990 est.) mun., 11,081.

Civil Constitution of the Clergy, French CONSTITUTION CIVILE DU CLERGÉ (July 12, 1790), during the French Revolution, an attempt to reorganize the Roman Catholic Church in France on a national basis. It caused a schism within the French Church and made many devout Catholics turn against the Revolution.

There was a need to create a new administrative and financial framework for the French Church after the Revolutionary governing body, the National Assembly, in its reforming efforts, had abolished the collection of tithes and had confiscated church lands. The main features of the proposed Civil Constitution of the Clergy were to reduce the number of bishops from 135 to 83, to have each diocese correspond to a *département* (the basic territorial administrative unit established by the Assembly), to have enfranchised citizens elect bishops and parish priests, and to have the state pay the clergy's wages.

Although passed by the Assembly with a large majority on July 12, 1790, and formally sanctioned by King Louis XVI on August 24, the Civil Constitution soon provoked much opposition. Many clerics disagreed with its strict subordination of the church to the state and with the limitation of the pope's jurisdiction to spiritual affairs. On Nov. 27, 1790, the National Constituent Assembly ordered the clergy to take an oath declaring their support of the nation's constitution and thus, indirectly, of the reorganization of the church. Priests were faced with the dilemma of accepting the Civil Constitution (which by then had been condemned by a number of bishops) or of losing their parishes. Only seven bishops and about one-half of the parish priests took the oath. Thus, the church in France was split between the nonjurors (refractory priests) and the jurors (constitutional priests). A continuation of the conflict became unavoidable when Pope Pius VI condemned the Civil Constitution in the spring of 1791. The various Revolutionary governments of the early 1790s took harsh measures against the nonjuring clergy as enemies of the state, although in some areas, especially in western France, they were supported by the people. The schism ended under Napoleon's rule with the Concordat of 1801.

civil defense, in war or national defense, all nonmilitary actions taken to reduce loss of life and property resulting from enemy action. It includes defense against attack from conventional explosive bombs or rockets, nuclear weapons, and chemical or biological agents. During World War II the threat of aerial attack on cities became sufficiently great to call for organized civil defense planning. Although a few special air-raid shelters had been built in Great Britain and Hawaii, civil defense tactics during the interwar years consisted principally of utilizing improvised shelters, such as basements and subways. Germany built special bunkers for a small fraction of its population, and these proved to be effective in saving lives. Other World War II civil defense tactics included blackouts to reduce the glow from city lights that could guide enemy pilots. The British government provided its people with gas masks, and practically all countries involved in the war trained citizens in fire fighting, rescue, and medical first aid.

The relatively small weapons used in World War II had afforded time for people to learn by experience that shelters were safer than ordinary buildings, and for civil defense volunteers to be recruited and trained after the war had begun. But with nuclear weapons that can destroy whole metropolitan areas at one blow, there is no opportunity to learn from repeated attacks because the first attack, in all probability, will accomplish its mission.

These radical increases in destructive force caused equally radical changes in civil defense policies. Although almost any shelter provided reasonable protection against conventional bombs, nuclear weapons required a policy of locating and marking sites that offered the best possible protection in the area. Consideration was also given to the evacuation of urban centres if an attack seemed imminent. With the advent of shorter warning times and with better understanding of the radiation hazards of fallout, however, this policy lost its appeal except as a possible pre-first-strike measure to be employed by an aggressor nation.

From the 1960s on, the attitude of the public in the West ranged from apathy to a crusading zeal for national defense and survival. Some peace organizations opposed all civil defense measures as futile and likely to encourage the acceptance of war as inevitable. The Soviet Union organized the most comprehensive civil defense program, with compulsory public training and drills, periodic alerts, and widespread dissemination of information and propaganda.

Significant civil defense measures that may be taken in peacetime include provision of warning and of communications; training of the populace in first-aid means and in radiological monitoring; reduction of fire hazards; and modification of building codes and general urban planning to incorporate such features as increased structural strengths and fireproofing of buildings, duplicate and emergency public utility services, community shelters, and wide streets and adequate parks to provide firebreaks.

civil disobedience, also called PASSIVE RESISTANCE, refusal to obey the demands or commands of a government or occupying power, without resorting to violence or active measures of opposition; its usual purpose is to force concessions from the government or occupying power. Civil disobedience has been a major tactic and philosophy of nationalist movements in Africa and India, in the civil rights movement of U.S. blacks, and of labour and anti-war movements in many countries.

Civil disobedience is a symbolic or ritualistic violation of the law, rather than a rejection of the system as a whole. The civil disobedient, finding legitimate avenues of change blocked

or nonexistent, sees himself as obligated by a higher, extralegal principle to break some specific law. It is because civil disobedience is a crime, however, and known by actor and public alike to be punishable that the act serves as a protest. By submitting to punishment, the civil disobedient hopes to set a moral example that will provoke the majority or the government into effecting meaningful political, social, or economic change. Under the imperative of setting a moral example, the major spokesmen of civil disobedience insist that the illegal actions be nonviolent.

A variety of criticisms has been directed against the philosophy and practice of civil disobedience. The radical critique of the philosophy of civil disobedience condemns its acceptance of the existing political structure; conservative schools of thought, on the other hand, see the logical extension of civil disobedience as anarchy and the right of the individual to break any law he chooses, at any time. Activists themselves are divided in interpreting civil disobedience either as a total philosophy of social change or as merely a tactic to be employed when the movement lacks other means. On a pragmatic level, the efficacy of civil disobedience hinges on the adherence of the opposition to a certain morality to which an appeal can ultimately be made.

The philosophical roots of civil disobedience lie deep in Western thought: Cicero, Saint Thomas Aquinas, John Locke, Thomas Jefferson, and Henry David Thoreau all sought to justify conduct by virtue of its harmony with some antecedent superhuman moral law. The man who most clearly formulated the concept of civil disobedience for the modern world was Mohandas Gandhi. Drawing from Eastern and Western thought, Gandhi developed the philosophy of *satyāgraha* (*q.v.*). First in the Transvaal of South Africa in 1906 and later in India, Gandhi led his people in *satyāgrahas* to obtain equal rights and freedom. Inspired by Gandhi's example, the civil-rights movement of the American blacks from the 1950s to the 1970s adopted the tactics and philosophy of civil disobedience, perhaps best expressed by Martin Luther King, Jr. Later the tactics of civil disobedience were employed by a variety of protest groups.

The principle of civil disobedience has achieved some standing in international law through the war crime trials at Nürnberg after World War II, which affirmed the principle that an individual may, under certain circumstances, be held accountable for failure to break the laws of his country.

civil engineering, the profession of designing and executing structural works that serve the general public.

A brief treatment of civil engineering follows. For full treatment, *see* MACROPAEDIA: Engineering; Public Works.

Civil engineering is a form of human activity that has been pursued as long as human beings have sought to change the natural environment for their own benefit. It is well described by the definition given in 1828 by Thomas Tredgold when the British Institution of Civil Engineers was applying for its charter:

> That species of knowledge which constitutes the profession of a Civil Engineer; being the art of directing the great sources of power in Nature for the use and convenience of man, as the means of production and of traffic in States both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks, for internal intercourse and exchange; and in the construction of ports, harbours, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce; and in the construction and adaptation of machinery; and in the drainage of cities and towns.

Of course, added to this are the particular forms of construction that serve modern needs, such as airports, highways, dams, tunnels, and power stations of various types, but these are minor refinements on the general theme of the civil engineer as the creator of the physical infrastructure on which any level of civilization depends.

Although essentially a practical profession, civil engineering is founded on applied science, and training is based on the appropriate courses in engineering as well as in ecology and public health. To this theoretical knowledge are added several years of practical training and experience under the direction of a practicing civil engineer. The total period of education and training required for the attainment of full professional status varies among countries but commonly is in the range of 8 to 10 years.

The profession of civil engineering can be divided into three broad categories, which may be described as consulting, contracting, and municipal engineering. The consulting civil engineer is the technical adviser to the client, who may be an individual, a commercial firm, or a government department. The consulting engineer is the designer of projects, and the duties generally include the outline preparation of a project and an estimate of cost; surveys and site investigation; the detailed design of the project, including drawings, specifications, schedules of quantities, and forms of contracts; advice to the client on which construction bid to accept; and administration of contracts and supervision of the execution of the work. In the execution of contracts the consulting engineer may be required to act in a quasi-judicial capacity to decide on various questions that may arise between the client and the contractor. Consulting engineers usually work in partnership with a small number of other engineers, and it is usual for such partnerships to specialize in a particular branch of engineering, such as transport, water supply, dams, large buildings, and so on.

The task of actually building the project is the responsibility of a firm of contractors, and firms that handle many government projects employ professional civil engineers capable of interpreting the design and of devising methods for carrying out the work. It is they who organize and control both labour and machines. The duties of the contracting civil engineer are to make detailed surveys of site conditions, to obtain information about the supply of materials, to plan in detail how the work shall be carried out, and determine what kind and quantity of both machines and manpower will be required.

The municipal engineer serves local or state government directly in planning and supervising the construction and management of water-supply and sewage-disposal systems, roads and bridges, public-transport systems, public buildings, and many other significant features of modern life. In addition to a variety of engineering work, the municipal engineer is also to a large extent responsible for the welfare, health, and safety of the community that is served.

Civil Guard, Spanish GUARDIA CIVIL, paramilitary national police force of Spain, engaged primarily in maintaining order in rural areas and in patrolling the frontiers and the highways. The Civil Guard is commanded by a lieutenant general of the army but is part of the Ministry of the Interior. It was created in 1844, and its first accomplishment was the suppression of brigandage in southern Spain.

In its service of successive governments the Civil Guard combatted, as forms of sedition, the organization of labour and republicanism and came to be regarded by the peasantry as an instrument of oppression by the state. In northeastern Spain a tradition of resentment persisted into the 1980s in the Basque and Catalan regions, where the Civil Guard opposed advocates of autonomy or separatism.

civil law, also called ROMANO-GERMANIC LAW, the law of continental Europe, based on an admixture of Roman, Germanic, ecclesiastical, feudal, commercial, and customary law. European civil law has been adopted in much of Latin America as well as in parts of Asia and Africa and is to be distinguished from the common law of the Anglo-American countries.

The term civil law has other meanings not employed in this article. The term *jus civile,* meaning "civil law," for example, was used in ancient Rome to distinguish the law found exclusively in the city of Rome from the *jus gentium,* the law of all nations, found throughout the empire. The phrase has also been used to distinguish private law, governing the relations among individuals, from public law and criminal law. Finally, the national law of a country is sometimes called civil law, in contrast to international law.

A brief treatment of civil law follows. For full treatment, *see* MACROPAEDIA: Legal Systems, The Evolution of Modern Western; Procedural Law.

Until the 5th-century invasions of the Roman Empire by Germanic tribes, Roman law prevailed in western Europe. The laws of the Franks, Burgundians, Goths, and Lombards largely replaced it. Several hundred years later, as universities came into being, scholars rediscovered Roman law. Its study and application spread, first throughout northern Italy, then into Germany and the Netherlands, all territories of the Holy Roman Empire. The Holy Roman (or German) emperors regarded themselves as the successors of imperial Rome. They therefore accepted the *corpus juris civilis,* the code established by the Byzantine emperor Justinian in the 6th century, as being still in effect.

The old Germanic feudal and ecclesiastical laws were not wholly replaced, however, but were fused with the Roman laws. In the system thus formed, Roman law was strongest in such matters as contracts, whereas church law dominated marital questions; and a fusion of both with Germanic tradition governed property and the succession to titles and estates. This system took the Latin name *jus civile,* or civil law, and was one of the chief factors underlying the unity that prevailed in western Europe until the Reformation.

The Reformation and the rise of nationalism led to a series of codifications of civil law along national lines, beginning in the 17th century. The most significant of these codifications were the French (the Code Napoléon, established in 1804) and the German. These codes each serve as the model for a major division of the civil-law system. The French group includes, in addition to France and its former possessions overseas, The Netherlands, Belgium, Luxembourg, Italy, Spain, and many Latin-American countries. The German group includes Germany, Austria, Switzerland, the Scandinavian countries, and certain countries outside Europe, such as Japan, that have westernized their legal systems.

The French Revolution established the idea that the basis of law is statute, not custom. Customs were to be tolerated as the basis of laws only until they were replaced by statutes. The civil code that Napoleon enacted sought to express all laws in written language comprehensible to the average citizen. It also sought to avoid ruptures with tradition where possible. The code is expressed in short articles arranged in a comprehensive and logical manner. It remained almost unchanged until 1875, when the Third Republic introduced many new statutes reflecting the social and economic changes that had taken place since the time of Napoleon. Even more amendments have taken place in the 20th century.

The civil code exercises firm jurisdiction over marriage, divorce, inheritance, ownership of real estate and of movable property, and gifts. Contracts and torts are dealt with very briefly in the code, leaving the courts considerable latitude in these matters.

The civil law in Germany is largely based on the Juristenrecht, a system worked out by the legal profession over a long period from the 15th century until 1896, when the German civil code was proclaimed. The German system attempts to be more precise than the French and to be more detailed in areas in which the French code is cursory. Its wording is more subdued and its tone less didactic. As modified for conditions in Germany today, the code is aimed at preserving social democracy.

Civil List, in the United Kingdom, the list of sums appropriated annually by Parliament to pay the expenses of the sovereign and his or her household. The sums are charged to the government's Consolidated Fund and audited by the treasury.

The custom of the Civil List dates back to 1689, when Parliament, on the accession of William and Mary, voted £600,000 specifically for civil expenses. Through the first Civil List Act in 1697, revenues estimated to yield about £700,000 were assigned to the monarch to cover civil and royal expenses. Previously these expenses had been paid entirely from the monarch's hereditary revenues and from certain taxes voted to him for life by Parliament.

During the reign of George I, the Civil List became a fixed sum, with Parliament paying any debts that were incurred. For George II there were assigned revenues in addition to fixed grants and a guaranteed total of £800,000. George III made a political tool of his Civil List (at a fixed sum of £800,000), rewarding his supporters in Parliament with secret pensions and bribes. Parliament, in turn, sometimes used a sovereign's dependence on the Civil List as a means of persuading him to give up other income or powers. The Civil List Act of 1762, providing supervision of the account, prevented the amending of pensions.

On his accession in 1820 George IV received an annual Civil List of £845,727. In 1830 the amount was reduced to £510,000 for William IV, but for the first time the account was intended to cover only royal expenditures. Further changes came during Queen Victoria's reign (1837–1901) when she was allowed to grant pensions, on the advice of her ministers, to persons who had achieved distinction in the arts, literature, or science or had given personal services to the crown—a custom that continued with her successors.

Queen Elizabeth II received a Civil List of £475,000 when she came to the throne in 1952, but inflation affected the list over the years, and by the late 20th century the Civil List amounted to more than £5,000,000 annually.

The Civil List acts of the period 1901 to 1937 provided an annuity of £70,000 to the widow of a sovereign. They also provided funds for members of the royal family who undertake official duties.

Civil Rights Act (1964), comprehensive U.S. legislation intended to end discrimination based on race, colour, religion, or national origin; it is often called the most important U.S. law on civil rights since Reconstruction (1865–77). Title I of the act guarantees equal voting rights by removing registration requirements and procedures biased against minorities and the underprivileged. Title II prohibits segregation or discrimination in places of public accommodation involved in interstate commerce. Title VII bans discrimination by trade unions, schools, or employers involved in interstate commerce or doing business with the federal government. The latter section also applies to discrimination on the basis of sex and established a government agency, the Equal Employment Opportunity Commission (EEOC), to enforce these provisions. The act also calls for the desegregation of public schools (Title IV), broadens the duties of the Civil Rights Commission (Title V), and assures nondiscrimination in the distribution of funds under federally assisted programs (Title VI).

The Civil Rights Act was a highly controversial issue in the United States as soon as it was proposed by President John F. Kennedy in 1963. Although Kennedy was unable to secure passage of the bill in Congress, a stronger version was eventually passed with the urging of his successor, President Lyndon B. Johnson, who signed the bill into law on July 2, 1964, following one of the longest debates in Senate history. White groups opposed to integration with blacks responded to the act with a significant backlash that took the form of protests, increased support for pro-segregation candidates for public office, and some racial violence. The constitutionality of the act was immediately challenged and was upheld by the Supreme Court in the test case *Heart of Atlanta Motel* v. *U.S.* (1964). The act gave federal law enforcement agencies the power to prevent racial discrimination in employment, voting, and the use of public facilities.

Civil Rights Movement, in the United States, mass movement starting in the late 1950s that, through the application of nonviolent protest action, broke the pattern of racially segregated public facilities in the South and achieved the most important breakthrough in equal-rights legislation for blacks since the Reconstruction period (1865–77).

Denied constitutional guarantees (1787) because of their mainly slave status at the founding of the republic, black Americans were first promised fundamental citizenship rights in the 13th–15th constitutional amendments (1865–70; *see* Reconstruction). The Civil Rights Act of 1875 required equal accommodations for blacks with whites in public facilities (other than schools), but this legislation was effectively voided by the Supreme Court in 1883. By 1900, 18 states of the North and West had legislated public policies against racial discrimination, but in the South new laws eroded the franchise (*see* grandfather clause) and reinforced segregation practices (*see* Jim Crow Law), while the U.S. Supreme Court upheld "separate but equal" facilities for the races in *Plessy* v. *Ferguson* (1896), thus legitimizing the segregation of blacks from whites.

During World War II, progress was made in outlawing discrimination in defense industries (1941) and after the war in desegregating the armed forces (1948). During the late 1940s and early 1950s, lawyers for the National Association for the Advancement of Colored People (NAACP) pressed a series of important cases before the Supreme Court in which they argued that segregation meant inherently unequal (and inadequate) educational and other public facilities for blacks. These cases culminated in the Court's landmark decision in *Brown* v. *Board of Education of Topeka, Kan.* (May 17, 1954), in which it declared that separate educational facilities were inherently unequal and therefore unconstitutional. This historic decision was to stimulate a mass movement on the part of blacks and white sympathizers to try to end the segregationist practices and racial inequalities that were firmly entrenched across the nation and particularly in the South. The movement was strongly resisted by many whites in the South and elsewhere.

After a black woman, Rosa Parks, was arrested for refusing to move to the Negro section of a bus in Montgomery, Ala. (Dec. 1, 1955), blacks staged a one-day local boycott of the bus system to protest her arrest. Fusing these protest elements with the historic force of the Negro churches, a local Baptist minister, Martin Luther King, Jr., succeeded in transforming a spontaneous racial protest into a massive resistance movement, led from 1957 by his Southern Christian Leadership Conference (SCLC). After a protracted boycott of the Montgomery bus company forced it to desegregate its facilities, picketing and boycotting spread rapidly to other communities. During the period from 1955 to 1960, some progress was made toward integrating schools and other public facilities in the upper South and the border states, but the Deep South remained adamant in its opposition to most desegregation measures.

In 1960 the sit-in movement (largely under the auspices of the newly formed Student Nonviolent Coordinating Committee; SNCC) was launched at Greensboro, N.C., when black college students insisted on service at a local segregated lunch counter. Patterning its techniques on the nonviolent methods of Indian leader Mohandas Gandhi, the movement spread across the nation, forcing the desegregation of department stores, supermarkets, libraries, and movie theatres. In May 1961 the Congress of Racial Equality (CORE) sent "Freedom Riders" of both races through the South and elsewhere to test and break down segregated accommodations in interstate transportation. By September it was estimated that more than 70,000 students had participated in the movement, with approximately 3,600 arrested; more than 100 cities in 20 states had been affected. The movement reached its climax in August 1963 with a massive march on Washington, D.C., to protest racial discrimination and demonstrate support for major civil-rights legislation that was pending in Congress.

The federal government under presidents Dwight D. Eisenhower (1953–61) and John F. Kennedy had been reluctant to vigorously enforce the *Brown* decision when this entailed directly confronting the resistance of Southern whites. In 1961–63 President Kennedy won a following in the black community by encouraging the movement's leaders, but Kennedy's administration lacked the political capacity to persuade Congress to pass new legislation guaranteeing integration and equal rights. After President Kennedy's assassination (November 1963), Congress, under the prodding of President Lyndon B. Johnson, in 1964 passed the Civil Rights Act (*q.v.*). This was the most far-reaching civil rights bill in the nation's history (indeed, in world history), forbidding discrimination in public accommodations and threatening to withhold federal funds from communities that persisted in maintaining segregated schools. It was followed in 1965 by the passage of the Voting Rights Act, the enforcement of which eradicated the tactics previously used in the South to disenfranchise black voters. This act led to drastic increases in the numbers of black registered voters in the South, with a comparable increase in the numbers of blacks holding elective offices there.

Up until 1966 the Civil Rights Movement had united widely disparate elements in the black community along with their white supporters and sympathizers, but in that year signs of radicalism began to appear in the movement as younger blacks became impatient with the rate of change and dissatisfied with purely nonviolent methods of protest. This new militancy split the ranks of the movement's leaders and also alienated some white sympathizers, a process that was accelerated by a wave of rioting in the black ghettos of several major cities in 1965–67. After the assassination of King (April 1968) and further black rioting in the cities, the movement as a cohesive effort disintegrated, with a broad

spectrum of leadership advocating different approaches and varying degrees of militancy.

In the years that followed, many civil rights leaders sought to achieve greater direct political power through elective office, and they sought to achieve more substantive economic and educational gains through affirmative-action programs that compensated for past discrimination in job hiring and college admissions. During the later 1970s and the '80s the civil rights movement was less militant but still persevering.

civil service, the body of government officials who are employed in civil occupations that are neither political nor judicial. In most countries it refers to employees selected and promoted on the basis of a merit and seniority system, which may include examinations.

A brief treatment of civil service follows. For full treatment, *see* MACROPAEDIA: Public Administration.

The civil service is a professional body of individuals employed by the state in an administrative capacity. Ideally, it is a nonpolitical body whose members serve in the military, constabulary, ministerial, or diplomatic branches of government. Civil servants are generally regarded as experts in public affairs and administration and are often utilized as neutral advisers by those responsible for state policy. Although the role of the civil service is not to make official decisions, it can assist in their implementation. The civil service is structured in standard bureaucratic fashion with a fixed hierarchy of positions extending from lower offices to a superior command. Each position maintains specific powers and responsibilities; individuals can work their way up the hierarchy through promotion.

The origins of civil service can be traced back to the ancient Middle Eastern river civilizations whose needs for civil organization presaged the complex bureaucracies of the ancient Egyptians and Greeks. With the Roman Empire came a highly sophisticated network of administrative offices, which was later adopted by the Roman Catholic Church. All branches of government were run by individual hierarchies, with each headed by an official of the state. The Chinese civil service (*q.v.*), founded by the Han dynasty in the 2nd century BC, survived until 1912; entrance into the civil service was gained by passing stringent examinations that emphasized knowledge of Chinese classics, but they were also designed to evaluate practical skills.

The basis for modern civil services dates back to 17th- and 18th-century Prussia and the electors of Brandenburg. These electors, who were later to become the kings of Prussia, strengthened the army and centralized the government to ensure maximum stability. Special government agents were sent to the provinces to help implement crown policy; they were later absorbed into an official civil service. At first these civil servants were involved only with military matters, but their responsibilities soon extended to civil affairs. The recruitment and installation of civil servants was formalized in the General Code of 1794, the principles of which are still applicable in modern times.

Similar efforts in bureaucratization were made by France, Great Britain, and the United States in the 18th and 19th centuries. Great Britain's efforts to organize an effective bureaucracy began during its involvement in governing India during the late 1700s. Eventually the tenets of the British civil service in India formed the basis for a similar body at home. In the United States, civil service recruitment under the patronage system gave way to the creation of the U.S. Civil Service Commission after 1883. The successor agencies of the commission continue to control entry to federal positions through examinations and the merit system.

The revolutions of the early 20th century led to great changes in the civil services of present-day Communist nations. After destroying the traditional structures of the tsarist regime, the Communist Party in Russia was initially opposed to the idea of a strong administrative body, but eventually it established the Soviet Commission and an efficient civil service based on the classic German and French systems. Although Communist China was at first wary of creating an elite bureaucracy, it adapted its long tradition of strong administrative organization to the task of solving the country's pressing economic problems.

Since the times when officials were appointed from the monarch's personal favourites, senior civil servants have never held secure positions. (The most extreme example is the United States, where senior officials ordinarily change with each new administration.) Strict guidelines for entry into the lower-ranked positions were established in Europe during the 19th century to minimize political favouritism and ensure a wide range of knowledge and skills in the civil services. Competition has traditionally been involved in the appointment of civil servants, often in the form of formal examinations or interviews.

civil service, Chinese: *see* Chinese civil service.

Civil War: *see* American Civil War; English Civil Wars; Greek Civil War; Spanish Civil War.

Civil War of AD 672 (Japan): *see* Jinshin-no-ran.

Civilian Conservation Corps (CCC; 1933–42), one of the earliest New Deal programs, established to relieve unemployment during the Great Depression by providing national conservation work primarily for young unmarried men. Projects included planting trees, building flood barriers, fighting forest fires, and maintaining forest roads and trails.



Members of the CCC planting trees in Lolo National Forest, Montana, 1938
By courtesy of the U.S. Forest Service

Recruits lived in work camps under a semimilitary regime; monthly cash allowances of $30 were supplemented by provision of food, medical care, and other necessities. The CCC, which at its largest employed 500,000 men, provided work for a total of 3,000,000 during its existence.

Civilis, Gaius Julius (fl. 1st century AD), Batavi chieftain and a Roman army officer who led a rebellion on the Rhine frontier against Roman rule in AD 69–70. His story is known only from Tacitus' vivid account.

Civilis was suspected of disloyalty by Aulus Vitellius when the latter was acclaimed emperor in January 69. Later that year a supporter of the rival emperor, Vespasian, urged Civilis to prevent German reinforcements from reaching Vitellius. Civilis complied, inducing the Batavi, followed by German tribes across the Rhine, to attack the Roman legions. He won control of the region and after the death of Vitellius continued the revolt against Vespasian.

The Gallic tribes who joined Civilis proclaimed a Gallic empire. Vetera was burned along with all Roman camps north of Moguntiacum (now Mainz). Some of the Roman soldiers were forced to swear allegiance to the new regime, and others were massacred. Reinforced troops, however, entered Moguntiacum, and the tide turned in favour of Rome. Civilis and the other rebel generals made their last stand on the Batavian "island" across the Vahalis (now Waal) River. He was evidently allowed to surrender on favourable terms, but nothing further is known of him.

Civilista, English CIVILIAN, member of a Peruvian political movement of the late 19th and early 20th centuries that opposed military control of the government. The party of the Civilistas, the Partido Civilista, was founded in 1871 by Manuel Pardo to oppose the corrupt military regime of President José Balta (served 1868–72). Pardo was elected president in May 1872, taking office that summer after a military coup to block his accession failed.

The first civilian president in Peruvian history, Pardo espoused a traditional liberal program of decentralized government, state-supported education, and economic nationalism, but his insistence on reducing the power of the military left the nation unprepared when the War of the Pacific (1879–83) broke out. In 1879 Nicolás de Piérola, another military man, succeeded in seizing control of the government from the Civilistas, but he was turned out by the Chileans in 1881. Piérola began a revolt in 1894 and then was elected president in 1895, serving until 1899. He made an accommodation with the Civilistas, thus initiating a period of relative stability.

José Pardo y Barreda, an able Civilista president, served two terms (1904–08 and 1915–19); he led efforts to enact labour-reform laws, moved forcefully to improve primary education, and oversaw fiscal reforms directed by the treasury minister Augusto B. Leguía y Salcedo, who followed Pardo as president in 1908–12. The Civilista movement waned when Leguía turned his second term as president into a dictatorship (1919–30), thereby increasing the appeal of left-wing political groups.

Civita Castellana, town, Viterbo province, Lazio (Latium) region, central Italy. It lies along the Treia River, just southeast of the town of Viterbo. Civita Castellana stands on the site of the 9th-century-BC Falerii Veteres ("Old Falerii"), the capital of the Faliscans, a tribe belonging to the Etruscan confederation against Rome. Faliscan vases have been found in its very rich necropolis. The city was destroyed by the Romans in 395 BC and again in 241 BC, and its inhabitants were moved to the plain where Falerii Novi ("New Falerii") was built; ruins of that settlement's walls still stand. The original site was repopulated in the 8th and 9th centuries AD, when it belonged to the Roman Catholic Church. It was raised to an episcopal see in 990 and was given the title of *civitas* (city-state) in 998 by Pope Gregory V. In the 14th century it passed to the princes Savelli. Orte (1437) and Gallese (1805) were later united with it. Notable buildings in Civita Castellana include the cathedral, begun in the 7th century and rebuilt in the 12th and 13th centuries, and the imposing pentagonal Castella fort commissioned by Pope Alexander VI in 1494. Agriculture (cereals, wine) and the ceramics industry are the chief occupations. Pop. (1984 est.) mun., 15,736.

Civitanova Marche, town, Macerata province, Marche region, central Italy, east of Macerata city. The town lies on the Adriatic

coast at the mouth of the Chienti River. It is divided into two centres: Portocivitanova, on the coast, and Civitanova Alta, on high ground 3 miles (5 km) inland. It is mainly a tourist resort. Pop. (1988 est.) mun., 36,820.

civitas, plural CIVITATES, citizenship in ancient Rome. Roman citizenship was acquired by birth if both parents were Roman citizens (*cives*), although one of them, usually the mother, might be a *peregrinus* ("alien") with *connubium* (the right to contract a Roman marriage). Otherwise, citizenship could be granted by the people, later by generals and emperors. By the 3rd century BC the plebeians gained equal voting rights with the patricians, so that all Roman citizens were enfranchised, but the value of the voting right was related to wealth because the Roman assemblies were organized by property qualifications. *Civitas* also included such rights as *jus honorum* (eligibility for public office) and *jus militiae* (right of military service)—though these rights were restricted by property qualifications.

As Rome expanded its control in Italy, those who lived in communities with Latin Rights (a status originally granted the cities of Latium) or in *municipia* (autonomous communities) governed their own local affairs while enjoying most rights of Roman citizenship except the right to vote. Also, Latin allies who moved to Rome permanently gained full citizenship, including the franchise. The *socii* (allies), bound to Rome by treaty, ordinarily did not then have the rights of Roman citizens, yet they were bound to do military service and to pay taxes or tribute, depending on the treaty's terms. Unhappy with their increasingly inferior status, the *socii* revolted; the ensuing conflict was called the Social War (90–88 BC), at the close of which full citizenship was conferred on all of Italy south of the Po River.

Beginning in the reign of Julius Caesar (*c.* 48 BC), colonies and *municipia* were established outside the Italian peninsula. Then Roman *civitas* was extended to provincials, but not en masse; granting Roman citizenship to soldiers and aristocrats of provincial origin hastened the pace of Romanization in the western provinces. The significance of Roman citizenship declined in the empire, however, because military service was no longer compulsory, and suffrage was invalidated by the abolition of republican government. In AD 212 the Edict of Caracalla granted citizenship to all free inhabitants of the empire.

Civitas also denoted a favoured provincial community. Some were exempted from tribute payment and Roman judicial jurisdiction. Others received grants of self-government and were not subject to military occupation.

Civitavecchia, town and episcopal see, Roma *provincia,* Lazio (Latium) *regione,* the principal port for Rome and central Italy and the main ferry link with the island of Sardinia. The port, situated on the Tyrrhenian Sea, was founded early in the 2nd century by the emperor Trajan on a stretch of coast known as Centumcellae. The Porto di Traiano ("Trajan's Port") is preserved in the central part of the modern port. The town flourished during late Roman times, but it was attacked by the Vandals and destroyed by the Saracens in 828. The people fled to the Allumiere Mountains, where a walled town was constructed by Pope Leo IV in 854. Later, the inhabitants returned to the old site (hence the name Civitavecchia, meaning "old city").

The keep, commissioned by Pope Paul III, was designed by Donato Bramante and completed by Michelangelo in 1537. The naval arsenal was begun in 1508. By 1870, when it passed to the Kingdom of Italy, the town was one of the most strongly fortified in the Papal States. The French novelist Stendhal was appointed consul there in 1831 and, although he found the city dull, wrote much there during the next decade. Three-fourths of Civitavecchia was destroyed during World War II, and the subsequent reconstruction was spread over a larger area.

In addition to the maritime traffic, industries include metallurgical works and a thermoelectric centre. Pop. (1988 est.) mun., 50,832.

Cixi (Chinese regent): *see* Tz'u-hsi.

Cizin, also spelled KISIN (Mayan: "Stinking One"), Mayan earthquake god and god of death, ruler of the subterranean land of the dead. He may possibly have been one aspect of a malevolent underworld deity who manifested himself under several names and guises (*e.g.,* Ah Puch, Xibalba, and Yum Cimil). In pre-Conquest codices, or manuscripts, the god of death is frequently depicted with the god of war in scenes of human sacrifice. One aspect of the dualistic nature of the Mayan religion is symbolically portrayed in the existing codices, which show Cizin uprooting or destroying trees planted by Chac, the rain god. Cizin is often depicted on pottery and illustrated in the codices in the form of a dancing skeleton, holding a smoking cigarette. He is also known by his death collar, the most prominent feature of which consists of disembodied eyes dangling by their nerve cords. After the Spanish Conquest, Cizin became merged with the Christian devil.

Clackmannan, district, Central region, eastern Scotland. The district was created by the reorganization of 1975; it includes the former county of Clackmannan, or Clackmannanshire, and a fragment of the former county of Perth. It has an area of 62 square miles (161 square km) and is bounded on the southwest by the River Forth, and the River Devon's main course, flowing east–west before turning to join the Forth, separates the carse (estuarian plain) from the moors of the Ochil Hills in the north.

The early inhabitants belonged to the great Celtic tribe known to the Romans as Damnonii. Later the county was part of the district of Mannan, disputed land in central Scotland. Near the end of the 7th century, St. Serf, who had come to the Fife peninsula to convert the Picts, visited Tullibody, Tullicoultry, and Alva; a well at Alva and a bridge over the Devon commemorate his name. The victory of Kenneth MacAlpin, king of the Scots, over the Picts in 844 is said to have taken place near Tullibody, a stone near Baingle Brae marking the battlefield. It is said that in 1559 the bridge over the Devon at Tullibody was broken down to impede the passage of French troops in the service of Mary of Lorraine (or Guise), but the French removed the roof of the church and repaired the bridge. In 1645 the royalist force of the Marquess of Montrose burned Dollar and also Castle Campbell, one of the seats of Montrose's bitter enemy, the Marquess of Argyll. By way of reprisal Argyll burned Menstrie House, the seat of the Earl of Stirling.

Although Clackmannan is primarily industrial, it also has a diversity of agricultural enterprises, ranging from the sheep farms of the Ochils to the lowland farms in the south, built on reclaimed land rich in alluvial soil. Agriculture suffers from land subsidence caused by coal mining, which was one of the former county's main sources of wealth.

Alloa, the seat of the district authority, is the industrial and commercial centre of the area. Pop. (1987 est.) 47,412.

Clactonian industry, early flake-tool tradition of Europe. Rather primitive tools were made by striking flakes from a flint core in alternating directions; used cores were later used as choppers. Flakes were trimmed and used as scrapers or knives. A kind of concave scraper, perhaps used to smooth and shape wooden spears, is typical of the Clactonian industry.

Clactonian tools are similar in appearance to those produced in the Soan industry of Pakistan and in several sites in eastern and southern Africa. The industry dates from the early part of the Mindel-Riss, or Great, Interglacial stage (a major division of the Pleistocene epoch, which occurred from 1,600,000 to 10,000 years ago) and is best known in England from the site of Clacton-on-Sea, Essex, and the Thames River at Swanscombe, Kent. At the latter site the Clactonian industry underlies a well-developed (Middle) Acheulian industry. The significance of the distinctive nature of the Clactonian industry still is not fully understood. The Tayacian industry of France and Israel is believed to be a smaller edition of the Clactonian.

Cladonia, genus of lichens that includes those species commonly known as cup lichen, reindeer moss, and British soldiers (*qq.v.*).

Cladophora, genus of green algae found growing attached to rocks or timbers submerged in shallow lakes and streams; there are some marine species. Coarse in appearance, with regular-branching filaments that have cross walls separating multinucleate segments, *Cladophora* grows in the form of a tuft or ball that may range up to 13 cm (5 inches) in length. Asexual reproduction involves small, motile spores (zoospores) with four flagella; in sexual reproduction the biflagellate gametes unite, although they sometimes develop into new plants without union.

Cladoselache, genus of extinct sharklike fishes of the order Cladoselachii, also known as the order Cladoselachiformes, known from fossilized remains in Late Devonian rocks in North America and Europe (the Late Devonian epoch occurred from 374 to 360 million years ago).

Cladoselache was a very primitive form and had many archaic features in the skull and skeleton. Two dorsal fins were present along the midline, and strong spines were developed behind the head and at the base of the pectoral fins. Although *Cladoselache* was an active predator, the broad attachments of the pectoral fins indicate that only restricted mobility was possible in any direction other than a straight line.

Claes, Ernest (André Jozef) (b. Oct. 24, 1885, Zichem, Belg.—d. Sept. 2, 1968, Uccle), popular Flemish novelist and short-story writer who sometimes wrote in German. The novel that made his reputation, *De Witte* (1920; *Whitey*), is a regional novel about a playful, prankish youngster. The partly autobiographical tale was made into a film in 1934.

Claes's writings were varied in subject. Animals and children were treated in such works as *Herman Coene* (1925–30), *Kiki* (1925), and *Floere het fluwijn* (1950; "Floere the Polecat"). World War I was the topic of *Namen 1914* (1916). *De fanfare 'De Sint-Jans-vrienden'* (1924; "The Fanfare 'The Friends of St. John' ") and *Het leven en de dood van Victalis van Gille* (1951; "The Life and the Death of Victalis van Gille") describe village life and village folk. His tone, usually kindly, was occasionally judgmental, as in *De vulgaire geschiedenis van Charelke Dop* (1924; "The Ignoble History of Charelke Dop"), a bitter and cutting tale of a war profiteer, and *Clementine* (1940), the story of a dishonest servant girl.

Claesz, Pieter, also called PIETER CLAESZ VAN HAARLEM (b. 1596/1597, Burgsteinfurt, Bishopric of Münster [now Steinfurt, Germany]—buried Jan. 1, 1661, Haarlem, Neth.), Dutch painter who achieved a striking simplicity and atmospheric quality in still-life representations. Avoiding the crowded com-

positions and strong local colouring of the Mannerist tradition, he concentrated on the monochrome "breakfast piece," the depiction



"Still Life with Drinking Vessels," oil painting by Pieter Claesz, 1649; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, A.C. Cooper Ltd

of a simple meal set near the corner of a table. The play of light on the characteristic objects—a glass of wine, a knife, a metal plate with fish or bread, and a bowl of berries—creates a rich effect while preserving the solidity of the forms. His "Still Life with a Burning Candle" (1627) and the "Breakfast Still Life" (1647) show a subtle variation of closely related monochrome colours, which in his later, more Baroque work became stronger. Claesz's increasingly decorative work after 1640 includes lavish still-life displays. His son, Claes Pieterszoon Berchem, was a famous landscape painter.

Claiborne, William (b. *c.* 1587, Westmorland County, Eng.—d. *c.* 1677, Virginia [U.S.]), American colonial trader and public official.

Claiborne immigrated to Virginia in 1621 as a surveyor for the colony, and in 1626 he was appointed secretary of state for Virginia and a member of the governor's royal council. The following year he received a license to trade with the Indians along Chesapeake Bay, and after exploring the region, he established a successful trading post on Kent Island in 1631.

Kent Island was included in the proprietorial grant to Lord Baltimore in 1632, despite Claiborne's opposition in London to the grant. When Claiborne resisted Baltimore's claim to the island, the proprietor ordered his governor in Maryland to seize the settlement. Claiborne thereupon sailed to England in 1637, attempting to justify his claim, but the commissioner of plantations ruled against him. Claiborne returned to Virginia, and in 1642 he became treasurer of the colony.

Two years later he and Richard Ingle seized the opportunity to incite a revolt in Maryland that expelled Governor Leonard Calvert, leaving Claiborne in control of the colony until 1646. Five years later he was appointed a member of the commission established by Oliver Cromwell's Parliament to enforce its rule over both Virginia and Maryland. He served as a member of the commission that governed Maryland from 1652 to 1657. Claiborne vainly persisted in his efforts to regain control over Kent Island despite the reestablishment of the Maryland proprietorship in 1658.

Claims, United States Court of: *see* United States Claims Court.

Clair, René, original name RENÉ CHOMETTE (b. Nov. 11, 1898, Paris, Fr.—d. March 15, 1981, Neuilly-sur-Seine), French director of silent films and talking pictures, whose productions were noted for humour and burlesque and also often for fantasy or surrealism. Among his major films were *Paris qui dort* (1924), *Un Chapeau de paille d'Italie* (1927), *Sous les toits de Paris* (1930), *Le Million* (1931), *À nous la liberté!* (1931), *The Ghost Goes West* (1935), and *Le Silence est d'or* (1947).

Clair was raised in the market quarter of Paris, the memory of which inspired some of his films. During World War I he served with the French ambulance corps, and afterward he worked as a journalist, critic, and songwriter before entering motion pictures as an actor in 1920, when he adopted the name of Clair. He also wrote film criticism and worked as an assistant director. In 1923 he wrote and directed his first film, *Paris qui dort,* also shown under the title *The Crazy Ray.* His next film, *Entr'acte* (1924), which was created to be shown between acts of a ballet by the modernist French composer Erik Satie, featured in its cast some of the most innovative artists of the day, including Satie and the Dadaist painters Marcel Duchamp, Francis Picabia, and Man Ray. These two films established Clair as a leader of the avant-garde. The great Russian writer Vladimir Mayakovsky wrote a scenario especially for him, though it was never produced. Subsequently, in such films as *Un Chapeau de paille d'Italie,* based on the farce by Eugène Labiche, he combined the avant-garde and the popular, modernity and tradition, in an original way. During this time he also published a novel, *Adams* (1926), written in a cerebral and elliptical style.



Clair, photograph by Yousuf Karsh

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The advent of sound in motion pictures in the late 1920s disoriented Clair until he recognized that sound need not kill the art of the film, as he had predicted it would. He learned to use sound not as a duplicate or substitute for visual representation but, rather, as a counterpoint to it. His *Sous les toits de Paris, Le Million,* and *À nous la liberté!* constituted a homage to the art of silent films and a manifesto for a new cinema. Clair rigorously constructed comical situations using either images or sounds independently, and his skillful use of music to further the narrative—rather than for production numbers in the manner of stage musicals—introduced a new form of musical film. The satirical edge of these films and his *Le Dernier Milliardaire* (1934), an antifascist film banned in Germany and elsewhere, resulted in political and financial difficulties for Clair. He went to England to make *The Ghost Goes West,* an effective merging of English humour with French verve that became an international triumph. He returned to France but soon left again in 1940, when the Germans overran the country in World War II. He spent the war years in Hollywood, where he made *The Flame of New Orleans* (1940), which was not at all successful. His *I Married a Witch* (1942), however, was well received, as were *It Happened Tomorrow* (1944), the most striking of his fantastic comedies, and *And Then There Were None* (1945), an adaptation of a mystery by Agatha Christie. After the war, he returned to France, where he made *Le Silence est d'or,* a masterful renewal of his Parisian past and his youth, which was to be his artistic testament. Though Clair's subsequent films, such as *La Beauté du diable* (1949), which propounded the Faust theme, and *Les Grandes Manoeuvres* (1955), a seriocomedy in a 1914 setting, were noteworthy, they were not equal to his earlier French films. In 1960 he was elected to the French Academy.

René Clair gained recognition as a creative artist long before screenwriters and directors generally were accorded serious critical attention. Each of his films revived and enriched his own wonderfully diverse view of the world. This poetic universe often centred on Paris, and Clair has been called the most French of filmmakers. His penchant for invention, research, and experimentation allied him to the pioneers of the film art; for him, to create a motion picture was not merely to express but to invent cinematically. Far from limiting his work to the avant-garde, however, he applied his techniques to comedies that poked fun at everyday life and were appreciated by vast audiences of moviegoers. His art, the refined and sentient art of an intellectual, was also a popular art. (B.Am.)

BIBLIOGRAPHY. Celia McGerr, *René Clair* (1980), outlines his film career and analyzes the films. More detailed descriptions can be found in R.C. Dale, *The Films of René Clair,* 2 vol. (1986). Further bibliographic information is provided by Naomi Greene, *René Clair: A Guide to References and Resources* (1985).

Clairon, Mlle, byname of CLAIRE-JOSÈPHE-HIPPOLYTE LÉRIS DE LA TUDE (b. Jan. 25, 1723, Condé-sur-l'Escaut, Fr.—d. Jan. 29, 1803, Paris), leading actress of the Comédie-Française who created many parts in the plays of Voltaire, Jean-François Marmontel, Bernard-Joseph Saurin, and others.

She began her career as a soubrette but made her debut at the Comédie-Française in 1743 as Phèdre in the tragedy by Racine. She also portrayed Corneille's heroines, who combined nobility of soul, pride, and intelligence. In 1753 Marmontel influenced her to simplify her declamatory style. Prompted by Diderot, she introduced touches of character and of ethnic realism into her costuming. Oliver Goldsmith called her "the most perfect female figure I have ever seen on any stage." In 1766 she retired, though she continued to appear at court and in private theatricals. Her *Mémoires* were published in 1798.

clairseach (musical instrument): *see* Irish harp.

Clairvaux, village, northeastern France, in Aube *département,* Champagne-Ardenne *région,* east-southeast of Troyes. Its abbey, founded in 1115 by the French churchman and mystic St. Bernard of Clairvaux, became a centre of the Cistercian order. All that remains of the original abbey is a large 12th-century storehouse and other vestiges, which have been incorporated in an 18th-century monastery. The central building was transformed into a prison during the 19th century.

clairvoyance (French: "clear seeing"), knowledge of information not necessarily known to any other person, not obtained by ordinary channels of perceiving or reasoning; thus a form of extrasensory perception ESP. Spiritualists also use the term to mean seeing or hearing (clairaudience) the spirits of the dead that are said to surround the living. Parapsychological research, using such tests as attempting to call the order of cards in a shuffled deck, has as yet failed to provide conclusive support for the existence of clairvoyance.

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Clajus, Johannes (German poet): *see* Klaj, Johann.

clam, in general, any member of the invertebrate class Bivalvia—mollusks with a bivalved shell (*i.e.,* one with two separate sections). More than 12,000 species of bivalves are known, of which about 500 live in freshwater; the others occur in all seas. Bivalves usually live on sandy or muddy bottoms.

True clams, in the strict sense, are bivalves with equal shells closed by two adductor muscles situated at opposite ends of the shell, and with a powerful, muscular, burrowing foot. Clams characteristically lie buried from just beneath the surface to depths of about 0.6 m (2 feet). They rarely travel over the bottom as do some other bivalves. Most clams inhabit shallow waters, in which they are generally protected from wave action by the surrounding bottom. One species of abra clam (*Abra profundorum*), however, has been taken in the Pacific Ocean at a depth of more than 4,800 m (16,000 feet).

Clams draw in and expel water for respiration and feeding through two tubes, the siphons, or "neck." The water is impelled by the beating of millions of cilia (hairlike structures) on the gills; other cilia strain food from the incurrent water and transport it, entangled in mucus, to the mouth. Eggs are usually shed by the female into the water and fertilized there by sperm released from the male. The eggs develop into larvae that swim briefly before settling permanently on the bottom. A few clams, such as the gem clam (*Gemma*), have internal fertilization and development.

The size of clams ranges from 0.1 mm (0.004 inch) in *Condylocardia* to 1.2 m across in the giant clam (*Tridacna gigas*) of the Pacific and Indian oceans.



(Left) Quahog (*Mercenaria*); (right) soft-shell clam (*Mya*)

Russ Kinne—Photo Researchers

Many species, including the quahog, geoduck, and soft-shell clam, are edible. The northern quahog (*Mercenaria mercenaria*), also known as the cherrystone clam, littleneck clam, or hard-shell clam, and the southern quahog (*M. campechiensis*) belong to the family of venus clams (Veneridae). *M. mercenaria* is about 7.5 to 12.5 cm (3 to 5 inches) long. The dingy white shell, which is thick and rounded and has prominent concentric lines, is found in the intertidal zone from the Gulf of St. Lawrence to the Gulf of Mexico; it is the most important food clam of the Atlantic coast. *M. campechiensis,* the southern quahog, is about 7.5 to 15 cm long and has a heavy, white, plump shell. It occurs in the intertidal zone from Chesapeake Bay to the West Indies.

The Pacific geoduck (*Panopea generosa*), found on the coast from Alaska to Baja California, burrows 60 to 90 cm into the mud of tidal flats. It is 15 to 20 cm in length, has a white, oblong shell, and may weigh as much as 3.6 kg (8 pounds). The Atlantic geoduck (*P. bitruncata*), similar to the Pacific species, occurs from the coast of North Carolina to the Gulf of Mexico.

The soft-shell clam (*Mya arenaria*), also known as the longneck clam, or steamer, is a common ingredient of soups and chowders. Found in all seas, it buries itself in the mud to depths from 10 to 30 cm. The shell is dirty white, oval, and 7.5 to 15 cm long.

The donax clam (*Donax*), also known as the coquina clam, is also commonly eaten in broth or chowder. The southern coquina (*Donax variabilis*), 1 to 2.5 cm long and pink, yellow, blue, white, or mauve, occurs on sandy beaches from Virginia to the Gulf of Mexico. The northern coquina (*D. fossor*), 6 to 12 mm long, is yellowish white with bluish rays and inhabits shallow waters from Long Island to Cape May, N.J.

Common clams not ordinarily eaten include long siphon clams (Sanguinolariidae), wedge clams (Mesodesmatidae), basket clams (Corbulidae), slender clams (Pandoridae), perforated clams (Thraciidae), and boring clams (*see* piddock). The extinct genus *Myalina* is important for stratigraphic correlations.

For more information on clam species and groups, *see* ark shell; coquina clam; gaper clam; geoduck; razor clam.

clam shrimp, also called CLAW SHRIMP, any member of the crustacean order Conchostraca (subclass Branchiopoda), a group of about 200 species inhabiting shallow freshwater lakes, ponds, and temporary pools throughout the world. Clam shrimps are so called because their entire body is contained within a bivalve shell (carapace) that resembles the shell of a small mollusk. Inside the shell the trunk of the animal carries up to 28 pairs of leaflike limbs that filter microscopic food particles and also assist in locomotion in those species that swim. The first two pairs of trunk limbs in the male form a claw for clasping the female during mating, hence the other common name for the group. Conchostracans are abundant in the fossil record dating back to the Silurian Period (438 to 408 million years ago).

clam worm: *see* rag worm.

clambake, seafood picnic traditional in the New England region of the United States. Early settlers on the Atlantic Coast adopted and elaborated the practice from the coastal Indians, who steamed shellfish over hot stones under a covering of seaweed. Clambakes, best undertaken on a large scale, have long been a feature of civic and fraternal celebrations in areas where clams, lobsters, and fish are abundant.

Preparations for a clambake begin with the digging of a deep pit on the beach. The pit is lined with stones upon which a wood fire burns for several hours to heat the stones thoroughly. Clams, lobsters, fish, chickens, ears of sweet corn (maize), whole onions, and potatoes are placed on top of the stones. The food is covered with a thick layer of seaweed, which furnishes the aromatic steam in which the food cooks, and a tarpaulin to hold in the heat. The food is usually eaten out of doors at the site of the clambake.

clammyweed (*Polanisia trachysperma*), North American herb of the caper family (Capparaceae). The plant is 60 cm (2 feet) tall and has leaves that give off a foul odour when bruised. The stems and three-parted leaves are hairy and sticky. Bladelike bracts (leaflike appendages) are crowded along the flowering stalks. The flowers have four sepals, four white petals, and eight-to-many protruding purple stamens (male pollen-producing structures). An annual, clammyweed grows on sunny waste ground and roadsides in warm-temperate regions.

clan, kinship group of fundamental importance in the structure of many societies. Membership of a clan is socially defined in terms of actual or purported descent from a common ancestor. This descent is unilineal—*i.e.,* derived only through the male (patriclan) or the female (matriclan). Normally, but not always, the clans are exogamous, marriage within the clan being forbidden and regarded as incest. Clans may segment into subclans or lineages, and genealogical records or myths may be altered to incorporate new members who have no demonstrable kinship ties with the clan.

Clan membership may be useful in ensuring mutual support and defense as well as in the mediation of disputes over the transmission of property rights and the mode of residence after marriage. Through exogamy, a clan may increase its number and consolidate alliances through affinal (marital) bonds. Some clans express their unity in terms of the possession of a common emblem, which may represent the ancestral being or common origin of the members and, as such, is often an object of reverence.

Clanconnell, Turlough Luineach O'Neill, Earl of (b. *c.* 1530—d. September 1595, near Strabane, County Tyrone, Ire.), chief of Tyrone, successor to his cousin Shane O'Neill.

Making professions of loyalty to Elizabeth I of England, he sought to strengthen his position by alliance with the O'Donnells, MacDonnells, and MacQuillans. When his conduct gave rise to suspicions, an expedition under the Earl of Essex was sent against him, which met with such doubtful success that in 1575 a treaty was arranged by which Turlough received extensive grants of lands and permission to employ 300 Scottish mercenaries. In 1578 he was created Baron of Clogher and Earl of Clanconnell for life; but on the outbreak of rebellion in Munster his attitude again became menacing, and for the next few years he continued to intrigue against the English authorities. The English, as a counterpoise to Turlough, supported his cousin Hugh, brother of Brian, whom Turlough had murdered. After several years of rivalry and much fighting between the two relatives, Turlough resigned the headship of the clan in favour of Hugh, who was inaugurated O'Neill in 1593.

Clanmaurice, Henry Charles Keith Petty-Fitzmaurice, Viscount: *see* Lansdowne, Henry Charles Keith Petty-Fitzmaurice, 5th marquess of.

Clanny, William Reid (b. 1776, Bangor, County Down, Ire.—d. Jan. 10, 1850, near Sunderland, Durham, Eng.), physician who invented one of the first safety lamps (1813) for use in coal mines; some of its features were incorporated in Sir Humphry Davy's safety lamp, which was the precursor of modern safety lamps.

Educated at the University of Edinburgh (M.D.), Clanny served with the navy before becoming a private practitioner. In Clanny's time, a serious hazard of coal mining was ignition by miners' lamps of firedamp, an explosive mixture of air and methane, a gas commonly present in deposits of coal. Clanny developed a miner's lamp that would not ignite firedamp but was unwieldy; he later reduced its bulk and adapted several improvements devised by Davy, one of which was a shield of metal gauze.

Clanricarde, Ulick de Burgh, marquess and 5th earl of, Burgh also spelled BOURKE, or BURKE (b. 1604, London—d. July 1657, Somerhill, Kent, Eng.), one of the few Catholic magnates to support the Royalist cause in Ireland against the Parliamentarians during the English Civil War.

The son of Richard, 4th earl of Clanricarde (created earl of St. Albans in 1628), Ulick de Burgh was summoned to the House of Lords as Lord Burgh in 1628 and succeeded to the earldom in 1635. On the outbreak of the Irish rebellion he declared for King Charles I; he was appointed commander of the English forces in Connaught in 1644 and in 1646 was created a marquess and a privy councillor. He supported the same year the treaty between Charles I and the Irish confederates, and endeavoured after its failure to persuade the Irish to agree to a peace, without success. In 1648 he besieged Galway and compelled its acquiescence. In 1649 he reduced Sligo. On the Duke of Ormonde's departure in December 1650 Clanricarde was appointed deputy lord lieutenant, but he was not trusted by the Roman Catholics and was unable to stem the tide of the Parliamentary successes. In 1651 he opposed the offer of Charles, duc de Lorraine, to supply money and aid on the condition of being acknowledged "Protector" of the kingdom. In May 1652 Galway surrendered to Parliament, and in June Clanricarde signed articles with the Parliamentary commissioners that allowed his departure from Ireland. In August he was excepted from pardon for life and estate, but by permits, renewed from time to time by the council, he was enabled to remain in England for the rest of his life.

Clanton, city, seat of Chilton county, central Alabama, U.S., near the Coosa River. Named for James H. Clanton, a Confederate general in the U.S. Civil War, it lies in a fertile agricultural area and developed as a shipping point for fruit (peaches) and vegetables; there is some light industry. Clanton is a base for fishermen on the Coosa River and on lakes created by the Lay and Mitchell dams. Inc. 1873. Pop. (1990) 7,669.

Clanvowe, Sir Thomas (fl. *c.* 1400), English courtier and poet, the reputed author of *The Cuckoo and the Nightingale,* a poetic debate about love, long attributed to Geoffrey Chaucer. The poem is a traditional dialogue between the two birds on the power of love, with delicate and attractive descriptions of spring, and a verse style that, though faulty at times, is Chaucerian in inspiration. *The Cuckoo and the Nightingale,* called in some manuscripts *The Book of Cupid, God of Love,* first appeared in William Thynne's edition of Chaucer in 1532, and it was not until W.W. Skeat's edition of Chaucer's works in 1894–97 that the poem was ascribed to Clanvowe, whose name appeared on the best of the extant manuscripts.

Clanvowe is known to have been at court in the reigns of Richard II and Henry IV, being one of the knights who accompanied John Beaufort, earl of Somerset, eldest son of John of Gaunt, duke of Lancaster, to Barbary in North Africa in 1390.

Claparède, Édouard (b. March 24, 1873, Geneva—d. Sept. 29, 1940, Geneva), psychologist who conducted exploratory research in the fields of child psychology, educational psychology, concept formation, problem solving, and sleep. One of the most influential European exponents of the functionalist school of psychology, he is particularly remembered for his formulation of the law of momentary interest, a fundamental tenet of psychology stating that thinking is a biological activity in service to the human organism.

After completing his medical studies (1897), Claparède spent a year in research in Paris, where he met Alfred Binet, a major developer of intelligence testing. After returning to Geneva, he joined the laboratory of his psychologist cousin, Theodore Flournoy, and began lecturing at the University of Geneva. About this time he became interested in comparative, that is, animal psychology.

In 1905 Claparède advanced a biological theory of sleep that anticipated the views of Sigmund Freud. He considered sleep to be a defensive reaction to halt activity of the organism and thereby prevent exhaustion. His research on sleep led him to the study of hysteria and the conclusion that hysterical symptoms may also be regarded as defensive reactions. After the appearance of his influential book *Experimental Pedagogy and the Psychology of the Child* (1905; Eng. trans., 1911), he began to conduct a seminar in educational psychology (1906). Advancing to professor of psychology (1908), he established the Institut J.J. Rousseau for the advancement of child psychology and its application to education (1912).

His work on the development of thinking in children was continued by Jean Piaget.

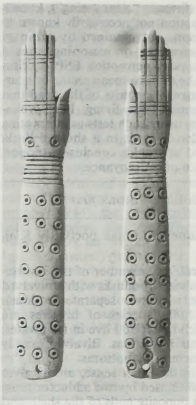
clapboard, also called WEATHERBOARD, or BEVEL SIDING, type of board bevelled toward one edge, used to clad the exterior of a frame building. Clapboards are attached horizontally, each one overlapping the next one down, and so this sort of covering is sometimes known as lap siding. Clapboards are six to eight inches in width, diminishing from about a $\frac{5}{8}$ inch thickness at the lower edge to a fine upper edge which is under the board above.

Cleft oak clapboard was introduced to New England in the 17th century. Later clapboard was generally made of pine, cypress, or cedar. Clapboards are applied with about four inches exposed. A device called a clapboard gauge may be used for spacing and to keep them parallel.

Clapham Sect, group of evangelical Christians, prominent in England from about 1790 to 1830, who campaigned for the abolition of slavery and promoted missionary work at home and abroad. The group centred on the church of John Venn, rector of Clapham in south London. Its members included William Wilberforce, Henry Thornton, James Stephen, Zachary Macaulay, and others. Many were members of Parliament, where, in addition to their abolitionism, they worked for prison reform, prevention of cruel sports, and the suspension of the game laws and the lottery. They supported several missionary and Bible societies, financed Hannah More's schools and pamphlets, and published their own journal, *The Christian Observer.* The Claphamites, mostly wealthy Anglicans, were politically conservative and appealed to the rich as the Methodists did to the poor. They believed in the preservation of the ranks and orders within society and preached philanthropic benevolence from above. To the poor they offered religious instruction and improvement in manners. Though their espousal of several "sentimental" causes brought upon them the derisive nickname of "Saints," they were responsible in large part for the abolition of the slave trade and slavery in England.

clapper, musical instrument consisting of pieces of wood, bone, metal, or other sonorous substance either held in both hands or, fastened together, held in one hand, sometimes with a handle, and struck against each other. Clappers have been played throughout the world since ancient times, often with a ritual, warning, or signalling function, rather than a musical one.

Clappers vary widely in size, shape, and number and arrangement of striking pieces. Varieties include spoons, bones, castanets,



Egyptian ivory clappers, *c.* 2000 BC; in the British Museum, London
By courtesy of the trustees of the British Museum, London

and small, tuned finger cymbals ("ancient cymbals"). The Greek *krotala* (Roman *crotala*) were dancers' rattles, or castanet-like finger cymbals. The Roman *scabella,* derived from their Greek counterparts *kroupezai,* or *kroupala,* were wooden sandals used for beating time.

Clapperton, Hugh (b. May 18, 1788, Annan, Dumfries, Scot.—d. April 13, 1827, near Sokoto, Fulani Empire), the first European explorer in West Africa to return with a firsthand account of the region now known as northern Nigeria. Following service in the Royal Navy, he joined explorers Dixon Denham and Walter Oudney in a British government expedition that journeyed southward from Tripoli across the Sahara. Early in 1823 they became the first Europeans to view Lake Chad and to enter the Sudanese province of Bornu, now in Nigeria. Clapperton travelled to Kano, Katsina, Sokoto, and Zaria, all now in Nigeria, before he and Denham returned to England in June 1825. Almost immediately he sailed to the west coast of Africa. In December he left the Bight of Benin for the Niger River with his servant and companion, Richard Lander. They crossed the Niger and travelled via Kano to Sokoto, near which Clapperton died. His *Narrative of Travels and Discoveries in Northern and Central Africa in the Years 1822–1823, and 1824* was published in 1828. Lander published *Records of Captain Clapperton's Last Expedition to Africa* in 1830.

claque (French *claquer:* "to clap"), organized body of persons who, either for hire or from other motives, band together to applaud or deride a performance and thereby attempt to influence the audience. As an institution, the claque dates from performances at the theatre of Dionysus in ancient Athens. Philemon frequently defeated Menander in the 4th century BC in the comedy competitions, not by virtue of any superiority in his plays but because he swayed the decision of the judges by infiltrating the audience with claques. Under the Roman Empire claques were common in the theatres and law courts; flatterers and legacy hunters would often serve as claqueurs at private performances sponsored by wealthy patrons of the arts. The emperor Nero established a school of applause and was followed on his concert tours by a claque of 5,000 knights and soldiers.

In France during the 18th century, the cheva-

lier Jacques de La Morlière and the poet-aster Claude-Joseph Dorat organized claques to support plays by themselves and others. The claque became a permanent institution in the 19th century, and almost every theatre in Paris was forced to submit to its services; the claque leaders, who received monthly payments from the actors and free tickets from the managements, were extremely influential. In addition to the leader, or *chef de claque,* there were the *commissaires,* who memorized the better parts of the play and called their neighbours' attention to them; the *rieurs,* who laughed loudly during comedies; the *chatouilleurs* ("the ticklers"), who kept the audience in good humour; the *pleureuses,* women who wept during melodramas; and the *bisseurs,* who shouted for encores. Claques have occasionally been employed in England but never with the elaborate organization of the French claques.

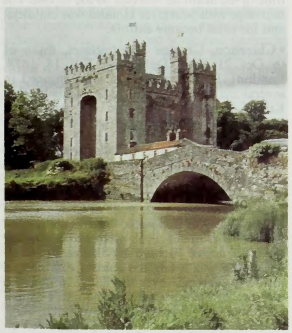
The claque in modern times has come to be restricted largely to opera houses, to political rallies, and to radio and television programs on which "canned" (recorded) laughter and applause are used, or studio audiences are advised by placards to laugh or applaud.

Clara OF ASSISI, SAINT: *see* Clare of Assisi, Saint.

Clare, town, southeastern South Australia, 80 miles (130 km) north of Adelaide. Founded in 1842, it was named for the Irish county in which one of its early settlers was born. In 1851, Jesuits planted the first vineyard of the district. Grapes for table use and wine making, along with other fruits, grains, livestock, and dairy products, now form the basis of the local economy. Declared a municipality in 1868, Clare is the site of a reserve for "stringybark" eucalyptus trees. Pop. (1986) 3,982.

Clare, Irish AN CLÁR, county in the province of Munster, Ireland. It has an area of 1,231 square miles (3,188 square km) and is bounded by Counties Galway (north), Tipperary (east), and Limerick (southeast); by the long estuary of the River Shannon (south); and by the Atlantic Ocean (west). The largest towns are Ennis, the county town (seat), and Kilrush. The seat of the Roman Catholic diocese is in Ennis, and the Church of Ireland cathedral is in Killaloe.

The county comprises three parts. In the east are peat- and bog-covered hills rising to 1,750 feet (533 m), including the Slieve Bernagh, Cratloe, and Slieve Aughty hills, which are penetrated by wide valleys. Lowland central



Bunratty Castle on the River Shannon, County Clare
G.F. Allen—Bruce Coleman Inc./EB Inc.

Clare has drained and embanked areas of former salt marsh along the Shannon and Fergus estuaries, and around Galway Bay the limestone country merges into the central Irish lowland. Surface drainage is restricted by the limestone: rivers often disappear underground, and in many turloughs, or limestone hollows, water may lie indefinitely.

West Clare comprises plateaus and lowlands. The Burren is a distinctive region of almost horizontal limestone slabs and little vegetation; along the coast is a limestone pavement area. The vegetation of the Burren comprises an unusual mixture of north and south European and alpine plants. The Burren plateau has a stony, desertlike appearance and is edged in places by steep, terraced rock faces. A flagstone occurs in some of the cliff faces, including the cliffs of Moher (600 feet [180 m]) along the Atlantic.

Clare has mild winters and rainy summers; more than two-thirds of the county is devoted to crops and pastures, and the main resources are cattle and sheep. Farms average 40–50 acres (16–20 hectares), and the chief crops are oats and potatoes. Most settlements are small trading centres, and Lisdoonvarna is a spa town. Ardnacrusha, on the Shannon, has a large hydroelectric-power station. Shannon International Airport, Ireland's major air terminal, is on reclaimed land 12 miles (19 km) southeast of Ennis, which is also the site of a major industrial estate. County Clare experienced significant industrial development in the 1960s and '70s.

Clare abounds in evidence of prehistoric settlement, particularly from the Neolithic and Bronze ages, including many megaliths and some 2,000 fortified enclosures. There are many early Christian sites with round towers and medieval castles—notably Bunratty Castle. Clare was part of Thomond, or North Munster, of which the O'Briens remained lords until the 16th century, despite the Anglo-Norman colonization in the 12th century. Clare was made a shire in the reign of Elizabeth I. In 1828 Daniel O'Connell won the election in Clare that led to the emancipation of Catholics in Ireland. Pop. (1986) 91,344.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Clare OF ASSISI, SAINT, Clare also spelled CLARA, Italian SANTA CHIARA DI ASSISI (b. July 16, 1194, Assisi, duchy of Spoleto [Italy]—d. Aug. 11, 1253, Assisi; canonized 1255; feast day August 11), abbess and founder of the Poor Clares (Clarissines).

Deeply influenced by St. Francis of Assisi, she refused to marry as her parents wished and fled (March 18, 1212) to the Porziuncola Chapel below Assisi, where Francis received her vows, thus marking the beginning of the Second Order of St. Francis. Many joined Clare, including her mother and her sister St. Agnes. Soon the Poor Clares were housed in the church and convent of San Damiano, near Assisi, where Clare became abbess in 1216. Clare's great concern was to obtain a rule reflecting the spirit of Francis to replace the Benedictine rule that Cardinal Ugolino (later Pope Gregory IX) had adapted for her order. Two days before she died Pope Innocent IV approved her definitive rule.

Besides its "privilege of perfect poverty," forbidding the ownership of property even by the community, Clare's order is noted for its apostolic aim: she considered its penitential prayer life a spiritually vitalizing force for church and society. This view was shared by the popes and by the grateful citizens of Assisi, who credited Clare with twice saving their city from destruction. On the first occasion, Clare caused the convent chaplain to elevate the Host at the refectory window, whereupon the Moorish allies of the Holy Roman emperor Frederick II, who were storming the walls, fell back. On the second occasion, when a larger force headed by General Vitale d'Aversa besieged Assisi, Clare and her nuns fervently prayed for the Assisians, and a great storm dispersed the attackers. She was credited with other miracles in life and after death. In 1958 Pope Pius XII declared her patron of television, alluding to an incident during her last illness when she miraculously heard and saw the Christmas midnight mass in the basilica of San Francesco on the far side of Assisi.

BIBLIOGRAPHY. *The Legend and Writings of Saint Clare of Assisi: Introduction, Translation, Studies* (1953), contains a legend ascribed to Thomas of Celano. Nesta De Robeck, *St. Clara of Assisi* (1951, reprinted 1980), is a biography.

Clare, John (b. July 13, 1793, Helpston, near Peterborough, Northamptonshire, Eng.—d. May 20, 1864, Northampton, Northamptonshire), English peasant poet of the Romantic school.

Clare grew up in extreme poverty and began work as a herder at the age of seven. Though he had little access to books, he had a



John Clare, detail of an oil painting by Thomas Grimshaw, 1844; in the collection of the Northampton Public Libraries
By courtesy of the Northampton Public Libraries Committee; photograph, Henry Cooper & Son

prodigious memory, and his poetic gift, which revealed itself early, was nourished by his parents' store of folk ballads. The frail, dreamy, shy boy wrote his first verses, chiefly influenced by James Thomson, on his mother's sugar bags. An early disappointment in love—for Mary Joyce, the daughter of a prosperous farmer—made a lasting impression on him.

In 1820 his first book, *Poems Descriptive of Rural Life and Scenery,* was published and created a stir. Clare visited London, where he enjoyed a brief season of celebrity in fashionable circles. He made some lasting friends, among them Charles Lamb and the poet Allan Cunningham, and was granted an annuity by wealthy patrons. That same year he married Martha Turner, the daughter of a neighbouring farmer, the "Patty of the Vale" of his poems. From then on he encountered increasing misfortune. His second volume of poems attracted little attention. His third, *The Shepherd's Calendar; with Village Stories, and Other Poems* (1827), though containing better poetry, met with the same fate. His annuity was not enough to support his family of seven children and his dependent father, so he supplemented his income as a field labourer and tenant farmer. Poverty, patronage, poetry, and drink took their toll of his health. His last book, *The Rural Muse* (1835), though praised by critics, again sold poorly. Clare began to suffer from fears and delusions. In 1837, through the agency of his publisher, he was placed in a private asylum at High Beech, Epping, where he remained for four years. Improved in health and driven by homesickness, he escaped in July 1841. He walked the 80 miles to Northborough, penniless, eating grass by the roadside to stay his hunger. He has left a moving account in prose of that extraordinary journey, addressed to his imaginary wife "Mary Clare." He was home about seven

months. At the end of 1841 he was certified insane. He spent the final 23 years of his life at St. Andrew's Asylum, Northampton, writing, with strangely unquenched lyric impulse, some of his best poetry. *Selected Poems and Prose*, edited by Eric Robinson and Geoffrey Summerfield, was published in 1966.

Clare, John Fitzgibbon, 1st earl of (b. 1749, near Dublin—d. Jan. 28, 1802, Dublin), lord chancellor of Ireland who was a powerful supporter of a repressive policy toward Irish Catholics and, from 1793, a strong advocate of union with Great Britain. He was probably the first to suggest to George III (ruled 1760–



1st Earl of Clare, detail of a portrait by Hugh Douglas Hamilton; in the National Gallery of Ireland, Dublin

By courtesy of the National Gallery of Ireland, Dublin

1820) that the King would violate his coronation oath if he consented to the admission of Catholics to Parliament.

He entered the Irish House of Commons in 1778 and became attorney general in 1783. When appointed lord chancellor in 1789, he was raised to the peerage as Baron Fitzgibbon and was made earl of Clare in 1795. Personally as well as politically opposed to the Irish patriot statesman Henry Grattan, he organized the defeat of Grattan's proposals (1787–89) for reform of the Irish land tithe system. Although he recommended the passage of the Catholic Relief Act of 1793, forced on the Irish executive by the English Cabinet, he denounced the policy it embodied. Responsible for the Convention Act (1793), which severely restricted radical agitation, he also defended the strict measures taken by the government in face of the rebellion of 1798, but he was neither cruel nor immoderate and was inclined to mercy when dealing with individuals.

In October 1798 Clare, who since 1793 had been convinced of the necessity for a legislative union between Great Britain and Ireland and was equally determined that the union must be unaccompanied by Catholic emancipation, crossed to England and pressed his views on the prime minister, William Pitt the Younger. On Feb. 10, 1800, Clare in the House of Lords moved the resolution approving the union in a long and powerful speech, in which he reviewed the history of Ireland since 1688, attributing the evils of recent years to the independent Constitution of 1782 and speaking of Grattan in language of deep personal hatred. He was not aware of the assurance which Lord Cornwallis, the viceroy of Ireland, had been authorized to convey to the Catholics that the union was to pave the way for emancipation; and, when he heard of it after the passing of the act, he bitterly complained that he had been deceived. After the union Clare became more violent than ever in his opposition to any policy of concession in Ireland.

Clare, Richard de: *see* Gloucester, Richard de Clare, 7th earl of; Pembroke (and Striguil), Richard de Clare, 2nd earl of.

Clare, Thomas Pelham-Holles, marquess of: *see* Newcastle (-under-Lyme), Thomas Pelham-Holles, 1st duke of.

Claremont, city, Los Angeles county, southwestern California, U.S., in the Pomona Valley, at the foot of the San Gabriel Mountains, adjacent to Pomona. Founded in 1887 by the Pacific Land Improvement Company, it was probably named for Claremont, N.H., hometown of one of the company's directors. It developed as an educational centre after 1889, when Pomona College moved there. It is now the seat of the associated Claremont Colleges, a group of colleges sharing adjoining campuses and including Pomona, Claremont Graduate School (1925), Scripps College (1926), Claremont McKenna College, founded 1946 as Claremont Men's College, Harvey Mudd College (1955), and Pitzer College (1963). The Southern California School of Theology (1957) is also located in the city. The first California citrus association was formed (1893) at Claremont. Inc. 1907. Pop. (1990) 32,503.

Claremore, city, seat (1907) of Rogers county, northeastern Oklahoma, U.S., northeast of Tulsa. In 1880 John Bullette, a Delaware Indian, settled on the site, which he called Claremore for an Osage chief whose tribe once lived there. In 1882 it was moved from the banks of the Verdigris River to its present location to meet the Frisco Railroad, and white settlement began. Artesian mineral waters, discovered in 1903, became known for their



Will Rogers Memorial, Claremore, Okla.

Bob Taylor—EB Inc.

therapeutic properties. In a farming, stock-raising, and oil and gas area, the city has some light manufactures, including chemicals, auto parts, and luggage. The Oologah Dam and Reservoir is 10 mi (16 km) north. Will Rogers was born in 1879 at a nearby ranch, and his house is preserved in Will Rogers State Park along the reservoir's southwestern shore. The Will Rogers Memorial (1938) at Claremore includes his tomb, a research library, and a collection of his mementos. The Will Rogers Rodeo is an annual event. The city is the site of Claremore Junior College (1909), a U.S. Indian hospital, and the J.M. Davis Gun Museum. Inc. town, 1896; city, 1908. Pop. (1990) 13,280.

clarence, also called GROWLER, a horse-drawn, four-wheeled coupé that was named in honour of the Duke of Clarence and first introduced in 1840 in London. The body held two seats facing one another and could transport four people in comfort. The carriage was suspended most often on large elliptic springs between two sets of equally sized wheels. It was an especially large style of coupé, with a separate outside seat for the driver and an extended front window, usually curved.

Clarence, dukes of, English royal nobility of several creations, grouped below chronologically and indicated by the symbol •.

• Clarence, Lionel of Antwerp, duke of, also called (1346–62) EARL OF ULSTER (b. Nov. 29, 1338, Antwerp—d. Oct. 17, 1368, Alba, Italy), second surviving son of King Edward III of England and ancestor of Edward IV.

Before he was four years of age Lionel was betrothed to Elizabeth (d. 1363), daughter and heiress of William de Burgh, earl of Ulster (d. 1333), and he entered nominally into possession of her great Irish inheritance. Having been named as his father's representative in England in 1345 and again in 1346, Lionel was created earl of Ulster and joined (in 1355) an expedition into France, but his chief energies were reserved for the affairs of Ireland. Appointed governor of that country, he landed at Dublin in September 1361. In November 1362 he was created duke of Clarence and in the following year his father made an abortive attempt to secure for him the succession to the crown of Scotland.

His efforts to secure an effective authority over his Irish lands were only moderately successful, and after holding a parliament at Kilkenny, which passed the celebrated Statute of Kilkenny in 1366, he threw up his task in disgust and returned to England. At Milan, on May 28, 1368, he married Violante, only daughter of Galeazzo Visconti, lord of Pavia, who brought him a rich dowry. Several months were then spent in festivities, during which Lionel was taken ill and died at Alba.

His only child, Philippa (1355–81), a daughter by his first wife, married in 1368 Edmund Mortimer (1352–81), 3rd earl of March, and through this union Clarence became an ancestor of Edward IV.

• Clarence, Thomas Plantagenet, duke of (b. before Sept. 30, 1388, London—d. March 22, 1421, Baugé, Anjou, Fr.), second son of Henry IV of England and aide to his elder brother, Henry V.

He twice visited Ireland, where he was nominally lord lieutenant, 1401–13. For a short time, in 1412, he replaced his elder brother, afterward King Henry V, as the chief figure in the government. Clarence favoured an alliance with the Orléanists and led an unsuccessful expedition to France in August 1412. But, after Henry V's accession in 1413, the Duke served his brother faithfully and took part in the preparations for the French war. He was present at the siege of Harfleur but was invalided home before Agincourt and acted as regent in 1416. During the invasion of Normandy, in 1417, Clarence led the assault to Caen, and, after Henry V's return to England in 1421, he remained in France as the King's lieutenant. He was killed in Anjou while rashly attacking the French and their Scottish allies. At the time of his death he was heir to the throne. His marriage with Margaret Holand was childless, and his titles became extinct.

• Clarence, George Plantagenet, duke of (b. Oct. 21, 1449, Dublin—d. Feb. 18, 1478, London), English nobleman who engaged in several major conspiracies against his brother King Edward IV (ruled 1461–70 and 1471–83). He was the younger son of Richard, duke of York (died 1460), whose struggle to gain power precipitated the Wars of the Roses (1455–85) between the houses of York and Lancaster.

Soon after Edward IV became king in March 1461, George was made duke of Clarence, and in 1462 he was appointed lord lieutenant of Ireland. But about 1468 Clarence fell under the influence of Richard Neville, earl of Warwick, who was losing the control that he had formerly exercised over the King. In defiance of Edward, Clarence married the Earl's daughter Isabel (July 1469). Then, in March 1470, Clarence and Warwick secretly supported an armed uprising in northern England. When Edward discovered their treachery, they fled to France but returned in September. After Edward went into exile, they put the ineffectual Lancastrian monarch Henry VI, deposed in 1461, back on the throne. But Clarence soon became disenchanted with Warwick's man-

agement of the government. When Edward returned from exile in March 1471, the brothers became reconciled, and Clarence, who fought in the battles that led to Edward's restoration, was made earl of Warwick and Salisbury in 1472.

After his wife died in 1476, Clarence sought to wed Mary, duchess of Burgundy. But when Edward objected to that match also, the embittered Clarence once more began scheming against his brother. Edward became convinced that Clarence was aiming at his throne. The Duke was thrown into prison, and in January 1478 the King unfolded the charges against his brother to Parliament. He had slandered the King, had received oaths of allegiance to himself and his heirs, and had prepared for a new rebellion. Both houses of Parliament passed the bill of attainder, and the sentence of death that followed was carried out secretly in the Tower of London on Feb. 18, 1478. Soon after the event, the rumour gained ground that he had been drowned in a butt of malmsey wine.

Two of the Duke's children survived their father: Margaret, countess of Salisbury (1473–1541), and Edward, earl of Warwick (1475–99), who passed the greater part of his life in prison and was beheaded in November 1499.

•Clarence, Prince William Henry, duke of: *see* William IV *under* William (England and Great Britain).

Clarence River, coastal river, northeastern New South Wales, Australia, rising in the McPherson Range near the Queensland border, flowing south and northeast for 245 mi (394 km), and emptying into the Pacific 40 mi below Grafton. Its chief tributaries are the Timbarra, Mitchell, and Orara. Woodford, Chatsworth, and Harwood are the largest of its many islands, most of which are subject to floods. The Clarence is navigable by small steamers as far as Grafton and by smaller craft 35 mi farther upstream. Known for many years as the Big River, it was crossed by escaping convicts in the 1820s, but credit for its discovery is generally given to Richard Craig (1831). It was named for the Duke of Clarence.

Clarence River, river in eastern South Island, New Zealand. Rising on the eastern slopes of the Spenser Mountains, it flows south, then northeast between the Inland and Seaward Kaikoura ranges. Cutting eastward by a gorge 7 mi (11 km) long through the Seaward Kaikoura Range, the river flows south and east, entering the Pacific Ocean 20 mi north of the town of Kaikoura. The main stream, fed by Lake Tennyson and its principal tributary, the Acheron River, is 130 mi long and drains a 1,270-sq-mi basin. The Clarence, bordered by mixed sheep and cattle runs, has a steep gradient that, in conjunction with several gorges, presents hydroelectric potential.

Clarence Series, major division of Cretaceous rocks and time in New Zealand (the Cretaceous Period began about 136,000,000 years ago and lasted about 71,000,000 years). Rocks of the Clarence Series overlie those of the Taitai Series and underlie rocks of the Raukumara Series. Clarence rocks (sandstones, conglomerates, graywackes, mudstones, and basaltic lava flows) have been divided into four stages representing shorter spans of time. The oldest of these is the Coverian Stage, which consists of about 300 metres (1,000 feet) of mudstones. The Coverian is followed by the Urutawan Stage, about 900 metres (3,000 feet) of mudstones and sandstones. The Motuan follows the Urutawan Stage and is followed by the Ngaterian Stage, about 600 metres (2,000 feet) of alternating mudstones and sandstones. During the Upper Motuan and throughout the Ngaterian, basaltic volcanic lavas were deposited in the Seymour River region of eastern New Zealand. Rocks of the Clarence Series are characterized by distinctive forms of fossil mollusks.

Clarendon, EARLS OF, titled English nobility of two creations, in the families Hyde and Villiers, grouped below chronologically and indicated by the symbol •.

•Clarendon, Edward Hyde, 1st earl of, VISCOUNT CORNBURY, also called (1643–60) SIR EDWARD HYDE, or (1660–61) BARON HYDE OF HINDON (b. Feb. 18, 1609, Dinton, Wiltshire, Eng.—d. Dec. 9, 1674, Rouen, Fr.), English statesman and historian, minister to Charles I and Charles II and author of the *History of the Rebellion and Civil Wars in England.*

Early life and career. Edward Hyde was the eldest surviving son of Henry Hyde of Dinton, Wiltshire. He was educated at Magdalen Hall, Oxford, and was trained in the law in London's Middle Temple. His first wife, Anne Ayliffe, died in 1632, within six months of their marriage. Two years later he married Frances, daughter of Sir Thomas Aylesbury, who held a high legal office and through whom he was able to pursue a successful career at the bar and become keeper of the writs and rolls of common pleas. He also established himself in literary and philosophical circles and counted the dramatist Ben Jonson, the jurist and scholar John Selden, and the statesman Lord Falkland among his friends.

In 1640 he was drawn into politics as a member in the Short Parliament (April–May 1640), called to finance Charles I's war against Scotland, and in the Long Parliament, which opposed Charles during the Civil War. Emerging as a critic of Ship Money (a tax levied for defense) and other new policies of the crown, he joined the attack on the misuse of the royal prerogative and helped to abolish oppressive courts and commissions. But he resisted measures that might permanently damage the balanced relations among king, House of Lords, and the Commons and opposed efforts to dictate the king's choice of ministers. From the first, he championed the Anglican establishment, for which he was commended by Charles I. It was as a Parliamentarian, however, that he opposed the execution of the Earl of Strafford, one of the King's chief advisers, and resisted the Root and Branch Bill, which would have abolished the episcopacy.

With the Commons' adoption of the Grand Remonstrance of November 1641, which demanded a voice for Parliament in the appointment of the king's ministers and in the reform of the church, accommodation between Charles I and Parliament became more difficult. Henceforth, Hyde chose to work behind the scenes as an adviser of the crown. He recommended moderate measures, which if consistently pursued might have undermined support for John Pym's radical leadership in the Commons. But Charles's attempt to seize five members of Parliament in January 1642 brought Hyde nearly to despair. After that, although civil war was not yet inevitable, few men were able to trust the King. For a while, Hyde's constructive moderation prevailed.

Joining the King at York about the end of May 1642, Hyde was proscribed by Parliament as an "evil counselor." Though he became a member of the Royalist council of war, Hyde was never a combatant in the ensuing conflict. From 1643, as a privy councillor and as chancellor of the Exchequer, he tried to moderate the influence of the military leaders. He advised Charles to summon a parliament at Oxford in December 1643. Its success was limited, however, and a year later Hyde agreed to recognize Westminster's claim to be the true Parliament. In January 1645 he vainly tried to temper parliamentary demands for control of the militia and for a presbyterian type of church government. By then there was little room left for Hyde's scrupulous constitutionalism, and his appointment as guardian to the Prince of Wales was a convenient means of disposing of him.

Hyde left Charles I in March 1645 and accompanied the Prince to the island of Jersey in April 1646. Later, the Queen ordered the Prince to move to Paris, a step that he had advised against. Unable to influence events, Hyde began a draft of his *History of the Rebellion and Civil Wars in England* in the hope that his interpretation of recent errors might instruct the King for the future.

Although he rejoined the Queen and Prince in Paris in 1648, Hyde remained a powerless spectator of Charles I's last efforts to save his throne and his life. He was no less helpless in seeking to guide the new king. Disapproving strongly of Charles II's policies, he was glad to escape from the quarrelsome court by accompanying a mission to Madrid, one, however, that proved unsuccessful in securing assistance from Spain.

Lord chancellor. After Charles II's escape to France from his unsuccessful invasion of England in the fall of 1651, Hyde rejoined him in Paris and followed him to Cologne in 1654 and Bruges in 1656. His object was to keep Charles from renouncing his Anglican faith, a step that would prejudice reconciliation with his subjects. Although he encouraged internal opposition to Oliver Cromwell, who as lord protector had by then become de facto ruler of England, Hyde held out against schemes for reconquest that would simply reunite the republican factions. Meanwhile, he closely followed events in England. After Cromwell's death in 1658, the overtures of the Presbyterians for a restoration of the monarchy were received. Hyde, who was appointed lord chancellor that same year, answered them. The Declaration of Breda (1660) embodied Hyde's belief that only a free parliament, matching the king's intentions with its own good will, could bring about a reconciliation. The final settlement, however, diverged from his own plans in several respects.

As lord chancellor, Hyde pressed for a generous Act of Oblivion, which spared most republicans from royalist vengeance, and for speedy provision of royal revenue. He hastened the disbanding of the army and strove to create a spirit of accommodation among religious leaders. He was not successful, however; the Parliament elected in 1661 at the height of the reaction initiated statutory persecution of Nonconformists far exceeding anything desired by the easygoing Charles II or even by the impeccably Anglican lord chancellor.

Although he denied being a "premier minister," Hyde, who was created earl of Clarendon in 1661, dominated most aspects of the administration. By the marriage of his daughter Anne to James, duke of York, in 1660 he became related to the royal family and, ultimately, grandfather to two English sovereigns, Queen Mary II and Queen Anne. But he took little pleasure in his distinctions, knowing himself to be hated by those impoverished royalists for whom the Restoration had brought little reward. Clarendon also was held responsible for unpopular decisions, such as the sale of Dunkirk to France. The Anglo-Dutch War of 1665, which he had opposed, proved his final downfall.

Fall from power. There were personal factors in his disgrace. Never a man to suffer fools gladly, his temper was shortened by attacks of gout that also incapacitated him for business. When he became openly critical of the King's immorality, the old friendship between them disappeared, and Clarendon became the butt of a young and frivolous court. The death of allies left him exposed, and Parliament was determined to find in him the scapegoat for the disasters of the war. Thus, in August 1667 Clarendon was dismissed from the chancellor-

ship, and in October the House of Commons began his impeachment. The charges lacked foundation, and the House of Lords refused to accept them; but by November, under threat of trial by a special court, Clarendon was forced to flee.

For the rest of his life, Clarendon remained an exile in France, cut off by an act of banishment that made correspondence with him treasonable. Determined to vindicate himself, he began writing an autobiography that narrated his political life from the 1630s to the 1660s. It lacked documentation, but in 1671 his son Lawrence was allowed to visit him, bringing manuscripts that included the unfinished *History* of the 1640s. This Clarendon then completed, inserting into it sections of the recently written autobiography. Consequently, the accuracy of the finished *History of the Rebellion and Civil Wars in England* varies considerably according to the date of its composition. The deficiencies of the *History* and the *Life*, which was later published from the remaining fragments of autobiography, do not always derive from inadequate documentation. For all his judicious moderation and the magisterial dignity of his prose, Clarendon was not always an objective historian. His accounts of opponents are sometimes unfair, and his analysis of events in which he participated diverges from the judgments guiding him at the time. They are the inevitable blemishes of a work of vindication written in the bitterness of exile. He was buried in Westminster Abbey a month after his death.

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• Clarendon, Henry Hyde, 2nd earl of, also called (until 1674) VISCOUNT CORNBURY (b. June 2, 1638, England—d. Oct. 31, 1709, England), English statesman, eldest son of the 1st Earl of Clarendon and a Royalist who opposed the accession of William and Mary.

As Viscount Cornbury he became a member of Parliament in 1661 and, in 1674, succeeded to the earldom on his father's death. James II made him lord lieutenant of Ireland (September 1685), where he became an unwilling instrument of the King's desire to replace Protestants in high positions by Roman Catholics. He was recalled in January 1687. At the time of the Revolution of 1688–89 he played a vacillating part but opposed the settlement of the crown on William and Mary and remained a nonjuror all his life. On June 24, 1690, he was arrested, by order of his niece, Queen Mary, on a charge of plotting against William, and though liberated for a time, was again imprisoned in January 1691 on the evidence of Richard Graham, Lord Preston. He was released in July of that year, and from that time until his death, in 1709, lived in retirement.

He was a man of some literary taste, a fellow of the Royal Society (1684), and the author of *The History and Antiquities of the Cathedral Church at Winchester, Continued by S. Gale* (1715).

• Clarendon, George William Frederick Villiers, 4th earl of (b. Jan. 12, 1800, London—d. June 27, 1870, London), British foreign secretary under four prime ministers at various times from 1853, including the Crimean War period; he was known as "the great Lord Clarendon."



4th Earl of Clarendon, detail of a lithograph by E. Desmaisons, 1856
By courtesy of the trustees of the British Museum; photograph J.R. Freeman & Co. Ltd

After serving as a customs commissioner in Dublin and Paris, Villiers was British ambassador to Spain in 1833. Inheriting the earldom of Clarendon in 1838, he returned to England the next year and served as lord privy seal (1839–41) and then as president of the Board of Trade (1846–47). As lord lieutenant (viceroy) of Ireland (1847–52) during the disastrous Irish famine, he resorted to coercive legislation to prevent a general outbreak of violence and sponsored ineffective relief projects. His agrarian reform measures only encouraged English speculation in Irish land.

In February 1853 Clarendon became secretary of state for foreign affairs in the 4th Earl of Aberdeen's ministry, just before the outbreak of the Crimean War against Russia. His attempts to prevent the war were unsuccessful, and his performance during the war undistinguished; but, acting for Lord Palmerston, who became prime minister in 1855, he did manage to secure favourable terms for Britain at the Congress of Paris in 1856.

Having left office with Palmerston in 1858, Clarendon served twice more as foreign secretary: under Lord John Russell (1865–66) and under William Ewart Gladstone (1868–70). On two occasions he refused a marquessate and the governor-generalship of India. Three weeks before the outbreak of the Franco-German War, he died while trying to induce Prussia to accept reduction of armaments.

Clarendon, Assize of (1166), a series of ordinances initiated by King Henry II of England in a convocation of lords at the royal hunting lodge of Clarendon. In an attempt to improve procedures in criminal law, it established the grand, or presenting, jury (consisting of 12 men in each hundred and 4 men in each township), which was to inform the King's itinerant judges of the most serious crimes committed in each local district and to name "any man accused or notoriously suspect of being a robber or murderer or thief." All such men were subjected to ordeal by water and, if convicted, deprived of their goods and chattels, which were forfeited to the King; a convicted man also had his foot amputated. Even those acquitted were subject to exile from England if they were deemed men of ill repute. The assize was an extreme effort to control rampant lawlessness and had the unfortunate effect of encouraging accusations leading to miscarriages of justice. It was amended by the Assize of Northampton (*q.v.*).

Clarendon, Constitutions of, 16 articles issued in January 1164 by King Henry II defining church–state relations in England. Designed to restrict ecclesiastical privileges and curb the power of the church courts, the constitutions provoked the famous quarrel between Henry and his archbishop of Canterbury, Thomas Becket.

During the chaotic reign of Henry's predecessor, Stephen (1135–54), the ecclesiastical courts, bolstered by the growth of canon law, had usurped many secular judicial prerogatives. The constitutions purported to restore the customs of the realm observed in the reign of Henry I (1100–35), but their strict statement exceeded all precedent. By their provisions, the king's consent was required for clerics to leave the realm or for judicial appeals to be made to Rome. The church was restricted in its powers of excommunication and interdiction and forbidden to act against laymen on secret information. The king was given the revenues from all vacant sees and monasteries and allowed discretion in the filling of vacancies. Cases of advowson (church patronage), church debt, and land held in lay fee were reserved to secular courts.

Church courts were given effective control over church property, but in cases where tenure was disputed between a layman and an ecclesiastic, a secular jury had jurisdiction. The most controversial provision (clause 3) exposed priests charged with serious felony to secular punishment. Though ecclesiastical courts were notoriously lenient to "criminous clerks," it was this provision that provoked the greatest protest from Becket.

When the King presented the constitutions at Clarendon in January, the bishops, led by Becket, reluctantly promised to observe them. Within a year, however, he repudiated his oath and was forced into six years of exile by Henry. Becket's martyrdom in 1170 forced Henry to moderate his attack on the clergy, but he did not specifically repudiate a single clause of the constitutions. By the 13th century, "criminous clerks" were tried in secular courts for their second offense. First offenders enjoyed "benefit of clergy."

Clarendon Code (1661–65), four acts passed in England during the ministry of Edward Hyde, 1st earl of Clarendon, designed to cripple the power of the Nonconformists, or Dissenters. The Corporation Act (1661) forbade municipal office to those not taking the sacraments at a parish church; the Act of Conformity (1662) similarly excluded them from church offices; the Conventicle Act (1662, revised 1670) made meetings for Nonconformist worship illegal, even in private houses, where more than four outsiders were present; and the Five-Mile Act (1665) forbade Nonconformist ministers to live or visit within five miles of a town or any other place where they had ministered. The Toleration Act of 1689 eased some of the restrictions, but the specific acts under the Clarendon Code were not repealed until the 19th century.

Clarendonian Stage, lowermost and oldest major division of continental rocks and time of the Pliocene in North America (the Pliocene Epoch began about 7,000,000 years ago and lasted about 4,500,000 years). The Clarendonian Stage, which follows the Barstovian Stage of the preceding Miocene Epoch and precedes the Hemphillian Stage, was named for exposures studied near Clarendon, Texas, and is characterized by the presence of distinctive mammalian fossil forms. The Clarendonian has been correlated with the Sarmatian Stage of European usage.

Clarín (pen name): *see* Alas, Leopoldo.

clarinet, French CLARINETTE, German KLARINETTE, single-reed woodwind instrument used orchestrally and in military and brass bands

and possessing a distinguished solo repertory. It is usually made of African blackwood and has a cylindrical bore of about 0.6 inch (1.5 centimetres) terminating in a flared bell. All-metal instruments are made but are little used in the best work. The mouthpiece, usually of ebonite (a hard rubber), has a slot-like opening in one side over which a single reed, made from natural cane, is secured by a screw clip, or ligature, or (in earlier times



(Left to right) Denner *clarinette*, early 18th century, in the Musée Instrumental du Conservatoire Royal, Brussels; Böhm clarinet, 1844; and contemporary bass clarinet

By courtesy of (left) the Musee Instrumental, Brussels, (centre and right) Conn Corporation, Oak Brook, Ill.; photograph, (left) © A.C.L., Brussels

and still often in Germany) by string lapping. The player grips the mouthpiece, reed down, between his lips or lower lip and upper teeth.

The ordinary clarinet is tuned in B♭ and is about 26 inches (66 centimetres) long; its notes, made with the finger holes and key mechanism, sound a step lower than written. The cylindrical pipe, coupled to a reed mouthpiece, acts acoustically as a stopped pipe (closed at one end). This arrangement accounts for (1) the deep-pitched fundamental register; (2) the characteristic tone colour, caused largely by the virtual absence of even-numbered tones of the harmonic series (produced by whole and partial vibrations of the enclosed air column); and (3) the "overblowing" (effected by a thumb key) to an upper register at the 12th (third harmonic) above the fundamentals, instead of at the octave (second harmonic), as in other woodwind instruments. A high register, using fifth and seventh harmonics, extends the compass just over three and one-half octaves upward from the D (written E) below middle C.

The invention of the clarinet in the early 18th century is ascribed to Johann Christoph Denner, a well-known flute maker in Nürnberg. Previously, single reeds were used only in organs and folk instruments. The clarinet's immediate predecessor was the small mock trumpet, or chalumeau (*q.v.*), an adaptation of a folk reed pipe that Denner is credited with improving. His *clarinette* was longer and intended for playing mainly in the upper register, with the fundamentals (to which the chalumeau was confined) as an adjunct. It thus provided a complete trumpet (*clarino*) compass with steadier, clearer notes.

The earliest known music for the clarinet appeared in tune books published by Estienne Roger of Amsterdam (2nd ed., 1716, extant). The instrument was played with the reed up (playing with the reed down is described only after 1800, in Germany) and had two keys, with F below middle C as the lowest note. A short bell was added by 1720, and the important extension of the tube to carry the low E key (also providing the upper B, formerly imperfectly available) followed *c.* 1740–50. By the late 18th century it had five or six keys and was built in various pitches, the written music being transposed to preserve the same fingerings. Clarinets were used in most large orchestras from *c.* 1780.

The modern clarinet developed between 1800 and 1850. Further keys were added to improve certain notes. Bores and mouthpieces were enlarged following general trends toward greater tonal power. Technological advances, including keywork mounted on pillars, the ring keys introduced by the flute-maker Theobald Böhm, and Auguste Buffet's needle springs, led in the 1840s to the appearance in their main essentials of the two principal modern systems.

The simple, or Albert, system, named for its Brussels maker, Eugène Albert, is a modernization of the earlier 13-key system of the clarinetist-builder Iwan Müller. It is used in German-speaking countries, with a complex accretion of auxiliary keywork but with conservative features in bore, mouthpiece, and reed (the last being smaller and harder than elsewhere) that give a deeper tone quality. The Böhm system, patented by Hyacinthe E. Klosé and Buffet (Paris, 1844) and still standard in most countries, incorporates much of Böhm's 1832 flute fingering system, bringing many technical advantages. It is distinguished from the other system by the ring at the back for the thumb and by the four or five keys for the right little finger. A more elaborate full Böhm model is used mainly in Italy, where orchestral players transpose A clarinet parts on the B♭ instrument.

Clarinets in sizes other than B♭ and its sharp-key equivalent in A include the C clarinet, much used in the Classical period and often preserved in German orchestration; octave clarinets in A♭, used in large European bands; and sopranino clarinets in F and later E♭, the latter often used with its sharp-key equivalent in D (popular in earlier days). Alto (or tenor) clarinets that followed the late 18th-century *clarinette d'amour* in A♭, G, or F and the more successful basset horn in F include the wider bore alto clarinet in F and later E♭, made with upturned metal bell and a curved metal crook holding the mouthpiece. Bass clarinets in B♭ were at first built experimentally but after 1810 were built in many designs. The modern version, with twice-curved crook, was influenced by the 1838 design of the Belgian instrument-maker Adolphe Sax, to which the upturned bell was later added. Contrabass clarinets are made in E♭ or in B♭.

Clarion Fracture Zone, submarine fracture zone in the Earth's surface in the northeastern Pacific seafloor; 3,200 mi (5,200 km) in length, it was discovered by the U.S. Navy ship "Serrano" in 1949 and by the Scripps Institution of Oceanography's Mid-Pacific Expedition in 1950. The fracture zone extends along a global small circle, from its western end near a seamount group about 330 mi south of Hawaii Island, to a point about six degrees of latitude farther north at the base of the continental slope off Puerto Vallarta, Mex.

The continuation of the Clarion small-circle trend across southern Mexico is marked by a linear chain of 21 other active volcanoes. This has led some geologists to suggest that the Clarion Fracture Zone may extend into the Caribbean, inasmuch as the Cayman Trench between Cuba and Hispaniola also lies along the same general trend.

Magnetic intensity variations of the seafloor along the Clarion Fracture Zone have not been mapped completely; however, the available data, together with the extraordinary length of the feature, suggest that it has been produced by seafloor spreading as the scar of transform faulting that began at least 80,000,000 years ago and that is still continuing at present.

Clarion River, river formed at Johnsonburg, Elk County, northwestern Pennsylvania, U.S., by the confluence of East and West branches and flows generally southwest for about 110 mi (177 km) past the towns of Ridgway and Clarion to join the Allegheny River. The Clarion Dam and Reservoir are on the East Branch. The river's name is attributed to surveyors who thought its sound, from a distance, was shrill and clear like that of a clarion.

Clark, Abraham (b. Feb. 15, 1726, Elizabethtown, N.J.—d. Sept. 15, 1794, Elizabeth, N.J., U.S.), U.S. patriot and signer of the Declaration of Independence. Benefitting little from formal education, he became a surveyor and managed transfers of property. Clark had a gift for politics and served in many public offices in New Jersey. He championed the cause of the colonies and in 1776 was elected to the Continental Congress, where he voted for separation from Great Britain and signed the Declaration. He was reelected to the Continental Congress several times and was also a delegate to the Annapolis Convention (1786). He was chosen to be a delegate to the federal Constitutional Convention (1787), but was unable to attend because of illness. Clark opposed the adoption of the new U.S. Constitution until he was assured that a bill of rights would be added to it. He served in the U.S. House of Representatives from 1791 until his death.

Clark, Alvan Graham (b. July 10, 1832, Fall River, Mass., U.S.—d. June 9, 1897, Cambridge, Mass.), U.S. telescope maker and astronomer who directed fabrication of the 40-inch (102-centimetre) diameter lens of the Yerkes Observatory, Williams Bay, Wis., the largest in the world, and, using telescopes of his own construction, discovered the companion of the star Sirius as well as 16 double stars.

After completing his education, he joined his father, Alvan Clark (b. March 8, 1804, Ashfield, Mass.—d. Aug. 19, 1887, Cambridge), and his brother George Bassett Clark (b. Feb. 14, 1827, Lowell, Mass.—d. Dec. 20, 1891, Cambridge) in the manufacture of astronomical lenses. Their firm, Alvan Clark and Sons, supplied unexcelled lenses to many observatories in the United States and Europe during the heyday of the refracting telescope. Besides that at Yerkes, they made the 36-inch lens for the Lick Observatory, Mt. Hamilton, Calif. (1888); the 30-inch for the Pulkovo Observatory, near St. Petersburg (1878); the 28-inch for the University of Virginia, Charlottesville (1883); and 24-inch lenses for the U.S. Naval Observatory, Washington, D.C. (1873), and the Lowell Observatory, Flagstaff, Ariz. (1896). All these telescopes remain in operation except that at Pulkovo, which was destroyed during World War II.

Clark, Champ, byname of JAMES BEAUCHAMP CLARK (b. March 7, 1850, near Lawrenceburg, Ky., U.S.—d. March 2, 1921, Washington, D.C.), speaker of the U.S. House of Representatives (1911–19) who narrowly lost the presidential nomination to Woodrow Wilson at the 1912 Democratic Convention on the 46th ballot.

Clark moved to Missouri in 1876 and settled at Bowling Green. He was successively a coun-

try newspaper editor, city attorney, county prosecuting attorney, and Missouri state legislator, and he served in the U.S. House of Representatives for 13 terms (1893–95, 1897–1921).



Champ Clark, 1915
By courtesy of the Library of Congress, Washington, D.C.

A follower of Democratic and Populist leader William Jennings Bryan, he consistently supported legislation favoured by Western and Southern agrarians. As a member of the Rules Committee and Democratic floor leader, he revolted against Speaker Joseph G. Cannon's dictatorial control over the House in 1910. His reminiscences, *My Quarter Century of American Politics*, were published in 1920.

Clark, Eugenie (b. May 4, 1922, New York City), ichthyologist noted for her research on poisonous fishes of the tropical seas and on the behaviour of sharks.

Her research on the reproduction of species of platys and swordtail fish earned her a Ph.D. degree from New York University in 1950; she was reported as being the first person in the U.S. to carry out successful artificial insemination experiments on fish. In the West Indies she studied the vision of fish, particularly their ability to transfer images from one eye to the other.

Clark was a member of the staff of the American Museum of Natural History, New York City, from 1948 to 1966, and from 1955 to 1967 she was executive director of the Cape Haze Marine Laboratory in Sarasota, Florida. She taught at the City College of New York in 1966–67 and then joined the faculty of the University of Maryland, becoming full professor in 1973. In 1949 the U.S. Office of Naval Research sent her to the South Seas to collect and identify species of poisonous fish. As a Fulbright Scholar (1950) at Fuad University, Egypt, she collected specimens of poisonous blowfish. In the early 1960s Clark undertook research on shark behaviour. She wrote *Lady with a Spear* (1953) and *The Lady and the Shark* (1969).

Clark, Francis Edward (b. Sept. 12, 1851, Aylmer, Quebec, Can.—d. May 26, 1927, Newton, Mass., U.S.), Congregational churchman and writer who founded and led Christian Endeavor.

Clark graduated from Dartmouth College in 1873 and Andover Theological Seminary in 1876. He was pastor of churches in Portland, Maine (1876–83), and South Boston (1883–87). In 1881 he founded the United Society of Christian Endeavor, an autonomous interdenominational organization of young people. Its members pledged to lead a Christian life, to pray to God and read the Bible every day, and to participate actively in the work of the church. In 1887 he resigned his pastorate to serve as the organization's president.

He became president of the World Christian Endeavor Union in 1895 and travelled around the world five times in the interests of its work. Clark also edited *The Christian Endeavor World* (1887–1919) and wrote many books on religious themes for young people.

Clark, George Rogers (b. Nov. 19, 1752, Albemarle County, Va.—d. Feb. 13, 1818, near Louisville, Ky., U.S.), frontier military leader in the U.S. War of Independence, whose successes were factors in the award of the Old Northwest to the United States in the Treaty of Paris, concluding the war.

Trained by his grandfather, Clark engaged in surveying along the Ohio River in the mid-1770s. He became interested in the Kentucky country around Harrodsburg and opposed those who sought to establish an independent colony of Transylvania there. At the outbreak of the Revolution, Clark persuaded the Virginia government to make Kentucky a separate county and to authorize him to enlist troops for its defense against the British and Indians along the frontier.

In May 1778 Clark, with an expedition of about 175 men, took two Mississippi River settlements—Kaskaskia and Cahokia, both in present Illinois. At Kaskaskia, Clark gained the friendship of Pierre Gibault, who induced the French at Vincennes on the Wabash to change their allegiance. When reinforcements promised from Virginia failed to arrive, Clark withdrew to Ft. Nelson (now Louisville) on the Ohio River and made that his base for



George Rogers Clark, portrait by J.W. Jarvis; in the Filson Club collection, Louisville, Ky.
By courtesy of the Filson Club, Louisville, Ky.

the rest of the war. In 1780 he helped defeat a British expedition sent against the Spanish settlement at St. Louis; the same year he destroyed the Shawnee Indian towns of Chillicothe and Piqua. Two years later he razed Shawnee villages and destroyed crops in the Miami Valley.

Throughout the war Clark and his men received no pay for their services. Furthermore, Clark was held responsible for debts incurred for supplies, since Virginia, despite its promises, never reimbursed him.

Clark was appointed an Indian commissioner after the war, and in 1786 he helped negotiate a treaty with the Shawnees. The same year he led an expedition against the Wabash tribes and seized goods taken to Vincennes by Spanish traders.

James Wilkinson, a double agent in the pay of Spain, coveted Clark's command and his post of Indian commissioner. After a deliberate campaign to discredit Clark, Wilkinson was appointed Indian commissioner and Clark was relieved of his military command. Thereafter Clark became involved in a scheme to found a Spanish colony west of the Mississippi. In 1793 he accepted a French major general's commission in connection with French emissary Edmond-Charles Genet's mission to involve the U.S. in hostilities between France and England. Clark returned to Louisville in 1799 and resided there until his death.

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Clark, James, byname JIM CLARK (b. March 4, 1936, Duns, Berwickshire, Scot.—d. April 7, 1968, Hockenheim, W.Ger.), Scottish automobile racer who became the world driving champion in 1963, when he won a record 7 of 10 title events, and in 1965, when he won 6 of 10 as well as the Indianapolis 500-mile race. Both years he drove rear-engined Lotus-Fords. Clark, who began racing in 1956, made his first tour of the international circuit in 1960 as a member of the Lotus team. He was killed in a racing accident.

Clark, Joe, byname of CHARLES JOSEPH CLARK (b. June 5, 1939, High River, Alta., Can.), prime minister of Canada from June 1979 to March 1980, the youngest person ever to win the post.

Clark was the son of the owner of the newspaper *High River Times*. He obtained a B.A. in history (1960) and an M.A. in political science (1973) from the University of Alberta and taught political science there from 1965 to 1967. He had been active in politics since 1957, when he solicited votes door-to-door for the Progressive Conservative Party; and from 1962 to 1965 he was national president of the Progressive Conservative Student Federation.

In 1967 he directed the campaign organization that brought Peter Lougheed to power as premier of Alberta and from 1967 to 1970 he served as executive assistant to Robert Stanfield, then the Conservative leader in the House of Commons. Clark himself was first elected to Parliament in 1972 to represent Alberta's Rocky Mountain riding (district) and he was elected leader of his party in 1976.

In 1979 the Progressive Conservatives won a plurality of seats in Parliament, and Clark became head of a minority government. Only six months after he took office, however, his government fell on a budget question; and in the subsequent general elections in February–March 1980 his party was swamped by the triumphant Liberals headed by Pierre Elliott Trudeau. The 40-year-old Clark was perceived as well meaning but lacking in authority. Clark served as the leader of the Progressive Conservative Party until 1983. A party Convention was held in January of that year to determine support for his leadership, and he won only 66 percent of the delegates' votes. He then elected to hold a formal leadership-selection meeting in June and was defeated by lawyer Brian Mulroney.

Clark, John Bates (b. Jan. 26, 1847, Providence, R.I., U.S.—d. March 21, 1938, New York City), U.S. economist noted for his theory of marginal productivity, in which he sought to account for the distribution of income from the national output among the owners of the factors of production (labour and capital, including land).

Clark was educated at Brown University and Amherst College. He then studied in Heidelberg and Zürich. Returning to the United States, he taught at Carleton, Smith, and



John Bates Clark
By courtesy of Columbia University

Amherst colleges and at Columbia University (1895–1923).

The publication of Clark's *Philosophy of Wealth* (1886) marked his "revolt against the spirit of the old political economy." He argued that people were motivated as much by their social as by their self-centred personal interests. He therefore rejected pure economic competition as a means by which products could be justly distributed. In *The Distribution of Wealth* (1899) Clark developed his distinctive utility theory. He held that commodities contain within them "bundles of utilities"; *i.e.*, they represent varying qualitative degrees of utility. In this work he also developed his marginal productivity theory by first setting up a theoretical model of perfect, "static" competitive equilibrium undisturbed by any dynamic change. From this imaginary model he reached his conclusions on the distribution of the total national product. Here he also advanced the concept of social capital as being a permanent, ongoing stream of future incomes out of which all productive inputs, including capital goods, are temporarily taken for a charge (interest).

Clark was one of the founders of the American Economic Association (of which he was president, 1893–95). He was editor of the *Political Science Quarterly* (1895–1911) and served as director of the division of economics and history of the Carnegie Endowment for International Peace (1911–23).

He became convinced in his later years that war constituted the greatest threat to human destiny. His last publication, *A Tender of Peace* (1935), called for a powerful League of Nations to enforce peace.

Clark, John Maurice (b. Nov. 30, 1884, Northampton, Mass., U.S.—d. June 27, 1963, Westport, Conn.), U.S. economist whose work on trusts brought him world renown and whose ideas anticipated those of Keynes.

Clark graduated from Amherst College in 1905 and received his Ph.D. from Columbia University in 1910. He subsequently held posts at several institutions including the University of Chicago and returned to Columbia in 1926, retiring in 1957. Clark was the son of a famous American economist, John Bates Clark, and he always acknowledged the importance of his father, with whom he produced, in 1914, a revision of an earlier work of Clark senior, the *Control of Trusts.*

J.M. Clark's name has been largely associated with industrial economics and competition. He is perhaps best remembered for the introduction of the concept of workable competition, embodied in *Competition as a Dynamic Process* (1961), which stresses not static optimization, but fiexibility of the economic system, the limits to market power, and the importance of potential competition, the latter theme also emphasized by his father. This work underlies the approach adopted by antitrust authorities throughout the world. Clark's industrial studies also led him to emphasize the acceleration principle—that investment demand can fluctuate severely if consumer demand fluctuations exhaust existing productive capacity—in *Studies in the Economics of Overhead Costs* (1923). He followed this by studying variations in consumer demand as a source of fluctuations in total demand, raising some of the issues subsequently treated by John Maynard Keynes.

Clark, John Pepper (b. April 6, 1935, Kiagbodo, Nigeria), the most lyrical of the Nigerian poets, whose poetry celebrates the physical landscape of Africa. He also won note as a journalist, playwright, and scholar-critic who conducted research into traditional Ijaw myths and legends and wrote a number of essays on African poetry.

While at the University of Ibadan, Clark founded *The Horn,* a magazine of student poetry. After graduating with an honours degree in English in 1960, he began his career as writer and journalist by working as a Nigerian government information officer and then as the features and editorial writer for the *Daily Express* in Lagos (1960–62). A year's study at Princeton University on a foundation grant resulted in his *America, Their America* (1964), in which he attacks American middle-class values, from capitalism to black American life-styles. After a year's research at Ibadan's Institute of African Studies, he became a lecturer in English at the University of Lagos and co-editor of the distinguished literary journal *Black Orpheus.*

In *Poems* (1962) and *A Reed in the Tide* (1965), each poem is the result of a single lyrical impulse, which is frequently inspired by a specific moment in the past. Clark's work does not display the degree of craftsmanship apparent in the work of his fellow Nigerian Christopher Okigbo; but in his best poems his sensual imagination makes successful use of the patterns of traditional African life. His *Casualties: Poems 1966–68* (1970) is concerned primarily with the Nigerian civil war.

Of his plays, the first three are tragedies in which certain individuals are unable to escape the doom brought about by an inexorable law of nature or society. *Song of a Goat* (1961), a family tragedy, in the eyes of some critics lacks the pity and terror of the Greek tragedy it imitates; yet it was well received throughout Africa and Europe for its dramatic skill and the poetic quality of its language.

The Masquerade (1964) again portrays a family tragedy, but it is *The Raft* that is considered to be his finest piece of dramatic writing. The situation of four men helplessly adrift on a raft in the Niger River suggests both the human predicament and the dilemma of Nigeria in the modern world. Clark's characterization is convincing and his symbolic setting richly allusive.

A more experimental work, *The Ozidi of Atazi* (performed in the early 1960s; pub. 1966), is a stage version of a traditional Ijaw ritual play, which in a native village would take seven days to perform. Like Yoruba folk opera, it is alive with music, dancing, mime, and spectacle. Clark also produced a film (with Francis Speed; *The Ozidi Saga: Tides of the Delts* [1972]) and an English translation of this Ijaw epic.

Clark (of Saltwood), Kenneth Mackenzie Clark, Baron, also called (1938–69) SIR KENNETH CLARK (b. July 10, 1903, London—d. May 21, 1983, Hythe, Kent, Eng.), British art historian who was a leading authority on Italian Renaissance art.

Clark was born to an affluent family. He was educated at Winchester and Trinity colleges, Oxford, but his education really began when he spent two years in Florence studying under Bernard Berenson, considered the foremost art critic of his time.

He returned to England and for the major portion of his life engaged not only in academic research but in public service as well. He served as director of the Ashmolean Museum at Oxford (1931–34) and then as director of the National Gallery, London (1934–45). In 1934 he was also appointed surveyor of the King's Pictures. From 1953 to 1960 he was chairman of the Arts Council of Great Britain, and from 1954 to 1957 he also served as the first chairman of the Independent Television Authority, which impressed upon him the potential of the mass media for exposing the general public to great art. He was Slade Professor of Fine Art at Oxford (1946–50, 1961–62).

Clark had already established himself as an elegant, accomplished writer and lecturer on a range of artistic and cultural subjects when he wrote and narrated a series, *Civilisation,* for BBC television in 1969. This series, a sweeping panorama of European art from the Dark Ages to the 20th century, made Clark internationally known. While the series demonstrated Clark's erudition, enthusiasm, and talent as a communicator, it was criticized by some art historians for its rather facile treatment of the subject.

Clark wrote a number of books on art. His first work was *The Gothic Revival* (1928). In 1935 he wrote a monograph on Leonardo da Vinci's drawings that, as *Leonardo da Vinci* (1939), is generally considered his most scholarly and penetrating work. His *Landscape into Art* (1949) and *The Nude* (1955) were critically well received and did much to encourage popular appreciation of painting. He wrote *Civilisation* (1969) as a companion to and summation of his television series. He also published two volumes of autobiography, *Another Part of the Wood* (1974) and *The Other Half* (1977).

Clark received many honours in his lifetime. He was made a Knight Commander of the Bath (1938), a Companion of Honour (1959), and in 1969 a life peer. He received the Order of Merit in 1976.

Clark, Mark (Wayne) (b. May 1, 1896, Madison Barracks, N.Y., U.S.—d. April 17, 1984, Charleston, S.C.), U.S. Army officer during World War II, who commanded Allied forces (1943–44) during the hard-fought and successful Italian campaign against the Axis powers.

A graduate (1917) of the U.S. Military Academy at West Point, N.Y., Clark served overseas in World War I. Early in 1942 he



Mark Clark
EB Inc

became chief of staff of army ground forces. Later that year, as deputy commander in chief to Gen. Dwight D. Eisenhower, he executed delicate and demanding assignments in connection with the Allied invasion of North Africa, including a dramatic submarine trip to Algeria for a secret meeting with French officers.

Clark's responsibilities were considerably enlarged when he was appointed commander of the American 5th Army, which effected a major landing at Salerno (September 1943) aimed at wresting the Italian peninsula from Axis control. Clark received the surrender of the Italian fleet and the government of Marshal Pietro Badoglio the same month; his march into Rome (June 4, 1944) marked the fall of the first enemy capital. In December he was appointed commander of the 15th Army Group and finally received the surrender of the stubborn German forces in the north of Italy on May 2, 1945.

After hostilities ended in Europe, Clark assumed command of U.S. troops in Austria before returning home to command the 6th Army and later the army field forces. In May 1952, during the Korean War, he was given command of all United Nations troops in Korea, holding that post until after an armistice was signed (July 1953); he retired from the army the same year. Clark served as president of The Citadel, a military college

in Charleston, S.C., from 1954 to 1966. He wrote *Calculated Risk* (1950), an account of his experience of World War II, and *From the Danube to the Yalu* (1954), his perspective on the Korean War.

Clark, Tom C., original name THOMAS CAMPBELL CLARK (b. Sept. 23, 1899, Dallas, Texas, U.S.—d. June 13, 1977, New York, N.Y.), U.S. attorney general (1945–49) and associate justice of the United States Supreme Court (1949–67).

Clark studied law after serving in the U.S. Army during World War I and graduated from the University of Texas law school in 1922 to enter private practice in Dallas. He served as civil district attorney for the county and became heavily involved in Democratic Party politics. In 1937 he joined the U.S. Department of Justice as a special assistant and remained with the department for eight years, working primarily on antitrust and war-fraud cases. In 1945 President Harry S. Truman appointed him attorney general, in which capacity he gained a reputation for vigorous antisubversive programs and the broadening of FBI powers. In 1949 he was appointed to the Supreme Court by Truman. On the court he maintained his strong views on the question of subversive activities, evident in *Irvine* v. *California* (1954) and *Breithaupt* v. *Abram* (1957), as well as in his dissents in the 1960s.

Although often at odds with the liberal majority under Chief Justice Earl Warren, Clark was nonetheless a frequent supporter of civil liberties. In the famous *Mapp* v. *Ohio* (1961) decision, Clark wrote the majority opinion that evidence obtained by illegal seizure could not be used in state courts, thereby greatly broadening the constitutional protection available to defendants. In *School District of Abington* v. *Schempp* (1963), Clark wrote the majority opinion that prohibited the reading of the Bible in public schools. His three 1964 civil-rights opinions, *Anderson* v. *Martin, Heart of Alabama Motel, Inc.* v. *United States,* and *Hamm* v. *Rock Hill,* provided the foundation for many subsequent civil-rights legal battles. Clark resigned from the court in 1967 upon the appointment of his son, Ramsey Clark, as attorney general.

Clark, Walter van Tilburg (b. Aug. 3, 1909, East Orland, Maine, U.S.—d. Nov. 10, 1971, Reno, Nev.), American novelist and short-story writer whose works, set in the American West, used the familiar regional materials of the cowboy and frontier to explore philosophical issues.

Clark grew up in Reno, which forms the background for his novel *The City of Trembling Leaves* (1945), the story of a sensitive adolescent boy's development. His best-known work is *The Ox-Bow Incident* (1940). The story of a lynching in 1885 of three innocent men, it conveys a powerful and dramatic insight into mob psychology. A film version appeared in 1943. *The Track of the Cat* (1949), a tale of a hunt for a black panther during a blizzard, is also a moral parable. *The Watchful Gods* (1950) is a collection of short stories. From the 1960s, Clark was a teacher of writing at San Francisco State College (now San Francisco State University).

Clark, William (b. Aug. 1, 1770, Caroline County, Va. [U.S.]—d. Sept. 1, 1838, St. Louis, Mo., U.S.), American frontiersman who won fame as an explorer by sharing with Meriwether Lewis leadership of their epic expedition to the Pacific Northwest (1804–06). He later played an essential role in the development of the Missouri Territory.

A younger brother of famed Revolutionary general George Rogers Clark, William entered military service in 1789 and participated in several campaigns against the Indians, including the Battle of Fallen Timbers (1794), which ended the threat of the Northwest Indian Confederation.



William Clark, portrait by Charles Willson Peale; in Independence National Historical Park, Philadelphia
By courtesy of the Independence National Historical Park Collection, Philadelphia

Upon the U.S. purchase of the Louisiana Territory (1803), Clark welcomed an invitation from Captain Lewis to share the leadership in an extensive exploration of the vast uncharted area of the Northwest. The Lewis and Clark Expedition thus embarked on a three-year trek from St. Louis to the Pacific Ocean and back—an enterprise that succeeded largely because of the harmonious and complementary leadership provided by the two men. Proving particularly daring and resourceful, Clark was credited with rescuing the expedition from disaster on more than one occasion. He also served as mapmaker and artist, portraying with meticulous detail animal life observed en route.

Following the journey, President Thomas Jefferson awarded Clark 1,600 acres (650 hectares) of public land and made him brigadier general of militia for the Louisiana (later Missouri) Territory as well as superintendent of Indian affairs, based in St. Louis. He held this post the rest of his life, and from 1813 he served as governor of the Missouri Territory. He also was surveyor general for Illinois, Missouri, and Arkansas (1824–25). Clark continued to show an intense concern for Indian affairs, and he appealed many times to the federal government to show justice and humanity to the country's first inhabitants. *See also* Lewis and Clark Expedition.

Clark Air Base, formerly CLARK FIELD, former U.S. military air base, northwestern Luzon, Philippines. It covered an area of about 12 square miles (30 square km). Located 48 miles (77 km) northwest of Manila near the foothills of the Cabusilan Mountains, it was established as a U.S. military camp for the 5th Cavalry after the Spanish-American War (1898). The base was named for Major Harold M. Clark, a pre-World War I pilot, in 1918. Clark Field was the principal target of raids by Taiwan-based Japanese bombers on December 8, 1941, that destroyed more than half of the U.S. Army's aircraft in East Asia. After the Japanese occupied the Philippines (1941–42), the airfield became a major Japanese base of operations during World War II. The first Japanese Kamikaze flight was made from Clark in 1944 as U.S. forces began the process of recapturing the Philippines. During the Vietnam War, Clark Air Base served as a strategic supply base and fighter-squadron installation. Beginning in the 1970s the United States and the Philippines held negotiations on the conditions for continued U.S. use of Clark Air Base. The eruption in 1991 of Mount Pinatubo covered the base with volcanic ash, destroying many buildings. At this point, the negotiations over Clark Air Base became moot, and the U.S. government withdrew, turning over the base to the Philippine government on Nov. 26, 1991.

Clark Fork, river in western Montana and northern Idaho, U.S. Rising near Butte, Mont., it flows in an irregular course north and northwest for about 360 miles (585 km) to enter Pend Oreille Lake in northern Idaho. From this point to the Columbia River, it is called the Pend Oreille River. Major tributaries are the Blackfoot, Bitterroot, St. Regis, and Flathead rivers.

Typically the river and its tributaries consist of long, narrow streams confined by mountainous terrain with cultivable intermontane valleys; irrigation is extensive in the Bitterroot and Flathead valleys. Glacier National Park, several wildlife preserves, and sections of a few national forests are in the Clark Fork–Pend Oreille Basin, which is noted for its mineral deposits, cool summer climate, and spectacular scenery.

Clarke, Alexander Ross (b. Dec. 16, 1828, Reading, Berkshire, Eng.—d. Feb. 11, 1914, Reigate, Surrey), English geodesist whose calculations of the size and shape of the Earth were the first to approximate accepted modern values with respect to both polar flattening and equatorial radius. The figures from his second determination (1866) became a standard reference for U.S. geodesy, even after the acceptance of other figures by the International Union of Geodesy and Geophysics in 1924.

Appointed to the Royal Engineers (1847), Clarke remained with the British ordnance survey at Southampton from 1850 to 1881, except for a period between 1851 and 1854. He was responsible for the principal triangulation (long-distance trigonometric surveying) of the British Isles and published the results of the first geodetic survey of Great Britain in 1861. Entrusted with comparing the standards of length for measuring an international arc of triangulation from Ireland to Russia, he published his results in 1866. His *Geodesy* (1880) has remained one of the best textbooks on the subject.

Clarke, Sir Andrew (b. July 27, 1824, Southsea, Hampshire, Eng.—d. March 29, 1902, London), British engineer, soldier, politician, and civil servant who, as governor of the Straits Settlements, negotiated the treaty that brought British political control to the peninsular Malay States.

Educated at the Royal Military Academy, Woolwich, Clarke received his commission in the Royal Engineers in 1844 and in 1848 was assigned to New Zealand. Five years later he became surveyor general of the state of Victoria in Australia and entered politics, holding Cabinet positions as surveyor general and commissioner of lands. Clarke's advocacy of universal suffrage led to a split with the government of Victoria and in 1857 to his return to active military duty.

After service in Africa and 10 years as director of engineering works at the Admiralty in London, Clarke was knighted and in 1873 became governor of the Straits Settlements. In January 1874 he negotiated the Pangkor agreement, by which the sultan of Perak, in return for British support against his rivals, agreed to allow a British resident to control his sultanate. This agreement became the model for later treaties that ultimately brought the entire peninsula within the British sphere of influence.

In 1875 Clarke was transferred to India as head of the public-works department. In 1882 he was appointed Britain's inspector general of fortifications and played a major role in planning the logistics of the Egyptian campaign carried on in 1884–85. Clarke spent the final years of his life as a consulting engineer and as agent-general for Victoria.

Clarke, Arthur C., in full ARTHUR CHARLES CLARKE (b. Dec. 16, 1917, Minehead, Somerset, Eng.), English writer, some of whose science-fiction concepts have had remarkable parallels, particularly in the development of satellite communications.

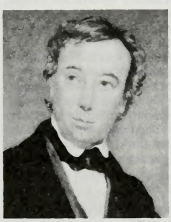
Interested in science from childhood, Clarke as a youth mapped the Moon with the aid of a telescope of his own construction. Lacking sufficient money for higher education, he worked as a government auditor from 1936 to 1941. He also joined a small, advanced group that called itself the British Interplanetary Society. From 1941 to 1946 Clarke served in the Royal Air Force, becoming a radar instructor and technician. While in the service he published his first science-fiction stories and in 1945 wrote for *Wireless World* an article entitled "Extra-Terrestrial Relays," predicting in detail a communications satellite system that would relay radio and television signals all over the world. The reaction of even specialized readers was skeptical. Twenty years later, however, the Early Bird synchronous satellites were actually launched.

After the war, Clarke secured a degree from King's College, London (B.Sc., 1948), with honours in physics and mathematics, and then became a prolific science-fiction writer, known especially for such novels as *Earthlight* (1955), *A Fall of Moondust* (1961), and *The Fountains of Paradise* (1979). Collections of essays and lectures include *Voices from the Sky* (1965), *The View from Serendip* (1977), and *Ascent to Orbit: A Scientific Autobiography* (1984).

In the 1950s Clarke developed an interest in undersea exploration and moved to Colombo, Ceylon (now Sri Lanka), where he embarked on a second career combining skin diving and photography; he reported his various underwater ventures in a succession of books, the first of which was *The Coast of Coral* (1956).

In the 1960s Clarke collaborated with motion-picture director Stanley Kubrick in making the innovative and highly praised science-fiction film *2001: A Space Odyssey* (1968), based on Clarke's short story "The Sentinel" (1951) and subsequently developed into a novel (1968). A sequel novel, *2010: Odyssey Two* (1982), was released as a film in 1984. A further novel in the series was *2061: Odyssey Three* (1987).

Clarke, Charles Cowden (b. Dec. 15, 1787, Enfield, Middlesex, Eng.—d. March 13, 1877, Genoa, Italy), English editor and critic best known for his work on William Shakespeare.



Charles Clarke, detail of a portrait by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

A friend of Charles Macready, Charles Dickens, and Felix Mendelssohn, Clarke became a partner in music publishing with Alfred Novello, whose sister, Mary, he married in 1828. Six years later Clarke began his public lectures on Shakespeare and other dramatists and poets. Those published include *Shakespeare Characters; Chiefly Those Subordinate* (1863) and *Molière Characters* (1865). In 1863 he edited George Herbert's poems and in the next 14 years produced new editions of nearly all the English poets.

After his wife had compiled her *Shakespeare Concordance* (1845), the couple collaborated in an edition of Shakespeare (completed in 1868) and *The Shakespeare Key: Unlocking the Treasures of His Style* (1879). Clarke was mainly interested in character study, as was his wife, whose *Girlhood of Shakespeare's Heroines* appeared in 1851–52. The Clarkes left London for Nice in 1856 and in 1861 settled in Genoa, where Clarke remained until his death.

Clarke, Edward Daniel (b. June 5, 1769, Willingdon, Sussex, Eng.—d. March 9, 1822, London), English mineralogist and traveler who amassed valuable collections of minerals, manuscripts, and Greek coins and sculpture.

Clarke journeyed through England (1791), Italy (1792 and 1794), Scandinavia, Finland, Russia, Siberia, Asia Minor, and Greece (1799–1802). In all of these places he collected minerals and made observations of geography and climate as well as plant, animal, and insect life. In Sweden he collected manuscripts of maps as well as plant and mineral specimens. In Greece he collected some 1,000 ancient coins, vases, and statues—most notably, a colossal marble sculpture from the ancient city of Eleusis.

After his return to England Clarke became a minister in the Church of England (1805) and the first professor of mineralogy at the University of Cambridge (1808). His Greek marbles, which he donated to the University of Cambridge, are in the Fitzwilliam Museum. The Bodleian Library of the University of Oxford purchased his manuscripts, and Cambridge purchased his minerals after his death. His principal work was *Travels in Various Countries of Europe, Asia, and Africa*, 6 vol. (1810–23).

Clarke, James Freeman (b. April 4, 1810, Hanover, N.H., U.S.—d. June 8, 1888, Jamaica Plain, Mass.), Unitarian minister, theologian, and author, whose influence helped elect Grover Cleveland president of the United States in 1884.

After graduating from Harvard College in 1829 and Harvard Divinity School in 1833 and serving his first pastorate in Louisville, Ky., from 1833 to 1840, Clarke established in 1841 the Church of the Disciples in Boston, where he was minister from 1841 to 1850 and from 1854 until his death. He was also professor of religion at Harvard (1867–71). He worked closely with many of the significant persons of his day, and he printed original works by his friends Ralph Waldo Emerson, Oliver Wendell Holmes, and Nathaniel Hawthorne in the *Western Messenger*, a short-lived magazine he edited while at Louisville. A versatile reformer, Clarke opposed slavery and advocated changes in the civil service. The latter reforms were part of Grover Cleveland's platform as a candidate for president in 1884, and Clarke lent his influential support to Cleveland's campaign.

In addition to editing such magazines as the *Christian World* (1843–48) and the *Monthly*



James Clarke, daguerreotype by Southworth and Hawes

By courtesy of the Metropolitan Museum of Art, New York, gift of I.N. Phelps Stokes, Edward S. Hawes, Alice Mary Hawes, Marion Augusta Hawes, 1937

Journal of the American Unitarian Association (1859–61), Clarke published more than 1,000 articles and sermons and 32 books, including *Ten Great Religions*, 2 vol. (1871, 1883). His *Autobiography, Diary, and Correspondence*, edited by Edward Everett Hale, appeared in 1891.

Clarke, John H(essin) (b. Sept. 18, 1857, New Lisbon, Ohio, U.S.—d. March 22, 1945, San Diego, Calif.), associate justice of the United States Supreme Court (1916–22).

Clarke studied law under his father and in 1880 opened a practice in Youngstown, Ohio, where he also bought an interest in the *Youngstown Vindicator* and helped make it an influential liberal newspaper. He gained a reputation in railroad law and was active in local Democratic politics, breaking briefly with the party over the silver issue but returning to become a supporter of the reform mayor of Cleveland, Ohio, Tom L. Johnson (1901–09) and Johnson's successor, Newton Baker. He was the unsuccessful Democratic nominee for the U.S. Senate in 1903 and in 1914 was appointed a federal district judge. In 1916 Clarke was named to the U.S. Supreme Court by President Woodrow Wilson.

Clarke generally favoured the extension of government regulatory powers over the economy. (His opinions sometimes were used later as precedents in the antitrust decisions during the New Deal.) His position on civil liberties was ambivalent, however, and he relied on a very narrow construction of First Amendment rights in his decisions concerning the suppression of free speech during the "Red Scare" of 1919–20. Clarke resigned from the court in 1922 after the death of his two sisters, with whom he had lived in Youngstown, and he devoted the rest of his life to the cause of international peace.

Clarke, Kenny, byname of KENNETH SPEARMAN CLARKE, also called KLOOK (b. Jan. 9, 1914, Pittsburgh, Pa., U.S.—d. Jan. 25, 1985, Montreuil-sous-Bois, near Paris, Fr.), American drummer who was a major exponent of the modern jazz movement of the 1940s.

Clarke's music studies in high school embraced vibraphone, piano, trombone, and theory, but it was as a drummer that he began his professional career in 1930. His experience included engagements with Roy Eldridge, Louis Armstrong, Coleman Hawkins, Ella Fitzgerald, Benny Carter, and Red Allen. In 1939 he joined Teddy Hill's band, at that time a refuge for several embryo modernists, and in 1946 he formed an association with Charlie Parker and Dizzy Gillespie. In April 1952 he helped found the Modern Jazz Quartet but left before the group became popular. He settled in France in 1956 and was coleader there of the Kenny Clarke–Francy Boland Band from 1960 until its dissolution in 1973.

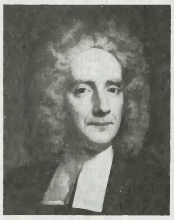
Clarke was a chief element in the modernist movement in the 1940s, revolutionizing the drummer's role by moving the principal timekeeping rhythms to the ride cymbal and by interjecting musical comments to the soloist by "dropping bombs" on the bass drum and snare drum with unexpected fills and underscorings.

Clarke, Marcus (Andrew Hislop) (b. April 24, 1846, London, Eng.—d. Aug. 2, 1881, Melbourne, Vic., Australia), English-born Australian author known for his novel *For the Term of His Natural Life* (1874), an important literary work of colonial Australia.

At the age of 17 Clarke left England for Australia, where his uncle was a county court judge. After working briefly as a bank clerk, he turned to farming on a remote homestead. By 1867, however, he was writing stories for *Australian Magazine* and working as a theatre

critic on the *Melbourne Argus*. Commissioned by the *Australian Journal* to write a serial about convict life, Clarke produced his masterwork, *For the Term of His Natural Life*, the story of Rufus Dawes, a man falsely convicted of a crime, who falls into the degradation of the convict world. It was written melodramatically in a style of almost garish realism. Clarke enjoyed good company and helped to found the Yorick Club, which numbered among its members many of the literary lights of his day. His numerous novels and tales are collected in *The Austral Edition of the Selected Works of Marcus Clarke* (1890).

Clarke, Samuel (b. Oct. 11, 1675, Norwich, Norfolk, Eng.—d. May 17, 1729, Leicestershire), theologian, philosopher, and exponent of Newtonian physics, remembered for his influence on 18th-century English theology and philosophy.



Samuel Clarke, detail of a portrait by John Vanderbank; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

In 1698 Clarke became a chaplain to the bishop of Norwich and in 1706 to Queen Anne. In 1704–05 he gave two sets of lectures, published as *A Demonstration of the Being and Attributes of God* (1705) and *A Discourse Concerning the Unchangeable Obligations of Natural Religion* (1706). In the first set he attempted to prove the existence of God by a method "as near to Mathematical, as the nature of such a Discourse would allow." In the second he argued that the principles of morality are as certain as the propositions of mathematics and thus can be known by reason unassisted by faith, an approach sometimes called ethical rationalism. The criticism of religion by David Hume resulted in part from his dissatisfaction with Clarke's effort to prove the existence of God. Clarke also spurred a vehement and prolonged controversy with his *Scripture Doctrine of the Trinity* (1712), which led many of his opponents to accuse him of Arianism, the belief that Christ is neither fully man nor fully God.

Clarke was a friend and disciple of Isaac Newton at the University of Cambridge and helped to spread Newton's views. In 1697 he made a Latin translation of the physicist Jacques Rohault's *Traité de physique* (1671; "Treatise on Physics"), adding numerous footnotes explaining Newton's improvements on Rohault's work. In 1706 he published a Latin translation of Newton's *Opticks*. A correspondence of 1715–16 between Clarke and Gottfried Wilhelm Leibniz, important for its defense of the reality of space and time, was published in 1717 and in several later editions. Clarke's collected works were issued in four volumes in 1738–42.

Clark's gazelle (antelope): *see* dibatag.

Clarksburg, city, seat (1784) of Harrison county, north-central West Virginia, U.S. The city lies along the West Fork of the Monongahela River. Settled in 1765, it was named for General George Rogers Clark, noted Virginia frontiersman. In 1772 Thomas Nutter built a fort near the site around which developed the town of Nutter Fort, now a southeastern suburb. During the American Civil War, Clarksburg was the headquarters of General George B. McClellan (1861), who was charged with holding western (now West) Virginia for the Union, and it was an important Union supply base. Thomas J. "Stonewall" Jackson, Confederate military leader, was born there (1824), as was John W. Davis, lawyer, diplomat, and presidential candidate in 1924. Coal mining, oil and gas production, agriculture, and manufactures (glassware, chemicals, zinc, coffins, machinery, brick) form the city's economic base. Watters Smith Memorial State Park and Salem College (1888) are nearby.

The adjacent communities of Broad Oaks, Stealey Heights, Adamston, and North View were consolidated into Clarksburg in 1917. Inc. town, 1785; city, 1921. Pop. (1992 est.) 18,244.

Clarksdale, city, seat (1892) of Coahoma county, northwestern Mississippi, U.S. It is situated in the Mississippi River valley and lies along the Sunflower River, 70 miles (113 km) south-southwest of Memphis, Tenn. It was settled in 1849 by John Clark on an Indian fortification site; in 1868 he opened a store and laid out a village, which was originally named Clarksville. Clarksdale is now a processing and distribution centre, and agriculture (cotton, small grains, soybeans, dairy products) is the economic mainstay, augmented by light manufacturing. According to the U.S. De Soto Exposition, Sunflower Landing, 14 miles (23 km) west, is the spot where Hernando de Soto discovered the Mississippi River in 1541. Coahoma Community College opened (1949) in Clarksdale. Inc. 1882. Pop. (1991 est.) 19,860.

Clarkson, Laurence (English sectarian): *see* Claxton, Laurence.

Clarkson, Thomas (b. March 28, 1760, Wisbech, Cambridgeshire, Eng.—d. Sept. 26, 1846, Ipswich, Suffolk), abolitionist, one of the first effective publicists of the English movement against the slave trade and against slavery in the colonies.

Clarkson was ordained a deacon, but from 1785 he devoted his life to abolitionism. His *An Essay on the Slavery and Commerce of the Human Species* (1786) brought him into association with Granville Sharp, William Wilberforce, and other foes of slavery. In 1787 he joined them in forming a society for the abolition of the slave trade. His essay also gained him the sympathy of Edmund Burke, Charles James Fox, and the younger William Pitt.

Clarkson visited British ports to collect facts for his pamphlet "A Summary View of the Slave Trade and of the Probable Consequences of Its Abolition" (1787). The evidence that he gathered was used in the antislavery campaign led by Wilberforce in Parliament. Little progress was made during the early years of warfare with France because many members of Parliament believed that the slave trade provided essential wealth for the nation and valuable training for the navy.

In 1807 a bill for the abolition of the slave trade finally was passed, and the next year Clarkson's two-volume history of the trade was published. Partly as a result of Clarkson's continued efforts, Viscount Castlereagh in 1815 secured the condemnation of the trade by the other European powers, though at the congress of Aix-la-Chapelle (1818) measures for enforcing international abolition were discussed without effect. When the Anti-Slavery Society was founded (1823), Clarkson was chosen a vice president.

Clarksville, city, seat (1796) of Montgomery county, northern Tennessee, U.S. It lies near the Kentucky state line, at the confluence of the Cumberland and Red rivers, 40 miles (64 km) northwest of Nashville. Settled in 1784, it was named for General George Rogers Clark, the American Revolutionary War soldier and frontiersman. It developed in the 19th century as a river depot for tobacco, grain, and lumber. Its modern, diversified farm economy (which includes the raising of beef and dairy cattle) is supplemented by manufacturing (footwear, clothing, heating and cooling equipment, and machine parts). The processing and marketing of dark-fired tobacco and of meat are important activities. Clarksville is the seat of Austin Peay State University (1927). Part of Fort Campbell, a military reservation headquartered in Kentucky, lies west of the city. Dunbar Cave, with a subterranean stream and varicoloured rock formations, is immediately northeast. Near the town of Dover, 28 miles (45 km) west, is Fort Donelson National Military Park, the site on which forces under the command of General Ulysses S. Grant won the first major Union victory (February 1862) of the American Civil War. Inc. town, 1785; city, 1820. Pop. (1992 est.) city, 77,765; Clarksville-Hopkinsville MSA, 173,761.

class (sociology): *see* social class.

classic skiing: *see* Nordic skiing.

classical ballet, also called ROMANTIC BALLET, system of dance based on formalized movements and positions of the arms, feet, and body designed to enable the dancer to move with the greatest possible agility, control, speed, lightness, and grace. Classical-ballet technique is based on the turned-out position of the legs, which increases the range of movement through added mobility in the hip joint and also imparts a more pleasing line to the extended leg. The subject matter of classical ballet may be romantic, realistic, or mythological; a variety of dramatic and emotional situations may be represented. A classical production is divided into three sections: the opening pas de deux (dance for two), or adagio; variations or individual performances by the partners, first by the male and then by the female; and the final pas de deux, or coda.

Classical ballet, with origins in the 17th-century French court ballet, came to fruition at the Russian Imperial School of Ballet, directed in the 19th century by Marius Petipa, and in the works of the Italian choreographic masters Carlo Blasis and Enrico Cecchetti. Blasis' *Traité élémentaire, théorique et pratique de l'art de la danse* (1820) was the first formal codification of classical-ballet technique. As head of the ballet school at La Scala, Milan, he applied his strict methods and emphasis on form; the school became the principal source of solo dancers who spread classical ballet across Europe. Examples of classical ballets that have survived in repertoires throughout the world are Peter Ilich Tchaikovsky's *Swan Lake* and *The Nutcracker*.

classical economics, English school of economic thought that originated during the late 18th century with Adam Smith; it reached maturity in the works of David Ricardo and John Stuart Mill. The theories of the classical school, which dominated economic thinking in Great Britain until about 1870, were primarily concerned with the dynamics of economic growth. They emphasized economic freedom, laying stress on such ideas as laissez-faire and free competition.

Many of the fundamental concepts and principles of classical economics were set forth in Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776). Strongly opposed to the mercantilist theory and policy that had prevailed in Britain since the 16th century, Smith argued that free competition and free trade, neither hampered nor coddled by government, would best promote the economic growth of a nation. As he saw it, the entire community benefited most when each

of its members followed his own self-interest. In a free enterprise system, individuals make a profit by producing goods that other people are willing to buy. By the same token, individuals spend money for goods that they want or need most. Smith demonstrated how the apparent chaos of competition, the welter of buying and selling, is transmuted into an orderly system of economic cooperation by means of which, under individual freedom as opposed to central direction, the nation's needs are supplied and its wealth is increased.

In analyzing the workings of free enterprise, Smith introduced the rudiments of a labour theory of value and a theory of distribution. Both these ideas were taken up by Ricardo to be elaborated and refined in his treatise *Principles of Political Economy and Taxation* (1817). In his labour theory of value, Ricardo emphasized the tendency of the value (*i.e.,* price) of goods produced and sold under competitive conditions to be proportionate to the labour costs incurred in producing them. He fully recognized, however, that over short periods price depends on supply and demand. This notion became central to classical economics, as did Ricardo's theory of distribution, which divided national product among three social classes: wages for labourers, profits for owners of capital, and rents for landlords. Taking the limited growth potential of any national economy as a given, Ricardo believed that a particular social class could gain a larger share of the total product only at the expense of another. These and other Ricardian theories were restated by Mill in *Principles of Political Economy* (1848), which marked the culmination of classical economics. In his treatise Mill managed to relate abstract economic principles to social conditions of the real world and thereby gave them a new authority.

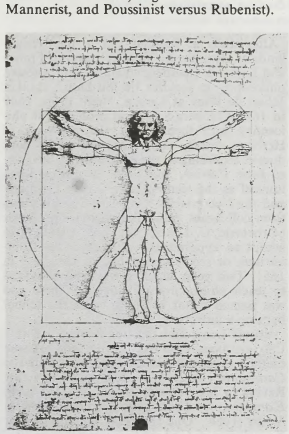
The teachings of the classical economists attracted much attention during the mid-19th century. The labour theory of value, for example, was adopted by Karl Marx, who worked out all of its logical implications and combined it with the theory of surplus value founded on the ethical postulate that human labour alone creates all value and thus constitutes the sole source of profits. More significant were the effects of classical economic thought on free-trade doctrine. The most influential was Ricardo's principle of comparative advantage, which states that every nation should specialize in the production of those commodities it can produce most efficiently and should import everything else. This idea implies that if all nations take full advantage of the territorial division of labour, total world output would invariably be larger than it would be if nations tried to be self-sufficient. The comparative-advantage principle became the cornerstone of 19th-century international-trade theory.

classical literature, the literature of ancient Greece and Rome (*see* Greek literature; Latin literature). The term is also used for the literature of any language in a period notable for the excellence and enduring quality of its writers' works. In ancient Greece such a period extended from about 500 to 320 BC; the Golden Age of Rome ran from about 70 BC to AD 18. French literature of the second half of the 17th century is considered classical, as is English literature of 1660–1714; the works produced and the critical standards that prevailed in both eras emulated those of the classical periods in Greek and Latin, although this criterion is not an essential characteristic of a classical literature.

Classicism and Neoclassicism, in the arts, historical tradition or aesthetic attitudes based on the art of Greece and Rome in antiquity. In the context of the tradition, Classicism refers either to the art produced in antiquity or to later art inspired by that of antiquity; Neoclassicism always refers to the art produced later but inspired by antiquity. Thus the terms Classicism and Neoclassicism are often used interchangeably.

When used to refer to an aesthetic attitude, Classicism invokes those characteristics normally associated with the art of antiquity—harmony, clarity, restraint, universality, and idealism. Because of the high regard accorded to ancient art, "classic" is sometimes used to mean that the example is the best of its type (*e.g.,* a classical example of a villa). By extension, "classic" is also sometimes used to refer to a stage of development that some historians and aestheticians have identified as a regular feature of what they have seen as the cyclical development of all styles. In such schemes the Classical phase is the moment at which the style is at its fullest and most harmonious expression; this phase is generally thought to follow a primitive or less completely realized phase and to precede a "mannered," "baroque," or "decadent" phase in which the style loses its original forcefulness and is sometimes meaninglessly elaborated. Phases of Western art history that intentionally imitate the antique example directly are usually called Neoclassical.

In the Western tradition, periods of Classicism share a reverence for the models of antiquity, but they may vary widely in their interpretation and application of those models, depending on the period and the genre (such as painting, architecture, literature, and music). In the visual arts, besides the general qualities associated with the aesthetic attitude of Classicism, classicizing artists tend to prefer somewhat more specific qualities; these include line over colour, straight lines over curves, frontality and closed compositions over diagonal compositions into deep space, and the general over the particular. Nevertheless, whenever artists have referred to antiquity, they have carried the problems and ideals of their own times with them, interpreting in different ways what antiquity had to offer. Classicism has historically been seen as one of any number of polar opposites. These polarities may designate aesthetic or critical oppositions (classic versus romantic, classic versus avant-garde), or they may indicate historical oppositions (in the following, the first term of each pair is considered to embody the aesthetic characteristics of Classicism: Renaissance versus Gothic, High Renaissance versus Mannerist, and Poussinist versus Rubenist).



Vitruvian man, a figure study by Leonardo da Vinci (*c.* 1509) illustrating the proportional canon laid down by the Classical Roman architect Vitruvius; in the Academy of Fine Arts, Venice

Foto Marburg/Art Resource, New York City

The Classical tradition was not extinguished during the Middle Ages, but because of the resolute efforts of 15th- and 16th-century Italians to absorb the Classicism of antiquity, the Italian Renaissance was the first period of thoroughgoing Classicism after antiquity. The 15th-century architect Leon Battista Alberti equated Classicism and beauty and defined beauty in architecture as "the harmony and concord of all the parts achieved by following well-founded rules [based on the study of ancient works] and resulting in a unity such that nothing could be added or taken away or altered except for the worse." He said that the "sculptor should endeavour as much as possible to express by both the deportment . . . and bearing . . . of the figure, the life and character . . . of the person." In painting, artists were to choose subjects that glorified man, use figures suited to the actions being represented, and imitate the appearance of actions in the natural world. In the visual arts the Classicism of the Renaissance is epitomized in Michelangelo's "David" (1501–04; Accademia, Florence), in Raphael's portrait of Baldassare Castiglione (1516; Louvre, Paris), and in Donato Bramante's Palazzo Caprini (*c.* 1510; Rome; destroyed).

The examples of antiquity and of the Renaissance in Rome provided the standard of Classicism for the next two centuries in Italy, while in 17th-century France those examples, along with Alberti's theories, guided the principal French artists to a purified Classicism. Especially important were Nicolas Poussin in painting (*e.g.,* "Landscape with the Burial of Phocion" [1648; Louvre]) and François Mansart in architecture (*e.g.,* Church of Val-de-Grace [1645–67; Paris; with Jacques Lemercier]). In 18th-century England, Classicism in architecture—based on the works and treatise of the Italian architect Andrea Palladio, themselves based on Roman antiquity and on Renaissance Rome—provided standards of Classicism that pervaded English and American architecture until the beginning of the 19th century (*e.g.,* Lord Burlington, Chiswick House, Middlesex, begun 1725; Thomas Jefferson, Monticello, Charlottesville, Va., completed 1809). The academic leanings of English painters such as Sir Joshua Reynolds provided lessons in Renaissance Classicism that dominated a similar span of English and American painting.

By the middle of the 18th century, Classicism was being attacked from two directions. The authoritative equation of Classicism and beauty was challenged by longings for the sublime, so that romantic fantasies, suggestive allusions, and bizarre inventions came to be more highly valued than classicist clarity and dignity. Likewise, the accepted superiority of Roman antiquity was being challenged by supporters of Greece. The historian of ancient art Johann Winckelmann, for example, saw in Greek sculpture "a noble simplicity and quiet grandeur" and admonished artists to imitate nature by imitating the Greeks, for only they have revealed man's greatness—a classicist doctrine translated from Rome to Greece. In sculpture this program was followed particularly by Antonio Canova. In painting, on the other hand, Jacques-Louis David reestablished the formal standards of Raphael and of Augustan Rome and turned Classicism into a tool that served the new exhortative and eulogizing subjects painters were called on to render (*e.g.,* "Oath of the Horatii" [1784; Louvre]). Restraint, grandeur, and simplicity, along with precise depiction and close congruence of clear form and noble content, continued to constitute the Classicism in many of the works of such later artists as Pablo Picasso, Aristide Maillol, and Henry Moore.

After the mid-18th century, Classicism in

architecture became connected with rationalism. Various Neoclassicisms were spawned by reverence for Greek, Roman, or Renaissance models. By the early 20th century, classicistic demands for harmony, proportion, and the congruence of parts were being applied to new technology to give order to many styles. The architects Le Corbusier and Ludwig Mies van der Rohe exemplified two different ways of adapting Classical stylistic characteristics to modern problems and materials.

Periods of Classicism in literature and music have generally coincided with the Classical periods in the visual arts. In literature, for instance, the first major revival of Classicism also occurred during the Renaissance, when Cicero's prose was especially imitated. France in the 17th century developed a rich and diversified Classicism in literature, as it had also in the visual arts. The dramatists Pierre Corneille and Jean Racine, together with the philosophers Blaise Pascal and René Descartes, were particularly important. In England, Classicism in literature arose later than in France and reached its zenith in the 18th-century writings of John Dryden and Alexander Pope. Gotthold Ephraim Lessing, Johann Wolfgang von Goethe, and Friedrich Schiller were major figures in the German Classical literary movement. In the early 20th century, T.S. Eliot and proponents of the New Criticism were sometimes considered classicists because of their emphasis on form and discipline.

In music the great Classical period arose in the late 18th century and was dominated by composers of the German-speaking area of Europe: Joseph Haydn, Wolfgang Amadeus Mozart, Christoph Gluck, and the young Ludwig van Beethoven. Their music is polished, refined, and melodic. In their era, instrumental music became more important than vocal music for the first time in history. Intense interest in such music and in regularized "Classical" form led to the standardization of symphony orchestras, chamber ensembles, pianos, and various compositional forms.

classification, in biology, the establishment of a hierarchical system of categories on the basis of presumed natural relationships among organisms. The science of biological classification is commonly called taxonomy (*q.v.*).

classification (library science): *see* library classification.

classification theory, principles governing the organization of objects into groups according to their similarities and differences or their relation to a set of criteria. Classification theory has applications in all branches of knowledge, especially the biological and social sciences. Its application to mathematics is called set theory (*q.v.*).

According to strict logic, organizing a domain of objects into classes must leave no two classes with any object in common; also, all of the classes together must contain all of the objects of the domain. This theory, however, disregards the frequency in practice of borderline cases—*i.e.,* objects that can with equal correctness be accepted or rejected as members of two otherwise exclusive classes. This is often seen in biology, where the theory of evolution implies that some animal populations will have characteristics of two distinct species.

In practice, the principles used to classify a domain of objects depend upon the nature of the objects themselves. In forming classes of perceptual objects—*e.g.,* the class of green things or of elephants—the perceived similarities and differences between the objects are important. The classification of such objects requires a standard object against which all others are compared in including them within or excluding them from a class. A domain of objects that never change is classified morphologically (*i.e.,* according to form or structure). If, on the other hand, the domain comprises changing or developing objects—*e.g.,* evolving plants or animals—then it is likely to be classified genetically (*i.e.,* in reference to crucial developmental stages). Sometimes objects are classified not so much by their characteristics as by the degree to which they possess them; minerals, for example, may be classified by their varying hardnesses rather than by the characteristic of hardness itself. Finally, classification by differences of quantity and of quality establishes equalities and inequalities of order or rank between different single objects within a domain as well as between different combinations of them.

classless society, in Marxist thought, the ultimate condition of social organization, expected to occur when true communism is achieved. According to Karl Marx, the state represents the dominant class in society, with the primary function of repressing other classes. After the class struggle has resulted in the victory of the proletariat and the establishing of a socialist society, however, there will be no further need for such a repressive institution; theoretically the state then is expected to "wither away."

Clauberg, Johann (b. Feb. 24, 1622, Solingen, duchy of Berg [Germany]—d. Jan. 31, 1665, Duisburg, Brandenburg), philosopher and theologian who became the foremost German proponent of the thought of the French philosopher René Descartes.



Clauberg, engraving by J. Wielant
By courtesy of the Staatsbibliothek, Berlin

After study at Bremen and in the Netherlands at Groningen and after travel in France and England, Clauberg encountered Cartesian philosophy in lectures by the Dutch thinker Johan de Raey at Leiden, Neth. From 1649 to 1651 Clauberg served as professor of philosophy and theology at the academy of Herborn, Nassau (an academy that was conducted according to the Reformation theology of John Calvin), and he soon distinguished himself as the leading Cartesian in Germany and the Netherlands. Opposition to his views from colleagues, particularly from a professor of rhetoric, C. Lentz, influenced Clauberg to accept an appointment as head of the *Gymnasium,* or secondary school, at Duisburg in 1651. Two years later he was commissioned to teach philosophy and theology there and was named rector in 1655, when the school became a university.

Against Lentz and Jacobus Revius, a Dutch Calvinist poet, Clauberg upheld the Cartesian method of pursuing knowledge in his *Defensio Cartesiana* (1652). He sought again to refute Revius in his *Initiatio Philosophi* (1655). In *Exercitationes Centum de Cognitione Dei et Nostri* (1656; "One Hundred Exercises on the Knowledge of God and Ourselves"), he proceeded from his proof for the existence of God based on a concept of the infinite to an account of knowledge and being in general. The similarity of this work to the thought of Plato is evident also in *Corporis et Animae in Homine Conjunctio* (1663; "On the Joining of the Body and the Soul in Man"), in which he addressed the Cartesian topic of the relation between body and soul. The soul, he maintained, is incapable of movement and cannot create movement in the bodily world, because the quantity of movement remains constant. Yet the soul can guide bodily movements through its will. Consequently, the soul has moral rather than physical force. In Clauberg's view, known as occasionalism, bodies do not cause or create the soul but provide the "occasion" for it to function creatively. The harmonious interaction of body and soul depends on the providence of God, who is considered by Clauberg in Cartesian fashion to be the ultimate cause of all motion.

A collected edition of Clauberg's philosophical writings, by J.T. Schalbruch, appeared in 1691. In addition to a work on German philology, *Ars Etymologica Teutonum e Philosophiae* (1663; "The Art of Teutonic Etymology"), Clauberg wrote lucid expositions of Descartes's *Meditations* and *Principia Philosophiae.* In his *Ontologia sive Metaphysica de Ente* (1660; "Ontology or Metaphysics of Being"), Clauberg sought to reconcile Cartesian doctrines with the metaphysical positions of his pre-Cartesian *Ontosophia* (1647; "The Wisdom of Being").

Claude OF FRANCE, French CLAUDE DE FRANCE (b. Oct. 14, 1499, Romorantin, France—d. July 20, 1524, Blois), queen consort of King Francis I of France (reigned 1515–47), the daughter of the French king Louis XII and Anne of Brittany.

In 1504 Claude's mother, eager to keep Brittany out of French hands, caused the Treaty of Blois to be concluded, which assured the hand of Claude to Charles of Austria (the future emperor Charles V) and promised him Brittany, Burgundy, and the county of Blois. This unpopular treaty was broken, however, and Claude was instead betrothed (1506) to Francis of Angoulême (the future Francis I of France). On her mother's death in January 1514, she inherited Brittany and, four months later (May 18, 1514), married Francis; on his accession to the throne the following year, Brittany was definitively joined to the crown of France.

Claude, Albert (b. Aug. 24, 1898, Longlier, Belg.—d. May 22, 1983, Brussels), Belgian-American cytologist who developed the principal methods of separating and analyzing components of the living cell. For this work, on which modern cell biology is partly based, Claude, his student George Palade, and Christian de Duve shared the Nobel Prize for Physiology or Medicine in 1974.

Upon obtaining his M.D. at Liège University, Belgium, in 1928, Claude began research at the Rockefeller Institute for Medical Research (now Rockefeller University) in New York City. In attempting to isolate the Rous sarcoma virus from chicken tumours, he spun cell extracts containing the virus in centrifuges that concentrated heavier particles in the bottom of the test tube; lighter particles settled in layers above. For comparison, he began centrifuging normal cells. This centrifugal separation of the cell components made possible a biochemical analysis of them that confirmed that the separated particles consisted of distinct organelles. Such analysis enabled Claude to discover the endoplasmic reticulum (a membranous network within cells) and to clarify the function of the mitochondria as the centres of respiratory activity.

Claude turned in 1942 to the electron microscope—an instrument that had not been used in biological research—looking first at separated components, then at whole cells. His demonstration of the instrument's usefulness in this regard eventually helped scientists to correlate the biological activity of each cellu-

lar component with its structure and its place in the cell.

Claude, who became a citizen of the United States in 1941, returned in 1949 to Belgium; through a legal process, he held dual citizenship in the two countries from 1949. While holding professorships at Rockefeller University (to 1972) and the Université Libre in Brussels (to 1969), he served as director (1948–71) of the Jules Bordet Institute.

Claude, Georges (b. Sept. 24, 1870, Paris—d. May 23, 1960, Saint-Cloud, Fr.), engineer, chemist, and inventor of the neon light, which found widespread use in signs and was the forerunner of the fluorescent light.

In 1897 Claude discovered that acetylene gas could be transported safely by dissolving it in acetone. His method was generally adopted and brought a wide expansion to the acetylene industry. Independently of the German chemist Carl von Linde, he developed a process for producing liquefied air in quantity (1902). Although he proposed the use of liquid oxygen in iron smelting as early as 1910, his suggestion was not adopted until after World War II.

While studying the inert gases, Claude found that passing electrical current through them produced light, and in 1910 he developed the neon lamp for use in lighting and signs. With the introduction of inner fluorescent coatings, the fluorescent light was developed and began to replace the incandescent lamp in industrial and certain home-lighting uses.

Claude also developed a process for the manufacture of ammonia in 1917 that was similar to the process developed by the German chemist Fritz Haber. In his efforts to find new sources of energy, he conducted experiments in producing electricity from the difference in temperature between the ocean floor and the surface.

A supporter of the Vichy government during World War II, Claude was afterward imprisoned as a German collaborator from 1945 to 1949.

Claude Lorrain, byname of CLAUDE GELLÉE (b. 1600, Chamagne, Fr.—d. Nov. 23, 1682, Rome), French artist best known for, and one of the greatest masters of, ideal-landscape painting, an art form that seeks to present a view of nature more beautiful and harmonious than nature itself. The quality of that beauty is governed by classical concepts, and the landscape often contains classical ruins and pastoral figures in classical dress. The source of inspiration is the countryside around Rome—the Roman Campagna—a countryside haunted with remains and associations of antiquity. The practitioners of ideal landscape during the 17th century, the key period of its development, were artists of many nationalities congregated in Rome. Later, the form spread to other countries. Claude, whose special contribution was the poetic rendering of light, was particularly influential, not only during his lifetime but, especially in England, from the mid-18th to the mid-19th century.

Life and works. Claude Lorrain, usually called simply Claude in English, was born of poor parents at Chamagne, a village in the then independent duchy of Lorraine. He received little schooling, and, according to his first biographer, Joachim von Sandrart, was brought up to be a pastrycook. His parents seem to have died when he was 12 years old, and, within the next few years, he travelled south to Rome.

In Rome he was trained as an artist by Agostino Tassi, a landscapist and the leading Italian painter of illusionistic architectural frescoes. At what stage and for how long he was apprenticed is uncertain, and, either before or during this period, Claude probably spent two years in Naples with Goffredo Wals, another pupil of Tassi. Tassi taught Claude the basic vocabulary of his art—landscapes and coast scenes with buildings and little figures—and gave him a lasting interest in perspective and, thus, in landscape painting.

In 1625, according to his second biographer, Filippo Baldinucci, Claude left Tassi and went back to Nancy, the capital of Lorraine, where he worked for a year as assistant to Claude Deruet on some frescoes (since destroyed) in the Carmelite church. But, in the winter of 1626–27, Claude returned to Rome and settled there permanently. He never married, but he had a daughter, Agnese (1653–*c.* 1713), who lived in his house; also staying with him were a pupil, Giovanni Domenico Desiderii, from 1633 to *c.* 1656, and two nephews, Jean from *c.* 1663 and Joseph from *c.* 1680. In 1633, to further his career, Claude joined the painters' Academy of St. Luke.

Little is known of his personality. He took no part in public events and lived essentially for his work. In his early period he mixed with other artists, especially those who were of northern European origin like himself, but in his 40s he apparently became more solitary. He remained on good terms with the painter Nicolas Poussin, another French master of the ideal landscape, yet there was hardly any artistic contact between them. Although ill-educated in the formal sense (both his spelling and counting were eccentric, and he wrote haltingly in French and Italian), Claude was not the ignorant peasant of legend. The subjects of his paintings show that he had an adequate knowledge of the Bible, Ovid's *Metamorphoses,* and the *Aeneid.* He had a special feeling for the country, but his mode of life was that of a bourgeois. Industrious, amiable, and shrewd, surrounded by his modest household, and keenly sought after as an artist, he pursued a successful career into old age and amassed a comfortable fortune.

No work by Claude survives from before 1627, and he probably did not take up landscape until after that date. His first dated work is "Landscape with Cattle and Peasants." Painted in 1629, it hangs in the Philadelphia Museum of Art. Soon after, in the early 1630s, he rose to fame. He did this partly on the basis of two or three series of landscape frescoes (all but one, a small frieze in the Crescenzi palace at Rome, are now lost), but, according to Baldinucci, he achieved renown chiefly because of his skill in representing "those conditions of nature which produce views of the sun, particularly on seawater and over rivers at dawn and evening." By about 1637—with commissions from Pope Urban VIII, several cardinals, and Philip IV of Spain—Claude had become the leading landscape painter in Italy.

In 1635–36 he began the *Liber Veritatis* ("Book of Truth"; in the British Museum, London), a remarkable volume containing 195 drawings carefully copied by Claude after his own paintings, with particulars noted on the backs of the drawings indicating the patron for whom, or the place for which, the picture was destined, and, in the second half of the book, the date. Although most paintings executed before 1635 and a few executed afterward are not included, the *Liber Veritatis* was compiled throughout in chronological order and thus forms an invaluable record of Claude's artistic development, as well as revealing his circle of patrons. Undertaken, as he told Baldinucci, as a safeguard against forgery of his paintings, the book gradually became Claude's most precious possession and a work of art in itself; he may also have used it as a stock of motifs for new compositions.

Claude's patrons were international and predominantly aristocratic, the majority being French or Italian noblemen. He was a fastidious worker and an expensive artist. He always worked on commission, at first sometimes selling his paintings through agents, but later he negotiated directly with patrons, with whom he would agree as to the size, price, and subject. Initially a fast painter, his rate of production subsequently slowed down. His late works are often individually larger and were still more carefully executed. About 250 paintings by Claude, out of a total of perhaps 300, and more than 1,000 drawings have survived. He also produced 44 etchings.

Stylistic development. Although they are basically consistent in method and aim, Claude's paintings show a gradual stylistic evolution, and it is possible to distinguish the phases of his development. His early works, showing the influence of Tassi and of Dutch and Flemish artists, are busy, animated, and picturesque. They are full of charm and effects of surprise. His smaller pictures, painted on copper, reflect the spirit of the German artist Adam Elsheimer, who had died in Rome in 1610. Occasionally Claude painted directly from nature during this period, although no examples have been certainly identified; his normal method of nature study was by means of drawings. A pattern common in the early paintings is a dark mass of foliage on one side in the foreground contrasted with a misty sunlit distance on the other. Herdsmen tending cattle or goats move out from beneath the trees or sit beside a stream (scarcely any of Claude's paintings at any time are without figures and animals). Simultaneously Claude



"Landscape: The Marriage of Isaac and Rebekah," oil on canvas by Claude Lorrain, 1648; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London

developed the traditional subject of a coastal scene with boats into a new type of picture: the seaport. This is an idealized harbour scene flanked on one or both sides with palaces, the latter often being adapted from actual ancient or contemporary buildings. Tall ships ride at anchor, recently arrived or preparing to depart. Light, however, is the key feature of the seaport pictures. Its source is often a visible sun just above the horizon, which Claude first introduced in 1634 in "Harbour Scene" and, in so doing, used the sun as the means of illuminating a whole picture for the first time in art. This use of light from the sky above the horizon, whether emanating directly from the sun or not, enforces another characteristic of Claude's paintings: recession in depth. Recession is further emphasized by subtle atmospheric perspective achieved through a gradual diminishing of the distinctness of outline and colour from the foreground to the background. The light is nearly always that of dawn or evening.

Beginning around 1640 Claude began to make his compositions more classical and monumental. The influence of contemporary Bolognese landscape painting, particularly the works of Domenichino, replaces that of Tassi and the northerners. During this decade something like a formula establishes itself: tall trees on one side of the picture balanced by a classical ruin and smaller trees further back on the other; a foreground "stage" with figures; a winding river conducting the eye by stages through an open landscape to the horizon; and distant hills, often with a glimpse of the sea. The figures are not, as often before, in contemporary dress but are always represented in classical or biblical costume. Contrary to popular belief, virtually all of Claude's figures were painted by himself. Sometimes they are merely shepherds, but frequently they embody a subject from classical mythology or sacred history. The light is clearer than in paintings of the early or late periods. Spacious, tranquil compositions are drenched in an even light, as can be seen in "Landscape: The Marriage of Isaac and Rebekah" (also called "The Mill"), dated 1648.

The 1650s witness some still larger and more heroic paintings, including "The Sermon on the Mount." In the middle of the following decade, Claude's style moved into its last phase, when some of his greatest masterpieces were produced. The colour range is restricted, and the tones become cool and silvery. The figures are strangely elongated and by conventional standards ill drawn. At the same time, the subjects define the mood and sometimes determine the composition of the landscape. The paintings of this period are solemn and mysterious and radiate a sublime poetic feeling. It was in this spirit that Claude painted his famous work "The Enchanted Castle."

Achievement as a draftsman. Claude's drawings are as remarkable an achievement as his paintings. About half are studies from nature. Executed freely in chalk or pen and wash, they are much more spontaneous than his paintings or studio drawings and represent informal motifs—trees, ruins, waterfalls, parts of a riverbank, fields in sunlight—that Claude saw on his sketching expeditions in the Campagna. Many were executed in bound books, which have since been broken up. The studio drawings consist partly of preparatory designs for paintings—Claude prepared his work more carefully than any previous landscape artist—and partly of compositions created as ends in themselves.

Claude had only two students; nonetheless, his paintings influenced a number of Dutch painters who were in Rome during the late 1630s and '40s, and, in a broad sense, his influence can be seen even in the work of certain English landscape painters of the 19th century. (M.W.L.K./Ed.)

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Claudel, Camille (-Rosalie) (b. Dec. 8, 1864, Villeneuve-sur-Fère, Fr.—d. Oct. 19, 1943, Montdevergues asylum, Montfavet, near Avignon), French sculptor of whose work little remains and who for many years was best known as the mistress and muse of Auguste Rodin. She was also the sister of Paul Claudel, whose journals and memoirs provide much of the scant information available on his sister's life.

Between the ages of about 5 and 12, Camille Claudel was taught by the Sisters of Christian Doctrine. When the family moved to Nogent-sur-Seine, the education of the Claudel children was continued by a tutor. Camille had little formal education from that point on, but she read widely in her father's well-stocked library. By her teenage years she was already a remarkably gifted sculptor, and her abilities were recognized by other artists of the time. When in 1881 her father was once again transferred, he moved his family to Paris. There Camille entered the Colarossi Academy (now the Grande Chaumière) and met a lifelong friend, Jessie Lipscomb (later Elborne). Her first extant works are from this period.

Claudel and Rodin probably first met in 1883. Shortly thereafter she became his student, collaborator, model, and mistress. While continuing to work on her own pieces, she is believed to have contributed whole figures and parts of figures to Rodin's projects of that period, particularly to *The Gates of Hell.* She continued to live at home until 1888, when she moved to her own quarters near Rodin's studio at La Folie Neubourg. By 1892 her relationship with Rodin had begun to crumble, and by 1893 she was both living and working alone, though she continued to communicate with him until 1898. From this point on she worked ceaselessly, impoverished and increasingly reclusive. She continued to exhibit at recognized salons (the Salon d'Automne, the Salon des Indépendents) and at the Bing and Eugène Blot galleries, though just as often she would utterly destroy every piece of work in her studio. She became obsessed with Rodin's injustice to her and began to feel persecuted by him and his "gang." Alienated from most human society, living at a great distance from Paul—the one family member close to her—her condition overwhelmed her. On March 10, 1913, she was committed by force to an asylum at Ville-Évrard. In September 1914 she was transferred to the asylum of Montdevergues, where she remained until her death.

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"Young Girl with a Sheaf," bronze sculpture by Camille Claudel, c. 1890; in the National Museum of Women in the Arts, Washington, D.C.

The National Museum of Women in the Arts, Gift of Wallace and Wilhelmina Holladay

Claudel, Paul (-Louis-Charles-Marie) (b. Aug. 6, 1868, Villeneuve-sur-Fère, Fr.—d. Feb. 23, 1955, Paris), poet, playwright, essayist, a towering force in French literature of the first half of the 20th century, whose works derive their lyrical inspiration, their unity and scope, and their prophetic tone from his faith in God.



Claudel

H. Roger-Viollet

Claudel was born in a village of Champagne, into a family of farmers and gentry, an inauspicious background for his subsequent diplomatic career. Becoming expert in economic affairs, in 1890 he embarked on a long and brilliant career in the foreign service that took him from New York City to China (for 14 years), back to Europe, and then to South America. While pursuing his literary career, he was the French ambassador to Tokyo (1921), Washington (1927), and Brussels (1933).

As he traveled the world, removed from the literary coteries of Paris, he slowly elaborated his theocentric conception of the universe and conceived his vocation: the revelation through poetry, both lyrical and dramatic, of the grand design of creation. This enthusiastic and relentless deciphering of the cosmos was inspired in Claudel's 18th year by a double revelation: the discovery of Rimbaud's *Illuminations* and his sudden conversion to Roman Catholicism.

Claudel reached his largest audience through his Symbolist plays—works that powerfully synthesized all theatrical elements to evoke a unified mood, atmosphere, and leitmotif. He reorchestrates his themes, expressed by a few symbolic types, again and again. His heroes are men of action—generals, conquerors, born masters of the earth. *La Ville* (published 1890), *L'Echange* (written 1893), and *Le Repos du septième jour* (written 1896) all portray heroes burning with all the lusts of the flesh: pride, greed, ambition, violence, and passion. But Claudel moves beyond man's appetites along a firm path to redemption.

In 1900 Claudel underwent a religious crisis and decided to abandon his artistic and diplomatic career and enter a Benedictine monastery. Discouraged by the Order and deeply disappointed, he left France to take up a consular post in China. On shipboard he met a married Polish woman with whom he shared an adulterous love for the next four years, after which time it was mutually renounced.

Although Claudel married a French woman in 1906, this episode of forbidden love became a major myth of his subsequent works beginning with *Partage de midi* (published 1906). In this searching, autobiographical work, Claudel appears torn between human and divine love. The conflict is resolved in *L'Annonce faite à Marie* (1912; *Tidings brought to Mary,* 1916), a medieval mystery in tone, in which Claudel expounds on woman's place in God's scheme. Woman, the daughter of Eve, temptress and source of evil, is also the child of Mary, the initiator of man's search for salvation: such is the Doña Prouhèze of *Le Soulier de satin* (written 1924; *The Satin Slipper,* 1931), Claudel's masterpiece. The stage is the Spanish Catholic world of the Renaissance; it reaches through Columbus, the Jesuits, and the conquistadors to the very ends of the earth. This huge tapestry is the story of the pursuit of the unattainable (because she is married) Doña Prouhèze by the adventurer Rodrigue, who is the characteristic worldly, passionate, and predatory Claudelian hero. The couple rejects sexual fulfillment and accepts the ultimate sacrifice: death for Prouhèze, enslavement for Rodrigue; thus, they reach the spiritual consummation of their union.

Claudel's other dramatic works include the historical trilogy *L'Otage* (published 1911), *Le Pain dur* (1918), and *Le Père humilié* (written 1916, published 1920). Set in the time of the French Revolution, it portrays faith humiliated in the person of the pope. He also wrote *Le Livre de Christophe Colomb* (published 1933), with music by Darius Milhaud, and the oratorio *Jeanne d'arc* (performed 1938), with music by Arthur Honegger.

His best known and most impressive lyrical works are the ambitious, confessional *Cinq grandes odes* (1910). Later volumes consist of poems written at various times and lack the symbolic unity that holds the odes together. He very early adopted the long, unscanned, usually unrhymed line—a strong and supple form well suited to the all-embracing character of his inspiration. Known as the *verset claudélien,* it is his peculiar contribution to French prosody.

Claudian, Latin in full CLAUDIUS CLAUDIANUS (b. *c.* 370, Alexandria—d. *c.* 404, Rome), last important poet of the classical tradition. Coming to Italy and abandoning Greek, he showed his mastery of Latin in a poem celebrating the consulship (395) of Probinus and Olybrius. An epigram on his superior, the Greek Hadrianus, *Deprecatio ad Hadrianum,* jeopardized his civil post; but, by assiduously praising Stilicho, minister of the Western emperor Flavius Honorius, and denouncing his rivals at the court of Flavius Arcadius, he gained the position of *tribunus et notarius,* the rank of *vir clarissimus,* and the honour of a statue.

The Stilicho poems were issued after Claudian's death but before the downfall of Stilicho in 408. They form part of the canon, in two books, known as *Claudianus major,* together with epistles, epigrams, and idylls. The longer poems are panegyrics on the consulships of Honorius, Mallius Theodorus, and Stilicho. A third book celebrates Stilicho's entry into Rome. There are also invectives against ministers of Arcadius, two poems addressed to Serena, wife of Stilicho, who helped to arrange Claudian's marriage, two epithalamiums, a delightful *De sene Veronensi* ("Old Man of Verona"), and *Gigantomachia* ("Battle of the Giants").

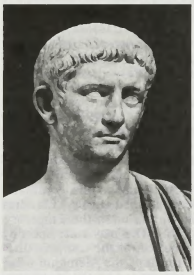
Claudianus minor contains the mythological epic *Raptus Proserpinae* ("The Rape of Proserpine"), on which Claudian's medieval fame largely depended. The second book of the epic has an elegiac epistle addressed to Florentinus, the city prefect, and reflects Claudian's interest in the Eleusinian mysteries.

Regarded in the Middle Ages as nearly the peer of Statius and Lucan, Claudian is faulted by modern critics for rhetoric too elaborate for his inferior themes, but his work is valuable as a historical source, and his fertility of invention and scathing invective compel attention. His diction and prosody are impeccable; yet their very smoothness proves tedious, and his graces too often seem engine-turned.

Claudian DYNASTY: *see* Julio-Claudian dynasty.

Claudius, in full TIBERIUS CLAUDIUS CAESAR AUGUSTUS GERMANICUS, original name (until AD 41) TIBERIUS CLAUDIUS NERO GERMANICUS (b. Aug. 1, 10 BC, Lugdunum [Lyon], Gaul—d. Oct. 13, AD 54), Roman emperor (AD 41–54), who extended Roman rule in North Africa and made Britain a province.

Early life. The son of Nero Claudius Drusus, a popular and successful Roman general, and the younger Antonia, he was the nephew of the emperor Tiberius and a grandson of Livia Drusilla, the wife of the emperor Augustus. Ill health, unattractive appearance, clumsiness of manner, and coarseness of taste



Claudius I, detail of a bust found near Priverno; in the Vatican Museum
Alinari—Art Resource/EB Inc.

did not recommend him for a public life. The imperial family seems to have considered him something of an embarrassment, and he was long left to his own private studies and amusements. It was the historian Livy who recognized and encouraged his inclination for historical studies. Claudius wrote a pamphlet defending the republican politician and orator Cicero, who was executed by the triumvirs; and, having discovered that it was difficult to speak freely on the civil wars toward the end of the Roman Republic, he began a history of Rome with the principate of Augustus. He composed 20 books of Etruscan and 8 books of Carthaginian history, all in Greek; an autobiography; and a historical treatise on the Roman alphabet with suggestions for orthographical reform—which as emperor he later tried not very successfully to implement. He also wrote on dice playing, of which he was fond. All his works are lost, and their importance cannot be measured. The Etruscan history may have had original material: his first wife, Plautia Urgulanilla, had Etruscan blood, and her family was probably able to put Claudius in touch with authentic Etruscan traditions. After divorcing Urgulanilla, he in turn married Aelia Paetina, Valeria Messalina, who was his wife at his accession, and, finally, Agrippina the Younger. By his first three wives he had five children, of whom Drusus and Claudia died before he became emperor. As a young man Claudius was made a member of various religious colleges, but he became consul only under the reign of his older brother's son Gaius (Caligula) in 37. There was, however, little cordiality between the two.

Emperor and colonizer. Power came to Claudius unexpectedly after Gaius' murder on Jan. 24, 41, when he was discovered trembling in the palace by a soldier. The Praetorian Guards, the imperial household troops, made him emperor on January 25. By family tradition and antiquarian inclinations, Claudius was in sympathy with the senatorial aristocracy; but soldiers and courtiers were his real supporters, while freedmen and foreigners had been his friends in the days of neglect. Initially, the attitude of the Senate was at best ambiguous. In 42 many senators supported the ill-fated rebellion of the Governor of Dalmatia. Even later, several attempts on Claudius' life involved senators and knights. Though paying homage to the dignity of the Senate (to whose administration he returned the provinces of Macedonia and Achaea) and giving new opportunities to the knights, Claudius was ruthless and occasionally cruel in his dealings with individual members of both orders. From the very beginning he emphasized his friendship with the army and paid cash for his proclamation as emperor.

Claudius' decision to invade Britain (43) and his personal appearance at the climax of the expedition, the crossing of the Thames and the capture of Camulodunum (Colchester), were prompted by his need of popularity and glory. But concern with the anti-Roman influence of the Druid priesthood, which he tried to suppress in Gaul, and a general inclination toward expanding the frontiers were other reasons. Claudius planted a colony of veterans at Camulodunum and established client-kingdoms to protect the frontiers of the province; these were afterward a source of trouble, such as the revolt in 47 of Prasutagus, client-king of the Iceni, and later the general revolt instigated by his wife Boudicca (also called Boadicea). He also annexed Mauretania (41–42) in North Africa, of which he made two provinces (Caesariensis in the east and Tingitana in the west), Lycia in Asia Minor (43), and Thrace (46). Though he enlarged the kingdom of Herod Agrippa I, he later made Judaea a province on Agrippa's death in 44. In 49 he annexed Iturea (northeastern Palestine) to the province of Syria. He was careful not to involve the empire in major wars with the Germans and the Parthians. Claudius supported Roman control of Armenia, but in 52 he preferred the collapse of the pro-Roman government to a war with Parthia, leaving a difficult situation to his successor.

In the civil administration, many measures demonstrate Claudius' enlightened policy. He improved in detail the judicial system, and, in his dealings with the provinces, he favoured a moderate extension of Roman citizenship by individual and collective grants: in Noricum, a district south of the Danube comprising what is now central Austria and parts of Bavaria, for instance, five communities became Roman municipalities. He encouraged urbanization and planted several colonies, for example, at Camulodunum and at Colonia Agrippinensis (modern Cologne) in Germany in 51. In his religious policy Claudius respected tradition; he revived old religious ceremonies, celebrated the festival of the Secular Games in 47 (three days and nights of games and sacrifice commemorating the 800th birthday of Rome), made himself a censor in 47, and extended in 49 the *pomerium* of Rome (*i.e.,* the boundary of the area in which only Roman gods could

be worshipped and magistrates ruled with civil, not military, powers). He protected the haruspices (diviners) and probably Romanized the cult of the Phrygian deity Attis. According to the biographer Suetonius in *Claudius* (25), during a period of troubles Claudius expelled the Jews from Rome for a short time; Christians may have been involved. Elsewhere he confirmed existing Jewish rights and privileges, and in Alexandria he tried to protect the Jews without provoking Egyptian nationalism. In a surviving letter addressed to the city of Alexandria, he asked Jews and non-Jews "to stop this destructive and obstinate mutual enmity." Although personally disinclined to accept divine honours, he did not seriously oppose the current trend and had a temple erected to himself in Camulodunum. His public works include the reorganization of the grain supply of Rome and construction of a new harbour at Ostia, which was later improved by the emperor Trajan.

Administrative innovations. Claudius' general policy increased the control of the emperor over the treasury and the provincial administration and apparently gave jurisdiction in fiscal matters to his own governors in the senatorial provinces. He created a kind of cabinet of freedmen, on whom he bestowed honours, to superintend various branches of the administration. An impressive series of documents, such as a speech for the admission of Gauls to the Senate recorded on a partly defective inscription at Lugdunum (Lyon), the edict for the Anauni (an Alpine population who had usurped the rights of Roman citizenship and whom Claudius confirmed in these rights), and the aforementioned letter to the city of Alexandria (AD 41), survive as evidence of his personal style of government: pedantic, uninhibited, alternately humane and wrathful, and ultimately despotic. The inscription from Lugdunum is an interesting comparison with the version of the historian Tacitus in his *Annals,* which gives an account of the same speech. The speech as recorded in the inscription, in spite of irrelevance, inconsequence, and fondness for digression (much of which is absent in the version of Tacitus), shows that Claudius knew what he wanted and that he appreciated the latent forces of Roman tradition.

His marriage with Messalina ended in 48, when she apparently conspired against him and, according to Tacitus, conducted a public marriage ceremony with her lover, Gaius Silius. Messalina and Silius were killed, and Claudius married his niece Agrippina, an act contrary to Roman law, which he therefore changed. To satisfy Agrippina's lust for power, Claudius had to adopt her son Lucius Domitius Ahenobarbus (later the emperor Nero), to the disadvantage of his own son Britannicus. In addition, the new commander of the guards, Afranius Burrus, was protected by Agrippina. Roman tradition is unanimous in stating that Claudius was poisoned by Agrippina on Oct. 13, AD 54, though the details differ. A version of poisoning by mushrooms prevailed. Lucius Annaeus Seneca, the politician and satirist, who had been exiled by Claudius at his accession but had been recalled at Agrippina's urging to educate Nero, derided the dead emperor and his apotheosis (duly decreed by the Senate) in the satire *Apocolocyntosis divi Claudii* ("The Pumpkinification of the Divine Claudius"; the title and its exact meaning are both subject to dispute).

The picture of Claudius that appears in this work has much in common with that of later Roman historians who give details of the unpopular side of Claudius' administration. The *Apocolocyntosis* ridicules his physical appearance and his speaking ability and casts aspersions on his abilities as a judge, depicting him as arbitrary—of giving legal judgments without a fair hearing and of summarily ordering the executions of relatives, senators, and knights.

Tacitus, Suetonius, and the later historian Dio Cassius attribute Claudius' mistakes to infirmity of character and the influence of his wives and freedmen. They echo the hostility of the upper classes against an emperor who, in spite of his words, had been unfavourable to them. That this tradition is one-sided is shown by the surviving documents of the reign and the energy with which Claudius carried out the affairs of government. (A.D.Mo./Ed.)

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Claudius GOTHICUS, original name MARCUS AURELIUS VALERIUS CLAUDIUS (b. May 214, Dardania, Moesia Superior—d. 270, Sirmium, Pannonia Inferior), Roman emperor in 268–270, whose major achievement was the decisive defeat of the Gothic invaders (hence the name Gothicus) of the Balkans in 269.

Claudius was an army officer under the emperor Gallienus from 260 to 268—a period of devastation of much of the Roman Empire by invading tribes. Rising to the command of Gallienus' newly formed cavalry, Claudius succeeded to the throne upon the Emperor's assassination in 268. The new ruler speedily suppressed the rebellion of the usurper Aureolus and drove from Italy the Alemanni tribe, which had been summoned by the insurgents.

During his brief reign, Claudius' authority was recognized only in the central territories of the empire. He made an unsuccessful attempt to recapture the allegiance of the western provinces, which obeyed the emperors of the Rhine. Nonetheless, in his own area, Claudius destroyed a vast Gothic migratory force near Naissus (modern Niš, Yugos.) in Moesia. While preparing a campaign against the Vandals, Claudius died of the plague and was succeeded by his cavalry commander, Aurelian.

Claudius, Matthias (b. Aug. 15, 1740, Reinfeld, Holstein—d. Jan. 21, 1815, Hamburg), German poet, most notable for *Der Mond ist aufgegangen* ("The Moon Has Risen") and editor of the important journal *Der Wandsbecker Bote.*

After studying at Jena, Claudius held a series of editorial and minor official positions until in 1788 he acquired a sinecure in the Schleswig-Holstein bank. He edited the *Wandsbecker Bote* (1771–75), popular not only with the common people, for whose enlightenment it was designed, but also with the most important literary men of the time. Among the journal's contributors were the philosopher Johann Gottfried von Herder, the poet Friedrich Klopstock, and the critic and dramatist Gotthold Ephraim Lessing, the three of whom, with Claudius, formed a circle that fought against the prevailing rationalist and classical spirit and sought to preserve a natural and Christian atmosphere in literature. Claudius' own poems have a naive, childlike, and devoutly Christian quality.

Claudius Caecus, Appius (fl. late 4th–early 3rd century BC), outstanding statesman, legal expert, and author of early Rome who was one of the first notable personalities in Roman history.

A member of the patrician class, Appius embarked on a program of political reform during his censorship, beginning in 312 BC. Elements of this program included the distribution of the landless citizens of Rome among the tribes, which at that time constituted basic political units. Appius also admitted sons of freedmen into the Senate. One intent of these reforms may have been to give the urban artisans and commercial interests full political rights and, consequently, a greater voice in government.

Speculation as to why this member of the nobility proposed reforms apparently offensive to his class range from the suggestion that he was attempting to break the power of a new patrician-plebeian nobility on behalf of the older nobility to the suggestion that he was a demagogue attempting to create a new base of power. However, Appius' reforms were partly undone in 304, while some freedmen had already been denied a place in the Senate during the consulship that followed his own of 307.

His building projects proved more lasting. He completed the construction of the Aqua Appia, Rome's first aqueduct, bringing in water from the Sabine Hills. He also initiated the Via Appia, the great military and commercial road between Rome and Capua. Both of these projects were named for him, the first time such an honour had been conferred. Appius was elected censor a second time in 296 and commanded Roman troops against Samnium.

Appius' legal contribution lies in his initiating publication of the *legis actiones* ("methods of legal practice") and of a list of court days, allowing people readier access to legal remedy. He was the author of a treatise, *De Usurpationibus* ("Concerning Usurpations"), which has been lost. He is also one of the earliest Roman prose and verse writers whose name is known, though only fragments of one poem have survived.

Appius Claudius suffered blindness in old age, hence his surname Caecus ("the blind"). Near the end of his life, during a war between Rome and the Epirite king Pyrrhus, the Senate was presented with peace proposals that, if accepted, could have resulted in the abandonment by Rome of southern Italy. The aged Appius gave an eloquent speech urging rejection of the proposals. The Senate was convinced, and further warfare between Rome and Pyrrhus compelled the Epirite king to depart from Italy. This speech and others were still preserved and read in the time of Cicero.

Claudius Mamertinus: *see* Mamertinus, Claudius.

Claudius Namatianus, Rutilius: *see* Rutilius Claudius Namatianus.

Claudius Ptolemaeus: *see* Ptolemy.

Claudius Pulcher, Appius (d. 48 BC), Roman politician, a leading member of the senatorial party opposed to the powerful general Julius Caesar.

From 72 to 70 Claudius served in Anatolia under his brother-in-law, Lucius Licinius Lucullus, in the war against Mithradates VI, king of Pontus. He was praetor in 57, governor in Sardinia in 56–55, and consul in 54. Although Claudius had opposed the return of Cicero from exile in 57, the two men were reconciled by Caesar's rival, Pompey the Great. Claudius and Cicero corresponded from 53 to 50, while Claudius was governor of Cilicia

in southeastern Anatolia, but they then quarrelled. Nevertheless, Cicero's testimony helped acquit Claudius of a charge of treason (51). In 50 Claudius became censor, and at the beginning of the Civil War (Caesar against Pompey and the Optimates, 49–45) he fled from Italy. Appointed by Pompey to the command in Greece, Claudius died shortly afterward. He wrote a work on augury, the first book of which he dedicated to Cicero.

Claudius Pulcher, Publius (d. before 246 BC), son of Appius Claudius Caecus and commander of the fleet that suffered the only serious Roman naval defeat of the First Punic War (264–241 BC). The setback occurred in 249, when Claudius was consul. He attacked the Carthaginian fleet in the harbour of Drepanum (modern Trapani, Sicily) and lost 93 of his 123 vessels. It was popularly believed that Claudius failed because he had committed a sacrilegious act before the battle: when the chickens, used in augury, refused to eat, he threw them into the sea with the words "Let them drink then." He was, accordingly, accused of treason and heavily fined.

Claudius Sabinus Inregillensis, Appius (fl. late 6th and early 5th centuries BC), traditional founder of the Claudii, one of the most distinguished gentes ("clans") of ancient Rome. About 504 BC he migrated from Regillum (or Regilli) in Sabine territory to Rome, where he received patrician rank. His followers were granted Roman citizenship and land beyond the Anio (modern Aniene) River; this region formed the centre of the Claudian *tribus*, one of the rural tribes (a political division) that took their names from old patrician families.

Claus, Carl Ernst: *see* Klaus, Karl Karlovich.

Clausel, Bertrand, Comte (Count): *see* Clauzel, Bertrand, Comte.

Clausewitz, Carl (Philipp Gottlieb) von (b. June 1, 1780, Burg, near Magdeburg, Prussia—d. Nov. 16, 1831, Breslau, Silesia),



Clausewitz, lithograph by Franz Michelis after an oil painting by Wilhelm Wach, 1830
By courtesy of the Staatsbibliothek, West Berlin

Prussian general whose writings, especially *On War,* advocated the concept of total war, in which all the enemy's territory, property, and citizens are attacked.

Born to a poor but middle-class family of professional background, Clausewitz entered the Prussian Army in 1792. He was commissioned during the Rhine campaign of 1793–94 against the French Revolutionary army and spent the next several years on garrison duty, a circumstance that enabled him to devote a large amount of time to educating himself. His efforts eventually enabled him to gain admission to the War College in Berlin in 1801.

During his formative years in Berlin, Clausewitz learned military science under the guidance of his mentor, Gerhard von Scharnhorst, studied philosophy and literature, and developed his basic strategic concepts. Scharnhorst introduced him at court—where he met his future wife, the countess Marie von Brühl—and obtained for him an appointment as aide to Prince August. He served in this capacity in the campaign of Jena (1806), was captured by the French at Prenzlau, and returned to Prussia in 1808. Clausewitz became one of the leaders of Prussian Army reform under Scharnhorst but resigned his commission on the eve of Napoleon's invasion of Russia (1812) and, like other German patriots, entered Russian service.

In the campaign of 1812, Clausewitz distinguished himself as a Russian staff officer. He was partially responsible for the Russians' successful strategic retreat and for negotiating the Convention of Tauroggen, which marked the beginning of Prussia's abandonment of the French cause.

After having served in various capacities during the campaigns of 1813–14, he returned to Prussian service and served as chief of staff of an army corps during the Waterloo campaign. In 1818 he became a general and was appointed administrative head of the War College. During the next 12 years, Clausewitz used much of the leisure that this position provided in writing his historical studies and his major work on strategy, *On War* (*Vom Kriege*). It is on these that his fame rests. Drawing on the experiences of Frederick the Great and Napoleon, Clausewitz tried to analyze the workings of military genius by isolating the factors that decide success in war. His conclusions have remained generally applicable, and since his work contains a minimum of technical discussion, it has retained a wide appeal. Clausewitz produced no system of strategy, thus breaking with the more rigid and mechanistic concepts of his predecessors. Instead, he emphasized the importance of psychological and accidental factors that elude exact calculation and the necessity of a critical approach to strategic problems. By means of a lengthy discussion of a variety of situations likely to confront the military leader, Clausewitz tried to develop in his reader a theoretically founded military judgment, capable of weighing all pertinent factors in a given situation. He stated that strategy should aim at three main targets: the enemy's forces, his resources, and his will to fight. Defensive warfare, he argued, is both militarily and politically the stronger position.

Before he completed *On War,* Clausewitz was transferred to Breslau and then assigned to Prussian forces deployed to observe the Polish revolution of 1830. He contracted cholera and died on Nov. 16, 1831, shortly after his return to Breslau. His papers were edited and published by his devoted widow.

Clausewitz' personality reflected not only his relatively humble origins but also the strong influence of contemporary German literature and philosophy. Shy and sensitive by nature, he often kept his ideas to himself. He never had a command of his own but served mostly in a staff capacity, distinguishing himself through his sound advice and bravery in combat. His background and career identified him more closely with the broader movements for national German revival than with the aristocratic Prussian military tradition.

While Clausewitz' extensive histories of the various Napoleonic campaigns are only of technical interest, *On War* has had a profound influence on modern strategic concepts. Its most significant single contribution is the doctrine of political direction in military matters. In maintaining that "war is nothing but a continuation of political intercourse with the admixture of different means," he denied that war is an end in itself.

Clausewitz was studied closely by his countrymen and left his imprint on German military thought, but his influence on actual German strategy has been overrated. Beginning with the 1853 edition of *On War,* a crucial passage calling for Cabinet control of strategy was altered to prescribe the reverse, and German military planning became increasingly devoid of political purpose. There was, however, a considerable revival of interest in Clausewitz during the interwar period.

Clausewitz was read extensively outside of Germany. Swedish, Dutch, Swiss, and Austrian officers took an early interest in his doctrines, and most of his works were translated into French. An English translation of *On War* appeared in 1873, and other editions exist in Russian, Italian, Hebrew, Hungarian, Serbian, and Spanish. By 1900 his doctrines were known in the United States and Japan. The first American translations appeared during World War II. Marx and Engels discussed Clausewitz' work, and Lenin studied his political doctrines during his exile in Switzerland. Communist theory on the nature of war, including such concepts as that of "imperialistic war," was largely derived from Clausewitz. By the middle of the 20th century, when new long-range weapons systems had appeared, the significance of Clausewitz' strategic concepts relating exclusively to land warfare declined, although many of his basic ideas remained as valid as ever.

(A.H.P.)

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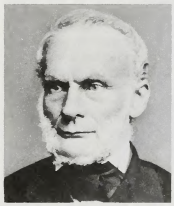
Clausius, Rudolf (Julius Emanuel) (b. Jan. 2, 1822, Köslin, Prussia—d. Aug. 24, 1888, Bonn), German mathematical physicist who formulated the second law of thermodynamics and is credited with making thermodynamics a science.

Clausius was appointed professor of physics at the Artillery and Engineering School at Berlin in 1850, the same year in which he presented a paper stating the second law of thermodynamics in the well-known form: "Heat cannot of itself pass from a colder to a hotter body." He applied his results to an exhaustive development of the theory of the steam engine, stressing the concept of entropy (dissipation of available energy). He became professor of physics at Zürich Polytechnikum in 1855, and, two years later, contributed to the theory of electrolysis (the breaking down of a compound by electricity) by suggesting that molecules are made up of continually interchanging atoms and that electric force does not cause but simply directs the interchange. This view later was used as the basis of the theory of electrolytic dissociation (breakdown of molecules into charged atoms or ions).



Clausius
Historia-Photo

He became professor of physics at the University of Würzburg in 1867 and at the University of Bonn in 1869. In molecular

physics, Clausius restated the French physicist Sadi Carnot's principle concerning efficiency of heat engines and thus provided a much sounder basis for the theory of heat.

Claussen, Sophus (b. Sept. 12, 1865, Hellerup, Island of Langeland, Den.—d. April 11, 1931, Gentofte), Danish Neoromantic poet of the 1890s who was influenced by the French Symbolists and who in turn greatly influenced Danish modernist poets of the 1940s and 1960s.

Claussen sought aesthetic perfection in his light, rhythmical poetry, and with his ingenious symbolism he constantly tried to transform his impressions of Danish nature into visionary, religious experiences. In spite of his close French literary connections, his humorous, romantic play with the myths of human existence in *Naturborn* (1887; "Children of Nature") and *Pileflojter* (1899; "Willow Pipes") remain in the Danish tradition. A sense of conflict enters his poetry because of the loss of beauty and the seeming meaninglessness of art in the face of the brutality and materialism of modern life, a theme that reaches its climax of expression in Claussen's last important collection, *Heroica* (1925). Claussen also published several travel books and lyrical prose tales of small-town life in Denmark. He translated some of his favourite poets, including Shelley, Heine, and Baudelaire.

clausula (Latin: "clause"), plural CLAUSULAE, in music, a 13th-century polyphonic genre featuring two strictly measured parts: notable examples are the descant sections based on the Gregorian chant melisma (several notes to a syllable), which in the organa of the Notre-Dame school alternated with sections featuring coloratura-like passages in relatively free rhythm above a slower-moving cantus firmus.

Clausulae early gained independent status as untexted "substitute" compositions. The first noted composer of such "substitute" clausulae was Pérotin, the successor of Léonin, whose name is forever associated with the two-part organa of the Parisian School. The motet, of only slightly later origin, was in essence a texted clausula. In the clausula the late-medieval, dance-influenced system of rhythmic modes found its first systematic application.

Clauzel, Bertrand, Comte (Count), Clauzel also spelled CLAUSEL (b. Dec. 12, 1772, Mirepoix, Fr.—d. April 21, 1842, Secourrieu, Haute-Garonne), marshal of France and governor of Algeria (1835–37).

After service in the eastern Pyrenees, northwestern France, and Italy, he rose to general of division in 1802 and distinguished himself during the Peninsular War (1809–12). Having crushed the Bordeaux royalists during the Hundred Days, he was made a peer of France by Napoleon (1815) but had to flee to the United States in 1816 to escape prosecution under the Restoration. Returning to France under the 1820 amnesty, he was elected deputy for Ariège in 1827. After the July Revolution of 1830 he temporarily replaced Marshal Bourmont in command in Algeria. On his recall he was elected deputy for Ardennes (October 1830) and made marshal of France (February 1831).



Clauzel, lithograph by A.-L. Lemercier after a portrait by A. Maurin

By courtesy of the Bibliotheque Nationale, Paris

Convinced of Algeria's possibilities, he proposed that settlers be brought there from all countries, that cotton be grown there, and that the Mitidja Plain be drained and protected by a network of blockhouses. Presenting himself as the only man capable of establishing and extending the French colony, he secured appointment as governor (1835). The French Cabinet, however, would not condone his aggressive policy. When he precipitately attacked Constantine (Algeria) and was defeated (1836), he was recalled to Paris and relieved of his post.

Claver, Saint Peter: *see* Peter Claver, Saint.

Claverhouse, John Graham of: *see* Dundee, John Graham of Claverhouse, 1st Viscount.

claves, percussion instrument, a pair of cylindrical hardwood sticks about 8 inches (20 centimetres) long and one inch (2½ centimetres) in diameter, one of which is held in the player's fingertips over the cupped hand (a resonator). When struck together they produce a sharp ringing sound.

Claves were originally used in Afro-Cuban folk music and are among the instruments that maintain various fixed rhythmic patterns in Latin-American dance bands. They are modern examples of concussion, or rhythm, sticks, one of the most ancient musical instruments, used in many cultures since ancient times in ritual, in accompanying work, and in calling attention, as well as for musical rhythm.

clavichord, stringed keyboard musical instrument, developed from the medieval monochord. It flourished from about 1400 to 1800 and was revived in the 20th century. It is usually rectangular in shape, and its case and lid were usually highly decorated, painted, and inlaid. The right, or treble, end contains the soundboard, the bridge, and the wrest, or tuning, pins. The strings run horizontally from the tuning pins over the bridge to the hitch pins in the left, or bass, end, where felt strips woven through the strings act as dampers. A small brass blade, the tangent, stands on each key just below its string. When the key is depressed, the tangent strikes the string, dividing it into two parts. It thus both determines the vibrating length of the string and causes it to sound. The string segment between the tangent and bridge vibrates, producing a note; the left part is damped by the felt. When the key is released, the tangent falls away from the string, which is then silenced by the felt.



German clavichord made in Hamburg by Johann Adolph Hass, 1764

Raymond Russell

The usual compass is from 3½ to 5 octaves, with one or two strings for each note. Tangents of adjacent keys (which produce notes that are unlikely to be played together) sometimes share a pair of strings. Such clavichords are fretted, or *gebunden;* those with independent strings for each key are unfretted, or *bundfrei.*

Alone among the forerunners of the piano, the clavichord can achieve dynamic variation—piano, forte, crescendo, diminuendo—by the player's touch alone. It can produce vibrato, or bebung, if finger pressure on the key is varied. Its tone is silvery and soft, best suited for intimate music such as C.P.E. Bach's keyboard sonatas and fantasias.

clavicle, also called COLLARBONE, curved anterior bone of the shoulder (pectoral) girdle in vertebrates; it functions as a strut to support the shoulder.

For a depiction of the clavicle in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-vision in the PROPAEDIA: Part Four, Section 421.

The clavicle is present in mammals with prehensile forelimbs and in bats, and it is absent in sea mammals and those adapted for running. The wishbone, or furcula, of birds is composed of the two fused clavicles; a crescent-shaped clavicle is present under the pectoral fin of some fish. In man the two clavicles, on either side of the anterior base of the neck, are horizontal, S-curved rods that articulate laterally with the outer end of the shoulder blade (the acromion) to help form the shoulder joint; they articulate medially with the breastbone (sternum). Strong ligaments hold the clavicle in place at either end; the shaft gives attachment to muscles of the shoulder girdle and neck. The clavicle may be congenitally reduced or absent; its robustness varies with degree of muscle development.

clavicytherium, harpsichord in which the soundboard and the plane of the strings are vertical, perpendicular to the keyboard, as in an upright piano (instead of horizontal and parallel to the keyboard, as is usual). By means of this design, the amount of floor space required for the instrument is greatly reduced, while the strings may be made as long as necessary for a full tone. The plucking mechanism, being now horizontal rather than vertical, is returned to a rest position by means of springs rather than by gravity.

Most clavicytheria have one keyboard and one or two sets of strings. Examples survive from the 15th through the 18th century, but the instrument was never common.

clavier, German KLAVIER, any stringed keyboard musical instrument in Germany from the late 17th century. The harpsichord, the clavichord, and, later, the piano bore the name.

The Anglicized form of the name is often used in English discussions of such instruments in German music. It is also used in place of "keyboard."

Clavijo, Ruy González de (Spanish diplomat): *see* González de Clavijo, Ruy.

Clavijo y Fajardo, José (b. 1730, Lanzarote, Spain—d. 1806, Madrid), Spanish naturalist and man of letters known for his campaign against public performance of the Corpus Christi *autos sacramentales,* one-act, open-air dramas that portrayed the eucharistic mystery. From his position as editor of the literary periodical *El pensador,* he issued constant attacks against the performance of these plays, which had become little more than vulgar public spectacles. Because of his activity, the *autos sacramentales* were eventually banned in 1765. His love affair with Louise, sister of the French playwright Pierre-Augustin Caron de Beaumarchais, was dramatized by the German dramatist Johann Wolfgang von Goethe in his tragedy *Clavigo.*

Largely educated in France, Clavijo was responsible for translations of Racine and Voltaire and translated the French naturalist Buffon's *Histoire naturelle* (1791–1802; "Natural History"). Besides his literary activity, he was also vice director of the Museum of Natural History, Madrid.

claw, also called TALON, narrow, arched structure that curves downward from the end of the digit in birds, reptiles, many mammals, and some amphibians. It is a hardened (keratinized) modification of the epidermis. Claws may be adapted for scratching, clutching, dig-

ging, or climbing. By analogy, the appendages of other lower animals are frequently called claws. The claw's shape is ordinarily suited to the food-getting habit of the animal. Eagles have long, curved talons for grasping prey; the claws of chickens are short and sturdy, for scratching the ground for food.

There are two mammalian modifications of the claw: the nail and the hoof. A nail is a broad, flat claw on the upper surface of the digit. It is present in mammals, such as primates, that use their appendages for grasping. A hoof is a short, thick structure that surrounds the end of the digit. It is present in various forms in the ungulates, which have a reduced number of digits. Hoofs are an adaptation for running.

claw shrimp: *see* clam shrimp.

clawed frog, also called AFRICAN CLAWED FROG (genus *Xenopus*), any member of 6 to 14 species of tongueless, aquatic African frogs (family Pipidae) having small black claws on the inner three toes of the hind limbs.

Xenopus species are generally dull-coloured. Their bodies are relatively flat and bear whitish fringelike mucus canals that serve as sensory organs. When feeding they hang just below the surface of stagnant or slow-flowing muddy



Platanna (*Xenopus laevis*)
Jane Burton—Bruce Coleman Ltd

waters with outspread forelimbs, waiting for prey to pass by. Because they are tongueless, they rely on the forelimbs to guide food to their mouths, with additional aid from the rapid forward thrust of their powerful hind limbs. Considered among the more primitive species of frogs, *Xenopus* species have a simple egg-laying strategy: eggs are scattered individually over submerged vegetation.

Xenopus was once widely used for tests for human pregnancy because researchers found that young female clawed frogs would lay eggs when injected with minute quantities of a human hormone found in the urine of pregnant women. Though other types of pregnancy tests have since proved more reliable, *Xenopus* is still used in embryological and anatomical research.

One of the more important species is the platanna (*X. laevis*) of southern Africa, a smooth-skinned frog about 13 cm (5 inches) long. It is a valuable mosquito control because it eats the eggs and young of these insects. Native to sub-Saharan Africa, *X. laevis* was introduced to the United States and Britain.

Claxton, Laurence, Claxton also spelled CLARKSON (b. 1615, Preston, Lancashire, Eng.—d. 1667, London), preacher and pamphleteer, leader of the radical English religious sect known as the Ranters.

Originally a tailor by trade, Claxton sampled many Protestant denominations before joining the Baptists in 1644. His first tracts, *The Pilgrimage of Saints* and *Truth Released,* appeared in 1646. He first came into contact with the Ranters in 1649 in London and quickly adopted their tenets, including the extreme beliefs that a believer is free from all traditional restraints, that sin is a product only of the imagination, and that private ownership of property is wrong. He espoused Ranter ideas in his tract *A Single Eye* (1650). In about 1658 he was converted to another extremist Puritan sect, the Muggletonians. He died in debtor's prison.

clay, soil particles the diameters of which are less than 0.005 millimetre; also a rock that is composed essentially of clay particles. Rock in this sense includes soils, ceramic clays, clay shales, mudstones, glacial clays (including great volumes of detrital and transported clays), and deep-sea clays (red clay, blue clay, and blue mud). These are all characterized by the presence of one or more clay minerals, together with varying amounts of organic and detrital materials, among which quartz is predominant. Clay materials are plastic when wet, and coherent when dry. Most clays are the result of weathering.

No other earth material has so wide an importance or such extended uses as do the clays. They are used in a wide variety of industries. As soils, they provide the environment for almost all plant growth and hence for nearly all life on the Earth's surface. They provide porosity, aeration, and water retention and are a reservoir of potassium oxide, calcium oxide, and even nitrogen.

The use of clay in pottery making antedates recorded human history, and pottery remains provide a record of past civilizations. As building materials, bricks (baked and as adobe) have been used in construction since earliest time. Impure clays may be used to make bricks, tile, and the cruder types of pottery, while kaolin (*q.v.*), or china clay, is required for the finer grades of ceramic materials. Another major use of kaolin is as paper coating and filler; it gives the paper a gloss and increases the opacity. Refractory materials, including fire brick, chemical ware, and melting pots for glass, also make use of kaolin together with other materials that increase resistance to heat. Certain clays known as fuller's earth have long been used in wool scouring. In rubber compounding, the addition of clay increases resistance to wear and helps eliminate molding troubles.

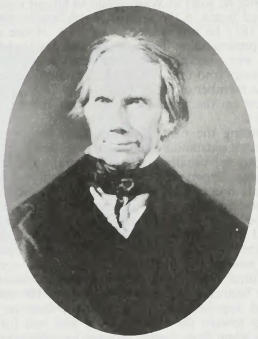
Clay materials have a wide variety of uses in engineering. Earth dams are made impermeable to water by adding suitable clay materials to porous soil; water loss in canals may be reduced by adding clay. The essential raw materials of portland cement are limestone and clays, commonly impure. After acid treatment, clays have been used as water softeners; the clay removes calcium and magnesium from the solution and substitutes sodium. A major use of clay is as drilling mud—*i.e.,* heavy suspension consisting of chemical additives and weighting materials, along with clays, employed in rotary drilling.

Clay, Cassius Marcellus (b. Oct. 19, 1810, Madison county, Ky., U.S.—d. July 22, 1903, Whitehall, Ky.), American antislavery leader who served the Abolition movement in spite of his Southern background.

Although he was the son of a slaveholder and a relative of the Kentucky senator Henry Clay, who—true to his byname (The Great Compromiser)—favoured only gradual emancipation, Cassius Clay was deeply influenced by the Abolitionist William Lloyd Garrison while he was still in college. He entered the Kentucky legislature (1835) but was defeated in 1840 on the slavery issue. He established an antislavery publication, the *True American,* in Lexington, Ky., in 1845 but was forced by attacks from pro-slavery Kentuckians to move it to Cincinnati, Ohio, and then to Louisville, Ky., where it was renamed *The Examiner.* Clay was one of the founders of the Republican Party in 1854. He served as U.S. minister to Russia (1861–62 and 1863–69) and helped negotiate the purchase of Alaska (1867). He left the Republican Party in order to support Horace Greeley in the presidential election of 1872 but supported Republican James G. Blaine as presidential candidate in 1884. He was adjudged insane shortly before his death.

Clay, Cassius Marcellus (boxer): *see* Ali, Muhammad.

Clay, Henry, byname THE GREAT PACIFICATOR, or THE GREAT COMPROMISER (b. April 12, 1777, Hanover county, Va., U.S.—d. June 29, 1852, Washington, D.C.), American statesman, U.S. congressman (1811–14, 1815–21, 1823–25) and U.S. senator (1806–07, 1810–11, 1831–42, 1849–52), who was a major promoter of the Missouri Compromise (1820), the compromise tariff of 1833 (ending the Nullification crisis), and the Compromise



Henry Clay, by Frederick and William Langenheim, 1850
By courtesy of the Library of Congress, Washington, D.C.

of 1850, all efforts to balance the rights of free and slave states. Clay was twice the unsuccessful Whig candidate for president (1832, 1844).

Born of moderately well-to-do parents, young Clay studied law under Chancellor George Wythe and was admitted to the Virginia bar in November 1797. He then moved to Lexington, Ky., a rising western community and a paradise for lawyers because of interminable lawsuits over land titles that were contested there. Endowed with great vitality, a ready but not profound intellect, and a gift for eloquent oratory, he was quick-witted and self-confident. Sociable, charming, and high-spirited, he loved to drink and gamble, qualities not distasteful to most of his contemporaries in Kentucky society. He was also hot-tempered, sensitive, and extremely ambitious.

Clay was spectacularly successful at the Kentucky bar in both civil and criminal cases, and he never lacked for clients. He acted as counsel for Aaron Burr (1806) in a Kentucky grand jury investigation of Burr's plan to establish an empire in the Southwest. Kentucky Republicans believed that Burr had been a victim of a Federalist conspiracy, and Clay's reputation did not suffer when his client's designs were later exposed.

Clay established his social position in 1799 by marrying Lucretia Hart, daughter of a wealthy Lexington businessman. By 1812 he possessed a 600-acre estate known as "Ashland," where he bred livestock and raised hemp, corn (maize), and rye. He and Lucretia had 11 children, 6 daughters and 5 sons.

Clay entered politics shortly after arriving in Kentucky by championing liberalization of the state's constitution. A Jeffersonian Republican, he shared that leader's distaste for slavery and was an advocate of gradual eman-

cipation in Kentucky, but he abandoned this idea when it proved a losing cause. Like Jefferson, he learned to accept slavery, though, unlike him, he provided for the freeing of his slaves in his will. His eloquent opposition to the Alien and Sedition Acts of 1798, a series of repressive measures designed to curb the pro-French activities of the Jeffersonian Republicans, made Clay popular with Kentucky voters, and (1803–09) they elected him to seven terms in the state legislature. In 1809 he fought a duel with a Federalist Party legislator, Humphrey Marshall, in which both men were wounded.

Clay advocated the establishment of banks, internal improvements, and manufacturing, thus foreshadowing his future national career. Twice he went to Washington to fill out unexpired terms in the United States Senate, and in 1811 he was elected to the U.S. House of Representatives. There, as speaker (1811–14), he was one of the leaders who pushed the country into the War of 1812. He also served as a member of the commission at Ghent that drew up the terms of peace with Britain in 1814.

During the next 10 years, Clay was Kentucky's outstanding representative in the U.S. Congress, usually serving as speaker of the House. Experience and a broadening outlook made him a neo-Jeffersonian Republican; he espoused internal improvements at national expense, a protective tariff, a national bank, and distribution of land-sale revenues to the states. Already he was developing a project of joining the industrial East and the agricultural West in a political alliance under the banner of his American System. He coveted appointment as secretary of state as a step toward the White House and was furious when Pres. James Monroe gave that post to John Quincy Adams. In 1819 he attacked Andrew Jackson for his invasion of Florida, thus earning Old Hickory's lasting enmity. In 1820 he promoted the passage of the Missouri Compromise—which maintained the balance between the slave states and free states within the Union—and his followers began to call him "the great pacificator." Then came one of the fateful crises in his career.

Clay was an unsuccessful candidate for the presidency in the election of 1824. But the decision in that election between the front-running candidates John Quincy Adams and Andrew Jackson was thrown into the House of Representatives. As speaker of the House, Clay was in an influential position. He had decided to vote for Adams before leaving Kentucky. Conferences with Adams satisfied him that he could have any position in the government that he desired if Adams won. He threw his support to Adams, who was elected and who made Henry Clay his secretary of state. Clay never lived down the resultant cry of "bargain and sale."

His four years in the state department were frustrating, largely because of the political machinations of the Jacksonians. Clay was thwarted in his effort to send delegates to a Pan American Congress at Panama, nor did he reach an accord with Great Britain on West Indian trade. Sneers at the "bargain" were hard to bear; a bitter attack on Clay by Congressman John Randolph led to a duel, in which neither man was wounded.

Adams was inept at political infighting, and Jackson won the election of 1828 decisively. The National Republican Party, the opposition party that had arisen in opposition to the Jacksonians, began to go to pieces and in 1834 was absorbed by the Whig Party. After Jackson's victory Clay retired for a time to Ashland, but in 1831 he returned to the Senate where he headed the opposition to the Jacksonian democracy and championed the renewal of the charter of the second Bank of the United States, which he had helped to found in 1816. Nominated for the presidency by the National Republicans in 1832, he was defeated by Andrew Jackson, largely on the bank issue. The following year he successfully piloted through Congress the compromise tariff of 1833, thus ending the so-called Nullification crisis, in which South Carolina threatened to secede from the Union.

Clay remained in the Senate, leading an uphill fight against the policies of the Jacksonians and becoming a leader of the Whig Party, which gradually emerged in the middle 1830s. He refused to run for the presidency in 1836, when the Whigs put up sectional candidates, and it was with a heavy heart that he accepted reelection to the Senate in 1837. His mood changed with the panic of 1837 and the consequent rise of Whig fortunes. He confidently expected the party's nomination in 1840, but, to his bitter disappointment, the Whig politicians turned to a military hero, Gen. William Henry Harrison, who, with John Tyler of Virginia as his running mate, was easily elected.

Clay's hopes and plans had been thwarted, and his temper had not been improved by years of political frustration. He was now bent upon dictating his party's policies from his post in the Senate. He tried to dominate Harrison, who lived only a month after his inauguration, and was determined to do the same with Tyler. The latter, a stubborn man, vetoed two bank bills that had Clay's approval, and, when other items in the Kentuckian's program of legislation were challenged from both Congress and the White House, Clay resigned from the Senate in 1842.

Confronted by a choice between Tyler and Clay as leader of the party, the Whigs rallied to Clay, nominating him for president in 1844 with a great display of enthusiasm for the "Old Prince," but once again fate proved unkind. Texas desired annexation to the Union. Clay came out against immediate annexation on the ground that it would stir up the already rising controversy over slavery and certainly involve the U.S. in war with Mexico, but the Democrats nominated James K. Polk, an ardent annexationist. Faced by a swelling tide of Manifest Destiny sentiment, Clay tried to explain his position in such a way as to satisfy pro-annexation, pro-slavery voters in the South without offending anti-slavery voters in the North. The effort was in vain, and once again his greatest ambition was unsatisfied.

Frustration continued to be Clay's lot. He opposed war with Mexico but supported its prosecution after the guns went off. He hoped for the Whig nomination in 1848, but the Whigs turned from their 71-year-old leader (even Kentucky refused to support him) and nominated a Mexican War hero, Gen. Zachary Taylor. Nevertheless, one last act of service to the nation remained for "the great pacificator."

The annexation of territory in the Southwest heightened the strife between North and South over the extension of slavery, and Clay came back to the Senate in 1849 resolved to confront the growing threat of disunion. There in a great speech (Feb. 5–6, 1850) he outlined the principal features of what became the Compromise of 1850 and put the weight of his reputation and influence behind its passage. The compromise again kept the numerical balance between slave and free states and perhaps delayed the Civil War by a decade. This was his last act of statesmanship. His health failed, and he died of tuberculosis in the National Hotel at Washington, D.C., in 1852.

Clay was a man whose charm and nationalist fervour, coupled with the appeal of his ideas to the more conservative-minded, made him a national leader loved and honoured by many thousands of Americans. Mistakes of judgment, together with the skill and good fortune of his political opponents, kept him from reaching the White House, and the passage of the years has somewhat dimmed the aura that surrounded him while he lived. During the Civil War, President Lincoln and Secretary of State William H. Seward, discussing the political past, agreed that Clay's selfishness had injured the Whig Party, and historical scholarship has shown that the importance of his influence on the passage of the Compromise of 1850 was less than had been thought. But he was a staunch defender of the Union, a man who spent his life in public service and in that service helped to guide his country through some of the most difficult crises in its history. (G.G.V.D.)

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Clay, Lucius D(uBignon) (b. April 23, 1897, Marietta, Ga., U.S.—d. April 16, 1978, Cape Cod, Mass.), U.S. Army officer who became the first director of civilian affairs in defeated Germany after World War II.



Gen. Lucius D. Clay, 1947
By courtesy of the U.S. Army

Graduated from the U.S. Military Academy at West Point, N.Y. (1918), Clay served in army engineer assignments before becoming head of the first national civil airport program (1940–41). Soon after the U.S. entrance into the war (December 1941), he became a leading production and supply specialist and was placed in charge of the army procurement program (1942–44).

In 1945 Clay was assigned by Pres. Franklin D. Roosevelt to be deputy military governor in Germany under Gen. Dwight D. Eisenhower. Two years later he was elevated to commander in chief of the U.S. forces in Europe and military governor of the U.S. Zone in Germany. During these demanding years, he had to gauge the requirements of food and shelter for a devastated civilian population and, simultaneously, supervise a de-Nazification and de-industrialization program that would harmonize with the postwar recovery of Germany's neighbours. In 1948–49 his administration was marked by the successful Allied airlift of food and supplies into Berlin during the Soviet blockade of that city.

Following his retirement in May 1949 Clay entered private business and became active in politics as a supporter and adviser of President Eisenhower (1953–61). In 1961 and 1962 Pres. John F. Kennedy asked Clay to serve as his personal representative in Berlin, with the rank of ambassador, to help deal with the critical situation that had developed among the four occupying powers concerning that city's future status.

clay mineral, any of a group of important hydrous aluminum silicates with a layer (sheet-like) structure and very small particle size (two microns [0.002 millimetre]). It may contain significant amounts of iron, alkali metals, or alkaline earths.

A brief treatment of clay minerals follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

The clay minerals are very similar, and many can be distinguished only by X-ray diffraction, electron microscopy, or differential thermal analysis. A number of classifications that differ in detail have been proposed for these minerals, but it is generally agreed that they can be divided into nine broad groups on the basis of variations in structure and composition. These groups are (1) allophane; (2) kaolinite; (3) halloysite; (4) montmorillonite; (5) illite; (6) chlorite; (7) vermiculite; (8) sepiolite, attapulgite, and palygorskite; and (9) mixed-layer clay minerals.

Two structural units describe the structures of most clay minerals. The first of these consists of a layer of silicon-oxygen tetrahedrons arranged in a hexagonal network in two dimensions, each tetrahedron sharing three oxygens with other tetrahedrons. (The oxygen atoms lie approximately in a plane.) The silicon-centred tetrahedrons all point in one direction with the fourth oxygen or hydroxyl group of the tetrahedrons also lying in a plane. The thickness of this undistorted unit is about 4.7 angstroms (1 angstrom is equal to 10^{-4} microns). The second structural unit characteristic of clay minerals consists of two layers of close-packed oxygen or hydroxyl ions forming octahedral sites in which metals, usually aluminum, magnesium, or iron, are located. Not all of these sites are filled, much depending on the charge of the octahedral ion. The undistorted thickness of this octahedral layer is about 5.05 angstroms. The tetrahedral and octahedral structural units can be joined or stacked in several configurations. Less common clay minerals are either amorphous or have a structure based on double tetrahedral chains similar to that of amphibole (*q.v.*) minerals.

Clay minerals are usually the products of weathering processes. Different environments, particularly different climatic and hydrologic regimes, will produce different clay minerals from the same parent rock. In some cases, clay minerals may be formed as a result of hydrothermal action, which may produce nearly monomineral deposits. Clay minerals occur widely in such sedimentary rocks as mudstones and shales, in marine sediments, and in soils.

Clay minerals have considerable economic importance. Such minerals' colloidal properties (*i.e.*, capacity to take up and hold water), for example, make them particularly suitable for use as drilling muds in petroleum extraction. Various clay minerals readily react with organic substances and thus are utilized as catalysts in petroleum refining and as a decolourizing agent in the processing of vegetable and mineral oils.

Consult the INDEX *first*

clay mineralogy, the scientific discipline concerned with all aspects of clay minerals, including their properties, composition, classification, crystal structure, and occurrence and distribution in nature. The methods of study include X-ray diffraction, infrared spectroscopic analysis, chemical analyses of bulk and monomineralic samples, determinations of cationic exchange capacities, electron-optical studies, thermal studies by differential thermal analysis, and thermo-gravimetric methods. The singular character of these hydrous silicate minerals and the nature of the problems surrounding them justify the status of clay mineralogy as a discipline distinct from mineralogy. A common body of knowledge is involved, however, particularly with regard to studies of internal structure.

clay-pigeon shooting: *see* trapshooting.

claystone, hardened clay. Some geologists further restrict the term to a sedimentary rock that is composed primarily of clay-sized particles (less than $^1/_{256}$ millimetre in diameter) and is not laminated or easily split into thin layers; such rocks that show cleavage roughly parallel to the bedding plane often are classed as clay shales. Claystones that are massive and blocky are sometimes called mudstones, but some geologists class as mudstones partly hardened muds that slake when wetted, reserving the term claystone for fully hardened material.

Clayton, John Middleton (b. July 24, 1796, Dagsboro, Del., U.S.—d. Nov. 9, 1856, Dover, Del.), U.S. public official best known for his part in negotiating the Clayton–Bulwer Treaty (1850), aimed at harmonizing U.S.–British interests in Central America.

Clayton entered politics as a member of the Delaware House of Representatives (1824) and served as secretary of state for Delaware (1826–28). In 1829 he was elected to the U.S. Senate by forces opposed to Andrew Jackson, was reelected in 1835 as a Whig, but resigned the next year. He was elected chief justice of Delaware in 1837 and in 1845 reentered the Senate. His term as secretary of state (under Pres. Zachary Taylor; March 1849–July 22, 1850) was notable for his negotiation with



John Clayton, portrait by Robert Hinckley; in the Department of State, Washington, D.C.

By courtesy of the Department of State, Washington, D.C.

the British minister in Washington, D.C., of a treaty dealing with canal rights in Central America. In March 1853 Clayton again entered the Senate and served until his death.

Clayton Antitrust Act, law enacted in 1914 by the United States Congress to clarify and strengthen the Sherman Antitrust Act (1890). The vague language of the latter had provided large corporations with numerous loopholes, enabling them to engage in certain restrictive

Clay minerals

name formula	shape	size	structure	specific gravity	cation-exchange capacity (meq/100 g)	refractive indices
attapulgite $(OH_2)_4Mg_5Si_8O_{20}(OH)_2 \cdot 4H_2O$	elongate laths and bundles of laths often interwoven and tangled	many μ long; 60–100 Å wide	silica tetrahedrons in double chains linked through oxygens at their longitudinal edges; the tips of the tetrahedrons of successive chains point in opposite directions	2.3	3–15	$\alpha = 1.510–1.520$ $\gamma = 1.540–1.555$
chlorite (Mg, Fe, Al)$_6$(Si, Al)$_4$O$_{10}$(OH)$_8$			layers of trioctahedral mica alternating with layers of brucite	2.6–3	10–40	$\alpha = 1.57–1.64$ $\gamma = 1.575–1.645$
halloysite $Al_2Si_2O_{10}(OH)_8$ $Al_2Si_4O_{10}(OH)_8 \cdot 4H_2O$	elongate tubes	outside diameter .04–0.19μ	kaolinite layers (see below) separated by layers of oriented water molecules	2.6 2–2.2 ($4H_2O$)	5–10 ($2H_2O$) 40–50 ($4H_2O$)	$n_{mean} = 1.485–1.556$ ($2H_2O$) $n_{mean} = 1.526–1.532$ ($4H_2O$)
illite $2K_2O\ 3(Mg, Fe)0.8(Al, Fe)_2O_3$ $24SiO_212H_2O$	irregular aggregates of poorly defined flakes	0.1–0.3μ in diameter; 30 Å thick	the same as montmorillonite (see below) except that some of the silicons are always replaced by aluminums	2.7–3.1	10–40	$\alpha = 1.545–1.63$ $\gamma = 1.57–1.67$
kaolinite $Al_4Si_4O_{10}(OH)_8$	well-formed, six-sided flakes	0.3–4.0μ wide; 0.05–2.0μ thick	single sheet of silica tetrahedrons whose tips are oriented the same way and are joined to a single sheet of alumina octahedrons	2.6–2.7	3–15	$\alpha = 1.553–1.563$ $\gamma = 1.560–1.570$
montmorillonite $(OH)_4Si_8Al_4O_{20} \cdot nH_2O$	broad undulating mosaic sheets that break into irregular fluffy masses of minute particles		sheet of alumina octahedrons sandwiched between two sheets of oriented silica tetrahedrons whose tips point toward the alumina sheet	2.2–2.7	80–150	$\alpha = 1.480–1.590$ $\gamma = 1.515–1.630$
sepiolite (meerschaum) $H_6Mg_8Si_{12}O_{30}(OH)_{10} \cdot 6H_2O$	elongate laths, often bent or interwoven	shorter and thicker than attapulgite	similar to attapulgite, except that three pyroxene chains are linked to form two amphibolic chains	2	3–15	$\alpha = 1.483–1.520$ $\gamma = 1.505–1.530$
vermiculite (Mg, Ca)$_x$(Si$_{8-x}$ Al$_x$) (Mg, Fe)$_6$O$_{20} \cdot 8H_2O$ (x = 1 to 1.4)			sheets of trioctahedral mica or talc separated by layers of water molecules		100–150	$\alpha = 1.525–1.56$ $\gamma = 1.545–1.585$

business arrangements which, though not illegal per se, resulted in concentrations that had an adverse effect on competition. Thus, despite the trust-busting activities of both the Roosevelt and Taft administrations under the Sherman Act, it appeared to a congressional committee in 1913 that big business had continued to grow bigger and that the control of money and credit in the country was such that a few men had the power to plunge the nation into a financial panic. When Pres. Woodrow Wilson asked for a drastic revision of existing antitrust legislation, Congress eagerly accommodated by passing the Clayton measure.

Whereas the Sherman Act declares monopoly illegal, the Clayton Act defines in some detail varied types of illegal business practices that are conducive to the formation of monopolies or that result from them. Certain forms of holding companies and interlocking directorates are forbidden, as are discriminating freight agreements and the distribution of sales territories among so-called natural competitors. Two sections of the Clayton Act were later amended by the Robinson–Patman Act (1936) and the Celler–Kefauver Act (1950) to fortify its provisions. The Robinson–Patman amendment made more enforceable Section 2, which relates to price and other forms of discrimination among customers. The Celler–Kefauver Act strengthened Section 7, prohibiting one firm from securing either the stocks or physical assets (*i.e.*, plant and equipment) of another firm when the acquisition would reduce competition. The amendment, furthermore, extended the coverage of antitrust laws to all forms of mergers whenever the effect would substantially lessen competition and tend to create a monopoly. Earlier legislative measures had simply restricted horizontal mergers—those involving firms that produce the same type of goods. In contrast, the Celler–Kefauver Act restricts even mergers of companies in different industries, that is, conglomerate mergers. *See also* Sherman Antitrust Act.

Clayton–Bulwer Treaty, compromise agreement (signed April 19, 1850) designed to harmonize contending British and U.S. interests in Central America. Because of its equivocal language, it became one of the most discussed and difficult treaties in the history of Anglo-U.S. relations. It resulted from negotiations between Sir Henry Lytton Bulwer, British minister to Washington, and John M. Clayton, U.S. secretary of state.

The treaty provided that the two countries should jointly control and protect the canal that they expected soon to be built across the Isthmus of Panama. The treaty's introductory article pledged a neutralized Central America, which neither signatory would "occupy, or fortify, or colonize, or assume or exercise any dominion over. . . ." The interpretation of this clause became the subject of a bitter dispute between the two governments. The United States held that the pledge not to "occupy" required renunciation on Britain's part of certain interests, viz., a protectorate over the Mosquito Coast, a settlement in British Honduras and the Bay Islands. Britain's counterposition on these matters was that the treaty recognized the status quo. When, after several decades, the canal was still unbuilt, there was popular demand in the United States for abrogation of the agreement to make possible a U.S.-controlled canal. The Clayton–Bulwer Treaty was finally superseded in 1901 with the conclusion of the second Hay–Pauncefote Treaty (*q.v.*) by which Britain agreed that the U.S. should construct and control the canal.

Clazomenae, ancient Ionian Greek city, located about 20 miles west of Izmir (Smyrna) in modern Turkey. It was founded on the mainland near the base of the Erythraean peninsula; it became part of the Ionian Dodecapolis and was well known for its painted terra-cotta sarcophagi (6th century BC). Later, its inhabitants, alarmed by Persian encroachments, moved the city to an island 400 yards from the coast. Alexander the Great built a pier to connect the island to the mainland. During the 5th century BC, the city was controlled by Athens; it revolted in 412 and after a period of party strife became subject to Achaemenidian Persia (387 BC). The Romans incorporated it into the province of Asia. The philosopher Anaxagoras and Pericles' siege engineer Artemon were natives of Clazomenae.

Clean Government Party, Japanese KŌMEITŌ, Japanese political party that was founded in 1964 as the political wing of the Buddhist lay movement Sōka-gakkai (*q.v.*). In 1970 the affiliation was officially severed, but the connection persists in membership and leadership.

After the 1962 elections to the upper house of the Japanese Diet, Sōka-gakkai members held 15 seats and replaced the Democratic Socialist Party as the party or group with the third largest representation. In 1964 the Clean Government Party, or Kōmeitō, was founded; and in July 1965 the Sōka-gakkai-Komeitō representation in the upper house increased to 20. In its first lower-house elections in 1967 the Clean Government Party won 25 seats and by 1979 had more than doubled its representation to 57 seats.

The Clean Government Party has sought to form a centre-left coalition (excluding the Communist parties) in order to challenge the ruling Liberal-Democratic Party. It preaches a "humanitarian socialism" and an open, independent foreign policy and, among other things, has campaigned for the gradual abolition of the Japan–U.S. security treaty.

clean room, in manufacturing and research, dust-free working area with strict temperature and humidity control that is of vital importance in the manufacture of equipment sensitive to environmental contamination, such as components for electronic and aerospace systems. Seamless plastic walls and ceilings, rounded corners, external lighting and wiring, a continuous influx of dust-free air, and daily cleaning are characteristic features. Clean-room workers wear special clothing, including head coverings, and, on entering, pass through an air blast, or air shower, to remove particles. Workpieces for assembly enter through an airlock.

cleaning behaviour, also called GROOMING, self-grooming, as the action of a bird in preening its feathers, or mutual grooming as part of species behaviour, as among monkeys and other mammalian groups. Mutual grooming, which is often derived from display behaviour, cements social bonds between individuals of a group or colony. The term preening is usually used to describe cleaning behaviour in birds. In some birds, oil from the preen gland, picked up from the feathers after exposure to sunlight, is a major source of vitamin D. A form of cleaning behaviour called cleaning symbiosis occurs between certain fishes or between certain shrimps and fishes. The cleaner is allowed by the recipient fish to clean the latter of external parasites, which the cleaner eats. Both cleaner and cleaned thereby benefit.

Cleanthes (b. 331/330 BC, Assos in the Troad, Asia Minor—d. 232/231), Stoic philosopher who became head of the Stoic school (263–232 BC) after the death of Zeno of Citium. Among his pupils were his successor, Chrysippus, and Antigonus II, king of Macedonia. Although Cleanthes produced little that is original, he brought a religious fervour to the teachings of Zeno, stressing the belief that the universe is a living entity and that God is the vivifying ether of the universe. He wrote about 50 works, of which only fragments survive, the most important being his hymn to Zeus. The principal fragments of Cleanthes' works are contained in works of Diogenes Laërtius and Stobaeus; some may be found in Cicero and Seneca.

clear-air turbulence, erratic air currents that occur in cloudless air between altitudes of 7 and 12 kilometres (4 and 7 miles) and constitute a hazard to aircraft. The turbulence apparently is caused by the wind velocity gradients around the jet stream, where rapidly moving air is close to much slower air; it is most severe over mountainous areas. Detection of clear-air turbulence for warning purposes is difficult, but in March 1964 a radar device, called "cat-spy," was introduced; it indicates probable turbulence 16 kilometres (10 miles) ahead of an aircraft.

clear-cell carcinoma: *see* renal carcinoma.

Clear Grits, political movement and party that arose in Canada West (now in Ontario) in opposition to the moderate Reform administration of Robert Baldwin, premier of the Province of Canada (now Ontario and Quebec) from 1848 to 1851.

The movement originated in 1849 within the Reform Party of Canada; the Clear Grits opposed Baldwin's policies toward the use of crown lands to support the Protestant churches (Clergy Reserves), judicial reforms, and the method of selecting legislators. Its name is said to have originated from the fact that its members wanted their party to be "all sand and no dirt, clear grit all the way through." Peter Perry was the early leader of the Clear Grits, but he died in 1851, and control of the movement eventually passed into the hands of George Brown, editor of the Toronto *Globe.* The Clear Grits eventually became one of the groups that formed the Liberal Party (*q.v.*) in Canada.

clearinghouse, institution established by firms engaged in similar activities to enable them to offset transactions with one another in order to limit payment settlements to net balances. Clearinghouses play an important role in settling transactions related to banks, railroads, stock and commodity exchanges, and international payments.

Bank clearinghouses are generally voluntary associations of local banks set up for the purpose of simplifying and facilitating the exchange of such items as checks, drafts, bills, and notes, as well as settling balances among banks. They also may serve as a medium for discussion and group action on matters of mutual interest, such as fixing service charges, exchanging credit information, gathering credit data, and regulating advertising.

The first modern bank clearinghouse was established in London in 1773, although the clearinghouse idea had been applied to various forms of trade in such places as Tokyo, Florence, and Lyon many centuries earlier. The first bank clearinghouse in the United States was established in New York in 1853.

Clearwater, city, seat (1912) of Pinellas County, western Florida, U.S., on Clearwater Bay, just west of Tampa via the Courtney Campbell Causeway across Old Tampa Bay. Odet Phillippe, former surgeon in Napoleon's navy, planted citrus groves there in the mid-1830s. After Ft. Harrison was established (1841) on the coastal bluffs, homesteaders under James Stevens arrived. A small farming and fishing settlement called Clear Water Harbor (named for the clear, sulfated springs bubbling up offshore) evolved. Tourism developed after the arrival of the Orange Belt Railroad (1888). After World War II there was urban and industrial expansion.

The city is connected to Clearwater Beach, a white-sand key, by the Garden Memorial Causeway. Clearwater Marina berths a sport-fishing fleet and is the location of the

Sea-Orama, a museum and aquarium (opened 1954) exhibiting life forms from the Gulf. The city is the location of a campus of St. Petersburg Junior College. Inc. town, 1891; city, 1915. Pop. (1990) city, 98,784; Tampa–St. Petersburg–Clearwater MSA, 2,067,959.

clearwing moth, also called WASP MOTH, any member of the approximately 700 species of the lepidopteran family Aegeriidae (Sesiidae) occurring worldwide particularly in temperate and tropical forested regions. Long-legged



Clearwing moth (*Aegeriidae*)
William E. Ferguson

and with a slender, dark body having bright red or yellow markings, many species resemble wasps, a form of protective mimicry. The wings frequently lack scales and are transparent. Unlike those of other moths, the front and back wings are hooked together by a series of curved spines (similar to the wasps they mimic).

Aegeriid larvae are pale, wormlike borers, often injurious to cultivated plants. They bore in roots and stems for about one year and usually pupate in their burrows.

The currant borer (*Ramosia tipuliformis*), the most widely distributed species of the family, originated in Europe and now is found in Asia, North America, Australia, and New Zealand. It is a serious pest of currants, gooseberries, black alders, and sumacs. The larvae overwinter in the pith and emerge as adults in early summer. The small adults have dark-purple bodies marked with three (on the female) or four (on the male) yellow bands.

The peach tree borer (*Sanninoidea exitiosa*) of North America attacks shrubs and fruit trees, especially peach. The female lays eggs near the base of the peach tree. The larvae overwinter in burrows in the tree; their boring in the bark in spring sometimes kills the tree. Pupation occurs in gummy masses on the surface of the burrows or in the soil, the adults appearing in midsummer. The adult borer is a day-flying mimic of the pepsid wasp.

The raspberry crown borer (*Bembecia*) bores into the roots and canes of raspberry and blackberry plants. The larvae hibernate beneath the plant bark near ground level and tunnel upward in spring. The plant wilts, breaks, and dies, leaving a stump in which the borers pupate. The adults of the day-flying North American *B. marginata* and the night-flying European *B. hylaeiformis* resemble wasps.

The squash vine borer (*Melittia*) occurs east of the Rocky Mountains from Canada to South America (as the North American *M. cucurbitae* and the Colombian *M. satyriniformis*). It is a serious pest of squash and related plants such as gourds, pumpkins, and cucumbers. Eggs are deposited near the base of the host plant, on which the larvae bore for six weeks. Infected vines wilt, and yellowish-green material protrudes from stem holes. The larvae form cocoons in the soil. The adult is wasplike in appearance.

cleavage, in embryology, the first few cellular divisions of a zygote (fertilized egg). Initially, the zygote splits along a longitudinal plane. The second division is also longitudinal, but at 90 degrees to the plane of the first. The third division is perpendicular to the first two and is equatorial in position. These early divisions produce separate cells called blastomeres. The first few cleavages occur simultaneously in all of the blastomeres (cells), but, as the number of cells increases, simultaneity is lost, and the blastomeres divide independently. Little growth occurs between divisions. Even after several divisions, the group of blastomeres is about the same size as the original zygote. Only new chromatin (nuclear material) is synthesized between divisions, and this takes place at the expense of the cytoplasm (the substance of the cell outside the nucleus).

The pattern of cleavage varies among animal groups but is quite standard for all individuals in a given species. Those eggs such as birds' eggs that contain much yolk often do not divide completely through the yolk-rich region and are called meroblastic. The blastomeres in the yolk-free region cleave completely and result in the embryo proper, while peripheral blastomeres become the yolk sac. Eggs with little yolk divide completely and are termed holoblastic.

cleavage, tendency of a crystalline substance to split into fragments bounded by plane surfaces. Although cleavage surfaces are seldom as flat as crystal faces, the angles between them are highly characteristic and valuable in identifying a crystalline material.

Cleavage occurs on planes where the bonding forces are weakest. A crystal may be cleaved with equal ease in any direction that is parallel to crystallographically identical faces; for example, galena cleaves parallel to all faces of a cube. Cleavage is described by its direction (as cubic, prismatic, basal) and by the ease with which it is produced. A perfect cleavage produces smooth, lustrous surfaces with great ease. Other degrees include distinct, imperfect, and difficult. *See also* fracture.

cleaver, heavy, axlike knife used since the Middle Pleistocene era to cut through animal bone and meat; in modern times the cleaver, generally made of iron or carbon steel, remains a requisite tool of the butcher and a common kitchen implement. The versatility of the cleaver is probably best exemplified by its prominent role in Chinese-style cooking, in which it figures in every step of preparation from chopping firewood to butchering meat to slicing delicate vegetables and even whittling chopsticks. Its flat side is used like a mallet to pound and tenderize meat.

In addition to the all-purpose broad-bladed cleaver, there is also a standard narrow-bladed and lighter cleaver used for gentler slicing.

Cleaver, (Leroy) Eldridge (b. 1935, Wabbaseka, near Little Rock, Ark., U.S.), black militant whose autobiographical volume *Soul on Ice* (1968) is a classical statement of black alienation in the United States.

In correctional institutions in California almost all the time from junior high school days to 1966 for crimes ranging from bicycle theft to assault with intent to kill, Cleaver supplemented his high school education with wide reading and became a follower of the Black Muslim separatist Malcolm X. After parole he became the Black Panthers' minister of information. Faced with reimprisonment after a police confrontation in Los Angeles following Martin Luther King's assassination, he jumped bail in November 1968 and fled first to Cuba and then to Algiers, where he maintained a headquarters for an international section of the Black Panthers. In November 1975 Cleaver returned voluntarily to the U.S. and posted bond in California to avoid being jailed on charges of attempted murder and assault. The charges against Cleaver were dropped in 1979 when he agreed to plead guilty to assault in connection with the 1968 shoot-out. Cleaver, who had proclaimed himself a born-again Christian, was placed on a five-year probation during which he was to occupy himself with community service.

cleavers (plant): *see* bedstraw.

Cleef, Joos van (Flemish painter): *see* Joos van Cleve.

Cleethorpes, district (borough), county of Humberside, England, a U-shaped area surrounding Grimsby district on the south side of the Humber Estuary of the North Sea. It has an area of 63 sq mi (164 sq km). The town of Cleethorpes has grown in modern times as a popular resort frequented by tourists from the Midlands and Yorkshire. Coastal erosion entails expensive maintenance of the promenade and seawalls behind the sandy foreshore. The district includes Immingham dock and other industrial installations. Inland the rural countryside extends over the coastal flats to the lower slopes of the Wolds. Pop. (1982) 68,700.

clef (French: "key"), in musical notation, symbol placed at the beginning of the staff, determining the pitch of a particular line and thus setting a reference for, or giving a "key" to, all notes of the staff. Three clef symbols are used today: the treble, bass, and C clefs, stylized forms of the letters G, F, and C, respectively.

Music for instruments and voices is written in the clef corresponding most closely to the range of their parts. The treble, or G, clef fixes the position of the G above middle C. In modern notation this is invariably the second line from the bottom of the staff:



The former French violin clef, however, fixed G at the bottom line of the staff:



Music for the tenor voice is usually written in an octave transposing treble clef; a small 8 under the clef indicates that the music is to be sung an octave lower than written:



The bass, or F, clef sets the position of the F below middle C. In modern notation this is fixed at the second line from the top of the staff:



The once common baritone clef set F at the middle line:



The C clef, or movable C clef, determines the position of middle C. It is found in two principal positions: as an alto clef, in which the middle line carries C:



and as a tenor clef, in which middle C occurs on the second line from the top:



Formerly common forms of the C clef are the soprano clef, with middle C as the bottom line, and the mezzo-soprano clef, with middle C as the second line from the bottom of the staff.

cleft lip (congenital malformation): *see* harelip.

cleft palate, a fairly common congenital deformity in which the palatal plates (in the roof of the mouth) fail to close during the second month of prenatal life. The resulting fissure may occur on the soft palate only, or it may extend forward through the hard palate, in which case the nasal cavity opens into the mouth and the nasal septum and its vomer bone are often absent. Cleft palate may be unilateral or bilateral and may occur alone or in conjunction with harelip (a fissure of the lip beneath the nostril) or other abnormalities. In infancy, cleft palate limits the child's ability to suck and may lead to malnutrition; later, speech difficulties develop. Surgery to form an airtight separation between nose and mouth is usually performed at about 18 months of age. Even with expert surgical repair, however, speech training is necessary, and nose, ear, and sinus infections may remain a hazard.

cleidocranial dysostosis, also called CLEIDOCRANIALIASIS, rare congenital, hereditary disorder in which bone substance is normal but form is not. Characteristically, in those afflicted, the collarbones are missing or reduced in size so that the shoulders may sometimes be made to touch in front of the chest, and certain facial bones are underdeveloped or missing. Cranial sutures are late in closing, and the skull is round and the eyes are set wide apart. Other bones, especially the radius (in the forearm), pelvis, hip joint, and vertebrae, may be malformed. Deciduous teeth are late in falling, and, as a result, the permanent dentition is often abnormal. Individuals are not disabled beyond difficulty in walking and poor teeth, and life expectancy is normal.

Cleisthenes OF ATHENS, Cleisthenes also spelled CLISTHENES (b. *c.* 570 BC—d. *c.* 508), statesman regarded as the founder of Athenian democracy, serving as chief archon (highest magistrate) of the city-state (525–524). Cleisthenes successfully allied himself with the popular Assembly against the nobles (508) and imposed democratic reform. Perhaps his most important innovation was the basing of individual political responsibility on citizenship of a place rather than on membership in a clan.

Cleisthenes belonged to the Alcmaeonid family, which had played a leading part in Athenian public life since the early Archaic period, and was the son of Megacles. At the time of Cleisthenes' birth the family was still affected by a public curse incurred by his greatgrandfather, also named Megacles. The latter had been chief archon when the Athenian noble Cylon had made an unsuccessful bid to seize the Acropolis and make himself tyrant (*c.* 632). Some of Cylon's followers had taken refuge at an altar and did not abandon their sanctuary until they had been promised that their lives would be spared. They were, however, put to death, and Megacles was held responsible. On the advice of Apollo's oracle at Delphi, a curse was pronounced on the Alcmaeonids, who went into exile, but they were back in Athens when the lawgiver Solon was called on to avert civil war in 594. The Alcmaeonids were strong supporters of Solon, and Megacles' son Alcmaeon led an Athenian contingent that fought with Thessaly and the powerful tyrant of Sicyon (also named Cleisthenes), in a so-called Sacred War for the protection of Delphi. It is not surprising that, when the tyrant of Sicyon was looking for a husband for his daughter Agariste (*c.* 574), he should have chosen Megacles, son of Alcmaeon. The first son of the marriage was named Cleisthenes after his mother's father.

In the period following Solon's reforms, Attica was unsettled. The old nobility thought that Solon had gone too far and were anxious to reverse the trend; the common people thought that he had not gone far enough. The Alcmaeonids, whom the curse had alienated from the nobility, championed a middle way based on Solon's reforms; but both these parties were outmanoeuvred by Peisistratus, a noble with a good military reputation who appealed to the poorer classes and, with their support, seized power in 560. After an unsuccessful attempt to share power with the tyrant, the Alcmaeonids joined the opposition; but, when Peisistratus, having built up his resources during a 10-year exile, defeated his enemies, the Alcmaeonids again had to leave Attica (546). Cleisthenes was now about 25 years old, and for nearly 20 years he could not return. Nothing more is heard of his father, who probably died before Peisistratus. The Alcmaeonids' part in the Sacred War ensured the favour of Delphi; this support was further strengthened by the part played by the family in the rebuilding of Apollo's temple, which had burned down around 548.

The fragment of an archon list found in the excavation of the Athenian Agora has shown that Cleisthenes was chief archon in 525–524. It is believed that when Peisistratus died in 527, his son and successor, Hippias, tried to win back those nobles who had been most hostile to the tyranny. But the reconciliation did not last. In 512, at a time when Hippias, frightened by the murder of his brother in 514, had become increasingly repressive, the Alcmaeonids tried unsuccessfully with other nobles to fight their way back. They were more successful when they enlisted the help of Delphi. The Spartans were repeatedly urged by Delphi to set Athens free, and it was finally a Spartan army that forced Hippias and his family to leave Attica.

In the struggle for power that followed the fall of the tyranny, Cleisthenes failed to impose his leadership, and in 508 Isagoras, the leader of the more reactionary nobles, was elected chief archon. It was at this point, according to later tradition, that Cleisthenes took the people into partnership and transformed the situation. Before the year 508–507 was over, the main principles of a complete reform of the system of government had been approved by the popular Assembly, a relative of the Alcmaeonids had been elected chief archon for the following year, Isagoras had left Athens to invoke Spartan intervention, and Sparta had declared for Isagoras. The Spartan king demanded the expulsion of "those under the curse," and Cleisthenes and his relatives were again exiles. The Spartans had no wish to see a democratic Athens, but they misjudged the mood of the people. The attempt to impose Isagoras as the leader of a narrow oligarchy was strongly resisted, and the Spartans had to withdraw. The Athenians now recalled the exiles and carried out the decision that the Assembly had taken in 508.

Cleisthenes had seen that though the tyranny had improved the economic condition of the common people and had, temporarily at least, broken the political power of the noble houses, most of the old families were still looking to the past rather than the future, the full promise of the Solonian reforms could not be realized unless the principle of hereditary privilege was attacked at the roots. He therefore persuaded the people to change the basis of political organization from the family, clan, and phratry (kinship group) to the locality. Public rights and duties should henceforward depend on membership of a deme, or township, which kept its own register of citizens and elected its own officials. The citizen would no longer be known only by his father's name but also or alone by the name of his deme. Ten new local tribes were formed to take the place of the four Ionic blood tribes, and, to make faction building more difficult, Attica was divided into three areas—the city itself and its suburbs, the coastal area, and the inland area; and townships from each of the three areas were included in each tribe, 10 counties, *trittyes,* being formed in each area for this purpose. And in this grouping steps were probably taken to diminish the local influence of some of the main priestly families. The mixed local tribe became the basis of representation in public office, and the Solonian Council of Four Hundred was increased to 500 (50 from each tribe, with members selected from demes according to their numbers). *Isonomia,* the principle of equality of rights for all, was one of the proudest boasts of the reformers, and there is no doubt that Cleisthenes' work led to a much wider and more active participation by all persons in public life. (RU.M.)

BIBLIOGRAPHY. The reforms of Cleisthenes are interestingly discussed in W.G. Forrest, *The Emergence of Greek Democracy, 800–400 B.C.,* pp. 191–203 (1966); and in more detail by Charles Hignett, *A History of the Athenian Constitution to the End of the Fifth Century B.C.,* pp. 124–158 (1952). *Clisthène l'Athénien,* by Pierre Leveque and Pierre Vidal-Naquet (1964), is a stimulating study of Cleisthenes' intellectual background.

Cleisthenes OF SICYON, Cleisthenes also spelled CLISTHENES (fl. early 6th century BC), tyrant of the ancient Greek city of Sicyon. He belonged to the non-Dorian family of Orthagoras, who had established the tyranny in Sicyon with the support of the Ionian section of the inhabitants. Cleisthenes emphasized the destruction of Dorian predominance by giving ridiculous epithets to their tribal units, which from Hylleis, Dymanes, and Pamphyli become Hyatae (Swine-men), Choireatae (Pig-men), and Oneatae (Ass-men). He also attacked Dorian Argos and suppressed the Homeric rhapsodists who sang the exploits of Dorian heroes.

He championed the cause of the Delphic oracle against the town of Crisa in the Sacred War of *c.* 595–596 BC. Crisa was destroyed, and Delphi became one of the meeting places of the Amphictyonic League, or religious league of neighbouring states. The Pythian games were reestablished with new magnificence, and Cleisthenes won the first chariot race in 582. He founded Pythian games at Sicyon and built a new Sicyonian treasury at Delphi. His power was so great that, when he offered his daughter Agariste in marriage, some of the most prominent Greeks sought the honour, which fell upon Megacles, the Alcmaeoid. The story of the rival suitors is told by Herodotus.

Cleitias, also spelled CLITIAS (fl. *c.* 580–550 BC), Athenian vase painter and potter, one of the most outstanding masters of the Archaic period, the artist of the decorations on the François Vase. This vase, a volute krater painted in the black-figure style, is among the greatest treasures of Greek art. Dating from *c.* 570 BC, it was discovered in 1844 in an Etruscan tomb near Chiusi and named after its discoverer; it is now in the Museo Archeologico at Florence.

More than 200 figures are found among the six friezes (painted on superimposed zones) that decorate the vase's surface. In content alone, the François Vase is an encyclopaedia of the epic themes popular during the Archaic period. The vase is signed "Ergotimos epoiēsen; Cleitias egraphsen" ("Ergotimos made [me]; Cleitias painted [me]").

Cleitias' signature has been found on five vases. Four of these, like the François Vase, are signed by Cleitias as painter and Ergotimos as potter. Among them is a small stand, now in the Metropolitan Museum of Art in New York City. Also from the hands of the



"Mask of Medusa," top view of stand made by Ergotimos and painted by Cleitias, c. 560 BC; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York. Fletcher Fund, 1931

two masters in collaboration are two cups and some cup fragments now in London, from which most of the signatures have been lost.

Other vases and fragments of other vases have been attributed to Cleitias on the basis of style, most of them now in the Acropolis Museum in Athens.

Cleitomachus, also spelled CLITOMACHUS, original name HASDRUBAL (b. 187/186 BC—d. 110/109), Greek philosopher, originally from Carthage, who was head of the New Academy of Athens from 127/126 BC. He characterized the wise man as one who suspends judgment about the objectivity of man's knowledge. He was the pupil and literary exponent of Carneades and asserted, against other philosophers, that Carneades never disclosed a preference for any epistemological doctrine. His 400 volumes, all lost, included *On the Withholding of Assent*, two popular introductions to Academy philosophy, and a consolatory letter to his compatriots on the fall of Carthage.

Cleland, James (fl. early 17th century, England), English author whose 1607 book, *The Institution of a Young Nobleman,* advocated an all-round rather than strictly classical education.

Little is known of Cleland's life except that he was a Scotsman living in England. The book was published at Oxford, but he was apparently neither educated at Oxford nor connected with the university in any other way.

Cleland's book is notable for its emphasis upon and praise of English vernacular; the young nobleman is urged to speak English well before attempting to speak Latin. Reading history, according to Cleland, is the nobleman's most important study, but mathematics, architecture, law, geography, philosophy, languages (especially French), and the humanities are also necessary to a proper education.

Cleland departed from tradition in viewing education in a broad context of learning experiences rather than as limited to strict training in the classics. In his book he advocated foreign travel and emphasized learning correct behaviour and manners, the duty of parents toward children, wise teaching techniques, the training of sound judgment, and even physical exercises.

Cleland, John (b. 1709—d. Jan. 23, 1789, London), English novelist, author of the notorious *Fanny Hill; or, Memoirs of a Woman of Pleasure.*

After serving as a consul at Smyrna and later as an agent of the British East India Company in Bombay, Cleland became a penniless wanderer who drifted from place to place and was apparently confined several times in English debtors' prisons. In such reduced circumstances, he wrote *Fanny Hill* (1748–49) for a fee of 20 guineas. An elegant, flowery work of pornography describing the activities of a London prostitute, this novel has enjoyed enormous popularity for more than two centuries as a classic of erotic literature. When originally published, it was immediately suppressed (an action later repeated many times), and Cleland was called before the Privy Council. He pleaded his extreme poverty and was not sentenced. Instead, Lord Granville, thinking him talented, secured him a yearly pension of £100, that he might put his gifts to better use. Thereafter, he became a journalist, playwright, and amateur philologist.

Clematis, genus of perennial, chiefly climbing shrubs of the buttercup family (Ranunculaceae) with more than 200 species distributed over most of the world, especially in Asia and North America. Many species are cultivated in North America for their attractive flowers.

The flowers may be solitary or in large clusters. The leaves usually are compound—*i.e.*, have several parts. Common species include



Clematis

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woodbine (*C. virginiana*); traveler's joy, or old-man's-beard (*C. vitalba*); virgin's bower (*C. cirrhosa*); and vine bower (*C. viticella*).

The most popular horticultural hybrids are found primarily in three species: *C. florida,* flowering on old wood in summer; *C. patens,* flowering on old wood in spring; and *C. jackmanii,* flowering on new wood in summer and fall.

Clemenceau, Georges, byname THE TIGER, French LE TIGRE (b. Sept. 28, 1841, Mouilleron-en-Pareds, Fr.—d. Nov. 24, 1929, Paris), statesman and journalist who was a dominant figure in the French Third Republic and, as premier (1917–20), a major contributor to the Allied victory in World War I and a framer of the postwar Treaty of Versailles.

Early life. Clemenceau was born in Vendée, a coastal *département* of western France.



Clemenceau

EB Inc

His youth was spent among peasants, but it was his father, Benjamin, a Voltairean, positivist, and admirer of the Revolution of 1789, who shaped him and remained his model. Through his father he met men who were plotting to overthrow the emperor Napoleon III and came to know the historian Jules Michelet, who was being hunted by the imperial police. Benjamin was arrested briefly in 1858. Three years later (November 1861), he took Georges to Paris to study medicine.

In the Latin Quarter, Clemenceau associated with young men of the republican opposition, who created an avant-garde association named Agis Comme Tu Penses (Act as You Think). Clemenceau, with some friends, founded a journal, *Le Travail* ("Work"), which set forth the views that were to characterize his future political action. It was seized by the police, and, because of an advertisement inviting the workers of Paris to commemorate the 14th anniversary of the Revolution of 1848, Clemenceau was imprisoned for 73 days. Upon his release, he started a new paper, *Le Matin* ("Morning"), which was in turn seized by the authorities. Having completed his studies, Clemenceau left for the United States, where he was to spend most of the next four years (1865–69). He reached New York City at the height of the Civil War. He was struck by the freedom of discussion and expression, unknown in France at the time, and he had great admiration for the politicians who were forging American democracy. When his father refused to continue financial aid, he taught in a girls' school in Stamford, Conn.; in due course, despite the opposition of her guardian, he married one of his pupils, Mary Plummer, in 1869. Three children were born of this union, but the couple separated after seven years.

Early political career. Five days after his marriage, Clemenceau returned to France and established himself as a doctor in Vendée. But politics soon took him back to Paris. In July 1870, Napoleon III declared war on Germany. Less than two months later, the French were defeated at Sedan and the empire collapsed. Clemenceau was among the crowd that invaded the Palais-Bourbon on September 4 and hailed the radical leader Léon Gambetta, who was proclaiming the republic. Soon afterward, Clemenceau was named mayor of the 18th *arrondissement* (district) of Paris (Montmartre) and, on Feb. 8, 1871, was elected as a Radical Republican deputy to represent the Seine *département* in the National Assembly held in Bordeaux. He voted against the preliminaries of the harsh peace terms demanded by Germany and left Bordeaux determined to avenge France's "shameful humiliation."

Back in Paris, he became involved in the insurrection known as the Paris Commune and tried to mediate between its leaders and the National Assembly, then meeting at Versailles. He was not successful and, therefore, resigned as mayor and deputy (March 27, 1871). In 1876 he stood again for the Chamber of Deputies and was elected for the 18th *arrondissement.* He joined the extreme left, and his energy and mordant eloquence speedily made him the leader of the Radical bloc.

In 1877, in the constitutional crisis precipitated on *le seize mai* (May 16), when Pres. Patrice MacMahon attempted to make the government responsible to him rather than to the National Assembly, Clemenceau took a leading part in resisting such antirepublican policy. In 1880 he started his newspaper, *La Justice,* which became the principal organ of the Radicals in Paris; from that time onward, throughout the presidency (1879–87) of Jules Grévy, he rapidly built up his reputation as a political critic of republicans and radicals

as well as of conservatives and as a destroyer of ministries who would not, however, take office himself. Hostile to the colonial expansion that was dispersing the resources of a weakened France, he mercilessly attacked its promoters, and in 1885 his use of a minor reverse in Tongking (Indochina; now Vietnam) was the principal factor in the fall of Jules Ferry's Cabinet. At the elections of 1885, he was returned both for his old seat in Paris and for the *département* of Var, for which he chose to sit. Refusing to form a ministry himself, because he could not command a majority in the Senate, he supported the government of Charles de Freycinet in 1886 and was responsible for the inclusion in the Cabinet of Gen. Georges Boulanger as minister of war. Clemenceau had mistakenly imagined Boulanger to be a republican, but when he showed himself an irresponsible demagogue and nationalist, a focus for both Bonapartist and monarchist support, Clemenceau became a vigorous opponent of the Boulangist movement and helped to form the League of the Rights of Man to press for radical reforms.

By his share in the exposure of President Grévy's son-in-law for trafficking in honours, Clemenceau caused the resignation of another prime minister, Maurice Rouvier, in 1887. Yet he refused Grévy's request that he form a ministry and intrigued to keep various other leaders out of office. His destructive political power won him an ever-increasing number of enemies, and his implication in the scandal of 1892, caused by the failure of the French Panama Canal Company (Compagnie Universelle du Canal Interocéanique), gave them all—especially the Boulangists—an unrivalled opportunity for revenge. Clemenceau's associations with the Jewish financier Cornélius Herz, who was deeply involved in the affair, inevitably threw suspicion on him; later he was accused of being in the pay of the British Foreign Office. The attack on Clemenceau was mounted in the powerful daily newspaper, *Le Petit Journal;* it took a dramatic turn when, in the Chamber of Deputies on Dec. 20, 1892, the author and Boulangist Paul Déroulède denounced him as the protégé and supporter of Herz. Clemenceau claimed that Déroulède was lying and challenged him to a duel, in which neither was hurt. More effectively, Clemenceau brought a successful lawsuit against his detractors. Their condemnation forced some of them to resign as deputies, but in the end they took Clemenceau with them. All the accumulated venom he had aroused was concentrated in the election of 1893 when, standing again for the Var *département,* Clemenceau was attacked on all sides. Despite conducting an exhaustive and brilliant campaign, he was defeated.

But Clemenceau was too much of a fighter to give in to discouragement. He started upon a serious career in journalism and, after a difficult beginning, came to be classed among the foremost political writers of his time. A new Clemenceau was revealed: a man of reflection, of vast culture, a friend of the best known writers and artists of the period. An ardent supporter of the Impressionists, he especially favoured the work of Monet: after World War I he arranged for a series of Monet's paintings to be exhibited in the Orangerie in the Tuileries Gardens.

At the same time, Clemenceau was writing books, mainly political and sociological, but his *Au pied du Sinaï (At the Foot of Mount Sinai,* 1922), illustrated by Henri de Toulouse-Lautrec, was a volume of sketches on the history of the Jewish people. He also tried his hand at writing a play.

He was, however, essentially a journalist and inevitably wrote much about the Dreyfus case, which agitated France from 1894 to 1906. At first Clemenceau had assumed that the young Jewish officer Alfred Dreyfus had, indeed, been guilty of selling secrets to Germany. But, once convinced of his innocence, Clemenceau carried on an eight-year battle (1897–1905) in his newspapers *La Justice* and *L'Aurore* (founded in 1897). Clemenceau's support for Dreyfus brought him back into favour with his fellow republicans, and he was prevailed upon to accept election as senator for Var in April 1902.

This election was of vital importance in the political career of Clemenceau. He remained a senator from Var until 1920, the year in which he voluntarily ended his political activity. It was as senator that he was to show his greatest qualities as a statesman. He became a member of the Cabinet in 1906 as interior minister and was premier from 1906 to 1909. Finally, in 1917, after three years of World War I, when France's morale and resources were at their lowest ebb, he accepted Pres. Raymond Poincaré's invitation to head the war government (1917–20). His steadfast and ruthless pursuit of war brought him the title "Father of Victory."

As minister of the interior, Clemenceau faced difficult problems, notably the enforcement of the new law (1905) separating church and state, as well as serious labour problems. When a strike of miners in the Pas-de-Calais led to a threat of disorder in 1906, he resolved to employ the military. His attitude in this matter alienated the Socialist Party, from which he definitely broke in a notable speech. It marked him, however, as the "strong man" of the day in French politics, and, when the ministry of Ferdinand Sarrien resigned in October 1906, Clemenceau became premier. During 1907 and 1908 the new entente with England was cemented. In Morocco, a dispute between France and Germany over the harbouring in the German consulate of German deserters from the French Foreign Legion brought renewed tension between the two countries. Austria-Hungary urged calmness on the Germans, and in February 1909 a joint agreement was signed, recognizing the economic interests of Germany and the special political interests of France in Morocco. The Clemenceau government fell on July 20, 1909, Clemenceau resigning after a violent and unexpected argument with the influential statesman Théophile Delcassé.

Freed from the responsibilities of power, Clemenceau travelled abroad. He took advantage of this opportunity to make speeches in Argentina, Uruguay, and Brazil on the subject of democracy. "I am a soldier of democracy," he said. "It is the only form of government which can establish equality for all, and which can bring closer the ultimate goals: freedom and justice."

Leadership during World War I. Back in the Senate (1911), Clemenceau became a member of its commissions for foreign affairs and the army. He was convinced that Germany intended war, and, haunted by the fear that France might again be caught unprepared, he enquired diligently into the state of France's armaments. In order to publicize his views on rearmament, he founded in May 1913 a new daily paper, *L'Homme Libre,* with himself as editor.

When World War I broke out in July 1914, the partisan in him gave way to the patriot, who called upon every Frenchman to join the fray. *L'Homme Libre* suffered at the hands of the censors for Clemenceau's plain speaking and, in September 1914, was suppressed. Two days later, however, it reappeared entitled *L'Homme Enchaîné,* and, although at first it was subjected to much cutting, later excisions became rare. Meanwhile, in the Senate Clemenceau agitated for more and more guns, munitions, and soldiers, for judicious use of the available manpower, and for a better organized and equipped medical service. Deeply concerned about the attitude of the United States to the war, he sent urgent appeals to the American public and to Pres. Woodrow Wilson and was overjoyed at the United States' entry into the war in April 1917.

Above all, Clemenceau strove to create an indomitable "will to victory." As the war dragged on, weariness, slackness, and pacifism began to appear. He was the first to draw public attention to such insidious perils. In these difficult conditions, President Poincaré, in November 1917, called upon Clemenceau to form a government. Though he was 76 years of age, he formed his Cabinet with himself as minister of war as well as premier. Clemenceau's single purpose was to win the war, and to this aim all other interests were subordinated. For traitors and defeatists he had no clemency. The hope of victory urged him on. Yet he was obsessed with the need for a unified military command and was able ultimately to convert to his viewpoint the allied governments and military leaders. In March 1918, Ferdinand Foch was designated sole commander. Despite disasters in May 1918, Clemenceau's resolve remained unshaken, and he declared that he would wage war "to the last quarter hour, for the last quarter hour will be ours."

Negotiation of the Peace. The armistice signed by the defeated Germans on Nov. 11, 1918, proved him right and brought him, the last survivor of those who had protested at Bordeaux in 1871 against the harsh terms imposed on France, the satisfaction of seeing Alsace-Lorraine returned to France. Clemenceau found that building the peace was a more arduous task than winning the war. He wanted the wartime alliance to be followed by an indefectible peacetime alliance. He presided with authority over the difficult sessions of the Paris Peace Conference (1919).

The Treaty of Versailles was in preparation, and this necessitated strenuous days of work and delicate negotiations. Clemenceau made it his task to reconcile the interests of France with those of Great Britain and the United States. He defended the French cause with enthusiasm and conviction, forcing his view alternately on the British prime minister, David Lloyd George and the United States president, Woodrow Wilson. He also took care to see that Germany was disarmed. With his desire for poetic justice, he insisted that the Treaty of Versailles be signed (June 28, 1919) in the Hall of Mirrors of the Versailles palace where, in 1871, William I had had himself proclaimed German emperor.

Meanwhile, the French Assembly began to grow restless, for it saw itself put to one side in the peace negotiations. It no longer regarded Clemenceau as indispensable. A new Chamber of Deputies was elected on Nov. 16, 1919, and Clemenceau imagined that he would have its support, since many of its members were former servicemen. But the politicians could not forgive him for having excluded them not only from the conduct of the war but also from the negotiation of the peace. He also had to face hostility from the clerical party on the extreme right and from the pacifist element on the extreme left. Defeated in the presidential election of Jan. 17, 1920, he then, as was customary on the election of a new president, resigned the premiership. He also gave up all other political activities.

Later years. Clemenceau was nearly 80 years old when he retired to Vendée, to Bel-Ebat, a modest cottage on a dune overlooking the Atlantic. He spent a few days in Corsica with his friend Nicolas Piétri, whom he named as executor of his will and whom he persuaded to accompany him on a long sea voyage to India, from September 1920 to May 1921. In Singapore, he dedicated a street bearing his name. He went tiger hunting and amazed his hosts with the spryness of his wit and with his insatiable intellectual curiosity. Everywhere he was warmly welcomed as "the

statesman who has deserved his world-wide reputation and who has done so much for the cause of the Allies."

When it appeared that the United States was seeking to dissociate itself from European affairs, Clemenceau, now 81 years old, visited the United States (November 1922) in an attempt to arouse its citizens from isolationism. He was welcomed triumphantly and in three weeks delivered about 30 speeches, admonishing his audiences that, if they forgot that there had been a war, another would break out. Woodrow Wilson, whom he visited, thanked him with great feeling for this peace crusade. Before returning to France, Clemenceau undertook a pilgrimage to the places where French soldiers had fought in the battle for American independence.

He retired finally to Bel-Ebat, although he still made short trips to Paris. He read a great deal and particularly enjoyed rereading Greek and Latin works in the original. He wrote *Démosthène* (1926; *Demosthenes,* 1926), a study of Demosthenes and the fate of Greece, whose political instability had compromised its independence. He also wrote *Au soir de la pensée* (1927; *In the Evening of My Thought,* 1929), a sort of philosophic testament. He remained interested in political events and was grieved by them. In 1926 he sent a virulent letter to the U.S. president, Calvin Coolidge, calling for solidarity among the Allies in the face of German demands.

The years went by, bringing bereavements. The death of Foch saddened him, for he had admired him. But the posthumous publication of the Marshal's *Mémorial* aroused in him bitterness and indignation. With sadness but with pride, he answered it in his own unfinished memoirs, *Grandeurs et misères d'une victoire* (1930; *Grandeur and Misery of Victory,* 1930).

On March 28, 1929, he wrote down his last wishes: to be buried near his father at Colombier, a spot of wild natural beauty in his native Vendée. He wanted no funeral procession, no official or religious ceremony. Around his tomb there was to be a very simple iron railing, with no inscription. He died in 1929 in his rue Franklin apartment in Paris.

(G.Mo./Ed.)

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Clemens, Jacobus, Clemens also spelled CLEMENT, also called CLEMENS NON PAPA (b. *c.* 1510, Ieper, Burgundian Flanders—d. *c.* 1556, Diksmuide, Spanish Netherlands), composer famous for his sacred music, who was a leader in the Flemish, or Netherlands, style that dominated Renaissance music. He called himself Clemens non Papa to avoid confusion with a contemporary priest and poet.

In 1544 he was probationary choirmaster of Saint-Donatien in Brugge (Bruges) and in 1550 was singer and composer at 's Hertogenbosch. An elegy of 1558 suggests that he died violently. His outstanding *Souter Liedekens* (1556) was an almost complete series of metrical psalms in Flemish. His other works include 16 masses, more than 200 motets, and 90 chansons. He used simple, impressive themes, melodious lines, and skillful melodic imitation.

Clemens, Samuel Langhorne: *see* Twain, Mark.

Clemens, Titus Flavius: *see* Clement of Alexandria, Saint.

Clement, Latin CLEMENS, name of Roman Catholic popes and antipopes, grouped below chronologically and indicated by the symbol •.

• **Clement I,** SAINT, byname CLEMENT OF ROME, Latin CLEMENS ROMANUS (b. Rome?—d. end of 1st century AD, Rome; feast day November 23), first Apostolic Father, pope from 88 to 97, or from 92 to 101, supposed third successor of St. Peter. According to the early Christian writer Tertullian, he was consecrated by Peter. Bishop St. Irenaeus of Lyon lists him as a contemporary of the Apostles and witness of their preaching. Bishop Eusebius of Caesarea dates his pontificate from 92 to 101. His martyrdom is legendary, and he has been hypothetically identified with the Clement mentioned in Phil. 4:3. His attribute is an anchor, to which he was tied and cast into the sea, according to spurious tales.

The authorship of the *Letter to the Church of Corinth* (I Clement) has been traditionally ascribed to him. Still extant, it was written to settle a controversy among the Corinthians against their church leaders and reveals that Clement considered himself empowered to intervene (the first such action known) in another community's affairs. His *Letter* achieved almost canonical status and was regarded as Scripture by many 3rd- and 4th-century Christians.

Numerous Clementine writings—those that at various times were added to the first *Letter*—show the high regard for Clement in the early church. He is credited with transmitting to the church the *Ordinances of the Holy Apostles Through Clement* (*Apostolic Constitutions*), which, reputedly drafted by the Apostles, is the largest collection of early Christian ecclesiastical law; the constitutions are now believed, however, to have been written in Syria *c.* 380. W.K. Lowther Clarke's edition of *The First Epistle of Clement to the Corinthians* was published in 1937.

• **Clement II,** original name SUIDGER (b. Saxony—d. Oct. 9, 1047, Aposella, near Pesaro, Romagna), pope from 1046 to 1047.

Of noble birth, he was bishop of Bamberg, in Germany, when in 1046 he accompanied the German king Henry III on an expedition to Italy, where Henry found three rival popes (Sylvester III, Benedict IX, and Gregory VI) claiming the papacy. Having had all claimants deposed, Henry selected Suidger as pope. He was consecrated on December 25 and immediately crowned Henry as Holy Roman emperor.

In 1047 Clement convoked the Council of Rome that passed strong decrees against simony (*i.e.,* the buying or selling of a church office) and began a period of reform that was carried on by his successors. His sudden death soon after returning from a trip to Germany was attributed to poisoning by Benedict's supporters. Benedict then reappeared in Rome and installed himself as pope.

• **Clement (III),** original name GUIBERT, or WIBERT, OF RAVENNA, Italian GUIBERTO, or WIBERTO, DI RAVENNA (b. *c.* 1025, Parma, Lombardy—d. Sept. 8, 1100, Cività Castellana, Papal States), antipope from 1080 to 1100.

Of noble birth, Guibert served at the German court (*c.* 1054–55) and became imperial chancellor for Italy (1058–63). As such he supported the election of Bishop Peter Cadalus of Parma as antipope Honorius II (1061). His appointment by Henry IV of Germany as archbishop of Ravenna was confirmed by Pope Alexander II (1073), but he later clashed with Alexander's successor, St. Gregory VII. When Guibert became the Italian leader of the imperialist faction opposing the Gregorian reform, Gregory excommunicated him. He was elected antipope on June 25, 1080, by a synod convoked by Henry at Brixen, which declared Gregory deposed. He was enthroned when Henry finally seized Rome (March 24, 1084), and on March 31 he crowned Henry emperor. Clement remained antipope throughout the succeeding pontificates of Victor III and Urban II.

• **Clement III,** original name PAOLO SCOLARI (b. Rome—d. March 20, 1191, Rome), pope from 1187 to 1191. He was cardinal bishop of Palestrina when elected pope on Dec. 19, 1187. In October 1187 Jerusalem fell to Saladin, the leader of the Muslim armies, and Clement called the Western princes to undertake the Third Crusade, the results of which were disappointing. In Italy the marriage of the German king Henry VI with Constance, the daughter of King Roger II of Sicily, threatened to unite south Italy with the German crown. Clement tried to avert this union by investing Count Tancred of Lecce with the fief of Sicily. He released the Scottish Church from the jurisdiction of the English see of York (1188), and the church became directly dependent on Rome.

• **Clement IV,** original French name GUI FOULQUES, Italian GUIDO FULCODI (b. Saint-Gilles, Languedoc—d. Nov. 29, 1268, Viterbo, Papal States), pope from 1265 to 1268.

An eminent jurist serving King St. Louis IX of France, Guido was ordained priest when his wife died *c.* 1256. He subsequently became bishop of Le Puy in 1257, archbishop of Narbonne in 1259, and cardinal in 1261. While on a diplomatic mission to England, he was elected pope in absentia on Feb. 5, 1265, and consecrated 10 days later.

Clement executed the plan of Pope Urban IV, his predecessor, in a century-old battle



Clement IV, detail from a fresco, *c.* 1270; in Tour Ferraude, Pernes-Les-Fontaines, Fr.
Giraudon—Art Resource/EB Inc.

between the papacy and the German Hohenstaufen family. For military and financial help against King Manfred of Sicily, a Hohenstaufen, Clement made Charles of Anjou king of Naples and Sicily in 1266. Having defeated and killed Manfred, Charles helped Clement eradicate Duke Conradin of Swabia, allied with the Italian Ghibellines (anti-papal political party) in 1268; thus, the Hohenstaufens were extinguished.

Clement's participation in the political affairs of Italy and Germany, however, brought peace neither to Rome nor to Italy. The Angevin dynasty founded by Charles was a new threat to the papacy's independence. Upon Clement's

death, the papacy was vacant for nearly three years.

• **Clement V,** original name BERTRAND DE GOT (b. *c.* 1260, Bordelais region, France—d. April 20, 1314, Roquemaure, Provence), pope from 1305 to 1314 who in choosing Avignon, France, for the papal residence—where it flourished until 1377—became the first of the Avignonese popes.



Clement V, detail from a fresco by Andrea da Firenze, late 14th–early 15th century; in the Convent of Sta. Maria Novella, Florence

Alinari—Art Resource

Bishop of Comminges from March 1295, he became archbishop of Bordeaux in 1299. He was elected pope through the manipulation of King Philip IV the Fair of France at Perugia in 1305. By creating a majority of French cardinals, Clement assured a line of French popes. His own pontificate was marked by woe, much of it caused by Philip.

Not allowing the church a role in secular affairs, Philip forced Clement to annul Pope Boniface VIII's bulls *Clericis Laicos,* forbidding clergy to pay subsidies to lay authorities, and *Unam Sanctam,* defining the pope's supreme authority. From 1307 Philip wanted to destroy the Knights Templars, a powerful religious military order of knighthood. After Philip accused the Templars of heresy, Clement arranged for a council to meet at Vienne, Dauphiné, in order to settle the issue. The prospect of this council prompted Clement to select Avignon, where he arrived in 1309, for his residence; he found it to be a more suitable centre for church administration than Rome, primarily for political reasons. The Council of Vienne convened in 1311. Clement approved the council's decision to charge heresy against the Spirituals, Franciscan extremists who observed absolute material poverty. In April 1312 Philip forced Clement, outside the council, to suppress the Templars. Furthermore, Clement was obliged to dissolve the Templars himself so as not to leave their extinction to Philip and to erase from the papal registers all apostolic letters against Philip and his agents.

Although he supported the election in 1308 of the German king Henry VII and his elevation as Holy Roman emperor in 1312, Clement was influenced by the Council of Vienne and by French pressure to favour King Robert of Naples when Henry prepared war against him. Consequently, Clement adopted an anti-imperial stand and in 1313 threatened Henry with excommunication. Upon Henry's death, Clement, claiming to rule while the throne was vacant, gave Robert the title of imperial vicar in Italy.

Clement openly favoured his relatives and appears to have had a large secret treasure. An adroit pontiff but timid and chronically ill from cancer, he left a notable contribution to canon law in the *Clementinae,* a collection of his decretals and those of the Council of Vienne later promulgated by his successor, Pope John XXII, in 1317. He made the school at Perugia a university and created chairs of Asiatic languages at Paris, France; Bologna, Italy; Oxford, England; and Salamanca, Spain. For yielding to France and complying with Philip, for turning against Henry, for practicing simony (selling ecclesiastical offices), and for transferring the papal see from Rome to Avignon, Clement was censured by Dante in *Inferno* XIX as "a shepherd without law, of uglier deed" and a "new Jason."

• **Clement VI,** original name PIERRE ROGER (b. *c.* 1291, Corrèze, Aquitaine [France]—d. Dec. 6, 1352, Avignon, Provence), pope from 1342 to 1352.

Abbot of the Benedictine monasteries at Fécamp and La Chaise-Dieu, France, he became archbishop of Sens in 1329 and of Rouen in 1330. He was made cardinal in 1338 by Pope Benedict XII, whom he succeeded, being consecrated at Avignon on May 19, 1342. His pontificate was confronted by three problems: the last of the Crusades, the failure of the Florentine bankers, and the state of papal possessions in Italy.

Clement considered the crusade against the Ottoman Turks as the pope's first duty. In 1344 he was responsible for a crusader naval expedition that took Smyrna, ending its piratical raids in the eastern Mediterranean. Smyrna was then entrusted to the Knights of St. John. The Florentine bankruptcies caused Clement to seek elsewhere for his bankers, but the problem was not a lack of revenue.

The papal territories in the Italian regions of the Romagna and the Marches were disputed by the noble Italian families. Clement dispatched his nephew Astorge de Durfort to reestablish papal authority in the Romagna. When Queen Joan I of Naples was suspected of the murder of her husband, Andrew, his brother King Louis I the Great of Hungary led an expedition against Naples. Joan fled to Avignon, in her county of Provence, to seek Clement's protection. Acquitted of the murder charge, she sold Avignon to Clement. In Rome Clement at first supported (1347) the popular leader Cola di Rienzo, who attempted to create a state based on the ancient Roman Republic, but the pontiff later excommunicated him.

Clement helped secure the election in 1346 of the German king Charles IV, who allied with the papacy. Clement opposed the Spirituals, Franciscan extremists who observed absolute material poverty. Enlarging the papal palace, he patronized artists and scholars and elevated his court to one of the most sophisticated of its time. During the Black Death (1348–50) one-fourth of Clement's staff died at Avignon. He welcomed Jews there, though they were accused of starting the plague.

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• **Clement (VII),** original name ROBERT OF GENEVA, French ROBERT DE GENÈVE (b. 1342, Geneva [Switzerland]—d. Sept. 16, 1394, Avignon, Provence [France]), first antipope (1378–94) of the Western (Great) Schism that troubled the Roman Catholic church for 40 years.

After serving as bishop of Thérouanne, county of Artois, from 1361, he became archbishop of Cambrai, in the Low Countries, in 1368 and cardinal in 1371. As papal legate to northern Italy (1376–78), he pillaged Cesena in 1377, where 4,000 antipapal rebels were massacred.

He was a leader of the cardinals who declared the unpopular Italian pope Urban VI's election invalid, and he was chosen antipope at Fondi, Papal States, as Clement VII on Sept. 20, 1378. By the end of that year, France favoured Clement over Urban, whom England supported. European countries then split over the papal claimants, and the Eastern church generally sided with Clement. He hoped to dislodge Urban from the Vatican with help from French mercenaries who were occupying the castle of Sant'Angelo, Rome. After Sant'Angelo fell in April 1379, Clement retired to Naples, where Queen Joan I recognized him as pope. But the Neapolitans favoured Urban, and Clement soon settled at Avignon.

The church's dual papacy caused profound confusion in territories that were uncertain which pope to obey; the difference on this issue between England and France prolonged the Hundred Years' War (1337–1453). France was especially given the chance to intervene in Italian politics. King Charles V the Wise of France not only recognized Clement but on the day of Clement's death declared him "the true Shepherd of the Church." Clement himself died convinced of his legitimacy.

• **Clement VII,** original name GIULIO DE' MEDICI (b. May 26, 1478, Florence [Italy]—d. Sept. 25, 1534, Rome), pope from 1523 to 1534.

The bastard son of Giuliano de' Medici, he was reared by his uncle Lorenzo the Magnificent. He was made archbishop of Florence and cardinal in 1513 by his cousin Pope Leo X, whose political policies he influenced. As cardinal he commissioned Raphael to paint the huge altarpiece the "Transfiguration" for his cathedral at Narbonne, France. He planned an impressive group of monuments to members of his family for the New Sacristy (Sagrestia Nuova) in San Lorenzo, Florence, and in 1520 Michelangelo began the designs, which were to rank among the finest of his sculptures.



Clement VII, detail from a portrait by Sebastiano del Piombo; in the Museo e Gallerie Nazionali di Capodimonte, Naples

Alinari—Art Resource

A weak, vacillating figure in the political struggles between King Francis I of France and the Holy Roman emperor Charles V for the domination of Europe, Clement shifted his support from one to the other while attempting to maintain control of Italy. He supported Charles in the fighting that ended in the Battle of Pavia (Feb. 24, 1525), during which Francis was taken prisoner. The following year, however, he joined Francis in founding the League of Cognac, a treaty opposing Charles. Clement's anti-imperial policy increased Charles's difficulties in Germany, especially his battle against the growing Reformation. Clement's alliance with France led to the emperor's sack of Rome in May 1527 and opened the way for reform of the papal Curia. The imperial army imprisoned Clement in the castle of Sant'Angelo, Rome, which compromised Charles's position, because this affront to the pope clashed with his ideal of a joint universal monarchy of pope and emperor.

Clement's incapacitation complicated the En-

glish king Henry VIII's request for an annulment of his marriage to Catherine of Aragon. In 1528 France invaded Italy, and Clement delegated Cardinal Lorenzo Campeggio as co-legate with Cardinal Wolsey to try Henry's case in England, but on May 31, 1529, Catherine denied their jurisdiction and appealed to Rome to sustain a validation of her marriage. A few weeks later, the French were defeated in Italy; Clement brought the revocation of Catherine's cause to Rome (July 1529) and in March 1530 forbade Henry to remarry until the papal verdict was pronounced.

The Reformation in Germany worsened when Charles released Clement without attempting to secure a guarantee that ecclesiastical reform would commence or that a general council would be convened to solve the problem raised by the Lutheran movement. Francis opposed such a council, and Clement was continually prevented from action on the urgent need for reform. His indecisiveness allowed the Protestant revolt to grow, which was nurtured further by Henry's eventual split from Rome.

Like the preceding popes Alexander VI, Julius II, and Leo X, Clement appeared to his contemporaries primarily as a Renaissance prince preoccupied with Italian politics, the patronage and enjoyment of Renaissance culture, and the advancement of his family. As were the pontiffs mentioned, Clement was financially unsystematic and extravagant. He gravely underestimated the depth and the dangers of his unpopularity in Germany, and the Reformation found the papacy psychologically unprepared for a radical and permanent rejection of its authority. Thus, by 1530, when Charles, after Clement crowned him at Bologna (the last imperial coronation by a pope), again gave his attention to Germany, it was too late. After considerable procrastination, which brought about Wolsey's fall and the triumph of the anti-ecclesiastical party in England, Clement accelerated the breaking of the English Church from Rome by finally pronouncing in 1533 Henry's marriage to Catherine as valid. The Act of Supremacy followed (November 1534), making the king of England head of the English Church. P. Crabitès' *Clement VII and Henry VIII* was published in 1936.

• **Clement (VIII),** original name GIL SÁNCHEZ MUÑOZ (b. Spain—d. Dec. 28, 1446, Majorca), antipope from 1423 to 1429.

Sánchez was chosen to succeed Antipope Benedict XIII. Refusing to recognize the Roman pope Martin V during the Western Schism, Benedict created his own cardinals,



Clement VIII, hammered copper bust, early 17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

who, through the influence of King Alfonso V of Aragon, chose Sánchez at the castle of Peñíscola, in Valencia, as Clement VIII on June 20, 1423. Benedict's cardinal Jean Carrier vehemently opposed the choice, declaring Sánchez vile and his election invalid. Clement postponed his coronation until May 19, 1426.

Alfonso despised Martin and used Clement against him. When Alfonso was later reconciled with Martin, however, the defenseless Clement abdicated on July 26, 1429, revoked all his decrees, and set forth his case: he established his acceptance of his election as the only hope to secure church peace and stressed that his abdication was his choice only. He asked the church to recognize Benedict's validity, or else his own election and abdication would be without purpose. After retiring to San Mateo, he had his cardinals acknowledge Martin as pope, thus ending the Western Schism. Absolved from censure and reconciled with the church, Sánchez was elected bishop of Majorca.

Where the same name may denote a person, place, or thing, the articles will be found in that order

• **Clement VIII,** original name IPPOLITO ALDOBRANDINI (b. Feb. 24, 1536, Fano. Papal States—d. March 5, 1605, Rome), pope from 1592 to 1605, the last pontiff to serve during the Counter-Reformation. The holder of numerous church offices, he was made cardinal in 1585 by Pope Sixtus V and elected pope as Clement VIII on Jan. 30, 1592.

Between 1562 and 1598, France was afflicted with civil wars between the Protestant Huguenots and Roman Catholics, which resulted in a problem of succession to the French throne. King Philip II of Spain, a power behind the Counter-Reformation, was one of the pretenders to the French throne, but he was a constant irritant to the papacy. Thus, after Henry IV's conversion to Roman Catholicism in 1593, Clement recognized him as the rightful king of France and absolved him (Sept. 17, 1595) from excommunication. Clement then moderated the dominance of the Spanish among the cardinals, reducing their influence on future conclaves of the church. Henry IV pacified the Protestants in France and concurrently promoted the Counter-Reformation.

In 1598 Clement incorporated the duchy of Ferrara into the Papal States, which by 1605 had become consolidated and provided the economic support of the papacy. The secular authorities of the Kingdom of Naples and of the Venetian republic constantly provoked Clement's remonstration in violating ecclesiastical rights, but he never retaliated. Clement's principal concern was with his spiritual functions. He encouraged the Counter-Reformative efforts of St. Francis de Sales, whom he made bishop of Geneva in 1602, and was responsible for printing of the Vulgate (the standard version of the Latin Bible) and other key liturgical books. In 1597 Clement established a commission to investigate a controversy between the Jesuits and the Dominicans on divine grace and free will, but the issue was not resolved until after his death.

• **Clement IX,** original name GIULIO ROSPIGLIOSI (b. Jan. 28, 1600, Pistoia, Tuscany—d. Dec. 9, 1669, Rome), pope from 1667 to 1669.

Rospigliosi served as papal ambassador to Spain from 1644 to 1653 and cardinal and secretary of state under Pope Alexander VII. He was elected pope on June 20, 1667, and consecrated as Clement IX six days later.

Clement clashed with King Louis XIV of France, who was determined to eliminate any religious divergence he saw as a threat to the unity of his kingdom and who revived the condemnation of Jansenism, a heretical doctrine deemphasizing freedom of the will and teaching that redemption through Christ's death is limited to some but not all. Clement's policy of appeasement materialized in an agreement called the Peace of Clement IX (January 1669), which suspended persecution of the Jansenists. He was further troubled, however, by Louis's principles of Gallicanism, a particularly French ecclesiastical doctrine advocating restriction of papal power. Furthermore, Louis refused Clement's plea for aid to Crete, which then belonged to the Venetians, against the Ottomans. Hence, the Cretan seaport city of Candia (now Iraklion), after a siege of 20 years, fell on Sept. 5, 1669, followed by the submission of the island to Persia. Despite his help to Venice, Clement failed to convince Europe about the Cretan dilemma. Noted for his charity and his kindness, Clement died mourning the Christians slain at Candia.

A distinguished man of letters, Giulio Rospigliosi—before his election as Pope Clement—wrote poetry but gained fame through his dramas with religious themes and several libretti, including *Il Sant'Alessio,* a sacred opera with music by one of the earliest Roman operatic composers, Stefano Landi; and *Chi soffre speri* ("He Who Suffers, Hopes"), a comic opera with music by Virgilio Mazzocchi and Marco Marazzoli. Clement is credited with creating comic opera as an individual form, and *Chi soffre speri,* the first comic opera, premiered in Rome on Feb. 27, 1639.

• **Clement X,** original name EMILIO ALTIERI (b. July 12, 1590, Rome—d. July 22, 1676, Rome), pope from 1670 to 1676.

Of noble birth, Altieri was in the service of the papal embassy in Poland from 1623 to 1627, when he returned to Italy to become bishop of Camerino. Until his appointment as cardinal by Pope Clement IX in 1669, he



Clement X, terra-cotta portrait bust, 1676; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

held numerous church offices, including papal ambassador to Naples. After a long conclave, he was elected pope on April 29.

Despite his advanced age, Clement held firm against French arrogance. Like his predecessor, he failed—largely because of King Louis XIV of France—to rouse Europe against the Turks, who were menacing the Mediterranean. He resisted Louis's demand that the collection of revenues from vacant sees were Louis's right. Clement organized papal finances and gave Poland considerable aid against Turkish invasion. He erected at Rome the Palazzo Altieri and the fountains in St. Peter's piazza. Well loved and deeply spiritual, he canonized the celebrated SS. Cajetan of Thiene, Francis Borgia, and Rose of Lima.

• **Clement XI,** original name GIOVANNI FRANCESCO ALBANI (b. July 23, 1649, Urbino, Papal States—d. March 19, 1721, Rome), pope from 1700 to 1721.

Of noble birth, Albani received an impressive education in the classics, theology, and canon law, after which he successively became governor of the Italian cities of Rieti and Orvieto. Pope Alexander VIII made him cardinal deacon in 1690, and he was ordained in September 1700.

Clement's election on the following November 23 occurred during a period when the political role of the papacy was shrinking. Focus shifted first to the dying king Charles II, last of the great Habsburg dynasty in Spain, and his choice of successor, Philip V, founder of the Bourbon dynasty in Spain, and second to the

antagonized Holy Roman emperor Leopold I, who, after Clement recognized Philip, accused the Pope of joining the French side in the endless contest between the Bourbons and the Habsburgs. Clement's real aims, however,



Clement XI, portrait by Carlo Maratti, 18th century; in the Villa Albani, Rome
Alinari—Art Resource/EB Inc.

were to avert war by mediation and to save Italy from inevitable calamity; he failed disastrously in both. French troops occupied Mantua, the key to upper Italy, but were ousted by the imperial general Prince Eugene of Savoy, launching the War of the Spanish Succession (1701–14).

Leopold's son and successor, Joseph I, proved even more hostile to Clement. His troops invaded the Papal States in May 1708 and conquered Naples, and in 1709 he compelled Clement to recognize his brother, Charles VI, as king of Spain. Thereupon, Philip broke off diplomatic relations with Clement. The treaties (1713–14) of Utrecht and Rastatt ending the war were a heavy defeat for Clement in ignoring papal suzerainty in the Kingdom of Naples (including Sicily) and the duchies of Parma and Piacenza.

Like the preceding popes Clement IX and X, he was embroiled in the French problems of Gallicanism, an ecclesiastical doctrine that advocated restrictions of papal power, and Jansenism, a heretical doctrine deemphasizing freedom of the will and teaching that redemption through Christ's death is open to some but not all. On Sept. 8, 1713, he issued his bull *Unigenitus* against the Jansenists, at a cost to France of 30 years of discord. *Unigenitus* was challenged, and some French bishops were not persuaded to accept the bull. On March 5, 1717, four Gallican bishops appealed against *Unigenitus,* receiving the support of 12 other bishops and more than 3,000 priests. In August 1718 Clement excommunicated the four bishops, an action that proved ineffectual amid the fervid Gallicans, for their appeal was renewed in September 1720.

Much less wise was Clement's condemnation of the Chinese and Malabar rites in a decree of 1704, reinforced in 1715 by his bull *Ex Illa Die* ("From that day . . ."), which was the climax of the Rites Controversy, a dispute over whether Roman Catholic missionaries to China were right in accepting and tolerating the ceremonies honouring Confucius and one's forefathers or whether they should reject them as so superstitious as to be incompatible with Christian belief, as Rome believed. Clement's ban led to a persecution of the Chinese Christians and to the ruin of many flourishing missions, a ban that was not permanently lifted until 1939.

• Clement XII, original name LORENZO CORSINI (b. April 7, 1652, Florence—d. Feb. 6, 1740, Rome), pope from 1730 to 1740.

A member of the influential Florentine princely family of Corsini, he became papal ambassador to Vienna in 1691, cardinal deacon in 1706, and pope on July 12, 1730.

Despite ill health and total blindness (from 1732), he worked diligently to halt the decline of papal influence. Although his protests against the spread of Gallicanism (an essentially French doctrine advocating restriction of papal power) to Spain were fruitless, his enforcement of Pope Clement XI's bull *Unigenitus* of 1713 sustained the suppression of Jansenism (a heretical doctrine deemphasizing freedom of the will and teaching that redemption through Christ's death is open to some but not all).

Clement aided large missionary enterprises, as exemplified in his sending Franciscans to Ethiopia, but he continued Clement XI's ban on the Chinese and Malabar rites—*i.e.*, those Far Eastern ceremonies honouring Confucius and one's forefathers.

On April 28, 1738, he promulgated his bull *In Eminenti,* which condemned Freemasonry, the beliefs and observances of which were considered pagan and unlawful by the Roman Catholic Church. The Masons were often hostile to the church, and Clement threatened to excommunicate any Catholic who joined.

• Clement XIII, original name CARLO REZZONICO (b. March 7, 1693, Venice—d. Feb. 2, 1769, Rome), pope from 1758 to 1769.

In 1716 Rezzonico he was ordained and appointed governor of Rieti, in the Papal States, becoming governor of Fano in 1721. He then served numerous church offices and was made cardinal by Pope Clement XII in 1737. On July 6, 1758, he was elected pope at a time when anti-Romanism amid European princes was revealed most explicitly in the Bourbons' plan to destroy the Society of Jesus, then at the peak of its influence. Concurrently, the anti-Roman movement received further impetus from the spread of Febronianism, a German doctrine claiming to restrict papal power and akin to its French counterpart, Gallicanism. In 1764 Clement condemned Febronianism and on May 21 promulgated a brief that commanded all German bishops to suppress it. The papal condemnation met with a mixed reception, however.

The Jesuit issue dominated Clement's pontificate and that of his successor, Clement XIV. He did everything in his power to save the Jesuits from the Bourbon absolutists, who confederated with the Jansenists (advocates of a heretical doctrine deemphasizing freedom of the will and teaching that redemption through Christ's death is open to some but not all) and the Freemasons, whose beliefs and observances were considered pagan and unlawful by the Roman Catholic Church. The greatest opposition came from countries where, for 200 years, the Jesuits had been strongest: Spain, France, and Portugal. The statesmen of those countries believed that an attack on the church was the best way to uphold the political status quo. The Jesuits, because of their intimate connection with the papacy, became the immediate target.



Clement XIII, detail from a portrait by Anton Raphael Mengs; in the New Orleans Museum of Art, New Orleans
The Samuel H. Kress Collection, New Orleans Museum of Art, New Orleans

During Clement's reign, the Jesuits were ruthlessly expelled successively from Portugal (1759), France and the French dominions (1764), Spain and the Spanish dominions (1767), and the Kingdom of Naples and Sicily and the duchy of Parma (1768). Their property was confiscated, and their flourishing missions in India, the Far East, and North and South America were ruined. Clement received the destitute exiles into the Papal States, but their enemies pursued. In January 1769 the ambassadors of Spain, Naples, and France personally demanded that Clement completely suppress the Society of Jesus throughout the world. He refused, despite their threat to form national churches independent of Rome, and, shortly afterward, he suffered a stroke and died.

• Clement XIV, original name GIOVANNI VINCENZO ANTONIO GANGANELLI, Franciscan name LORENZO (b. Oct. 31, 1705, near Rimini, Papal States —d. Sept. 22, 1774, Rome), pope from 1769 to 1774.

Educated by the Jesuits at Rimini, he joined the Conventual Franciscans at Mondaino, taking the religious name of Lorenzo. After holding various academic offices, he was made



Clement XIV, detail from marble bust, 1766; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

cardinal in 1759 by Pope Clement XIII because he was supposed to be friendly toward the Society of Jesus, which was suffering suppression sponsored by a confederation led by Bourbon absolutists. He was elected pope on May 18, destined to face the ugly resolution of the Jesuit issue.

Portugal had already been in schism for nine years because the Jesuits, whom King Joseph I considered to be an impediment to his monarchical ambitions, had not been exterminated. Clement ended the schism by reestablishing a papal ambassador in Portugal and appointing a Portuguese cardinal. In delaying action against the Jesuits, he was subjected to unprecedented pressure and interference. Fearing that France and Spain would resort to open schism, he yielded and on July 21, 1773, issued the brief *Dominus ac Redemptor* ("Lord and Saviour") dissolving the Society of Jesus, which from its inception had dedicated itself to the service of the pope. Clement asserted that he did so because the Society could no longer attain its original ends and because he wanted peace within the church. The suppression lasted until 1814. Clement lived his last year in ill health, remorse, and dread of assassination. An autopsy nullified rumours that he had been poisoned.

Clement OF ALEXANDRIA, SAINT, Latin name TITUS FLAVIUS CLEMENS (b. *c.* AD 150, Athens—d. between 211 and 215; Western feast day November 23; Eastern feast day November 24), Christian Apologist, missionary theologian to the Hellenistic (Greek cultural) world, and second known leader and

teacher of the catechetical school of Alexandria. The most important of his surviving works is a trilogy comprising the *Protreptikos* ("Exhortation"), the *Paidagōgos* ("The Instructor"), and the *Strōmateis* ("Miscellanies").

Early life and career. According to Epiphanius, a 4th-century bishop, the parents of Titus Flavius Clemens were Athenian pagans. There is little significant information about his early life. As a student he travelled to various centres of learning in Italy and in the eastern Mediterranean area. Converted to Christianity by his last teacher, Pantaenus—reputedly a former Stoic philosopher and the first recorded president of the Christian catechetical school at Alexandria—Clement succeeded his mentor as head of the school in about 180.

During the next two decades Clement was the intellectual leader of the Alexandrian Christian community: he wrote several ethical and theological works and biblical commentaries; he combatted heretical Gnostics (religious dualists who believed in salvation through esoteric knowledge that revealed to men their spiritual origins, identities, and destinies); he engaged in polemics with Christians who were suspicious of an intellectualized Christianity; and he educated persons who later became theological and ecclesiastical leaders (*e.g.*, Alexander, bishop of Jerusalem).

In addition to the famed trilogy his extant works include a tract on the use of wealth, *A Discourse Concerning the Salvation of Rich Men;* a moral tract, *Exhortation to Patience or Address to the Newly Baptized;* a collection of sayings by Theodotus, a follower of Valentinus (a leading Alexandrian Gnostic), with commentary by Clement, *Excerpta ex Theodoto;* the *Eclogae Propheticae* (or Extracts), in the form of notes; and a few fragments of his biblical commentary *Hypotyposeis* (Outlines).

Clement presented a functional program of witnessing in thought and action to Hellenistic inquirers and Christian believers, a program that he hoped would bring about an understanding of the role of Greek philosophy and the Mosaic tradition within the Christian faith. According to Clement, philosophy was to the Greeks, as the Law of Moses was to the Jews, a preparatory discipline leading to the truth, which was personified in the Logos. His goal was to make Christian beliefs intelligible to those trained within the context of the Greek *paideia* (educational curriculum) so that those who accepted the Christian faith might be able to witness effectively within Hellenistic culture. He also was a social critic deeply rooted in the 2nd-century cultural milieu.

Clement's view, "One, therefore, is the way of truth, but into it, just as into an everlasting river, flow streams but from another place" (*Strōmateis*), prepared the way for the curriculum of the catechetical school under Origen that became the basis of the medieval quadrivium and trivium (*i.e.*, the liberal arts). This view, however, did not find ready acceptance by the uneducated orthodox Christians of Alexandria, who looked askance at intellectuals, especially at the heretical Gnostics who claimed a special knowledge (*gnōsis*) and spirituality. Led by Demetrius, the bishop of Alexandria who was elevated to the episcopacy in 189, they taught a legalistic doctrine of salvation and preached that the Christian was saved by faith (*pistis*).

Clement's view of the roles of faith and knowledge. Clement attempted to mediate between the heretical Gnostics and the legalistic orthodox Christians by appropriating the term gnostic from the heretical groups and reinterpreting to meet the needs of both the uneducated orthodox stalwarts and the growing numbers of those educated in the Greek *paideia* who were enlisting in the Christian Church. *Gnōsis* became, in Clement's theology, a knowledge and aspect of faith; he viewed it as a personal service that "loves and teaches the ignorant and instructs the whole creation to honor God the Almighty" (*Strōmateis*). Thus, Clement's Christian Gnostic—as opposed to the heretical Gnostic—witnessed to nonbelievers, to heretics, and to fellow believers, the educated and uneducated alike, by teaching new insights and by setting a lofty example in moral living. Like the pistic Christians (those who claimed that man was saved by faith, which was to be demonstrated in legalistic and moral terms), Clement held that faith was the basis of salvation; but, unlike them, he claimed that faith was also the basis of *gnōsis,* a spiritual and mystical knowledge. By distinguishing between two levels of believers—*i.e.*, the pistic Christian, who responds through discipline and lives on the level of the law, and the Christian Gnostic, who responds through discipline and love and lives on the level of the gospel—Clement set the stage for the efflorescence of monasticism that began in Egypt about a half century after his death.

Though much of Clement's attention was focussed upon the reorientation of men's personal lives in accordance with the Christian gospel, his interest in the social witnessing of Christians also involved him in the political and economic forces that affected man's status and dignity. In keeping with the *logos–nomos* (word–law, or, sometimes, gospel–law) theme that pervades his works, Clement alluded to the theory of the two cities, the city of heaven and the city of the earth. Like Augustine, the great theologian who utilized the same theme two centuries later in *De civitate Dei* (*The City of God*), Clement did not equate the city of heaven with the institutional church. According to Clement, the Christian was to live under the Logos as befitting a citizen of heaven and then, in an order of priorities, under the law (*nomos*) as a citizen of the earth. If a conflict should arise between God and Caesar (*i.e.*, the state), the Christian was to appeal to the "higher law" of the Logos. At one point Clement advocated the theory of the just cause for open rebellion against a government that enslaves people against their wills, as in the case of the Hebrews in Egypt. In this view he also anticipated Augustine's theory of the just war, a theory that has been dominant in Western civilization since the early Middle Ages. He also struck at racism when it is considered a basis for slavery.

Views on wealth. In Egypt during the late 2nd century the rising inflation, high cost of living, and increased taxes placed extreme burdens not only on the poor but also on the relatively wealthy middle class, which was eventually ruined. From the tenor of the *Paidagōgos,* one can conclude that the majority of Clement's audience came from the ranks of Alexandrian middle and upper classes, with a few intelligent poorer members coming from the Alexandrian masses. The problem of wealth was disturbing to the pistic Christians, who interpreted literally the command of Christ to the rich young man who wanted to be saved, "sell what you have and give to the poor." In response to the literal interpretation, Clement wrote *The Discourse Concerning the Salvation of Rich Men,* in which he stated that wealth is a neutral factor in the problem. Possessions are to be regarded as instruments to be used either for good or for evil. "The Word does not command us to renounce property but to manage property without inordinate affection" (*Eclogae Propheticae*). In the matter of welfare (almsgiving), Clement's views are not consistent. On the one hand, he advised that the Christian should not judge who is worthy or unworthy of receiving alms by being niggardly and pretending to test whether or not a person is deserving. On the other hand, he stated that alms should be dispensed with discernment to the deserving, for freeloaders, who are lazy and have some possessions, take what can be given to the needy.

Because of the persecution of Christians in Alexandria under the Roman emperor Severus in 201–202, Clement was obliged to leave his position as head of the catechetical school and to seek sanctuary elsewhere. His position at the school was assumed by his young and gifted student Origen, who became one of the greatest theologians of the Christian Church. Clement found safety and employment in Palestine under another of his former students, Alexander, bishop of Jerusalem. He remained with Alexander until he died.

Assessment. In his various roles, as missionary theologian, Apologist, and polemicist, Clement developed or touched upon ideas that were to influence the Christian world in the areas of monasticism, political and economic thought, and theology. In this last area, the Greek Church regarded his views as too close to Origen's, some of which were considered heretical. In the Latin Church, however, he was regarded as a saint, and his feast day was celebrated on December 4. In 1586, however, because some of his views were questioned in regard to their orthodoxy, Sixtus V deleted his name from the Roman martyrology.

(L.F./Ed.)

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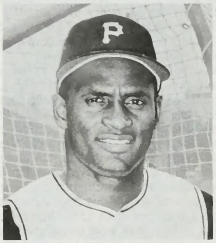
Clement, First Letter of, originally titled LETTER TO THE CHURCH OF CORINTH; also called I CLEMENT, a letter to the Christian Church in Corinth from the church of Rome, traditionally ascribed to and almost certainly written by St. Clement I of Rome, *c.* AD 96. It is extant in a 2nd-century Latin translation, which is possibly the oldest surviving Latin Christian work. Regarded as scripture by many 3rd- and 4th-century Christians, it was transmitted in manuscripts with a sermon known as the *Second Letter of Clement,* written *c.* 125–140 by an unknown author.

Concerned about a dispute in the Corinthian Church in which younger members had deposed older men from the ministry, the letter opposed the deposition and discussed the orders of the ministry, which it asserted were established by the Apostles and were the will of God. The *First Letter of Clement* was an important influence on the development in the church of the episcopal orders of the ministry (bishops, priests, deacons), and it has been used to support the doctrine of the apostolic succession, according to which bishops represent a direct, unbroken line of succession from the Apostles.

Clemente, Roberto, byname BOB (b. Aug. 18, 1934, Carolina, Puerto Rico—d. Dec. 31, 1972, San Juan), professional U.S. National League baseball player, who could hit almost every kind of pitch and whose powerful throwing arm as a right fielder helped tag many base runners. He was also a daring base runner and a team leader.

Clemente was a softball player until he was 17, when he was signed by the San-

turce Cangrejeros, with whom he played until 1953, when the Brooklyn Dodgers signed him. The Pittsburgh Pirates drafted him in 1954, and he played his entire major-league career (1955–72) with them. He batted and threw right-handed. He batted more than .300 in 13 seasons (1956, 1960–67, and 1969–72)



Clemente
UPI

and led the league in hitting (1961, 1964–65, and 1967), his highest average being .357 (1967). During his career, he drove in 1,305 runs and scored 1,416. In two World Series (1960, 1971), he batted .362. He was killed in the crash of an airplane that was en route to Nicaragua with relief supplies he had collected for earthquake survivors. He was elected to the Baseball Hall of Fame in 1973.

Clementi, Muzio (b. Jan. 24, 1752, Rome, Papal States [Italy]—d. March 10, 1832, Evesham, Worcestershire, Eng.), Italian-born English pianist and composer whose studies and sonatas developed the techniques of the early piano to such an extent that he was called "the father of the piano."

A youthful prodigy, Clementi was appointed an organist at 9 and at 12 had composed an oratorio. In 1766 Peter Beckford, a cousin of William Beckford, the author of *Vathek,* prevailed upon Clementi's father to allow him to take the boy to England, where he lived quietly in Wiltshire pursuing a rigid course of studies. In 1773 he went to London and met with immediate and lasting success as a composer and pianist. The piano had become more popular in England than anywhere else, and Clementi, in studying its special features, made brilliant use of the new instrument and its capabilities. From 1777 to 1780 he was employed as harpsichordist at the Italian Opera in London. In 1780 he went on tour to Paris, Strasbourg, Munich, and Vienna, where he became engaged in a friendly musical duel with Wolfgang Amadeus Mozart at the instigation of the emperor, Joseph II.



Clementi, engraving, published 1803
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

In 1782 Clementi returned to London, where for the next 20 years he continued his lucrative occupations of fashionable teacher, composer, and performer. He was a shrewd businessman, and in 1799 he cofounded a firm for both music publishing and the manufacture of pianos. Among his numerous pupils were Johann Baptist Cramer, Giacomo Meyerbeer, and John Field. Clementi visited the European continent again in 1820 and 1821. In his later years he devoted himself to composition, and to this period belong several symphonies, the scores of which were either lost or incomplete.

Clementi's chief claims to fame are his long series of piano sonatas, many of which have been revived, and his celebrated studies for piano, the *Gradus ad Parnassum* (1817; "Steps Toward Parnassus"). His own contributions to the development of piano technique coincided with the period of the new instrument's first popularity and did much to establish the lines on which piano playing was to develop.

Clementia, in Roman religion, personification of mercy and clemency. Her worship began with her deification as the celebrated virtue of Julius Caesar. The Senate in 44 BC decreed a temple to Caesar and Clementia, in which the cult statue represented the two figures clasping hands. Tiberius was honoured with an altar to his *clementia,* and the clemency of Caligula received yearly sacrifices. On coins the goddess was usually depicted standing, with a patera (a dish used in sacrifices) in one hand and a sceptre in the other.

Clementine literature, diversified group of apocryphal writings that at various times were attributed to Clement, bishop of Rome near the end of the 1st century (*see also* Clement, First Letter of). The writings include (1) the so-called *Second Letter of Clement* (*II Clement*), which is not a letter but a sermon, probably written in Rome about 140; (2) two letters on virginity, perhaps the work of Athanasius (d. *c.* 373), bishop of Alexandria; (3) the *Homilies* and *Recognitions,* along with an introductory letter supposed to have been written by Clement to James "the Lord's brother"; (4) the *Apostolic Constitutions,* a collection of early Christian ecclesiastical law; and (5) five letters that are part of the False Decretals, a 9th-century collection of partially forged documents.

II Clement was accepted as a genuine work of Clement by some and was regarded as canonical in the Codex Alexandrinus (a 5th-century manuscript of the Greek Bible) and by the later Syrian church. It emphasized a high doctrine of Christ and the importance of preserving the seal of baptism by maintaining the purity of the flesh for the resurrection.

The two letters (actually treatises) on virginity are preserved in a Syriac manuscript from 1470. Originally written in Greek, they also survive in extracts from the original in the sermons of a Palestinian monk, Antiochus (*c.* 620), and in Coptic fragments, in which they are attributed to Athanasius. They were first mentioned (*c.* 375) by Epiphanius, bishop of Constantia (now Salamis, Cyprus), and were used in Egypt in the 4th and 5th centuries. They denounced violations of asceticism.

The *Homilies* (preserved in the Greek original) and the *Recognitions* (translated into Latin and into Syriac, both about AD 400) contain a great deal of common material. They attempted to exalt the position of the Oriental churches in relation to Rome and were based on an earlier work, the *Circuits of Peter,* attested by Epiphanius and probably mentioned by the ecclesiastical historian Eusebius of Caesarea and by Origen, the theologian of the Greek church (early 3rd century). The *Homilies* are important for the information they give on Jewish-Christian heresy in the early centuries of the church, while the *Recognitions* show how, in an expurgated form, such literature could provide entertainment along with edification. In later times, the medieval story of Faust was based on the portrait of Simon Magus in the *Recognitions.*

Clementis, Vladimír (b. Sept. 20, 1902, Tisovec, Slovakia, Austria-Hungary [now in Slovakia]—d. Dec. 3, 1952, Prague, Czech. [now in Czech Republic]), Slovak lawyer, political journalist, and communist politician.

In 1942 Clementis was appointed by President Edvard Beneš to the Czechoslovak National Council in exile (headquartered in London). After the liberation of Czechoslovakia from the Germans at the end of World War II, he became possibly the strongest figure in Jan Masaryk's foreign ministry, and he succeeded to the foreign secretaryship following Masaryk's murder or suicide in 1948. Officially disgraced in 1950 for his allegedly insufficient Stalinism, he was convicted in 1952 on charges of treason and espionage and was sentenced to death.

Clemmys, genus of small, terrestrial or semiaquatic turtles in the family Emydidae. The genus contains four species, all restricted to North America. Earlier classifications included several European and Asian species that are now placed in the genus *Mauremys.*

Clemmys females lay fewer than a dozen eggs in early summer that hatch by fall. Three of the species occur in the eastern United States and one in the Pacific coast region. The bog turtle (*C. muhlenbergi*) is an officially recognized threatened species.

Clemo, Jack, original name REGINALD JOHN CLEMO (b. March 11, 1916, near St. Austell, Cornwall, Eng.—d. July 25, 1994, Weymouth, Dorset), English poet and author whose physical sufferings—he became deaf about 1936 and blind in 1955—influenced his work.

Clemo's formal education ended when he was 13. The son of a Cornish clay-kiln worker (d. 1917), he was raised by his mother, a dogmatic Nonconformist. His early poems reflect the stark landscape of the clay-pits in their austere intensity. Important in his writings are the themes of Christianity and conversion, erotic mysticism and marriage, and the role of suffering in attaining happiness. He married Ruth Peaty in 1968, and she inspired his later poetry, which shows a softened acceptance of sex and love.

Clemo's prose works include *Wilding Graft* (1948), *The Shadowed Bed* (1986), and the autobiographical *Confession of a Rebel* (1949) and *The Marriage of a Rebel* (1980). His major poetic collections are *The Map of Clay* (1961), *Cactus on Carmel* (1967), *The Echoing Tip* (1971), *Broad Autumn* (1975), *A Different Drummer* (1986), *Selected Poems* (1988), and *Approach to Murano* (1993).

Cleobis: *see* Biton and Cleobis.

Cleomenes I (d. 491 BC), Spartan king from 519 BC to his death, a ruler who consolidated his city's position as the leading power in the Peloponnesus. He refused to commit Spartan forces overseas against the Persians but readily intervened in the affairs of his Greek rival, Athens. A member of the Agiad house, he succeeded his father Anaxandridas as king.

In 510 he led an army to Athens and expelled the tyrant Hippias. Three years later at Athens he supported Isagoras, the leader of the oligarchs, against the democratic Cleisthenes. Both Cleomenes and Isagoras, however, were forced to withdraw. Next Cleomenes raised a large Peloponnesian army for use against Athens, but the enterprise failed after the Corinthian contingent mutinied with the support of the other Spartan king, Demaratus. Cleomenes rejected Miletus' appeal (499) for aid in the revolt of the Ionian Greeks against Persia. In 494 he inflicted a severe defeat on Argos at Sepeia near Tiryns. Three years later he tried to punish Aegina for its submission to the Persians, but Demaratus again thwarted

him. Cleomenes engineered the deposing of Demaratus by bribing the Delphic oracle, but his deceit was discovered, and he fled to Thessaly. The Spartans reinstated him, but soon afterwards he went insane and committed suicide.

Cleomenes III (d. 219 BC), Spartan king (235–222) who reorganized Sparta's political structure and struggled unsuccessfully to destroy the Achaean League. A member of the Agiad house, he was the son of King Leonidas II. The conflict with the Achaean League under Aratus of Sicyon began in 229. In 227 Cleomenes defeated the Achaeans at Mt. Lycaeum and at Ladoceia near Megalopolis. The next year he captured Mantineia and severely defeated the Achaeans at Hecatombaeum, near Dyme. After Cleomenes took Pellene, Phlius, Argos, and other cities, Aratus was forced to call upon King Antigonus Doson of Macedonia for assistance. Antigonus failed to pierce Cleomenes' lines near Corinth in 224, but a revolt against Cleomenes at Argos put the Spartans on the defensive. Finally, in 222, Antigonus defeated Cleomenes at Sellasia (north of Sparta). Sparta fell to the Macedonian king, and Cleomenes fled to King Ptolemy Euergetes in Egypt. Imprisoned by Euergetes' successor, Ptolemy Philopator, Cleomenes escaped in 219 and, after failing to raise a revolt in Alexandria, took his own life.

The reforms imposed by Cleomenes in 227 were somewhat similar to those attempted earlier by the Spartan king Agis IV (died 241 BC). Cleomenes cancelled debts, redivided the land to provide 4,000 new citizen holdings, and restored the old Spartan training of youth. The Ephorate, five elected magistrates who, with the king, formed the main executive body of the state, was abolished (four of the five ephors being executed); the powers of the council were probably curtailed; and *patronomoi* (the board of six elders) was probably introduced at this time. In addition the army was trained to use a longer pike. Cleomenes' system was designed to re-create a society of aristocrats while neglecting helots (serfs) and *perioikoi* (a special class of disenfranchised inhabitants).

Cleon (d. 422 BC, Amphipolis, Macedonia), the first prominent representative of the commercial class in Athenian politics, he became leader of the Athenian democracy in 429 after the death of his political enemy, Pericles. In the Peloponnesian War he strongly advocated an offensive strategy. When Mytilene, which had revolted against Athens, fell in 427, Cleon proposed that all its citizens be put to death and the women and children enslaved. His decree was passed but rescinded the next day, in time to save Mytilene. He reached the summit of his fame by capturing the Spartans on the besieged island of Sphacteria in 425 after refusing their peace terms, but was defeated and killed at Amphipolis by the Spartan general Brasidas when trying to recover the cities of Thrace for the Athenian Empire. Cleon is represented by Aristophanes and Thucydides in an extremely unfavourable light, but neither can be considered an unprejudiced witness.

Cleopatra I SYRA (d. 176 BC), queen of Egypt (193–176 BC), wife of Ptolemy V Epiphanes and regent for her minor son, Ptolemy VI Philometor.

Daughter of Antiochus III the Great of the Syrian Empire, Cleopatra was married to Ptolemy V in 193 as part of the Peace of Lysimacheia, concluding warfare and border conflicts between Syria and Egypt. She brought as her dowry the revenues (but apparently not the ownership) of Coele-Syria, a land that Egypt had long sought to recover; and the total agreement helped to ensure Egypt's neutrality in Syria's continuing struggles with the Romans. When Ptolemy V died (180), Cleopatra became the true ruler of Egypt as regent for her young son, and she ruled equitably, keeping peace with Syria while doing nothing to alienate Rome, and thereby kept Egypt free of invasion.

Cleopatra VII THEA PHILOPATOR (Greek: Goddess Loving Her Father) (b. 69 BC—d. Aug. 30, 30 BC, Alexandria), Egyptian queen famous in history and drama, lover of Julius Caesar and later the wife of Mark Antony. She became queen on her father's death (51 BC), ruling successively with her two brothers Ptolemy XIII (51–47) and Ptolemy XIV (47–44) and her son Ptolemy XV Caesar (44–30). After the Roman armies of Octavian (the future emperor Augustus) defeated their combined forces, Antony and Cleopatra committed suicide, and Egypt fell under Roman domination. Her ambition no less than her charm actively influenced Roman politics at



Cleopatra, detail of a bas relief, c. 69–30 BC; in the Temple of Hathor, Dandarah, Egypt
By courtesy of the Oriental Institute, the University of Chicago

a crucial period, and she came to represent, as did no other woman of antiquity, the prototype of the romantic femme fatale.

The second daughter of King Ptolemy XII, Cleopatra was destined to become the last sovereign of the Macedonian dynasty that ruled Egypt between the death of Alexander the Great in 323 and its annexation by Rome in 31. The line had been founded by Alexander's marshal Ptolemy. Cleopatra was of Macedonian descent and had no Egyptian blood, although she alone of her house took the trouble to learn Egyptian, and for political reasons regarded herself as the daughter of Re, the sun god. Coin portraits of her show a countenance alive rather than beautiful, with a sensitive mouth, firm chin, liquid eyes, broad forehead, and prominent nose. Her voice, says the Greek biographer Plutarch, "was like an instrument of many strings." He adds that "Plato admits four sorts of flattery, but she had a thousand." When Ptolemy XII died in 51, the throne passed to his 15-year-old son, Ptolemy XIII, and that king's sister-bride, Cleopatra. They soon fell out, and civil war ensued. Ptolemy XII had been expelled from Egypt in 58 and had been restored three years later only by means of Roman arms. Rome now felt that it had a right to interfere in the affairs of this independent, exceedingly rich kingdom, over which it had in fact exercised a sort of protectorate since 168. No one realized more clearly than Cleopatra that Rome was now the arbiter and that to carry out her ambition she must remain on good terms with Rome and its rulers. Thus when Caesar, the victor in the civil war, arrived in Egypt in October 48, in pursuit of Pompey (who, a fugitive from his defeat at Pharsalus in Thessaly, had been murdered as he landed four days before), Cleopatra set out to captivate him. She succeeded. Each was determined to use the other. Caesar sought money—he claimed he was owed it for the expenses of her father's restoration. Cleopatra's target was power: she was determined to restore the glories of the first Ptolemies and to recover as much as possible of their dominions, which had included southern Syria and Palestine. She realized that Caesar was the strong man, the dictator, of Rome, and it was therefore on him that she relied. In the ensuing civil war in Egypt Caesar was hard-pressed by the anti-Cleopatra party, led by her brother, Ptolemy XIII, but Caesar eventually defeated them and reestablished the joint rule of brother and sister-wife. Caesar, having won his victory on March 27, 47, left Egypt after a fortnight's amorous respite. Whether Caesar was in fact the father of Cleopatra's son whom she called Caesarion cannot now be known.

It took Caesar two years to extinguish the last flames of Pompeian opposition. As soon as he returned to Rome, in 46, he celebrated a four-day triumph—the ceremonial in honour of a general after his victory over a foreign enemy—in which Arsinoe, Cleopatra's younger and hostile sister, was paraded. Munda, in 45, was the coup de grace. Cleopatra was now in Rome, and a golden statue of her had been placed by Caesar's orders in the temple of Venus Genetrix, the ancestress of the Julian family to which Caesar belonged. Cleopatra herself was installed by Caesar in a villa that he owned beyond the Tiber. She was accompanied by her husband–brother and was still in Rome when Caesar was murdered in 44. She behaved with a discretion that she was later to discard, and her presence seems to have occasioned little comment; officially she was negotiating a treaty of alliance. Cicero, the politician and writer, mentions her in none of his contemporary letters, though his later references to her show that he regarded her, as most Romans did, with rancour.

Caesar's assassination put an end to Cleopatra's first campaign for power, and she retired to Egypt to await the outcome of the next round in the Roman political struggle. When, at the Battle of Philippi in 42, Caesar's assassins were routed, Mark Antony became the heir-general of Caesar's authority—or so it seemed, for his great-nephew and personal heir, Octavian, was but a sickly boy. When Antony, bent on pursuing the eternal mirage of Roman rulers, an invasion of Persia, sent for Cleopatra, she was delighted. Here was a second chance of achieving her aim. She had known Antony when he had been in Egypt as a young staff officer and she had been 14. She was now 28 or 29 and completely confident of her powers. She set out for Tarsus in Asia Minor, loaded with gifts, having delayed her departure to heighten Antony's expectation. She entered the city by sailing up the Cydnus River in the famous barge that Shakespeare immortalized in *Antony and Cleopatra*. Antony was captivated, and Cleopatra subtly exploited his raffish and unstable character. Forgetting his wife, Fulvia, who in Italy was doing her best to maintain her husband's interests against the growing menace of young Octavian, Antony put off his Persian campaign and returned as Cleopatra's slave to Alexandria, where he treated her not as a "protected" sovereign but as an independent monarch. "Her design of attacking Rome by means of Romans," as one historian put it, "was one of such stupendous audacity that we must suppose that she saw no other way." Her first effort had been frustrated by Caesar's death; she felt now that she could win all by using the far more pliant and apparently equally powerful Antony. In Alexandria Cleopatra did all she could to pander to his weaknesses. They formed a society

of "inimitable livers," whose members in fact lived a life of debauchery and folly. Cleopatra, however, knew how to handle her catch. Yet the final struggle for the dominion of Rome was to last for 10 years and was to end in disaster for Cleopatra (no less than for Antony), largely promoted by Cleopatra herself.

In 40 BC, Antony left Alexandria to return to Italy, where he was forced to conclude a temporary settlement with Octavian, whose sister Octavia (Fulvia having died) he married. Three years later Antony was convinced that he and Octavian could never come to terms. He went east again and again met Cleopatra; he needed her money for his postponed Parthian campaign. He then took the fatal step of marrying her. The union was not only utterly insulting to Octavia and her brother but in Roman law it was also invalid. Henceforward all Rome was united against him.

Meanwhile, during Antony's absence, Cleopatra had committed another act of disastrous folly. She had antagonized Herod of Judaea, by far the ablest, richest, and most powerful of the "protected" sovereigns, or "client kings," of Rome. Herod and Antony were old friends; but in the year 40, after Antony's departure, Cleopatra unsuccessfully tried to seduce Herod on his way through Egypt. Cleopatra never forgave him for the rebuff. She went much further: when she and Antony were reunited she persuaded him to give her large portions of Syria and Lebanon and even the rich balsam groves of Jericho in Herod's own kingdom. But Antony refused to sacrifice Herod wholly to Cleopatra's greed, whereupon she hated Herod more than ever and even interfered in his unhappy family affairs by intriguing against him with the women of his household. She made a tour of her new acquisitions, on which Herod received her with simulated delight; but she remained as jealous and hostile as ever, bitterly resentful that anyone other than herself should influence Antony. The fruit of her folly was soon to be gathered.

Cleopatra had merely acquiesced in the Parthian campaign: she sought other ways of spending her money. The campaign itself was a costly failure, as was the temporary conquest of Armenia. Nevertheless, in 34 Antony celebrated a fantastic triumph in Alexandria. Crowds beheld Antony and Cleopatra seated on golden thrones, with their own three children and little Caesarion, whom Antony proclaimed to be Caesar's son, thus relegating Octavian, who had been adopted by Caesar as his son and heir, to legal bastardy. Cleopatra was hailed as queen of kings, Caesarion as king of kings. Alexander Helios was awarded Armenia and the territory beyond the Euphrates, his brother Ptolemy the lands to the west of it. The boys' sister, Selene, was to be ruler of Cyrene. Octavian, now lord of the ascendant in Italy, seized Antony's will from the temple of the Vestal Virgins, to whom it had been entrusted, and revealed to the Roman people that not only had Antony bestowed Roman possessions on this foreign woman but had intended to transfer the capital from Rome to Alexandria, there to found a new dynasty.

Antony and Cleopatra spent the winter of 32–31 in Greece amid revels and dissipation. The Roman Senate deprived Antony of his prospective consulate for the following year. When it finally declared war against Cleopatra the unwisdom of her policy against Herod was revealed, for she had contrived to embroil him with the King of Petra just when his ability and resources would have been of the utmost value to Antony. At the naval Battle of Actium, in which Octavian faced the combined forces of Antony and Cleopatra on Sept. 2, 31, Cleopatra suddenly broke off the engagement and set course for Egypt. Inevitable defeat followed. Antony went on board her flagship and for three days refused to see her; but they were reconciled before they reached Alexandria, styling themselves no longer "inimitable livers" but "diers together."

Cleopatra with all her subtlety, all her political foresight, had backed two losers, first Caesar and then Antony, to whose downfall she had notably contributed. Octavian now became the magnet. Cleopatra realized that she could neither kill Antony nor exile him. But she believed that if he could be induced to kill himself for love of her, they would both win undying renown. She retired to her mausoleum, then sent messengers to Antony to say she was dead. He fell on his sword, but in a last excess of devotion had himself carried to Cleopatra's retreat, and there died, after bidding her to make her peace with Octavian.

When Octavian visited her, Cleopatra tried yet once again to captivate the leading Roman. She used all her arts; she failed. She knew, then, that Octavian intended that she and her children should adorn his triumph. Rather than be dragged through the city in which she had been borne as a queen, she killed herself, possibly by means of an asp, symbol of divine royalty. Octavian, on receiving her letter asking that she might be buried with Antony, sent messengers posthaste. "The messengers," Plutarch says, "came at full speed, and found the guards apprehensive of nothing; but on opening the doors they saw her stone dead, lying upon a bed of gold, set out in all her royal ornaments." She was 39 and had been a queen for 22 years and Antony's partner for 11. They were buried together, as both of them had wished, and with them was buried the Roman Republic.

In retrospect, Cleopatra's political career ended in utter failure. Had she been less ambitious she might have preserved her kingdom as a client, as her rival Herod did with complete success. In overreaching herself she ruined all. And yet it was this political failure that was to be transmuted into the grand original of the great lover, consecrated by the art of Shakespeare himself. The best epitaph on Cleopatra is that of the historian Dio Cassius: "She captivated the two greatest Romans of her day, and because of the third she destroyed herself." (S.H.P.)

BIBLIOGRAPHY. All the authorities, ancient and modern, including papyri, inscriptions, and coins, are exhaustively set out in the appendix to Hans Volkmann, *Kleopatra* (1953; Eng. trans. 1958), the standard work on the subject. They are in brief, and chiefly, as follows. (*Ancient sources*): These are copious and hostile. Plutarch's *Life of Antony* is one of his longest and most vivid. His grandfather remembered contemporary Alexandrian gossip; but Plutarch cites other contemporaries as well. Josephus, a Jewish historian writing under Roman supervision a little before Plutarch, is uniformly hostile to Cleopatra, especially in regard to her intrigues against Herod. Dido Cassius, a Bithynian who wrote a history of Rome in Greek at the end of the 2nd century AD, gives a fair and straightforward narrative of events. From Virgil onward, Roman poets treat Cleopatra with disdain and abuse. (*Modern sources*): Shakespeare was the first to present Cleopatra as the *grande amoureuse*. This characterization, one of the most splendid in all literature, was the received version until modern times. George Bernard Shaw's version in his *Caesar and Cleopatra* has no historical basis. The first to restore Cleopatra to her predominantly political role was John Buchan, Lord Tweedsmuir, in his *Augustus* (1937). The most recent scholarly view, in accord with Buchan, is that of J.P.V.D. Balsdon in his *Julius Caesar and Rome* (1967; U.S. title, *Julius Caesar: A Political Biography*, 1967). In vol. 10, pp. 35–111, of the *Cambridge Ancient History*, William W. Tarn and M.P. Charlesworth cover the main events of Cleopatra's life and her part in them. Theodore John Cadoux's article in the *Oxford Classical Dictionary*, 2nd ed., pp. 251–252 (1970), is a good compendium. Narrative references to Cleopatra may be found in *The Life and Times of Herod the Great* (1956) and *The Death of the Roman Republic* (1969), both by Stewart Perowne.

Cleopatra's Needle, either of two monumental Egyptian obelisks. *See* obelisk.

Cleophon (d. 404 BC), Athenian statesman, one of the dominant figures in Athenian politics until the end of the Peloponnesian War, who came to power in 410. He led the people to reject Spartan peace offers after the Athenian victory at Cyzicus (410) and again after Arginusae (406), as his political predecessor Cleon had rejected similar offers in 425. Even after the decisive defeat of the Athenians at Aegospotami, when the Spartans blockaded Athens, Cleophon continued to urge resistance, but the situation became desperate and he was arrested and condemned to death in 404.

Consult the INDEX *first*

Cleophrades Painter (fl. late 6th and early 5th centuries BC), Attic vase painter, among the finest of the late Archaic period, son of the Amasis Potter and a student of the vase painter Euthymides. The Cleophrades Painter was the decorator of vessels made by the Cleophrades Potter. His name was probably



"Dionysus with Satyrs and Maenads," painted amphora by the Cleophrades Painter, c. 500–490 BC; in the Staatliche Antikensammlungen, Munich
By courtesy of the Staatliche Antikensammlungen, Munich

Epictetus, which occurs in an inscription on a pelike (wine container) now in Berlin. He should not be confused with another Epictetus, an approximately contemporary painter and potter.

More than 100 vessels have been attributed to the Cleophrades Painter. Most of these are in the red-figure style (that is, red figures are painted on a black ground). Several black-figure (black figures painted on a red ground) "Panathenaic" vessels (ceremonial vessels, used during the Panathenaic Festivals held once every four years on the Athenian Acropolis) have also been attributed to him. Some of the red-figure vase paintings frequently attributed to the Cleophrades Painter include a cup in Paris; an amphora, now at the Staatliche Antikensammlungen in Munich, with "Dionysus, Maenads and Satyrs"; a hydria (water jar) now in Naples, with the "Iliupersis" ("Sack of Troy"); two calyx kraters (chalice-bowls), one at Tarquinia (Italy), one at the Metropolitan Museum of Art in New York City, with "Youths Arming."

The Cleophrades Painter decorated large vessels in a great variety of shapes. The subjects he painted were among those most popular during his time: athletic scenes, mythological epics of Theseus, Heracles, and Dionysus. His

work is praised for strength of design, pathos, and dramatic intensity.

clepsydra, also called WATER CLOCK, ancient device for measuring time by the gradual flow of water. One form, used by the North American Indians and some African peoples, consisted of a small boat or floating vessel that shipped water through a hole until it sank. In another form the vessel was filled with water that was allowed to escape through a hole, and the time was read from graduated lines on the interior measuring the level of the remaining water. It may have been an invention of the Chaldeans of ancient Babylonia; specimens from Egypt date from the 14th century BC. In early specimens the graduations do not allow for the fact that, as the water escaped, pressure was reduced and the flow slowed down. The Romans invented a clepsydra consisting of a cylinder into which water dripped from a reservoir; a float provided readings against a scale on the cylinder wall. Clepsydras were used for many purposes, including timing the speeches of orators; as late as the 16th century, Galileo used a mercury clepsydra to time his experimental falling bodies.

Clérambault, Louis-Nicholas (b. Dec. 19, 1676, Paris—d. Oct. 26, 1749, Paris), French composer and organist whose secular chamber cantatas, his most important works, are esteemed for their grace and feeling.

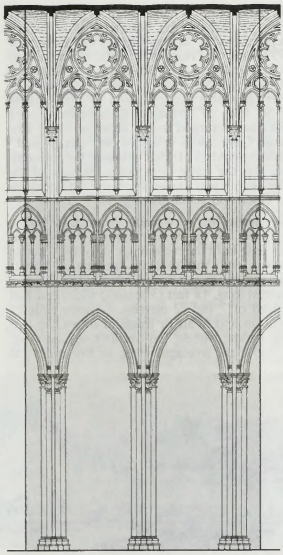
Clérambault was organist at several Paris churches and at Saint-Cyr and held the post of music superintendent to Mme de Maintenon. In 1745 he wrote the music for the wedding of the Dauphin and the Infanta of Spain.

His cantatas, published in five volumes (1710 ff.), were frequently drawn from classical subjects—*e.g.*, *Orphée*, *Héro et Léandre*, *Pigmalion*. The recitatives are in the French style, but the arias are fluent and strong in the prevailing Italian tradition. The instrumental introductions or *simphonies* show a mastery of the concerto style. One of his best works was *Le Soleil vainqueur* (1721), a thanksgiving for Louis XV's recovery from illness. He also composed a book of organ music, which ranks with the best organ music of his era; church music, including a *Te Deum;* and a volume of harpsichord music.

Clères Zoological Park, French PARC ZOOLOGIQUE DE CLÈRES, specialty ZOO that has one of the world's finest bird collections. The park was founded in 1919 by Jean Delacour, a widely known aviculturist and ornithologist, on his 26-hectare (65-acre) estate in Clères, Fr. Its bird collection comprises 1,800 specimens representing some 360 species. Waterfowl and pheasants predominate, but cranes, pigeons, parrots, and many other groups are also represented. Breeding has been successful with many varieties, including the rare Palawan peacock pheasant, Cuban whistling duck, and Hawaiian goose. Research has always been important at the park, and many new insights into bird behaviour, breeding, and systematics have emerged from the work carried on there. In addition to its birds, the park maintains several species of mammals, such as the blackbuck and Bennett's wallaby, which roam freely on the park grounds.

clerestory, in architecture, any fenestrated (windowed) wall of a room that is carried higher than the surrounding roofs to light the interior space. In a large building, where interior walls are far from the structure's exterior walls, this method of lighting otherwise enclosed, windowless spaces became a necessity. One of the earliest uses of the clerestory was in the huge hypostyle hall of King Seti I and Ramses II at the Temple of Amon (1349–1197 BC, Karnak, Egypt), in which the central range of columns, higher than those on either side, permitted clerestories to be built of pierced stone slabs.

In Roman architecture many great halls



Elevation drawing of nave wall showing the clerestory, Amiens cathedral, begun 1220

From N. Pevsner, *An Outline of European Architecture*, Copyright © Nikolaus Pevsner, 1943, 1963. Penguin Books, Ltd

were lighted with clerestories. Usually, groined vaults over the central hall allowed large semicircular windows to be built above the side roofs, as in the tepidarium of the Baths of Diocletian (3rd century AD) and the Basilica of Constantine (AD 310–320), both in Rome. This device was used in Byzantine and Early Christian architecture, as exemplified by the clerestory walls under the side arches of Hagia Sophia in Constantinople (532–563).

The clerestory became most highly developed and widely used in the Romanesque and Gothic periods. The Chartres cathedral (1194), for example, has pairs of lancet clerestory windows that are almost as wide as the aisle windows.

clergy, a body of ordained ministers in a Christian church. In the Roman Catholic Church and in the Church of England, the term includes the orders of bishop, priest, and deacon. Until 1973, in the Roman Catholic Church, clergy also included several lower orders.

The Greek word *kleros*, signifying "share," or "inheritance," is used in I Pet. 5:3 to designate the priesthood of all the faithful. Most Christian churches, including the Roman Catholic, understand the clergy as persons functioning within the priesthood of all the people but ordained, or set aside, for particular service, especially in connection with eucharistic ministry.

A distinction between clergy and laity developed in the 2nd century, although the clerical ministry traces its beginnings to the commission of the Twelve Apostles and the Seventy for service. Over the centuries, the distinction between clergy and laity was emphasized by special privileges granted to the clergy, including those granted by the Roman emperor Constantine the Great. These privileges were later extended and codified by the Theodosian Code (438). Later progressive legislation in most countries removed the special privileges enjoyed by the clergy.

Within the Roman Catholic tradition, from the 4th century on, celibacy began to be enforced on priests. By the 12th century anyone taking vows as a deacon or priest also took a vow of celibacy. In the Eastern Church, however, celibacy prevailed only for bishops. In the 20th century the permanent diaconate, open to married men and single, was once more restored within the Roman Catholic Church.

Until the 20th century, in most Christian churches, the clergy was restricted to males. Gradually, however, most main-line Protestant churches began discussing the issue and changing their laws to allow ordination for women, under some circumstances and in some church branches.

clergy, benefit of, formerly a useful device for avoiding the death penalty in English and American criminal law. In England, in the late 12th century, the church succeeded in compelling Henry II and the royal courts to grant every *clericus,* or "clerk" (*i.e.,* a member of the clergy below a priest), accused of a capital offense immunity from trial or punishment in the secular courts. On producing letters of ordination, the accused clerk was turned over to the local bishop for trial in the bishop's court, which never inflicted the death penalty and frequently moved for acquittal. Later, anyone having the remotest relationship to the church could also claim benefit of clergy. In the 14th century, the royal judges turned this clerical immunity into a discretionary device for mitigating the harsh criminal law by holding that a layman, convicted of a capital offense, might be deemed a clerk and obtain clerical immunity if he could show that he could read, usually the 51st Psalm. Later, a layman was allowed to claim benefit of clergy only once.

From the 16th century on, however, a long series of statutes made certain crimes punishable by death "without benefit of clergy." The importance of this device was further diminished by the 18th-century practice of transporting persons convicted of capital crimes to the colonies, whether they were entitled to benefit of clergy or not, and it was finally abolished in the early 19th century.

Benefit of clergy was adopted in most of the American colonies by judicial practice. Though generally abolished soon after the American Revolution, it persisted in the Carolinas until the mid-19th century.

Clergy, Civil Constitution of the: *see* Civil Constitution of the Clergy.

Clergy Reserves, lands formerly set aside for the Church of England in Canada, a cause of controversy in 19th-century Canadian politics. Established by the Constitutional Act of 1791 "for the support and maintenance of a Protestant clergy," the Clergy Reserves amounted to one-seventh of all land grants. The phrase "a Protestant clergy" was interpreted as referring exclusively to the Church of England.

In Upper Canada (now in Ontario), where a majority of Protestants were non-Anglican, controversy over the Clergy Reserves arose soon after the conclusion of the War of 1812. In 1822 the Church of Scotland demanded a share in the Clergy Reserves. Most other denominations denounced their existence as inimical to religious liberties and demanded their application to general public purposes, such as education.

An imperial act of 1827 allowed for the sale of one-fourth of the reserved land. In 1840 another imperial act forbade the creation of any new reserves; divided the income from past sales among the Church of England, the Church of Scotland, and the Wesleyan Methodists; and left the income from future

sales to be divided among other denominations.

The Clergy Reserves were finally secularized in 1854. At the same time, a large cash payment was made to the Church of England, the Church of Scotland, and the Wesleyan Methodists as acknowledgment of their "vested interests" in the Clergy Reserves.

Clericus, Johannes (encyclopaedist and biblical scholar): *see* Leclerc, Jean.

clerihew, comic biographic verse form invented by Edmund Clerihew Bentley (1875–1956), which he introduced in *Biography for Beginners* (1905) and continued in *More Biography* (1929) and *Baseless Biography* (1939). The humour of the form lies in its purposefully flat-footed inadequacy: both the verse and its treatment of the subject are off the mark, as in the work of a reluctant schoolboy. It is written as a four-line verse of two rhyming couplets, the first line almost invariably ending with the name of the subject:

After dinner, Erasmus
Told Colet not to be "blas'mous"
Which Colet, with some heat
Requested him to repeat.

The number of accents in the line is irregular, and one line is usually extended to tease the ear. Another requisite of the successful clerihew is an awkward rhyme, as in Bentley's "Aeschylus":

"Steady the Greeks!" shouted Aeschylus.
"We won't let such dogs as these kill us!"
Nothing, he thought, could be bizarrer than
The Persians winning at Marathon.

Some of the best clerihews were written by Sir Francis Meynell, W.H. Auden, and Clifton Fadiman.

Clerk, Sir Dugald (b. March 31, 1854, Glasgow—d. Nov. 12, 1932, Ewhurst, Surrey, Eng.), British engineer who invented the two-stroke Clerk cycle internal-combustion engine, widely used on light motorcycles and other small machines.



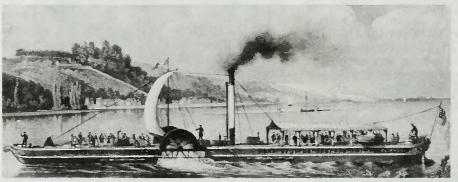
Sir Dugald Clerk
By courtesy of the Science Museum, London

Clerk studied science at Andersonian College, Glasgow, and Yorkshire College, Leeds. He built a gas (hydrocarbon vapour) engine in 1876 and in 1881 patented his two-stroke engine. The principal difference between the Clerk cycle and the more common Otto cycle is that the Clerk cycle generates an explosion once every two strokes of the piston rather than once every four. Clerk also investigated extensively the properties and commercial uses of gas for heating and lighting.

In 1916 Clerk, a director of the National Gas Engine Company, was appointed director of engineering research for the British Admiralty; he was knighted in 1917. The results of his research are published in part in his book *The Gas, Petrol, and Oil Engine* (vol. 1, 1909; vol. 2, 1913).

Clerkenwell, neighbourhood in the inner borough of Islington, Greater London, comprising the parishes of St. James and St. John, which grew up around the Nunnery of St. Mary (replaced by St. James, Clerkenwell Green, in 1792) and the Priory of St. John of Jerusalem, both founded in the 12th century. The priory was the headquarters of the chivalrous and later charitable group known as the Knights of St. John of Jerusalem (Hospitallers) until 1540 and returned to the order in 1931. The name Clerkenwell refers to the "clerks' well" (rediscovered 1924) that adjoined the nunnery and was the scene of medieval miracle plays. The district was known from the 18th century for clock and watchmaking.

Clermont, first serviceable steamboat (1807), designed by the U.S. engineer Robert Fulton and built in New York City by Charles Brown, with the financial backing of Robert Livingston. The "Clermont" was 133 feet (41 metres) long, 18 feet (5 metres) wide, and had a draft of 7 feet (2 metres). Engines built by Boulton and Watt in England drove the two side paddle wheels. On her first voyage, Aug. 7, 1807, she averaged close to five miles (or about eight kilometres) per hour for the 150 miles (240 kilometres) up the Hudson River to Albany. The "Clermont" inaugurated the first profitable venture in steam navigation, carrying paying passengers between Albany and New York City.



The "Clermont"
Brown Brothers

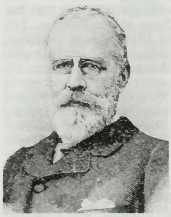
Clermont, Council of, an assembly for church reform called by Pope Urban II in 1095, which, as a result of a request by envoys from the Byzantine emperor Alexius I Comnenus to aid the Greeks against the Muslim Turks, became the occasion for initiating the First Crusade. Urban II exhorted the French knights at Clermont to rescue the Holy Land from the Turks, closing his speech with the words "God wills it," which became a battle-cry of the crusaders; the event inaugurated the medieval religious wars against the Muslims.

Clermont-Ferrand, city, capital of Puy-de-Dôme *département,* Auvergne region, south central France, west of Lyon, created in 1731 by the union of Clermont and Montferrand. It stands on the small Tretaine River. Surrounded by hills to the north, west, and south, the town opens to the east onto the extremity of the Limagne Plain. The houses of the old town of Clermont are mostly built of dark volcanic rock, as is the 13th-century cathedral. The 12th-century church of Notre-Dame-du-Port is a fine example of Auvergnat Romanesque architecture. The Renaissance Maison des Architectes houses the Musée du Ranquet, devoted to the town's past and to Blaise Pascal, who was born in Clermont. A university town, Clermont-Ferrand is also a tourist and commercial crossroads: its influence extends throughout the valley of the Allier and the neighbouring plateaus. A great part of the town's prosperity rests on the rubber industry, especially the manufacture of rubber tires. Michelin, which maintains plants and laboratories there, together with its subsidiary, Bergougnan, employs more than 30,000 persons. Other industries, far less important, include printing and pharmaceutical products. There is an airport nearby at Aulnat.

Named Augustonemetum by the Romans, Clermont was converted to Christianity in the 3rd or 4th century AD by Saint Austremonius, who became the first bishop of Clermont. Its bishopric gave it great ecclesiastical importance during the Middle Ages, and it was there that Pope Urban II preached the First Crusade in 1095. Far from the central authority in Paris, the local nobility became tyrannical, and Louis XIV sent judges to punish their excesses. The town was hardly affected by the French Revolution and grew into a large manufacturing centre in the 19th century. Pop. (1982) 145,901.

Clermont-Ganneau, Charles (b. Feb. 19, 1846, Paris—d. Feb. 15, 1923, Paris), French archaeologist who contributed to biblical studies and also exposed a number of archaeological frauds.

Clermont-Ganneau pursued his archaeological investigations while holding various diplomatic posts. A notable event in biblical research was his identification of the site of the ancient Canaanite city of Gezer, near modern Lod (Lydda), Israel (1873–74). He also directed expeditions to Syria (1881), Crete (1895), and Elephantine (Jazīrat Aswān), Egypt (1906–08). Equipped with an excellent knowledge of the languages of western Asia, he improved the translation of important Phoenician, Aramaic, and other ancient texts and became professor of archaeology and Oriental epigraphy at the Collège de France (1890). Among the frauds he exposed was the "biblical manuscript" acquired by the British Museum in 1883. His



Clermont-Ganneau, engraving
H. Roger-Viollet

publications include *Études d'archéologie orientale,* 2 vol. (1880–97; "Studies in Eastern Archaeology").

cleruchy, in ancient Greece, body of Athenian citizens in a dependent country holding grants of land awarded by Athens. The settlement in Salamis, which Athens captured from Megara in the 6th century BC, may have been the earliest cleruchy. Athens made wide use of the institution to cripple dependent states: plantations took the best territory, and the colonizers were garrisons for the future. With the establishment of the Delian League and the Second Athenian League in the 5th and 4th centuries BC, the cleruchy became a regular arm of Athenian imperialism.

Athenian cleruchs, separate in prestige and privilege from the native peoples among whom they were placed, retained full Athenian citizenship—voting, paying taxes, and serving in the forces—and governed their internal affairs with archon and Ecclesia on the Athenian model. Cleruchies were placed strategically on main lines of communication (*e.g.*, on Andros, Naxos, and Samos and at Sestos on the Hellespont) and provided permanent bases for the Athenian police fleets. At the same time, the financial advantage of being a cleruch encouraged thousands of Athenian citizens to resettle, relieving the pressure of population in Athens and increasing the financial and military strength of the state.

Clethra, genus of about 30 species of flowering trees and shrubs, of the family Clethraceae, occurring in North and South America, in Asia, and on the Mediterranean island of Madeira. Often called white alders, they are commonly cultivated for their handsome spikes of white fragrant flowers. The leaves are



Sweetpepper bush (*Clethra alnifolia*)
A to Z Botanical Collection—EB Inc.

alternate, usually toothed, and either deciduous or persistent. Three species (*C. alnifolia, C. acuminata,* and *C. tomentosa*) occur in North America. *C. alnifolia,* commonly known as sweet-pepper bush, or summer sweet, occurs on the eastern Coastal Plain and grows about 1 to 3 m (3 to 10 feet) tall. Its foliage turns yellow or orange in the fall. *C. acuminata,* commonly called cinnamon clethra, occurs in mountainous and hilly regions of southeastern North America and grows about 4.5 m tall. It is valued for its attractive cinnamon-brown bark as well as for its flowers. *C. tomentosa* is found in the same region as *C. alnifolia.*

Cletus, SAINT (pope): *see* Anacletus, Saint.

Cleve, also called CLEVES (Germany): *see* Kleve.

Cleve, Joos van: *see* Joos van Cleve.

Cleve, Per Teodor (b. Feb. 10, 1840, Stockholm, Swed.—d. June 18, 1905, Uppsala), Swedish chemist who discovered the elements holmium and thulium.

Cleve became assistant professor of chemistry at the University of Uppsala in 1868 and in addition taught at the Technological Institute in Stockholm from 1870 to 1874. He then was appointed professor of general and agricultural chemistry at Uppsala.

After extensive chemical investigations, Cleve concluded in 1874 that the element didymium was actually two elements. His theory was vindicated 11 years later by C.A. Welsbach's discovery of neodymium and praseodymium. In 1879 Cleve showed that the newly discovered scandium was the element previously predicted by D.I. Mendeleyev, who called it eka-boron. In that same year Cleve discovered the rare-earth elements holmium and thulium. His contributions to organic chemistry include the discovery of 6 of the 10 possible forms of dichloro naphthalene and the discovery of the aminonaphthalenesulfonic acids, sometimes known as Cleve's acids.

From 1890 Cleve concentrated on biological studies, notably on freshwater algae, plankton, and diatoms. He developed a method of determining the age and order of late glacial and postglacial deposits from the types of diatom fossils in the deposits. This use of diatoms for identification has also been applied to determining the origin of ocean streams, and Cleve's work on diatoms, *The Seasonal Distribution of Atlantic Plankton Organisms* (1900), became a basic text on oceanography.

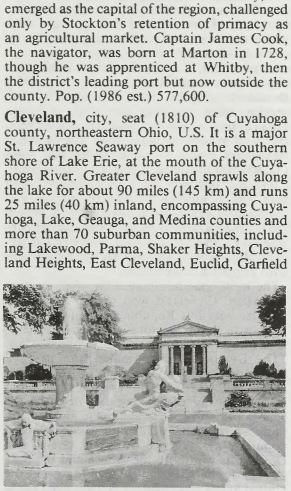
Cleveland, county, northeastern England. The county, created in 1974, has taken a traditional district name derived from "cliff" land, which refers to the commanding escarpment that overlooks the Vale of Tees and continues southward as a high rocky coastline. With an area of 225 square miles (583 square km), the county is divided into the following administrative districts: Hartlepool, Langbaurgh, Middlesbrough, and Stockton-on-Tees, all with borough status.

Until the creation of the county borough of Teesside in 1968, the River Tees had been the county boundary between the historic counties of Durham and Yorkshire all the way to the North Sea. In the reorganization of 1974, when the new county was created, not only was the adjacent industrial port of Hartlepool included but the conurbation absorbed adjacent rural areas in the Vale of Tees and in the Cleveland Hills, where its countryside extends to the national park of the North York Moors.

The industrial conurbation has grown since 1825 owing to the railways, the port improvement of an estuary that in its natural state was almost unnavigable, and the exploitation of a quite remarkable local resource base of minerals that have become recognized successively only since 1850. The area now has one of the country's major concentrations of steel making, heavy chemicals, and, most recently, petrochemicals and petroleum refining.

Middlesbrough, founded in 1830, the first town ever to owe its existence to a railway, has emerged as the capital of the region, challenged only by Stockton's retention of primacy as an agricultural market. Captain James Cook, the navigator, was born at Marton in 1728, though he was apprenticed at Whitby, then the district's leading port but now outside the county. Pop. (1986 est.) 577,600.

Cleveland, city, seat (1810) of Cuyahoga county, northeastern Ohio, U.S. It is a major St. Lawrence Seaway port on the southern shore of Lake Erie, at the mouth of the Cuyahoga River. Greater Cleveland sprawls along the lake for about 90 miles (145 km) and runs 25 miles (40 km) inland, encompassing Cuyahoga, Lake, Geauga, and Medina counties and more than 70 suburban communities, including Lakewood, Parma, Shaker Heights, Cleveland Heights, East Cleveland, Euclid, Garfield



The Cleveland Museum of Art, Cleveland, Ohio
Ellis-Sawyer—Shostal/EB Inc.

Heights, and Rocky River. Most of the city is on a plain that rises 60–80 feet (18–25 m) above the lake and is divided by a half-mile-wide valley locally known as the Flats. Before the arrival of the English, the French and Indians had established trading posts in the lower Cuyahoga valley. In 1786, after the American Revolutionary War, when the Ohio country was opened for settlement, Connecticut reserved 3,500,000 acres (1,400,000 hectares) of land (the Western Reserve) in northeastern Ohio. Moses Cleaveland, from the Connecticut Land Company, arrived with surveyors in 1796 to speed up the sale of land. Two months later the plan for the town of Cleaveland was completed. (In 1832 an *a* in Cleaveland was dropped to shorten a newspaper's masthead.)

The city's growth was slow until the completion in 1825 of New York state's Erie Canal opened a water route between Lake Erie and the Atlantic; Ohio then constructed its first canal, to connect Lake Erie and the Ohio River (completed 1830). A decade later, railroads increased the community's commercial and industrial activity. When St. Mary's Falls Canal (Soo Canal) between Lakes Superior and Huron was opened in 1855, Cleveland became Lake Erie's transshipment point for lumber, copper and iron ore, and rail shipments of coal and farm produce. The American Civil War provided the initial stimulus for iron and steel processing, fabrication of metals, oil refining (John D. Rockefeller founded Standard Oil there), and chemical manufacturing. Suburban trains were developed at the end of the 19th century. By the 1930s Cleveland had the appearance of a modern metropolis, with main arteries converging on its Public Square, dominated by the 708-foot (216-metre) Terminal Tower. Rapid-transit lines now extend to Shaker Heights (southeast) and to the Cleveland Hopkins International Airport (southwest).

The city's Hough district was the scene in 1966 of violent racial disorders. The following year Carl B. Stokes became the first black to be elected mayor of a U.S. city of this size. The late 20th century was marked by a decline in heavy manufacturing and population and by budgetary problems.

Heavy industry is basic to the city's economy. Manufactures are highly diversified and include primary steel, aluminum and steel products, enamelware, hardware, appliances, machine tools, tractor and motor vehicles, petrochemicals, electronic equipment, and airplane parts. Over 400 medical and industrial research centres are headquartered in the area, including the National Aeronautics and Space Administration's Lewis Research Center. Educational facilities include Case Western Reserve University (1967; a federation of Case Institute of Technology [1880] and Western Reserve University [1826]), Cleveland Institute of Art (1882), Cleveland Institute of Music (1920), Cuyahoga Community College (1962), Cleveland State University (1964; formerly Fenn College [1923]), and two Roman Catholic Colleges—Notre Dame College (1923) and Ursuline College (1871). John Carroll University (1886, Roman Catholic) is in suburban University Heights.

Developed under a 20-year master plan, University Circle encompasses more than 30 cultural and religious institutions in a 488-acre (197-hectare) site near Case Western Reserve University. Included are the Cleveland Museum of Art, Severance Hall (home of the Cleveland Orchestra), the Western Reserve Historical Society Museum and Library, Cleveland Museum of Natural History, Cleveland Health Museum, Allen Memorial Medical Library, and several parks. The park system includes the Cleveland Zoo and international horticultural

displays. "The Mall" in the heart of the city, near the lakefront, includes city, county, and federal office buildings, the Public Library (in holdings one of the largest city libraries in the nation), and the Public Auditorium and Convention Center. Cleveland Stadium is home to the Cleveland Browns football team. Jacobs Field (for the Cleveland Indians baseball team) and Cavs Gund Arena (for the Cleveland Cavaliers basketball team) opened in 1994. The Rock and Roll Hall of Fame and Museum, designed by I.M. Pei, was constructed in the mid-1990s. During the 1960s and '70s much of the downtown area was rebuilt. Inc. city, 1836. Pop. (1993 est.) city, 505,730; (1992 est.) Cleveland-Lorain-Elyria PMSA, 2,221,-000; Cleveland-Akron CMSA, 2,890,000.

Cleveland, city, seat (1836) of Bradley county, southeastern Tennessee, U.S., 26 miles (42 km) east-northeast of Chattanooga. Established in 1836 following the agreement for the evacuation of the area by the Cherokee Indians, the community was named after Colonel Benjamin Cleveland, a Revolutionary War commander. During the American Civil War, Union generals Ulysses S. Grant and William Tecumseh Sherman had headquarters in Cleveland. The city is the headquarters for the Cherokee National Forest, site of the Ocoee dams, a few miles southeast. The Church of God (Cleveland) operates Lee College (1918) and has its national headquarters in the city. Cleveland State Community College opened in 1967. Inc. town, 1838; city, 1893. Pop. (1993 est.) 32,929.

Cleveland, Barbara Villiers, Duchess of, COUNTESS OF SOUTHAMPTON, BARONESS NONSUCH, married name (1659–70) BARBARA PALMER, or (from 1661) COUNTESS OF CASTLEMAINE (b. autumn 1641, London, Eng.—d. Oct. 9, 1709, Chiswick, Middlesex), a favourite mistress of the English king Charles II; she probably bore one or more of his illegitimate children. According to the diarist Samuel Pepys, she was a woman of exceptional beauty, but others commented on her crude mannerisms.

She was the daughter of William Villiers, 2nd Viscount Grandison (d. 1643). Her intimacy with Charles II began soon after her marriage in 1659 to Roger Palmer, who was created Earl of Castlemaine two years later. The king probably fathered her first child, Anne, born in February 1661, although paternity was also attributed to one of her earlier lovers, the 2nd Earl of Chesterfield. Legend has it that the restored king spent his first night at his palace in Whitehall with her. In the early years after the Restoration, her house became the rendezvous for opponents of Lord Chancellor Clarendon, and her delight at his fall in 1667 was conspicuous. But although her favour had become an avenue to political advancement (her most famous protégé was Henry Bennet, 1st Earl of Arlington, for a time one of the most powerful advisers of Charles II), her hold on the king was precarious. He had forced the queen to accept her as one of the ladies of the bedchamber in 1662, a status she retained for several years. She had become a Roman Catholic in 1663, and for a while the French ambassador was instructed to seek her favour. But the king paid less attention to her demands after 1670, and by 1674 she was entirely supplanted by Louise de Kéroualle, Duchess of Portsmouth.

In 1670 Barbara Villiers became Countess of Southampton and Duchess of Cleveland. She secured the right of succession to the remainder titles for her first and third sons, Charles and George, but the king at this time did not admit paternity of her second son, Henry. She consoled herself with other lovers, such as John Churchill, later 1st Duke of Marlborough (who probably fathered her daughter Barbara), and the playwright William Wycherley. In 1677 she settled in Paris.

She returned to England just before Charles died in February 1685. In July 1705 her husband, the Earl of Castlemaine, whom she had left in 1662, died, and the same year, the duchess was married to the notorious rake Robert "Beau" Fielding (d. 1712), but this union was declared void in 1707.

Cleveland, Grover, in full STEPHEN GROVER CLEVELAND (b. March 18, 1837, Caldwell, N.J., U.S.—d. June 24, 1908, Princeton, N.J.), American lawyer who was 22nd and 24th president of the United States, serving from 1885 to 1889 and from 1893 to 1897.

The need to support a widowed mother ruled out college for Cleveland, and he read law at a Buffalo law firm where he clerked. Admitted to the bar in 1859, he practiced law and



Grover Cleveland

By courtesy of the Library of Congress, Washington, D.C.

entered Democratic politics. As mayor of Buffalo (1881–82), he quickly won wide notice as a foe of corruption, and he was elected governor of New York in 1882. His independence of political machines won him the undying hostility of New York City's dominant Democratic machine, Tammany Hall, and in 1884 the Democratic nomination for president. After a virulent campaign, Cleveland became the first Democrat elected president since 1856—by virtue of the electoral vote of New York state, which he won by a scant plurality of some 1,100 (out of over a million) votes.

As president, Cleveland continued his policies of reform and independence, transferring thousands of jobs from patronage to civil service, often rejecting the pleas of fellow Democrats for appointments. He vetoed hundreds of private pension bills and nullified fraudulent grants to some 80,000,000 acres (32,400,000 hectares) of Western public lands. Cleveland opposed the high protective tariff that was producing a treasury surplus and strenuously advocated a lowered tariff, which led business interests to label the usually conservative Cleveland a radical. The Republican-controlled Senate scuttled his tariff proposals with crippling amendments.

The tariff issue dominated the 1888 election campaign. Cleveland won a majority of the popular vote but Republican Benjamin Harrison won in the Electoral College, and Cleveland moved to New York City to practice law.

The Democrats renominated him in 1892 with significant opposition only from Tammany Hall. Tariff again was the issue, and in a three-way race, Cleveland defeated the agrarian Populist Party candidate and the Republican incumbent Harrison with the largest popular plurality since Ulysses S. Grant. The Democrats won both the House and the Senate. Early in Cleveland's second term, the United States was engulfed in a financial panic and the most severe economic depression the country had yet experienced. Cleveland held the Sherman Silver Purchase Act of 1890 responsible for the drain of gold from the Treasury (the immediate cause of the panic). He called Congress into special session and, through party discipline and generous use of patronage, forced repeal of the Sherman Act, thereby alienating many Western and Southern Democrats in and out of Congress.

The problem of the gold reserve in the Treasury persisted. Three times in 1894 and 1895 the government issued bonds to obtain gold, selling them to a banking syndicate headed by J.P. Morgan. Dealing with bankers to preserve the gold standard further antagonized the agrarians, who were committed to a bimetallic standard of silver and gold.

The depression caused unrest among labourers as well as farmers. When a strike against virtually the entire railroad system of the Midwest led to violence near Chicago, Cleveland sent federal troops to protect the mails, despite Illinois Governor John P. Altgeld's denial that troops were needed. The strike was broken within a week, and the president received the plaudits of the business community and the general public, but he lost whatever support he still had in the ranks of labour.

In foreign policy Cleveland was an isolationist and opposed territorial expansion. He withdrew from the Senate a treaty for the annexation of Hawaii negotiated by the Harrison administration. He refused aid to Cuban anti-Spanish insurgents despite wide sympathy for them in the United States, and he did not protest British occupation of a Nicaraguan port (Corinto) in April 1895. Public and congressional criticism and concern about a boundary dispute between British Guiana and Venezuela finally impelled Cleveland to invoke the Monroe Doctrine and demand arbitration, which the British rejected. Cleveland sent a message to Congress that carried a threat of war if Great Britain did not recede. After some delay Britain did agree to arbitration and implicitly accepted the Monroe Doctrine.

Free silver forces took over the Democratic Party in 1896 and nominated William Jennings Bryan, even rejecting a resolution commending Cleveland's "honesty, economy, courage, and fidelity."

Cleveland retired to Princeton, N.J., and became active in the affairs of Princeton University, which he served as lecturer in public affairs and as trustee (1901–08). Partisan rancour dwindled gradually, and he regained the public admiration he had enjoyed as a staunch exemplar of integrity in government.

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Cleveland, Horace William Shaler (b. Dec. 16, 1814, Lancaster, Mass., U.S.—d. Dec. 5, 1900, Hinsdale, Ill.), American landscape architect who, with his better known contemporary Frederick Law Olmsted, developed landscape architecture into a recognized profession in the United States.

Educated as a civil engineer, Cleveland farmed for a while and then became a landscape gardener. He designed the municipal park systems of Minneapolis, Minn., and Omaha, Neb.; Washington and South Shore parks, Chicago; and Roger Williams Park, Providence, R.I. In several books and pamphlets on landscape architecture, he stressed the interpretation of its principles in terms of Midwestern physical geography.

Cleveland, John (b. June 16, 1613, Loughborough, Leicestershire, Eng.—d. April 29, 1658, London), English poet, the most popular of his time, and then and in later times the most commonly abused metaphysical poet.

Educated at Cambridge, Cleveland became a fellow there before joining the Royalist army

at Oxford in 1643. In 1645–46 he was judge advocate with the garrison at Newark until it surrendered to the Parliamentary forces, after which he lived with friends. When Charles I put himself in the hands of the Scots' army and they turned him over to the Parliamentary forces, Cleveland excoriated the Scots in a satire they have never forgiven.

Cleveland's poems first appeared in *The Character of a London Diurnal* (1647) and thereafter in some 20 collections in the next quarter century; this large number of editions attests to his great popularity in the mid-17th century. Cleveland carried Metaphysical obscurity and conceit to their limits, and many of his poems are merely intellectual gymnastics. From the time of John Dryden's deprecatory



John Cleveland, engraving

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd

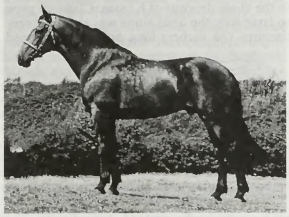
criticism of the Metaphysical poets, Cleveland has been a whipping boy for them, largely because his conceits are profuse and cosmetic rather than integral to his thought. Cleveland's real achievement lay in his political poems, which were mostly written in heroic couplets and satirized contemporary persons and issues. Cleveland's political satires influenced his friend Samuel Butler (in *Hudibras*), and his use of heroic couplets foreshadowed that of Dryden.

Cleveland, Thomas Wentworth, earl of, also called (from 1593) 4TH BARON WENTWORTH OF NETTLESTEAD, 4TH LORD LE DESPENSER (b. 1591—d. March 25, 1667), prominent Royalist during the English Civil Wars.

The eldest son of Henry Wentworth (whom he succeeded as 4th Baron Wentworth and Lord le Despenser in infancy), he was created earl of Cleveland in 1626 by Charles I. Adhering to the king's cause in the Parliamentary troubles, he attended his kinsman Thomas Wentworth, 1st earl of Strafford, at his execution, and afterward Cleveland was a general on the Royalist side in the Civil Wars until he was taken prisoner at the second Battle of Newbury. Cleveland commanded a cavalry regiment at Worcester in 1651, when he was again taken prisoner, and he remained in the Tower of London until 1656. His early extravagance and the fortunes of war had greatly reduced his estates, and the family home of Nettlestead was sold in 1643. At his death the earldom of Cleveland became extinct.

Cleveland Bay, breed of horse notable for its strength, endurance, and beauty and for its prepotency—*i.e.,* its ability to impart these characteristics to both purebred and crossbred progeny. Such qualities made the Cleveland Bay one of the most favoured coach horses of the 19th and early 20th centuries, and it continues to be a popular breed of performance horse.

The Cleveland Bay is descended from a strong pack and saddle breed that originated in the Cleveland Hills of North Yorkshire, Eng., in the Middle Ages. It acquired its present character during the 17th and 18th centuries, when it was crossed with lighter Andalusian and Arabian horses. By the 19th



Cleveland Bay

Sally Anne Thompson

century it was greatly admired as a British cavalry mount, and it became one of the most common draft and coach horses in Britain and the United States. It is now kept as a harness horse for ceremony or competition, and it is crossed with other breeds (most prominently, the Thoroughbred) to produce horses for hunting, driving, jumping, and the three-day event.

Cleveland Bay horses stand 16 to 17 hands (64 to 68 inches, or 163 to 173 cm) and weigh 1,400 to 1,500 pounds (635 to 680 kg). They are always a rich bay colour with black mane, legs, and tail. Stud books are kept by the British Cleveland Bay Horse Society (founded 1883) and the Cleveland Bay Horse Society of America (founded 1885).

Cleveland Heights, city, eastern residential suburb of Cleveland, Cuyahoga county, northeastern Ohio, U.S. Incorporated as a village in 1903, Cleveland Heights remained a wooded area until it became a city in 1921. It is zoned only for homes and retail businesses and has no industry. The city's Cain Park has an outdoor summer theatre in a natural amphitheatre setting. Pop. (1994 est.) 51,477.

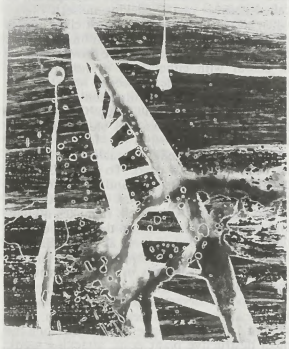
Cleveland Museum of Art, in Cleveland, major American museum that houses one of the United States' finest art collections. The museum's more than 45,000 art objects represent virtually all major cultures and periods. It holds items from ancient Egypt, Greece, and Rome; early and contemporary America; Europe, East Asia and the Middle East, India, and Africa, as well as pre-Columbian Mexico and Central America. It was incorporated in 1913 and opened in 1916. The Guelph treasure, 11th- and 12th-century sacred objects from Brunswick, Ger., was added to the museum's holdings in 1931. An addition to the building was opened in 1958, and an education wing with auditorium and lecture halls was opened in 1971.

Clianthus, genus of flowering shrubs of the pea family (Fabaceae). Its two species, *C. puniceus* and *C. formosus,* are native to New Zealand and Australia, respectively. They grow to 1–2 m (3–6 feet) tall and in the spring bear brilliant red flowers (whence the name, from Greek, *kleios,* "glory," and *anthos,* "flower"). The flowers, 7.5–10 cm (3–4 inches) or more long, are downward-turning with one standard, or upturned, petal. Leaves are pinnate, with one to two dozen short leaflets alternating along the stem.

C. puniceus, the parrot's bill, or red kowhai, grows outdoors in warm, dry climates and sandy, well-drained soils. It can be trained as a vine to grow on a wall or trellis. The shoots are pruned once flowering is over.

C. formosus, the glory pea, or Sturt's desert pea, is the floral emblem of South Australia. It does poorly away from its native semidesert environment. In less favourable climates it is grown in hanging baskets in sunny, well-ventilated greenhouses. Often it is grafted as a seedling onto the bladder senna (*Colutea arborescens*), a more vigorous shrub of the pea family. Its flowers are scarlet with large purple-black blotches at the base of the standard petal.

cliché-verre, also called GLASS PRINT, print made by placing photographic paper beneath a glass plate on which a design has been scratched through a coating of an opaque substance and then exposing it to light. The fluid lines possible with *cliché-verre* prints are reminiscent of etched lines.



"Monuments," gelatin-silver *cliché-verre* print by Gyorgy Kepes, 1939

The Museum of Modern Art, New York City, gift of the photographer; copy print © 1996 The Museum of Modern Art, New York City

The technique was popular in the 1850s with such French artists as Camille Corot, Jean-François Millet, Théodore Rousseau, and Eugène Delacroix. The most prominent 20th-century exponent of *cliché-verre* was the Hungarian-American designer Gyorgy Kepes, who carried out many innovations in the medium, such as painting the glass with mutually repellent substances to achieve infinitely variable effects.

Clichy, in full CLICHY-LA-GARENNE, northern industrial suburb of Paris, France, Hauts-de-Seine *département,* Paris *région.* It is served by a subway line from the Porte de Clichy, by an arterial highway surrounding Paris, and by suburban train service. The Beaujon Hospital, one of the largest and most modern in the Paris region, is located in the town. The Church of Saint-Vincent-de-Paul, built when the saint was village priest at Clichy (1612–25), is on the boulevard Jean-Jaurès. The suburb's manufactures include mechanical, electrical, and chemical products. Pop. (1990) 48,204.

click, in phonetics, a suction sound made in the mouth. Click sounds occur in a number of African languages and are often used as interjections in other languages—*e.g.,* the sound of disapproval represented in English by *tsk, tsk.* That sound is an example of a dental click; to make it, the back of the tongue contacts the soft palate and the sides and tip of the tongue touch the teeth. The click noise occurs when the tip of the tongue is lowered. Other click sounds differ in the positions of the tip and blade of the tongue and in the manner of the release of air into the mouth cavity.

Clicks are a regular part of the consonant system in the Nguni languages of southern Africa, which include Zulu and Xhosa; these languages have dental clicks as described above, lateral clicks (like the clucking sound made to horses), and alveolar clicks, in which the tip of the tongue is on the ridge behind the upper

teeth. There are as many as 15 contrasting click sounds in some Nguni languages.

The Khoisan languages of the Bushmen and the Hottentots have even more basic types of clicks than the Nguni languages, distinguishing not only dental, lateral, and alveolar clicks but also postalveolar and, in some dialects, bilabial clicks; the latter is the sound of a kiss.

click beetle, also called SKIPJACK, SNAPPING BEETLE, or SPRING BEETLE, any of the approximately 7,000 species of the widely distributed insect family Elateridae (order Coleoptera), so called because of the clicking noise it makes when seized by a predator. Most click beetles range between 2.5 and 18 millimetres (less than 3/4 inch) in length and are brown or black in colour with either little or no ornamentation. (Some tropical species, however, are brightly coloured and luminescent.) Click beetles have a characteristic shape: the elongated body has parallel sides and bluntly rounded ends.

When a click beetle is touched, it falls on its back and plays dead. To right itself the click beetle bends its head and thorax forward, hooking a spine into a notch on the abdomen. When the spine is released, it makes a click, and the beetle is hurled into the air. Click beetles usually feed on leaves at night. Because they are attracted to sweet liquids, farmers once placed sweet baits in their fields in the spring to trap adults.

Click beetle larvae have a hard skin and are known as wireworms because of their long, slender, cylindrical shape. They are among the most destructive plant pests, attacking seeds, plant roots, and underground stems. The larvae live in the soil from two to six years. The plowing of fields in the fall can cut open the pupal case and destroy the wireworms; in addition, applications of insect poisons may help control wireworm populations.

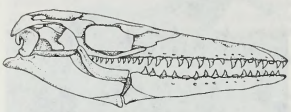


Eyed elator (*Alaus oculatus*)
Margiocco—Popperfoto

The eyed elator (*Alaus oculatus*), a North American click beetle, grows to 45 mm (over 1 3/4 in.) long and has two large black-and-white eyelike spots on the prothorax, a region behind the head. The genus *Pyrophorus,* which occurs in the tropical areas of the Western Hemisphere, is luminescent, giving off a greenish and reddish-orange light. Several of these species can provide light sufficient for reading, and they have even been used as emergency light sources during surgery.

click languages: *see* Khoisan languages.

Clidastes, genus of extinct, ancient marine reptiles, the mosasaurs, related to modern lizards. *Clidastes* is found as a fossil in Late Cretaceous marine rocks in North America (the Cretaceous Period ended 65,000,000 years ago). Excellent fossil remains have been found in the chalk deposits of Kansas. *Clidastes* grew to large size; the head alone was about 60 centimetres (24 inches) long and was equipped



Skull of *Clidastes*
Reprinted from *Vertebrate Paleontology* by A.S. Romer, by permission of the University of Chicago, copyright 1933, 1945, 1966, all rights reserved

with many sharply pointed, curved teeth. The neck was short, but the body and tail were long and relatively slim. The tail was probably the main means of propulsion, with the poorly developed limbs, which terminated in broad appendages, providing directional control. *Clidastes* was clearly an efficient swimming predator and probably fed largely on fish, as well as on ammonite cephalopods, mollusks related to the squids and pearly nautilus of today. It is uncertain whether *Clidastes* emerged on land to reproduce.

client-centred psychotherapy: *see* nondirective psychotherapy.

clientship, Latin CLIENTELA, in ancient Rome, the relationship between a man of wealth and influence (patron) and a free client; the client acknowledged his dependence on the patron and received protection in return. This sort of relationship was recognized in law as early as the 5th century BC; by the 1st century BC it had become hereditary. Freed slaves were automatically clients of their former owners. The patron might support his client in the courts or supply him with daily food, often converted into cash (*sportula*). The client was expected to show deference to his patron, especially by calling upon him each morning (*salutatio*) and by aiding him in his private and public life. The political influence exercised by patrons over their clients was of considerable importance in the voting conducted in the public assemblies (*comitia*) under the republic. In the courts, no evidence could be given by patron or client against each other. Under the empire (*i.e.,* after 27 BC) clients were often looked upon as parasites; because of their duty of *salutatio* they were sometimes called *salutatores* ("greeters"), or *togati* because they were required to wear the toga when it was passing out of fashion. Clientage became the most important social relationship in the Roman provinces as well as in Rome. The extension of the system to client nations was a cardinal feature of the growth and maintenance of Roman power under Julius Caesar and the emperors.

cliff, steep slope of earth materials, usually a rock face, that is nearly vertical and may be overhanging. Structural cliffs may form as the result of fault displacement or the resistance of a cap rock to uniform downcutting. Erosional cliffs form along shorelines or valley walls where the most extensive erosion takes place at the base of the slope. Because of their greater gradient, cliffs are subjected to greater erosive action and tend to retreat more rapidly than other slopes.

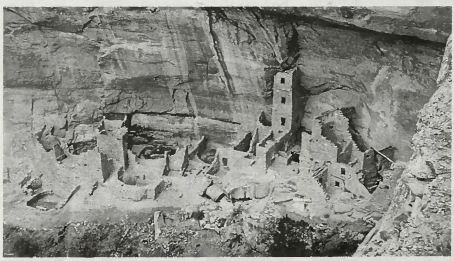
cliff dwelling, prehistoric house of the Pueblo Indians of the southwestern United States, built along the sides or under the overhangs of cliffs, primarily in the area where the present-day states of Arizona, New Mexico, Colorado, and Utah meet. Such masonry cliff dwellings are associated with the Classic Pueblo, or Pueblo III, cultural period after which the Pueblo moved farther south and built the pueblo (*q.v.*) villages that they still inhabit.

The ancestors of the Pueblos were nomadic Indians of the Basket Maker culture. When they became sedentary and began to cultivate corn, they also began to build circular pits as storage bins. When the bins were later reinforced with stone walls and covered with roofs, some Indians began to use these enclosures as houses. Finally, the Indians became proficient enough in the dry farming required in this arid climate to live completely from the corn (maize), squash, beans, and cotton they grew and to establish permanent communities. At that point they began to build their houses above ground.

The cliff dwellings are the culmination of this architectural development; the use of hand-hewn stone building blocks (the principal construction material) and adobe mortar was unexcelled even in later buildings. Ceilings were built by laying two or more large crossbeams and placing on them a solid line of laths made of smaller branches. The layers were then plastered over with the same adobe mixture frequently used for the walls. Edifices several stories high were built with succeeding stories set back, creating a row of terraces on each level that gives the structure the appearance of a ziggurat (ancient Babylonian temple tower).

Residential rooms measured about 10 by 20 feet (3 by 6 metres). Entrance to ground-floor rooms was by ladder through a hole in the ceiling; rooms on upper floors could be entered both by doorways from adjoining rooms and by a hole in the ceiling. Each community had two or more kivas (*see* kiva), or ceremonial rooms, usually round in early times but later square.

It is thought that the Pueblo Indians began to build these cliff dwellings in about AD 1000, as a defense against northern tribes of Navajo and Apache, who were invading their territory. In addition to the natural protection of the cliff, the absence of doors and windows to the rooms on the ground floor left a solid outer stone wall that could be surmounted only by climbing a ladder, and the ladders could easily be removed if the town were attacked. Many



Cliff dwellings in the Mesa Verde National Park, Colorado, 9th–13th century
R.S. Waysee—Shostal/EB Inc.

smaller communities joined together to form the large towns built beneath the cliffs. Two of the largest, the Cliff Palace at Mesa Verde National Park in Colorado and the five-storied Pueblo Bonito in New Mexico, probably had about 200 and 800 residential rooms, respectively.

At the end of the 13th century, these cliff dwellings were deserted by the inhabitants. Two factors account for the move: an examination of tree trunks indicates a severe drought between 1272 and 1299; and it is thought that there was internal dissension between tribes in these large urban cliff pueblos. Thus, smaller pueblos were created in the south near better water sources.

cliffbrake (*Pellaea* species), any of about 80 species of ferns of the genus *Pellaea* (family Adiantaceae or Sinopteridaceae, depending on the authority consulted). Cliffbrake ferns grow on or among rocks, mostly limestone, throughout the world. Small plants with blue-green leaves, they are characterized by spore-bearing structures (sporangia) that occur in round or elongated clusters (sori) on the margins of fertile leaves. Overlapping leaf margins form a protective covering.



Cliffbrake (*Pellaea*)
Sven Samelius

The name cliffbrake is sometimes used for rockferns or rock brakes, about four to seven species constituting the genus *Cryptogramma*, native to Europe, Asia, and both Americas. They differ from *Pellaea* species by having fragile, light-coloured stalks.

Clifford, Sir Hugh Charles (b. March 5, 1866, London—d. Dec. 18, 1941, Roehampton, London), British colonial official and governor, especially associated with Malaya, novelist, and essayist.

A descendant of Clifford of the Cabal under Charles II, and a grandson of the 7th Baron Clifford of Chudleigh, Hugh Clifford was expected to follow his father, a distinguished general, into the British Army but decided instead to join the civil service of the Protected Malay States, of which a relative, Sir Frederick Weld, was then high commissioner. Arriving in Malaya in 1883, at the age of 17, not 10 years after the British takeover of the western peninsular states, Clifford became a cadet in Perak, and began a close association of more than 20 years with the Malay people and their lives. Like all district administrators of the time, he learned the language and spent long periods living in remote parts of the country. Those experiences, most particularly in the state of Pahang, where he was sole British representative for two years from 1887, gave Clifford a romantic taste for the exotic that became the subject of his many essays, stories, and novels published from 1896, when more senior posts—as resident of Pahang from 1895 to 1903, with a brief interval as governor of North Borneo and Labuan—made it impossible to mingle as he had with all levels of Malay society. He was knighted in 1909.

Clifford's writings, like those of his contemporary in Malaya, Frank Swettenham, brought him some literary reputation in England, though, as his friend and mentor Joseph Conrad wrote in reviewing one of his books, "One cannot expect to be, at the same time, a ruler of men and an irreproachable player on the flute." Despite artistic shortcomings, Clifford did depict with some freshness a Malay society that was fast disappearing—and one that the romantically ambivalent Clifford regretted the passage of, while acting as a principal agent of its disappearance. Leaving Malaya in 1903 to become colonial secretary in Trinidad, and later governor successively of Ceylon, the Gold Coast, and Nigeria, he continued for many years to write about Malaya and to republish his many Malayan stories. No other place ever held for him the same satisfaction. His official career closed with a final two years as governor of the Straits Settlements and high commissioner of the Malay States, from 1927 to 1929.

Clifford, John (b. Oct. 16, 1836, Sawley, Derbyshire, Eng.—d. Nov. 20, 1923, London), evangelical Baptist minister and social reformer active in the British labour movement. He was the first president of the Baptist World Alliance.

Clifford began work in a lace factory at the age of 10. In 1855 he was sent to the General Baptist Academy in Leicester, and in 1858 he became minister of Praed Street Chapel, Paddington. By 1877 the growth of his congregation required a new chapel to be opened at Westbourne Park.

President of the Baptist Union from 1888, he was prominent for his defense of the Union from charges of heresy brought by C.H. Spurgeon, an influential preacher who opposed modern biblical criticism. Clifford also took the lead in helping unite the General Baptists of the New Connection with the Union in 1891, and in 1898 he became president of the



John Clifford, oil painting by an unknown artist after a portrait by John Collier; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

National Free Church Council. His concern for social reform caused him to associate with the radical wing of the Liberal Party and with leaders in the Labour Party, including James Keir Hardie (1865–1915).

For his advocacy of passive resistance to the Education Act of 1902, which required public funds to support denominational schools, Clifford became a national figure and several times suffered confiscation of his personal belongings. From 1905 to 1911 he served as the first president of the Baptist World Alliance. Among his writings are *The English Baptists* (1881), *The Christian Certainties* (1893), and *The Ultimate Problems of Christianity* (1906).

Clifford, Nathan (b. Aug. 18, 1803, Rumney, N.H., U.S.—d. July 25, 1881, Cornish, Maine), associate justice of the United States Supreme Court (1858–81).

Admitted to the bar in 1827, Clifford was elected to the Maine legislature in 1830 and became an eloquent exponent of Jacksonian principles. He served four terms, the last two as speaker. In 1834 he was appointed state attorney general and in 1839 elected to the U.S. Congress. He was named attorney general by Pres. James K. Polk in 1846 and served as his special commissioner to Mexico to arrange the Treaty of Guadaloupe Hidalgo, which ended the Mexican War in 1848. After completing his duties in Mexico, he returned to private practice in Maine and twice ran unsuccessfully for the U.S. Senate before being appointed to the U.S. Supreme Court in 1858 by Pres. James Buchanan, who had been his friend on the cabinet.

He delivered over 400 opinions in his 23 years on the bench, most of which dealt with areas of his special competence—commercial and maritime law and Mexican land grants—and did not address constitutional issues or capture wide public interest. He presided over the court briefly in 1873 after the death of Chief Justice Salmon P. Chase and presided on the commission appointed to canvass the state returns in the disputed Hayes–Tilden election in 1877. He voted with the conservative majority on most of the constitutional issues arising out of the Civil War.

Articles are alphabetized word by word, not letter by letter

Clifford (of Chudleigh), Thomas Clifford, 1st Baron, also called (1664–72) SIR THOMAS CLIFFORD (b. Aug. 1, 1630, Ugbrooke, near Exeter, Devon, Eng.—d. Oct. 17, 1673, Ugbrooke), English statesman, lord treasurer in Charles II's Cabal ministry.

Clifford matriculated at Exeter College, Oxford, in 1647 and entered the Middle Temple in 1648. In Parliament in 1660–61 he became a steady supporter of Henry Bennett (who became Lord Arlington in 1665) in opposition to the chancellor, the Earl of Clarendon. Knighted in 1664 and appointed ambassador to Denmark and Sweden, he served with the fleet in 1665 and 1666. In 1666 he was made controller of the household and a privy councillor, in 1667 a commissioner for the treasury, and in 1668 treasurer of the household.

As one of the Cabal ministry, Clifford cooperated zealously with the King in breaking through the triple alliance with the United Provinces and Sweden and in effecting an understanding with France. He was the only minister, besides Arlington, entrusted with the secret Treaty of Dover of 1670; he signed it as well as the ostensible treaty shown to all the members of the Cabal. In 1672, during the absence abroad of Arlington and Sir William Coventry, Clifford acted as principal secretary of state. In the same year he was appointed a commissioner to inquire into the settlement of Ireland. On April 22, 1672, he was raised to the peerage and, on November 28, by the Duke of York's interest, was made lord treasurer. This excited the jealousy of Arlington, who had always aspired to that office. It was, however, the Test Act of 1673 which brought about Clifford's downfall. On the passing of the bill Clifford followed the Duke of York into retirement. He had, it would seem, been gradually moving toward Roman Catholicism, and probably the Test Act precipitated his conversion to the Roman faith. He gave up the treasurership and his seat in the privy council in June. He left London for his Devon estate, and his death a few months later may have been a suicide.

Clifford, William Kingdon (b. May 4, 1845, Exeter, Devon, Eng.—d. March 3, 1879, Madeira Islands, Portugal), British philoso-

pher and mathematician who developed the theory of biquaternions (a generalization of the Irish mathematician Sir William Rowan Hamilton's theory of quaternions) and then linked them with more general associative algebras.

Clifford was educated at King's College, London, and at Trinity College, Cambridge, and was elected a fellow of the latter in 1868. In 1871 he was named professor of mathematics at University College, London. Three years later he was elected a fellow of the Royal Society of London.

Influenced by the non-Euclidean geometries of Bernhard Riemann and Nikolay Lobachevsky, Clifford wrote "On the Space-Theory of



William Clifford, portrait replica by John Collier; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Matter" (1870). He presented the idea that matter and energy are simply different types of curvature of space, thus foreshadowing Albert Einstein's general theory of relativity. In addition, he used biquaternions to study motion in non-Euclidean spaces and certain closed Euclidean manifolds (surfaces), now known as "spaces of Clifford–Klein." He showed that spaces of constant curvature could have several different topological structures and proved the topological equivalence of a Riemann surface to a box with holes in it.

Karl Pearson of England further developed Clifford's views on the philosophy of science, which were related to those of Hermann von Helmholtz and Ernst Mach, both of Germany. In philosophy Clifford's name is chiefly associated with two phrases of his coining, "mind-stuff" (the simple elements of which consciousness is composed) and "the tribal self." The latter gives the key to his ethical view, which explains conscience and moral law by the development in each individual of a "self" that prescribes conduct conducive to the welfare of the "tribe." He recognized the serious difficulties created for certain features of Immanuel Kant's philosophy by the non-Euclidean geometries of Riemann and Lobachevsky.

Clifford's works were for the most part published posthumously and include *Elements of Dynamic,* 2 vol. (1878, 1887), *Seeing and Thinking* (1879), *Lectures and Essays* (1879), *Mathematical Papers* (1882), and *The Common Sense of the Exact Sciences,* completed by Karl Pearson (1885).

Clifton, town, Greenlee county, southeastern Arizona, U.S. It lies near the New Mexico border. Copper was discovered in 1865 at nearby Morenci (unincorporated) and was first mined there in 1872. In 1937 the Phelps Dodge Corporation began excavating an open-pit mine, now one of the largest in the United States (7,920 feet [2,414 m] across and more than 1,320 feet [402 m] deep). Clifton (incorporated 1908), the county seat, lies 2 miles (3.2 km) east of Morenci along the San Francisco River and is one of the oldest continuously producing copper-mining camps in the Southwest. Gems (agates, azurite, turquoise) are also found in the area around Clinton. Pop. (1990) 2,840.

Clifton, city, Passaic county, northeastern New Jersey, U.S. It lies along the Passaic River, between Paterson and Passaic cities. Founded in 1685, it was part of the Acquackanock Tract bought by the Dutch from the Lenni Lenape Indians. It was a part of Passaic until 1917, when it was incorporated as Clifton. Clifton is situated in a heavily industrialized area and forms a major segment of the Bergen-Passaic metropolitan statistical area. Its manufactures include steel, textiles, chemicals, electrical products, and paperboard. Pop. (1990) 71,742.

climate, condition of the atmosphere at a particular location over a long period of time; it is the long-term summation of the atmospheric elements (and their variations) that, over short time periods, constitute weather. These elements are solar radiation, temperature, humidity, precipitation (type, frequency, and amount), atmospheric pressure, and wind (speed and direction).

A brief treatment of climate follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

The idea of climate has broadened greatly in recent years. To the general public the word retains the meaning of expected or habitual weather, which is heavily dependent on place and time of year. To the specialist, however, it connotes an ensemble that transcends the simple notion of average weather.

Climate is now perceived as part of a larger system that includes not only the atmosphere but also the hydrosphere (all liquid and frozen surface waters), the lithosphere (all solid land surfaces, including the ocean floors), the biosphere (all living things), and such extraterrestrial factors as the Sun.

These interconnected subsystems are governed by known physical laws, but each nonetheless behaves in a complex, unpredictable manner. Thus, it is not surprising that the climatic system is also characterized by complexity and variability. Distinct rhythms (such as the seasons) or certain prevailing conditions may be evident, but within these constraints any number of variations may occur. Descriptions of climate therefore should include not only the average values of such elements as temperature and atmospheric pressure but also measurements of variability, such as frequency of occurrence and extreme ranges.

Large-scale fluctuations that result in new and apparently lasting conditions are known as climatic changes. Such changes may take place over millennia or even over millions of years. Evidence of such changes and of past climates is understandably limited. Full-scale measurement and analysis of all climatic variables has been possible only in recent decades as a result of technological advances. Fairly reliable instrumental records of temperature and precipitation are available for the past century or so, but these measurements were usually taken only over land areas, which constitute only a fraction of the Earth's surface. Other variables were not even measured. Older instrumental records are even less complete, and they date only to about 1700. Archaeological evidence and sporadic, primarily anecdotal, documentary records exist for the 2,000 years or so before that, but knowledge of earlier climates depends on the ability to interpret indirect sources. Major sources of this kind are sediments deposited by wind, water, or glaciers, the plant and animal fossils often contained in these rocks, and tree-ring records of annual growth.

In order for these indirect sources to be of use in reconstructing past climates, the age of the materials must first be accurately determined. The oldest and least-precise dating method involves comparing sediment contents for similarities to known deposits, thus establishing a time equivalence between the two. More accurate techniques developed in the 20th century involve radiocarbon dating of organic remains, correlating visible annual bands (such as tree rings or seasonal glacial deposits), and comparing the geomagnetic polarity of a sample to the known chronology of changes in the polarity of the Earth's magnetic field.

Once the age of a source has been determined, the sample can be studied for climatic evidence. The texture, structure, and markings of sedimentary rocks reveal much about the climatic conditions under which they were formed and deposited. Evidence of erosion, for example, can provide information about temperature and precipitation. Inferences about the living conditions of fossil organisms can be made based upon the known living conditions of the organisms' modern relatives. Less-speculative information can be derived from analyzing the isotopic composition of fossil remains. Oxygen isotope analysis of marine fossils, for example, provides a record of the temperature of the waters in which the organisms lived as well as evidence of changes in sea level. Fossil pollen and spores are especially useful because they are abundant, widespread, well-preserved, and easily identifiable. Finally, the relative size of tree rings can be studied to determine fluctuations in temperature and precipitation.

The study of paleoclimates reveals that the present is an abnormal time for the climates of the world. Ice sheets cover Greenland and Antarctica, and permanent pack ice blocks the Arctic Ocean. The deep waters of the oceans are frigidly cold in all latitudes (mostly below 3° C [37° F]). The vegetation map is strongly zonal, with treeless tundra on high-latitude land surfaces and luxuriant rain forests near the equator. Few of these conditions were typical of most of the Earth's history.

Information about climates more than 570 million years ago is fragmentary. Little is known except that temperatures were probably between 0° and 50° C (32° and 122° F).

From the beginning of the Paleozoic era (about 570 million years ago) to the beginning of the Cenozoic era (about 66.4 million years ago), it appears that the Earth's climate was relatively warm and moist, with latitudinal zonations. Evidence indicates that deserts existed and that the area around both poles was ice-free. Temporary variations did occur, including a prolonged glacial episode about 280 million years ago during which ice sheets extended into the southern high latitudes. In general, cooler, drier conditions prevailed from about 320 million to 208 million years ago. Then, warm, equable conditions returned, with mean annual surface temperatures about 6° C (11° F) higher than those of today.

These mild conditions appear to have ended abruptly about 65 million years ago, when it is thought that rapidly cooling conditions may have contributed to the extinction of the dinosaurs as well as of many other forms of life. Warm, moist conditions returned fairly soon thereafter, giving rise to latitudinal climatic zones similar to those of today. The oceans, especially the deep waters, began to experience slow cooling at this time, with occasional sharp decreases in temperature. Atmospheric cooling began in the middle Cenozoic, and by about 36 million years ago large ice sheets covered much of Antarctica, which has remained at least partly glaciated ever since. Glaciation of the Northern Hemisphere began much later, probably in the Late Miocene epoch (about 10 million years ago).

The cooling continued into the Pleistocene epoch, which began about 1.6 million years ago. In fact, the Pleistocene is sometimes re-

ferred to as the Ice Age, especially in older literature, because it is characterized by the advance of great continental glaciers from a number of centres, of which the most important were Scandinavia and the Alps in Europe and the Cordilleras and various other regions in North America. It was once believed that there were four glacial episodes, each followed by a warm interglacial interval during which the ice receded. The Holocene epoch, which constitutes roughly the past 10,000 years, was viewed as the fourth of these interglacials. Recent evidence, however, suggests that the number of glacial and of corresponding shorter interglacial episodes is actually much greater. Differences in planetary temperatures between the glacial and interglacial episodes may have been as much as 15° or 20° C (27° or 36° F). It is thought that during full glaciation global temperatures were lower than present-day values by 5° C (9° F) or more. The last glacial episode, called the Wisconsin/Würm glaciation, reached its climax about 18,000 years ago.

A warming trend followed the Wisconsin/Würm maximum. By about 9,000 years ago, summer temperatures and precipitation were above current values in much of the land areas of the Northern Hemisphere. This warm, moist phase was especially widespread in the Middle East and Asia, where it gave early humans the opportunity to develop pastoral and agricultural civilizations. A similar case of climatic fluctuation affecting human development occurred during the period AD 600 to 1400, when a slight warming in Europe and the North Atlantic enabled Viking and other northern cultures to spread and flourish. This warm phase was followed by a period during which the glaciers advanced and cooler, harsher conditions prevailed in most parts of the world. Known as the Little Ice Age, this period lasted as late as the mid-19th century in some areas. Meteorologic instrument records show that a gradual global warming trend has set in since that time. Precipitation measurements show much greater variability.

Large-scale climatic variations have been attributed to various causes. The most likely theories involve variables that produce changes in the pattern of solar heating. These are described hereafter.

Variations in the solar constant, the power per unit area of incoming solar energy, would seem to be the simplest process. Although it appears that minor fluctuations in solar irradiance have occurred, they do not seem to correlate with observed climatic changes.

Variations in the Earth's orbital behaviour can result in significant redistribution of solar heating, with attendant climatic effects. The three modes of variation are the obliquity (or tilt) of the Earth's axis, the precession of the equinoxes, and the eccentricity of the Earth's orbit around the Sun. All three occur over long time scales (from 20,000 to 100,000 years) and thus can only be used to explain climatic changes on the millennial time scale.

Variations in atmospheric composition have been shown to correlate with changes in the amount of solar radiation that reaches the Earth. It is thought that carbon dioxide and certain other atmospheric trace gases act as selective screens, admitting incoming shorter-wave radiation from the Sun (rays of visible light) but obstructing outgoing long-wave infrared radiation. Thus, an increase in the concentration of such components in the atmosphere would result in higher planetary temperatures (*see* greenhouse effect).

Volcanic activity can also introduce an atmospheric screen. The gases and dust particles emitted into the stratosphere by a major eruption can spread worldwide and remain in suspension for several years. Such dust veils can reduce the amount of solar energy reaching the lower atmosphere, resulting in lower temperatures.

Other factors that result in climatic changes are continental drift, continental uplift, and mountain building. The changes in land–sea distributions caused by these processes influence temperature and atmospheric and oceanic circulation patterns, but they operate on such long time scales that they can only help explain climatic variations on the order of millions of years.

No single theory can adequately account for all past climatic variations. Short-term fluctuations on the order of 10 years or less and the internal variability of climate are especially difficult to explain. The effects of human activities upon climate, which are incompletely understood, further complicate the study of short-term climatic fluctuations.

climatic adaptation, in physical anthropology, the genetic adaptation of human beings to different environmental conditions. Physical adaptations in human beings are seen in response to extreme cold, humid heat, desert conditions, and high altitudes.

Cold adaptation is of three types: adaptation to extreme cold, moderate cold, and night cold. Extreme cold favours short, round persons with short arms and legs, flat faces with fat pads over the sinuses, narrow noses, and a heavier-than-average layer of body fat. These adaptations provide minimum surface area in relation to body mass for minimum heat loss, minimum heat loss in the extremities (which allows manual dexterity during exposure to cold and guards against frostbite), and protection of the lungs and base of the brain against cold air in the nasal passages. Moderate cold favours the tall, stockily built individual with moderate body fat and a narrow nose, for similar reasons. Night cold—often part of a desert environment, where inhabitants must be able to withstand hot, dry daytime conditions as well as cold at night—favours increased metabolic activity to warm the body during sleep.

Heat adaptation is of two types: adaptation to humid heat and to dry heat (desert conditions). In hot climates the problem is not in maintaining body heat but in dissipating it. Ordinarily the body rids itself of excess heat by sweating. In conditions of humid heat, however, the humidity of the surrounding air prevents the evaporation of perspiration to some extent, and overheating may result. Hence, the heat-adapted person in humid climates is characteristically tall and thin, so that he has maximum surface area for heat radiation. He has little body fat; often a wide nose, since warming of the air in the nasal passages is not desirable; and usually dark skin, which shields him from harmful solar radiation and may serve to lower his sweating threshold. The desert-adapted person can sweat freely but must deal with the water loss involved; hence, he is usually thin but not tall. This adaptation minimizes both water needs and water loss. Skin pigmentation is moderate since extreme pigmentation is good protection from the sun but allows absorption of heat, which must be lost by sweating. Adaptation to night cold is also common in desert-adapted people.

High altitudes demand a degree of cold adaptation plus adaptation for low air pressure and the consequent low oxygen. This adaptation is accomplished by an increase in lung tissue generally.

climatic bubo (disease): *see* lymphogranuloma venereum.

climatic map, chart that shows the geographic distribution of the monthly or annual average values of climatic variables—*i.e.*, temperature, precipitation, relative humidity, percentage of possible sunshine, insolation, cloud cover, wind speed and direction, and atmospheric pressure over regions ranging in area from a few tens of square kilometres to global. To minimize biasing the data because of one or two periods with abnormally high or low values, the data are averaged over at least 30 periods, whether they be months or years.

Climatius, genus of extinct, primitive jawed vertebrates common as fossils in Devonian rocks in Europe and North America (the Devonian period began 408 million years ago and ended about 360 million years ago). *Climatius* is representative of the acanthodians,



Climatius, model

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

spiny sharks characterized by diamond-shaped scales—generally of small size—and fins that possessed a strong bony spine at their leading edges. *Climatius* had two dorsal fins and numerous paired ventral fins, each with a supporting spine.

climatology, branch of the atmospheric sciences concerned with both the description of climate and the analysis of the causes of climatic differences and changes and their practical consequences. Climatology treats the same atmospheric processes as meteorology (*q.v.*), but it seeks as well to identify the slower-acting influences and longer-term changes of import, including the circulation of the oceans and the small yet measurable variations in the intensity of solar radiation.

From its origins in 6th-century-BC Greek science, climatology has developed along two main lines: regional climatology and physical climatology. The first is the study of discrete and characteristic weather phenomena of a particular continental or subcontinental region. The second involves a statistical analysis of the various weather elements, principally temperature, moisture, atmospheric pressure, and wind speed, and a detailed examination of the basic relationships between such elements. Since the 1960s a third main branch, dynamic meteorology, has emerged. It deals primarily with the numerical simulation of climate and climatic change, employing models of atmospheric processes based on the fundamental equations of dynamic meteorology. Other significant subdisciplines of climatology include bioclimatology and paleoclimatology (*qq.v.*).

Climax, unincorporated mining town, Lake county, central Colorado, U.S. It lies in the Park Range of the Rockies at Fremont Pass (altitude 11,450 feet [3,490 m]), 12 miles (19 km) northeast of Leadville. Much of the world's supply of molybdenum was produced at a mine in nearby Bartlett Mountain that is the largest underground mine of its kind in North America. Molybdenum was first discovered there in 1903 by gold prospectors who ignored it, thinking it was lead. The metal was subsequently identified by the Colorado School of Mines, and later, when its value as a steel-toughening alloy was recognized, a worldwide demand ensued. Climax thus became one of Colorado's most prosperous mining towns. Pyrites, monazites, tin, and tungsten concentrates were recovered from the mill tailings.

climax (Greek: "ladder"), in dramatic and nondramatic fiction, the point at which the highest level of interest and emotional response is achieved.

In rhetoric, climax is achieved by the arrangement of units of meaning (words, phrases, clauses, or sentences) in an ascending order of

importance. The following passage from Melville's *Moby Dick* (1851) is an example:

> All that most maddens and torments; all that stirs up the lees of things; all truth with malice in it; all that cracks the sinews and cakes the brain; all the subtle demonisms of life and thought; all evil, to crazy Ahab, were visibly personified and made practically assailable in Moby Dick.

In the structure of a play the climax, or crisis, is the decisive moment, or turning point, at which the rising action of the play is reversed to falling action. It may or may not coincide with the highest point of interest in the drama. In the influential pyramidal outline of five-act dramatic structure, advanced by the German playwright Gustav Freytag in *Die Technik des Dramas* (1863), the climax, in the sense of crisis, occurs close to the conclusion of the third act. By the end of the 19th century, when the traditional five-act drama was abandoned in favour of the three-act, both the crisis and the emotional climax were placed close to the end of the play.

climbing perch, also called WALKING FISH (species *Anabas testudineus*), small Asian freshwater fish of the family Anabantidae (order Perciformes) noted for its ability to live and walk about out of water. The climbing perch is an air-breathing labyrinth fish. Rather oblong, brownish or green, it grows to about 25 cm (10 inches). It lives in ponds and ditches and sometimes emerges for short periods, "walking" with a jerky motion, aided by its tail and by spines on the lower edges of its gill covers. *See also* labyrinth fish.

Clinch River, river rising in Tazewell county, southwestern Virginia, U.S., and flowing about 300 miles (480 km), generally southwest, through the Great Appalachian Valley into eastern Tennessee. There it passes through Norris Reservoir (impounded by Norris Dam) near the junction with the Powell River and flows on through Watts Bar Reservoir to the Tennessee River. The river is an important part of the Tennessee Valley Authority (TVA) system.

clingfish, any of about 100 species of small fishes of the family Gobiesocidae and the order Gobiesociformes. Clingfishes are characterized by a strong suction disk located on the undersurface and formed by the pelvic fins and adjacent folds of flesh. They are scaleless fishes and have wide, flattened heads. Most species are about 7.5 cm (3 inches) or less in length, though the South African *Chorisochismus dentex* is up to 30 cm long. Some of the tropical American clingfishes of the genus *Gobiesox* live in rapid streams, but most clingfishes inhabit the sea, living in the intertidal zone and maintaining a hold on the bottom with the sucking disk.

Clingmans Dome, peak in the Great Smoky Mountains National Park, U.S., near the Tennessee–North Carolina boundary, 35 miles (56 km) southeast of Knoxville. The highest point in Tennessee, it rises 6,643 feet (2,025 m). A tower 45 feet (14 m) high at the end of a sloping spiral ramp affords an unobstructed view of the Smokies. The peak was named for Thomas L. Clingman, U.S. senator from North Carolina.

clinical psychology, a branch of psychology concerned with the practical application of research findings and methodologies in the diagnosis and treatment of mental disorders.

Clinical psychologists classify their basic activities under three main headings: assessment (including diagnosis), treatment, and research. In assessment, clinical psychologists give and interpret psychological tests, either for the purpose of evaluating individuals' relative intelligence or other capabilities or for the purpose of eliciting mental characteristics that will aid in diagnosing a particular mental disorder. The interview, in which the psychologist observes, questions, and interacts with a patient, is another standard tool of diagnosis.

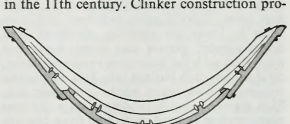
For purposes of treatment, the clinical psychologist may use any of several types of psychotherapy (*q.v.*), and recently the tendency has been toward an eclectic approach, using a combination of techniques suited to the client. Clinical psychologists may specialize in behaviour therapy, group therapy, family therapy, or psychoanalysis, among others.

Research is an important field for some clinical psychologists because of their training in the use of experimental studies and statistical procedures. Clinical psychologists are thus often crucial participants in research projects bearing on mental-health care. They also function as teachers and as mental-health administrators.

Many clinical psychologists perform their services in general or psychiatric hospitals and in clinics, with community prevention and treatment becoming more of a focus. Some treat patients in private practice, while others work with the mentally or physically handicapped, prison inmates, drug and alcohol abusers, or geriatric patients. In some clinical settings, a clinical psychologist works in tandem with a psychiatrist and a social worker and is responsible for conducting the team's research. Clinical psychologists are also employed in industry, where some specialize in services to emotionally disturbed employees and others in services for managerial officials. Other clinical psychologists serve the courts in assessing defendants or potential parolees, and some are employed by the armed forces to evaluate or treat service personnel.

The training of clinical psychologists usually includes the university-level study of general psychology and some clinical experience and amounts to 5–7 years of higher education in all. Because they have not earned a medical degree, clinical psychologists cannot prescribe medications for patients.

clinker construction, method of shipbuilding characteristic in north European waters during ancient and medieval times, in which the planks were overlapped and, in earlier times, usually joined by sewing. The earliest-known specimen, found in Als, Denmark, dates from about AD 300. The Viking ships that raided Europe and discovered America were clinker built, as were the ships with which William the Conqueror invaded Britain in the 11th century. Clinker construction provided less efficient streamlining than edge-to-edge (carvel) construction but gave the extra strength needed for safety in stormy north European waters.



Midship section of a boat found at Björke, Swed., an early clinker-built vessel

From Björn Landström, *The Ship*, illustration copyright 1961 by Björn Landström; reproduced by permission of Doubleday & Company, Inc.

clinoptilolite, hydrated alkali aluminosilicate that is one of the most abundant minerals in the zeolite family. Its structure consists of an outer framework of silica and alumina tetrahedra, within which water molecules and exchangeable cations (*e.g.*, calcium, potassium, sodium) migrate freely. Although clinoptilolite's chemical formula varies with composition, a typical representation is given by $(Na_2,K_2,Ca)_3Al_6Si_{30}O_{72} \cdot 24H_2O$.

Clinoptilolite's structure closely resembles that of heulandite, another zeolite mineral, but contains a higher proportion of silica and alkalies. Clinoptilolite is somewhat soft and forms platy, nearly transparent crystals of monoclinic symmetry. It is typically colourless in thin sections, but other colours (*e.g.*, brown, pink, red) may occur owing to the presence of impurities such as iron oxide. The dehydrated mineral has the properties of a molecular sieve that selectively extracts nitrogen from a stream of air, leaving the effluent enriched in oxygen. As an ion exchanger, clinoptilolite has been used to remove cesium and strontium from radioactive wastes produced in reprocessing nuclear fuels and to remove ammonia from sewage streams. The mineral is also used as a filler and bulking agent in the manufacture of paper.

Clinoptilolite can be found in many zeolitic sedimentary rocks; in the compacted deposits of volcanic ash commonly called tuffs; as a by-product of the weathering of basalt; and in some shale deposits. Its sites of occurrence include Oregon, South Dakota, and Wyoming, U.S.; New Zealand; New South Wales, Australia; the Faroe Islands; and Bombay, India.

Clinton, urban town (township), Worcester county, central Massachusetts, U.S. It lies along the South Branch of the Nashua River, 12 miles (19 km) north-northeast of Worcester. Settled in 1654 as part of Lancaster, it was separately incorporated in 1850 and named for the statesman DeWitt Clinton. The manufacture of lace (for stagecoach windows), employing modern factory methods, was of early economic importance. In 1843, Erastus and Horatio Bigelow built a mill there for the manufacture of ginghams (striped or checked cotton cloths). A few years later, the Bigelow carpet mills were also established. The town developed around these two plants, which existed until the early 1930s. Carpets and looms are still manufactured; other economic activities include printing, metalwork, and the manufacture of electrical machinery, chemicals, and wire products. The Wachusett Dam and Reservoir are nearby. Pop. (1993 est.) 13,475.

Clinton, DeWitt (b. March 2, 1769, Little Britain, N.Y. [U.S.]—d. Feb. 11, 1828, Albany, N.Y., U.S.), American political leader who promulgated the idea of the Erie Canal (*q.v.*), which connects the Hudson River to the Great Lakes.

DeWitt Clinton was the nephew of Governor George Clinton of New York. A Republican (Jeffersonian) attorney, he served as state senator (1798–1802, 1806–11), U.S. senator (1802–03), mayor of New York City (1803–15 except for two annual terms), and lieutenant governor (1811–13). As mayor of New York City, he advocated free and widespread public education, promoted legislation that removed voting restrictions against Roman Catholics, and established various public-welfare institutions in the city. He was an unsuccessful presidential candidate in 1812, winning 89 electoral votes to James Madison's 128.

In 1811 Clinton introduced a bill into the New York Senate to appoint a commission to explore suggested routes for a canal across New York state to link the Northeast coastal trade with the Great Lakes via Lake Erie. He and Gouverneur Morris, chairman of the commission, were sent to Washington, D.C., to seek federal aid for the project but were unsuccessful. After the War of 1812 ended (1814), the canal idea was revived, and Clinton went to the state capital at Albany, urging acceptance of a detailed canal plan. After much persuasion, the legislature agreed to finance the canal as a state project (April 1816) and appointed Clinton to the commission.

Elected governor at this opportune time and serving almost continuously (1817–23, 1825–28) until his death, he was in an advantageous

position to oversee the entire project. As bitter opposition to his administration developed under Martin Van Buren and Tammany Hall, Clinton refused to run for a third term in



DeWitt Clinton, detail of an oil painting by John Wesley Jarvis; in the National Portrait Gallery, Washington, D.C.
By courtesy of the National Portrait Gallery, Smithsonian Institution, Washington, D.C.

1822. But his dismissal as canal commissioner in 1824 caused such indignation statewide that he was swept into the governorship the next year and served until his death. With the opening of the Erie Canal on Oct. 25, 1825, Clinton assured the 19th-century development of New York City as the major port of trade with the Midwest.

Clinton was also profoundly interested in the arts and the natural sciences, and he published an excellent summary of the state of scientific knowledge in the United States in a work entitled *An Introductory Discourse* (1814).

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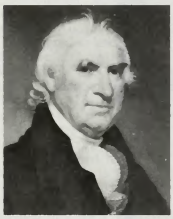
Clinton, George (b. July 26, 1739, Little Britain, N.Y. [U.S.]—d. April 20, 1812, Washington, D.C.), soldier, governor of New York, and vice president of the United States.

Clinton served in the last French and Indian War (1756–63) and was a member of the New York Assembly (1768–75) and, in 1775, of the Continental Congress. In the summer of 1776



George Clinton, detail of an oil painting by Ezra Ames, 1814; in the collection of the New-York Historical Society
By courtesy of the New-York Historical Society

he was ordered by General George Washington to New York City before he could sign the Declaration of Independence. In March 1777 he was appointed brigadier general.

Immensely popular with the people of New York, Clinton served for 18 consecutive years as governor (1777–95) and later served an additional three-year term (1801–04). As governor he was a forceful leader and an able administrator. During the struggle in New York over the adoption of the U.S. Constitution, he was one of the leaders of the opposition. In national politics Clinton was a follower of Thomas Jefferson. He was elected vice president of the United States in 1804 and 1808. In the latter year he unsuccessfully sought the nomination for the presidency. He died before the expiration of his second term as vice president.

Clinton, Sir Henry (b. April 16?, 1730?—d. Dec. 23, 1795, Cornwall, Eng.), British commander in chief in America during the Revolutionary War.

The son of George Clinton, a naval officer and administrator, Henry joined the New York militia in 1745 as a lieutenant. He went to London in 1749 and was commissioned in the British army in 1751. He was wounded (1762) in the Seven Years' War in Europe and was promoted to major general in 1772. He went to North America in 1775 as second in command to Sir William Howe. He fought with distinction at Bunker Hill and Long Island and was left in command in New York when Howe went south to Pennsylvania. On Howe's retirement (1778), Clinton (knighted 1777) succeeded to the supreme command. He led the main body of his army in an offensive in the Carolinas in 1780. After Charleston fell, he returned to New York, leaving Lord Cornwallis, his second in command, in charge of the subsequent operations that led to the capitulation at Yorktown and the peace treaty recognizing American independence. Clinton resigned his command in 1781 and went back to England, where he found Cornwallis viewed with sympathy and himself blamed for the Yorktown defeat. His *Narrative of the Campaign of 1781 in North America* (1783) provoked an angry reply from Cornwallis.

Clinton, William J., in full WILLIAM JEFFERSON CLINTON, original name WILLIAM JEFFERSON BLYTHE IV, byname BILL CLINTON (b. Aug. 19, 1946, Hope, Ark., U.S.), American politician who became the 42nd president of the United States (in 1993).

Bill Clinton's father, William Jefferson Blythe 3rd, died in an automobile accident before his son was born. Blythe's widow married Roger Clinton, and Bill eventually took the latter's name. Bill Clinton graduated from Georgetown University (Washington, D.C.) in 1968 with a degree in international affairs and then attended the University of Oxford as a Rhodes scholar for two years. He graduated from the Yale University Law School in 1973 and joined the faculty of the University of Arkansas School of Law that same year. Clinton directed the presidential campaign of Democratic candidate George McGovern (1972) in Texas and that of Jimmy Carter (1976) in his home state, and in 1974 he ran unsuccessfully for a seat in the U.S. House



Bill Clinton
© Hartmann/Gamma-Liaison

of Representatives. He was elected attorney general of Arkansas in 1976, and in 1978 he was elected governor, becoming at age 32 the youngest governor the nation had seen in 40 years.

After an eventful two-year term as governor, Clinton failed in his reelection bid in 1980 but regained the governor's office in 1982, after which he was successively reelected three more times by substantial margins. A pragmatic Democrat, he reformed Arkansas' neglected educational system and encouraged the growth of industry in his state through favourable tax policies.

Clinton campaigned for and won the Democratic presidential nomination in 1992 after withstanding charges early in the primary campaigns of personal impropriety. He went on to win the presidential election that November, defeating the Republican incumbent, George Bush, and independent candidate Ross Perot. In 1993 Clinton obtained narrow Congressional approval of legislation designed to reduce the federal government's continuing large budget deficits through a combination of increased taxes on the wealthy and modest cuts in government programs. Later that year he won Congressional approval of the North American Free Trade Agreement, which created a free-trade zone between the United States, Canada, and Mexico.

Clinton spent a considerable portion of 1994 campaigning for Congressional passage of his plan to overhaul the U.S. health-care system. But the plan, which sought to control costs while simultaneously providing universal coverage for all Americans, died in Congress. Clinton's major foreign-policy venture was a successful effort in September–October 1994 to reinstate Haitian president Jean-Bertrand Aristide, who had been ousted by the military in 1991.

In the Congressional elections of November 1994, the voters registered a strong rejection of Clinton and his policies; the Democrats lost control of both the Senate and the House of Representatives to the Republican Party for the first time since 1954.

clintonite, also called SEYBERTITE, mica mineral, a basic aluminosilicate of calcium, magnesium, and iron. It occurs in chlorite schist (with talc) and in altered limestones. Clintonite is the primary member of a group of micas (also including margarite) in which calcium substitutes for potassium and the silicon content increases. The members of the clintonite group, also called the brittle micas, are harder and more brittle than the common micas. For chemical formula and detailed physical properties, *see* mica (table).

Clio, in Greek mythology, one of the nine Muses, patron of history. Traditionally Clio, after reprimanding the goddess Aphrodite for her passionate love for Adonis, was punished by Aphrodite, who made her fall in love with Pierus, king of Macedonia. From that union was born Hyacinthus, a young man of great beauty who was later killed by his lover, the god Apollo. From his blood sprang a flower. In art Clio was frequently represented with the heroic trumpet and the clepsydra (water clock).

clionid, any member of the sponge family Clionidae (class Demospongiae, phylum Pori-



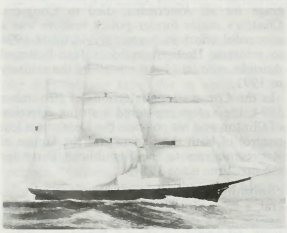
A clionid (*Cliona viridis*) with three large openings (oscula)
Mattini Solaini—M. Grimoldi

fera), noted for its ability to dissolve and bore into calcium-containing substances, such as limestone, coral, and the shells of mollusks. Clionids occur in all oceans. The clionid larva settles on a calcium-containing substance and develops into an adult as it bores galleries.

Clionids are ecologically important, for they destroy seashells that would otherwise accumulate on the ocean floor. *Cliona sulphurea,* common in coastal waters from New England to South Carolina, is bright yellow and lives on the shells of both dead and living mollusks.

The name Clionidae is also applied to a family of gastropods.

clipper ship, classic sailing ship of the 19th century, renowned for its beauty, grace, and speed. Apparently starting from the small, swift coastal packet known as the Baltimore clipper, the true clipper evolved first in American and later in British yards. In its ultimate form it was a long, slim, graceful vessel with



The clipper *Flying Cloud*
By courtesy of the Peabody Museum, Salem, Mass.

projecting bow and radically streamlined hull, carrying an exceptionally large spread of sail on three tall masts. The emphasis on speed came partly from the desire to bring the first tea of the season back from China, partly from the competition with the overland route across North America to the California goldfields. The *Flying Cloud,* launched in 1851, made the voyage from New York City to San Francisco in a record 89 days, and the *James Baines* set the transatlantic sailing record of 12 days 6 h from Boston to Liverpool, Eng. The *Lightning* set the all-time record for a single day's sail, covering 436 nautical miles in 24 h. The *Lightning* and the *James Baines* (both launched in 1854 or 1855), as well as the *Flying Cloud,* were built by Donald McKay, a Canadian-born shipbuilder, at his shipyard at East Boston, Mass.

Clipperton Fracture Zone, fracture zone in the Earth's surface, in the floor of the northeastern equatorial Pacific Ocean, discovered and delineated by expeditions of the Scripps Institution of Oceanography in 1950 and succeeding years. The fracture zone is more than 7,240 km (4,500 miles) long, trending eastnortheast along a global small circle from the vicinity of the Line Islands at about latitude 2° N and longitude 153° E to the vicinity of the Middle America Trench off Central America at latitude 10° N.

The Clipperton Fracture Zone is one of a family of five great lineations in the North Pacific seafloor, all of which conform closely to global small circles concentric about a common pole at latitude 79° N and longitude 111° E. This geometry suggests a common history for the fracture zones and implies that the Clipperton Fracture Zone, like its northern counterparts, was produced as a scar of transform faulting associated with seafloor spreading that began at least 80 million years ago. *See also* seafloor spreading hypothesis.

Clipperton Island, uninhabited French island in the eastern Pacific Ocean, 1,800 miles (2,900 km) west of Panama and 1,300 miles (2,090 km) southwest of Mexico. It is a roughly circular coral atoll (2 square miles [5 square km]), barely 10 feet (3 m) high in most places but with a promontory 70 feet (21 m) high surmounted by a ruined 19th-century lighthouse. Vegetation consists of low scrub, patches of wild tobacco, and a few coconut groves. Named after the English mutineer and pirate John Clipperton, who made the island his lair in 1705, it was listed as a U.S. island under the Guano Act (1856) but had already been annexed by France in 1855. Seized by Mexican forces, it was garrisoned from 1897 to 1917. With the opening of the Panama Canal, Clipperton Island attained new importance. In 1930, King Victor Emmanuel III of Italy arbitrated the conflicting claims in favour of France. It was a dependency of French Polynesia until 1979, when France assumed direct administration of the dependency.

Clisthenes OF ATHENS (Athenian statesman): *see* Cleisthenes of Athens.

Clisthenes OF SICYON: *see* Cleisthenes of Sicyon.

Clitherow, Saint Margaret, *née* MIDDLETON (b. 1556, York, Yorkshire, Eng.—d. March 25, 1586, York; canonized 1970; feast day March 25), one of the 40 British martyrs who were executed for harbouring priests during the reign of Queen Elizabeth I of England.

She married (1571) a widower, John Clitherow, a butcher twice her age. Brought up in a Protestant England, she converted to Roman Catholicism in 1574. She refused to attend the Anglican Church and was repeatedly fined for refusing. Thus, on June 6, 1576, she was designated a recusant (*i.e.,* one who fails to attend Anglican services). Because she was pregnant, she was excused from having to report to a council the following November, but she was later imprisoned for nearly a year.

Clitherow allowed secret masses to be celebrated in her home, where she also hid Roman Catholic missionary priests. After further imprisonments and releases, she was seized on March 10, 1586, during a raid on her home. Her fate was sealed, for a law of 1583 made aiding Jesuits and seminary priests punishable by death. She refused to plead guilty or innocent, stating that only God could judge her, and was executed by being slowly crushed to death with an 800-pound weight.

Clitias (Athenian vase painter): *see* Cleitias.

clitoridectomy, also called FEMALE CIRCUMCISION, or EXCISION, ritual surgical procedure that may range in degree from the drawing of blood to infibulation (also called Pharoanic circumcision), which consists in removal of the clitoris, the labia minora, and the anterior two-thirds of the labia majora, the sides of which are joined leaving a small posterior opening.

The practice of female circumcision dates to ancient times and was traditionally performed to guard virginity and to reduce sexual desire. Though statistics are generally unavailable because the operation is rarely performed by the medical community, it is widely practiced in such places as New Guinea; Australia; the Malay Archipelago; Ethiopia, Egypt, and other parts of Africa; Brazil; Mexico; Peru; and by various Islāmic peoples of the Middle East, Africa, western Asia, and India. Infibulation is common particularly in The Sudan, Somalia, and Nigeria. The operation is usually performed by a midwife, often under less than hygienic conditions. Especially with the more radical excision, consequences sometimes include severe bleeding, tetanus and other infections, exquisite pain, and death. Even with normal healing, urination and sexual intercourse can be quite painful and menstrual blood can back up. Where the practice of infibulation is common, women are reinfibulated after the birth of each child.

Groups in which clitoridectomy is practiced also usually practice male circumcision and view the ritual as part of a religious or ethnic tradition and as a necessary stage for passage into responsible adulthood.

clitoris, female erogenous organ capable of erection under sexual stimulation. A female homologue of the male penis, the clitoris develops (as does the penis) from the genital tubercle of the fetus, and it plays an important role in female sexual response.

The clitoris is a small cylinder about 2 to 3 cm (about ¾ inch to slightly more than 1 inch) long, containing two small erectile bodies (the corpora cavernosa). In the female fetus, the corpora cavernosa begin as separate entities, but later in fetal development they unite at the midline to form the clitoris proper. During sexual excitement, the corpora cavernosa become engorged with blood, causing erection. The body of the clitoris is suspended from the pubic bone by a short ligament and emerges to form the tiny glans at the top of the vulva (*q.v.*). This glans has a generous supply of sensitive nerve endings, which account for the clitoris' central role in tactile sexual stimulation.

Clitunno River, Latin CLITUMNUS, river in Umbria *regione,* central Italy, rising from an abundant spring between Spoleto and Trevi and flowing 37 miles (60 km) northwest to join the Timia, a tributary of the Tiber (Tevere) River. The spring was described by the Roman writers Virgil and Pliny the Younger and was visited by the emperors Caligula and Flavius Honorius.

Clive, Kitty, original name CATHERINE RAFTOR (b. 1711—d. Dec. 6, 1785, Twickenham, near London, Eng.), one of David Garrick's leading ladies, the outstanding comedic actress of her day in England.



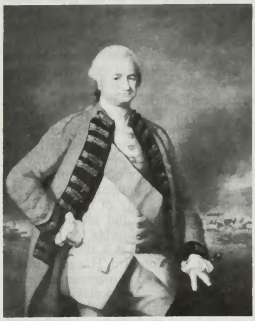
Kitty Clive, engraving by W. Greatbach after G.P. Harding
By courtesy of the Mander and Mitchenson Theatre Collection

About 1728 Clive began to play at Drury Lane Theatre under the actor and dramatist Colley Cibber, and she soon became a favourite. She married George Clive, a barrister, but they separated by mutual consent. Her first great success was as a comedienne and singer. Almost her whole career belonged to Drury Lane, where, in 1747, she joined Garrick. Although she was temperamental and led Garrick, who was afraid of her, a troubled life, she remained with him for 22 years, always playing comedy roles. She also sang in some of the oratorios of George Frideric Handel, whose friend she was. In 1769 she retired.

The author Horace Walpole gave her a villa near his own at Twickenham.

Clive, Robert, 1ST BARON CLIVE OF PLASSEY (b. Sept. 29, 1725, Styche, Shrop-

shire, Eng.—d. Nov. 22, 1774, London), soldier and first British administrator of Bengal, who was one of the creators of British power in India. In his first governorship (1755–60) he won the Battle of Plassey and became master



Robert Clive, replica of an oil painting by N. Dance; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

of Bengal. In his second governorship (1764–67) he reorganized the colony.

Young Clive was a difficult boy and was sent to several schools, including the Merchant Taylors' School in London, without much visible profit. In 1743, when 18, he was sent to Madras in the service of the English East India Company.

First years in India. At Madras, Clive was moody and quarrelsome, attempted suicide, and once fought a duel. He found solace in the governor's library where he virtually educated himself. Hostilities between the English and French East India companies and their competitive support of rival Indian princes drew Clive into military service and gave him a chance to demonstrate his ability. In 1751 Chanda Sahib, an ally of the French, was besieging his British connected rival, Muhammad 'Ali, in the fortress of Trichinopoly. Clive offered to lead a diversion against Chanda's base at Arcot. With 200 Europeans and 300 Indians, he seized Arcot on August 31 and then successfully withstood a 53-day siege (September 23–November 14) by Chanda's son. This feat proved to be the turning point in a contest with the French commander, Joseph-François Dupleix. In the next months Clive established himself as a brilliant exponent of guerrilla tactics. In March 1753 he left Madras with his bride, Margaret Maskelyne, and something of a fortune, having been appointed in 1749 a commissary for the supply of provisions to the troops.

In 1755, after unsuccessfully standing for Parliament, he was sent out again to India as governor of Ft. St. David and with a lieutenant colonel's commission in the Royal Army. With him went troops intended to expel the French from India. On the way, at the request of the Bombay government, he stormed the pirate stronghold at Gheriah on the western coast.

Reaching Madras in June 1756, Clive immediately became involved in the affairs of Bengal, with which, henceforward, his fate was to be linked. Hitherto Bengal had been ruled by viceroys of the figurehead Mughal emperor, and it was under their protection that the English East India Company carried on its trade. The principal city, Calcutta, had come to rival Madras as a trading centre, and its commerce was the most valuable in India. In 1756 a dispute with the British about fortifying the city caused the new nawab (Mughal viceroy) of Bengal, Sirāj-ud-Dawlah, to attack and capture the fort there.

Calcutta and Plassey. News of the fall of Calcutta reached Madras in August 1756. After some delay Clive was given command of the relief expedition and set out on Oct. 16, 1756, with 900 Europeans and 1,500 Indians. Clive retook Calcutta on Jan. 2, 1757, and forced the Nawab to restore the company's privileges, pay compensation, and allow the British to fortify Calcutta. Determined to take advantage of discontent with the Nawab's regime, he sponsored a new ruler in order to ensure conditions agreeable to the company's trade. His candidate was Mīr Ja'far, an elderly general secretly hostile to Sirāj-ud-Dawlah. Clive broke with Sirāj-ud-Dawlah and overthrew him at the Battle of Plassey on June 23. The conflict was more of a cannonade than a battle, and only 23 of Clive's men were killed. This victory made Clive the virtual master of Bengal.

Clive's first government lasted until February 1760. He was confirmed as governor by the company and went about the business of strengthening Mīr Ja'far's authority, though at the same time keeping him under control. A challenge from the Mughal crown prince was repulsed at Patna in 1759. The Dutch, who sought to play on the Nawab's discontent at Clive's restraints, sent a force to their settlement at Chinsura, but through a series of adroit moves Clive destroyed this force even though England was at peace with the Netherlands. By 1760 Mīr Ja'far's authority was unchallenged throughout Bengal and Bihār, and his subservience to the company was complete. In addition, by the dispatch of a force under Col. Francis Forde in 1758, Clive secured the Northern Sarkārs from the French garrison.

His settlement of the company's affairs was less skillful. First, he accepted not only full compensation for loss to the East India Company and the Calcutta citizens but also large payments to himself and the council. He himself received in all £ 234,000 in cash, a Mughal title of nobility, and an estate, or *jāgīr*, with an annual rental of about £ 30,000. This example opened the way to a flood of corruption that nearly ruined both Bengal and the company and which Clive himself later struggled to control. Second, he obtained from the Nawab the practical exemption from internal duties not only of the company's goods but also of the private trade of the company's servants as well. Since the company possessed paramount force and its servants believed in working on their own behalf, this had a most harmful effect on the economy of Bengal.

Though stained by corruption and duplicity, Clive's first government was a tour de force of generalship and statecraft. He had snatched the richest province of India out of the hands of his political superiors and with the authority of the Mughal regime. Returning to England in February 1760, he was given an Irish peerage as Baron Clive of Plassey in 1762 and was knighted in 1764. He was described by William Pitt (afterward 1st earl of Chatham) as "a heaven-born general." He became member of Parliament for Shrewsbury, purchased an estate, and tried to use his Indian wealth to carve out an English political career. But he had to reckon with the current jealousy toward any upstart, however brilliant, the unpopularity of returned Indian "nabobs," and suspicions within the East India Company resulting from his suggestion to Pitt that the state should take over its territories. His critics, led by a former friend who was then chairman of the company, tried to cut off the income from his Indian estates. Though they failed to ruin him, they did prevent him from becoming a national statesman.

In 1764 opinion within the company turned in Clive's favour because of the news from India. Clive's protégé Mīr Ja'far had been deposed in favour of Mīr Qāsim, who in turn had been deposed in 1763. Shāh 'Ālam II, the Mughal emperor, attacked again, and the company seemed to be on the brink of disaster. Clive was appointed governor and commander in chief of Bengal with power to override the council. Arriving in Calcutta for the second time on May 3, 1765, he found that the decisive Battle of Baksar (Buxar) had already been won; Shujā'-ud-Dawlah, the nawab of Oudh, was in flight, and the Emperor had joined the British camp. But there was a political and military vacuum between Bengal and Delhi (the Mughal capital), and the whole Bengal administration was in confusion.

Clive's administrative achievements. Clive's chief claim to fame as a statesman rests upon the achievements of his second governorship. His work falls into three parts: external policy, the settlement of Bengal, and the reform of the company's service. In his external policy Clive had to face one of the most difficult tests of statesmanship: that of knowing where to stop. Though there was nothing to prevent him from restoring Shāh 'Ālam II to Delhi and ruling north India in his name, he wisely decided to limit the company's commitments to Bengal and Bihār. Oudh was returned to Shujā'-ud-Dawlah a buffer state between Bengal and the turbulent northwest. The Emperor was solaced with an annual tribute, and in return he conferred the revenue administration (dewanee) of Bengal on the East India Company. This grant formed the key to Clive's second achievement, the settlement of Bengal. It gave legal authority to the company to collect the revenues of Bengal and Bihār, sending the Emperor only his annual tribute. The administration of the dewanee was organized through a deputy nawab appointed by the company. The police and magisterial power was still exercised by the nawab of Bengal as the Emperor's deputy, but he in turn nominated the company's deputy to act for him. This was Clive's so-called dual system, which made the company the virtual ruler of India's two richest provinces.

Clive's third task was the reform of the company's service. Within two days of landing he superseded the Calcutta council, which defied his predecessor, Henry Vansittart. He reestablished discipline by accepting all resignations, enforcing others, and bringing replacements from Madras. All company servants were required to sign covenants not to receive presents worth more than 1,000 rupees without the consent of the governor. Private trade, the abuse of which had caused the war, was forbidden. This was the least successful measure because the company's officials were not adequately paid and had no other means of livelihood. Clive tried to meet the difficulty by forming a trading company that administered the salt monopoly and in which the servants received shares according to their rank. These two measures, only partially successful, marked the end of nearly 10 years' reckless plunder in Bengal. Finally Clive dealt with the army with equal rigour. He cut down swollen allowances and faced with dauntless courage the White Mutiny of discontented officers, when for a time he stood almost alone in Bengal.

Clive left Calcutta in January 1767. His second government was his crowning achievement, but he had made many enemies. An active group, supported by Lord Chatham, feared the corrupting influence of Indian wealth on English public life. In 1772, when the company appealed to the government to save it from bankruptcy, it appeared that Clive's system of government in Bengal had not been as successful as had been hoped. Two parliamentary committees uncovered the facts

of corruption among the company's servants, and this set off an attack on Clive as the instigator of the whole process. He defended himself in Parliament (1773) with characteristic vigour and conviction, complaining of being treated like a sheep stealer and declaring "I stand astonished at my own moderation." In 1773 Parliament declared that he did "render great and meritorious services to his country." This triumph was his last. With his already shaken health, the strain on his melancholic temperament was too great: November 1774 he died by his own hand at his house in London. Clive's talents were outstanding, his character no more unscrupulous than that of many men of his day, and his work marked the real beginning of the British Empire in India. (T.G.P.S.)

BIBLIOGRAPHY. For Clive's Indian career, the best book is H.H. Dodwell, *Dupleix and Clive* (1920, reprinted 1968); and for his relations with the East India Company in Britain, see Lucy Sutherland, *The East India Company in 18th Century Politics* (1952). Both works are of outstanding merit. A detailed but uncritical biography is G.W. Forrest, *The Life of Lord Clive*, 2 vol. (1918); the best personal study is A.M. Davies, *Clive of Plassey* (1939).

cloaca (Latin: "sewer"), in vertebrates, common chamber and outlet into which the intestinal, urinary, and genital tracts open. It is present in amphibians, reptiles, birds, elasmobranch fishes (such as sharks), and monotremes. A cloaca is not present in placental mammals or in most bony fishes. Certain animals have, within the cloaca, an accessory organ (penis) that is used to direct the sperm into the female's cloaca. This structure occurs in many reptiles and in a few birds, including ducks. Most birds, however, mate by joining their cloacas in a "cloacal kiss"; muscular contractions transfer the sperm from the male to female.

Cloaca Maxima, ancient Roman sewer, one of the oldest monuments in the Roman Forum. Originally an open channel constructed in the 6th century BC by lining an existing stream bed with stone, it was enclosed, beginning in the 3rd century BC, with a stone barrel (semicircular) vault. Its primary function was to carry off storm water from the Forum district to the Tiber, but in Imperial times large public baths and latrines were connected to it. Much of its original masonry has been replaced by concrete.

cloak and dagger theatre: *see* cloak and sword drama.

cloak and sword drama, also called CLOAK AND DAGGER THEATRE, Spanish COMEDIA DE CAPA Y ESPADA, 17th-century Spanish plays of upper middle class manners and intrigue. The name derives from the cloak and sword that were part of the typical street dress of students, soldiers, and cavaliers, the favourite heroes. The type was anticipated by the plays of Bartolomé de Torres Naharro, but its popularity was established by the inventive dramas of Lope de Vega and Tirso de Molina. The extremely complicated plots deal with the frustration of an idealized love by the conventional Spanish *pundonor* ("point of honour"). The affairs of the lady and her gallant are mirrored or parodied in the actions of the servants; the hero's valet (the *gracioso*) also supplies a common-sense commentary on the manners of his masters. After many misunderstandings, duels, renunciations, and false alarms about honour, the plays usually end happily with several marriages. In the 19th and 20th centuries the term "cloak-and-dagger" referred to espionage, both real and fictional.

Clochán an Aifir (Northern Ireland): *see* Giant's Causeway.

clock, machine in which a device that performs regular movements in equal intervals of time is linked to a counting mechanism that records the number of movements. All clocks, of whatever form, are made on this principle.

The origin of the all-mechanical escapement clock is unknown; the first such devices may have been invented and used in monasteries to alert the sacristan to toll a bell that called the monks to prayers. The first mechanical clocks to which clear references exist were large, weight-driven machines, fitted into towers and known as turret clocks. These early devices did not strike the hour, nor did they have hands or a dial.

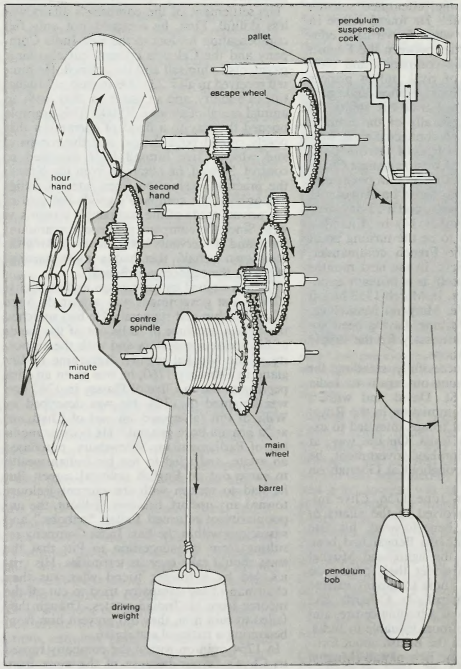
The first public clock that struck the hours was made and erected in Milan in 1335. The oldest surviving clock in England is that at Salisbury Cathedral, which dates from 1386. A clock erected at Rouen, Fr., in 1389 is still extant, and one built for Wells Cathedral in England is preserved in the Science Museum, London. The Salisbury clock strikes the hours, and those of Rouen and Wells also have mechanisms for ringing chimes at the quarter hour. Other English clocks of somewhat later date were large, iron-framed structures driven by falling weights attached to a cord wrapped around a drum and regulated by a mechanism known as a verge (or crown wheel) escapement. Their errors probably were as large as a half hour per day. The first domestic clocks were smaller versions of these large public clocks. They appeared late in the 14th century, and few examples have survived; most of them, extremely austere in design, had no cases or means of protection from dust. These clocks stood on a pedestal with an aperture to accommodate the weights.

About 1500 Peter Henlein, a German locksmith, began to make small clocks driven by a spring. These were the first portable timepieces, representing one of the great strides in horology. The dials of these clocks, placed on the top and possessing an hour hand only (minute hands did not appear until 1670), were exposed to the air; there was no form of cover such as a glass until the 17th century (*see also* watch).

From the end of the 16th century, clocks were made in the upright form. They were similar to the domestic weight-driven clocks but were not portable. During the early part of the 17th century, the mechanism was enclosed and the cases were made of brass.

About 1582 Galileo noticed the characteristic timekeeping property of the pendulum. The Dutch astronomer and physicist Christiaan Huygens was responsible for the application of the pendulum as a time controller in clocks from 1656 onward. Huygens' invention brought about a great increase in the importance and extent of clockmaking. Clocks, weight driven, with short pendulums, were encased in wood and made to hang on the wall. In 1670 the long, or seconds, pendulum was introduced by William Clement, an English clockmaker. The next step was to enclose the pendulum and weights, and the long-case, or grandfather, clock was born.

The pendulum is a reliable time measurer because, for small arcs, the time required for a complete swing (period) depends only on the length of the pendulum and is almost independent of the extent of the arc. The length of a pendulum with a period of one second



Weight-driven clock

is about 39 inches (990 millimetres), and an increase in length of 0.001 in. (0.025 mm) will make the clock lose about one second per day. Altering the length of a pendulum is, therefore, a sensitive means of regulation. The alteration is usually carried out by allowing the bob to rest upon a nut that can be screwed up or down the pendulum rod.

Any expansion or contraction of the rod caused by changes of temperature will affect the timekeeping of a pendulum; *e.g.*, a pendulum clock with a steel rod will lose one second a day for a rise in temperature of 4° F (2.2° C). For accurate timekeeping, the length of the pendulum must be kept as nearly constant as possible. This may be done in several ways, some of which use the differing coefficients of expansion (the amount of expansion per degree change in temperature) of different metals to obtain a cancelling-out effect. In one popular compensation method, the bob consists of a glass or metal jar containing a suitable amount of mercury. The gridiron pendulum employs rods of brass and steel, while in the zinc-iron tube, the pendulum rod is made up of concentric tubes of zinc and iron. A less expensive method, however, is to make the pendulum rod from a special alloy called Invar. This material has such a small coefficient of expansion that small changes of temperature have a negligible effect.

In a pendulum clock an escape wheel is allowed to rotate through the pitch of one tooth for each swing of the pendulum, and to transmit an impulse to the pendulum to keep it swinging. An ideal escapement would perform both functions without interfering with the free swing. The double three-legged gravity escapement was invented by Edmund Beckett, afterward Lord Grimthorpe, and used by him for the great clock at Westminster, now generally known as Big Ben, which was installed in 1859. It has since become standard for all really accurate tower clocks.

The mechanism of a modern mechanical clock. The wheelwork, or train, of a clock is the series of moving machine parts (gears) that transmits motion from a weight or spring to the minute and hour hands. It is most important that the wheels and pinions be made accurately, and the tooth form designed so that the power is transferred as steadily as possible.

In a clock driven by a weight or a spring, the power is first transmitted by the main, or great, wheel. This engages with the first pinion (a gear with a small number of teeth designed to mesh with a larger wheel), whose spindle (a turning rod to which gears are attached) is attached to the second wheel that, in its turn, engages with the second pinion, and so on, down through the train to the escapement. The gear ratios are such that one spindle, usually the second or third, rotates once an hour and can be used to carry the minute hand. A simple 12-to-1 gearing, known as the motion work, gives the necessary step-down ratio to drive the hour hand. The spring or weight is fitted with a mechanism so it can be rewound when necessary, and the spindle carrying the minute hand is provided with a simple slipping clutch that allows the hands to be set to the correct time.

The timekeeping part of all clocks, including large tower clocks, is substantially the same. The figure shows the mechanism of a simple weight-driven timepiece with a pendulum. The frame is made up of two plates that carry the pivots of the various wheels and other moving parts and that are united and spaced by four pillars. The driving weight hangs from a line coiled around the barrel and is raised by turning the winding square. The main wheel engages with the centre pinion, on the spindle of which is also mounted the centre wheel. The front pivot of this wheel and pinion is lengthened to the left of the illustration, and carries the minute hand and part of the gearing necessary to drive the hour hand.

The centre wheel is also coupled through a suitable gear train to the escape wheel, which engages with the pallets that are fixed to the spindle and pivot between the front plate and the pendulum suspension cock. Also fixed to the pallet spindle is the crutch, which terminates at its lower end in a fork that embraces the pendulum rod.

The motion work used for driving the hands is mounted between the dial and the front plate of the frame. The wheel driving the hour hand rotates once an hour; it is coupled to the centre spindle by a flat spring that acts as a clutch and permits the hands to be set.

Electrical clocks. Electrical currents can be used to replace the weight or spring as a source of power and as a means of signalling time indications from a central master clock to a wide range of distant indicating dials. Invented in 1840, the first battery electric clock was driven by a spring and pendulum and employed an electrical impulse to operate a number of dials. Considerable experimental work followed, and it was not until 1906 that the first self-contained battery-driven clock was invented.

In a master clock system electricity is used to give direct impulses to the pendulum that in turn causes the clock's gear train to move, or to lift a lever after it has imparted an impulse to the pendulum. In various modern master clocks the pendulum operates a light count wheel that turns through the pitch of one tooth every double swing and is arranged to release a lever every half-minute. This lever gives an impulse to the pendulum and is then restored to its original position by an electromagnet. The pulse of current that operates the electromagnet can also be transmitted to a series of distant dials, advancing the hands of each through the space of a half-minute. Thus a master clock can control scores of dials in a large group of buildings, as well as such other apparatus as time recorders and sirens.

Electrical master clocks of this type are good timekeepers, since the impulse can be given symmetrically as the pendulum passes through its middle position and the interference with its motion is small.

With the application of the synchronous electric motor to clocks in 1918, domestic electric clocks became popular. A synchronous electric motor runs in step with the frequency of the electric power source, which in most countries alternates at 60 hertz (cycles per second). The electric motor is coupled to a reduction gearing that drives the clock hands at the correct rate.

The synchronous electric clock has no timekeeping properties in itself and is wholly dependent upon the frequency stability of the alternating current supplied. If this frequency changes, the electric clock will not keep correct time.

The most accurate mechanical timekeeper is the Shortt pendulum clock; it makes use of the movement described above for electric master clock systems. The Shortt pendulum clock consists of two separate clocks, one of which synchronizes the other. The timekeeping element is a pendulum that swings freely, except that once every half-minute it receives an impulse from a gently falling lever. This lever is released by an electrical signal transmitted from its slave clock. After the impulse has been sent, a synchronizing signal is transmitted back to the slave clock that ensures that the impulse to the free pendulum will be released exactly a half-minute later than the previous impulse. The pendulum swings in a sealed box in which the air is kept at a constant, low pressure. Shortt clocks in observatories are kept in a room, usually a basement, where the temperature remains nearly constant, and under these conditions can maintain the correct time to within a few thousandths of a second per day.

In 1929 the quartz crystal was first applied to timekeeping; this invention was probably the single greatest contribution to precision time measurement. Quartz crystals oscillating at frequencies of 100,000 hertz can be compared and frequency differences determined to an accuracy of one part in 10^{10}.

The timekeeping element of a quartz clock consists of a ring of quartz about 2½ in. in diameter, suspended by threads and enclosed in a heat-insulated chamber. Electrodes are attached to the surfaces of the ring and connected to an electrical circuit in such a manner as to sustain oscillations. Since the frequency of vibration, 100,000 hertz, is too high for convenient time measurement, it is reduced by a process known as frequency division or demultiplication and applied to a synchronous motor connected to a clock dial through mechanical gearing. If a 100,000 hertz frequency, for example, is subjected to a combined electrical and mechanical gearing reduction of 6,000,000 to one, then the second hand of the synchronous clock will make exactly one rotation in 60 seconds. The vibrations are so regular that the maximum error of an observatory quartz-crystal clock is only a few ten-thousandths of a second per day, equivalent to an error of one second every 10 years.

Clodia (fl. 1st century BC), profligate Roman beauty and sister of the demagogue Publius Clodius. She was married in 63 BC to Quintus Metellus Celer and was suspected of responsibility for his death in 59 BC. She was mistress to the poet Catullus, who wrote of her as Lesbia, and was the most important influence in his life. Another of her lovers was Marcus Caelius Rufus, whom Cicero defended against a charge of attempting to poison her, painting a graphic picture of Clodia as a dangerous beauty.

Clodion (Frankish king): *see* Chlodio.

Clodion, original name CLAUDE MICHEL (b. Dec. 20, 1738, Nancy, Fr.—d. March 29, 1814, Paris), French sculptor whose works represent the quintessence of the Rococo style.

In 1755 Clodion went to Paris and entered the workshop of Lambert-Sigisbert Adam, his uncle. On his uncle's death, he became a pupil of J.B. Pigalle. In 1759 he won the grand prize for sculpture at the Académie Royale de Peinture et de Sculpture, and in 1762 he



"Female Satyr Carrying Two Putti," terra-cotta statuette by Clodion; in the Walters Art Gallery, Baltimore

By courtesy of the Walters Art Gallery, Baltimore

went to Rome. Catherine II was eager for him to come to St. Petersburg, but he returned to Paris in 1771. There he was successful and frequently exhibited at the Salon.

Clodion worked mostly in terra-cotta, his preferred subject matter being nymphs, satyrs, bacchantes, and other classical figures sensually portrayed. He was also, with his brothers, a decorator of such objects as candelabra, clocks, and vases. Perhaps because of his apparent unwillingness to be seriously monumental, he was never admitted to the Académie Royale. Nevertheless, after the Revolution had driven him in 1792 to Nancy, where he lived until 1798, he was flexible enough to adapt himself to Neoclassical monumentality—the relief on the Arc de Triomphe du Carrousel, representing the entry of the French into Munich, is an example.

Clodius Albinus (Roman general): *see* Albinus, Decimus Clodius Septimius.

Clodius Pulcher, Publius, (b. *c.* 93 BC—d. January, 52 BC, Bovillae, Latium), a disruptive politician, head of a band of political thugs, and bitter enemy of Cicero in late republican Rome.

Born into two distinguished families, Clodius served under his brother-in-law L. Lucullus in the war against Mithradates and instigated a mutiny among the troops in the winter of 68–67. In December 62, when the winter ceremony of the Bona Dea (from which men were excluded) was celebrated in the house of Julius Caesar, a man believed to be Clodius was discovered disguised as a female harpist among the participants. Charged with *incestum* he was tried before the Senate. Caesar divorced his wife in suspicion that she had admitted Clodius to the ceremony. Clodius maintained he had been at Interamna, 90 miles (145 km) from Rome, on the day in question, but Cicero, who abused the defendant intemperately, presented evidence to the contrary. Clodius was acquitted, perhaps because the jury had been bribed, but immediately began to devise ways to revenge himself on Cicero.

In 59, Clodius was adopted into a plebeian family and elected tribune for 58. He put an end to such unprincipled obstruction of public business on religious grounds as Bibulus had practiced in 59 and reenacted a series of laws forbidding execution of a Roman citizen without trial. Cicero, the intended target of the latter measures, had in December 63 put to death without trial the associates of the conspirator Catiline. The orator thereupon fled from Rome to avoid prosecution, and Clodius managed, with a second act, to have him outlawed. In the following two years Clodius worked for Caesar to ensure that Pompey did not abandon his political alliance with Caesar to side with the Optimates. Clodius then became the political rival in Rome of the Optimate tribune T. Annius Milo, who helped to have Cicero recalled from exile in 57. The conflicting gangs, partisans of Milo and of Clodius, kept the city in turmoil for several years and prevented elections of officials. Clodius was killed by Milo after a running fight on the Appian Way.

Clodomir, also spelled CHLODOMER (b. *c.* 496?—d. June 25, 524, Vézeronce, near Vienne, Fr.), Merovingian king of Orléans from 511.

Eldest son of Clovis I by Clotilda, Clodomir shared in the fourfold partition of his father's kingdom in 511, receiving lands in western and central France; his was the only one of the four kingdoms to form a single geographical unit on both sides of the Loire. In 523, with his two full brothers, Chlotar I and Childebert I, as allies, he attacked his eastern neighbours, the Burgundians; their king, Sigismund, was captured and put to death together with his family. In the following year, Clodomir resumed the attack, this time with his half-brother, Theodoric I, but was killed at the battle of Vézeronce, where king Godomer, Sigismund's brother, was his opponent. Two of his young sons were then murdered by Chlotar and Childebert, who shared his lands with Theodoric. A third son, Chlodovald, escaped, to enter the religious life and found the monastery at Paris which bears his name (Saint-Cloud).

Cloete, (Edward Fairly) Stuart (Graham) (b. July 23, 1897, Paris—d. March 19, 1976, Cape Town), South African novelist, essayist, and short-story writer known for his vivid narratives and characterizations in African settings.

He farmed in South Africa for several years (1926–35) before turning to writing. His first novel, *Turning Wheels* (1937), expressed a negative view of Boer life and dealt with interracial love affairs. It stimulated much discussion, being published during the centennial celebration of the Great Trek. Later works included *Rags of Glory* (1963) and *The Abductors* (1966). He also wrote poems, collected in a volume, *The Young Men and the Old* (1941), and a collection of biographies, *African Portraits* (1946). His autobiography, *A Victorian Son*, appeared in 1972.

clog dance, kind of dance in which the dancer accentuates the rhythm of his feet by wearing wooden-soled shoes, or clogs. Clog dancing appears in many dance forms—*e.g.,* in some bourrées of Auvergne, in Swiss ländler, and often in Irish step dances (solo jigs, reels, and hornpipes). In northern England, notably among the miners of Northumbria and Durham, dances such as the Lancashire and Liverpool hornpipes may be danced on tabletops, in clogs, the dancers competing for medals. Like Irish step dancers, English clog dancers maintain an expressionless face and motionless torso and arms; the dance focusses on the feet as they beat complex rhythms. In the U.S., English and Irish clog dancing influenced the development of tap dance (*q.v.*).

cloisonné, in the decorative arts, an enamelling technique or any product of that technique, which consists of soldering to a metal surface delicate metal strips bent to the outline of a design and filling the resulting cellular spaces, called *cloisons* (French: "partitions," or "compartments"), with vitreous enamel paste. The object then is fired, ground smooth, and polished. Sometimes metal wire is used in place of the usual gold, brass, silver, or copper strips.



Cloisonné parrot, Chinese, Ch'ing dynasty, late 18th century; in the M.H. de Young Memorial Museum, San Francisco

By courtesy of the Center of Asian Art and Culture, The Avery Brundage Collection, Golden Gate Park, San Francisco, Calif.; photograph, Martin Grayson

Among the earliest examples of cloisonné are six Mycenaean rings of the 13th century BC. The great Western period of cloisonné enamelling was from the 10th to the 12th century, especially in the Byzantine Empire. In China cloisonné was widely produced during the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties; in Japan, it was especially popular during the Tokugawa, or Edo (1603–1868), and Meiji (1868–1912) periods.

Cloisonnism (art): *see* Synthetism.

cloister, quadrilateral enclosure surrounded by covered walkways, usually attached to a monastic or cathedral church and sometimes to a college. The term used in a narrow sense also applies to the walkways or alleys themselves (the central area being the cloister garth), in a general sense to the houses of religious orders, and in a generic sense to places of retreat for religious purposes.



Open arcaded cloister of Saint-Trophime, Arles, Fr., 1150

Jean Roubier

A cloister is usually the area in a monastery around which the principal buildings are ranged, affording a means of communication between the buildings. In developed medieval practice, cloisters usually followed either a Benedictine or a Cistercian arrangement. In the Benedictine form, the church was located on one side of the cloister, with the refectory occupying the opposite side, so that the worshippers might be removed from kitchen noises and smells. The chapter house was placed on the eastern side, with other apartments adjacent to it and the dormitory usually occupying the entire upper story. On the western side, the cellarer's lodgings were generally located, near storehouses that held the community's provisions.

In Cistercian monasteries the western side of the cloister was usually occupied by the two-story *domus conversorum,* or lodgings of the lay brothers, with their day rooms and workshops situated beneath the dormitory. The buildings generally stood on the south of the church to get as much sunshine as possible.

The cloister of a religious house was the centre of activity for its inhabitants. There the younger members were educated and the elders studied. The west walk was traditionally,

if unofficially, the place of educational instruction. The other walkways, especially the one next to the church, were devoted to the studies of the elder monks, and for this purpose small studies (known as carols, or carrels) were often built into the recesses of the windows. The cloister also served for exercise and general recreation, particularly in bad weather, and its central area and walkways were the customary places of burial.

Larger monastic establishments commonly had more than one cloister; there was usually a second connected with the infirmary (*e.g.*, Westminster Abbey and Canterbury) and sometimes one giving access to the kitchen and other domestic offices. Cloisters were also attached to colleges of secular canons, as at the cathedrals of Lincoln, Salisbury, and Wells; and the colleges of Eton and Winchester, as well as New College and Magdalen College at Oxford, also have cloisters.

The earliest cloisters consisted of open arcades, usually with sloping wooden roofs. This form of the cloister was generally superseded in England by a range of windows, usually unglazed but sometimes, as at Gloucester, provided with glass, lighting a vaulted ambulatory. In southern climates, the open-arcaded cloister remained standard; of this type are the cloisters of Saint-Trophîme at Arles in southern France, Santo Domingo de Silos in Spain, and the Belém Monastery near Lisbon, all of which are famous for their sculptural decoration.

The open cloister attained its fullest development in Italy, however. A fine example, damaged beyond full repair during World War II, was the Campo Santo at Pisa, consisting of four ambulatories as wide and lofty as the nave of a church, with inner walls covered with early Renaissance frescoes. An especially fine example of the Renaissance cloister is provided by Donato Bramante's design for the two-story open arcade at Santa Maria della Pace in Rome.

clone, also spelled CLON, population of genetically identical organisms derived originally from a single individual by asexual methods. Clones have been commonplace in horticulture since ancient times. All individual MacIntosh apple trees, for example, are members of a clone, having been derived initially from a single mutated plant, and all share identical genes. A vast array of fruit and nut tree varieties and innumerable ornamental plants represent clones.

During the second half of the 20th century, techniques for cloning animals were successfully demonstrated in amphibians. The nucleus of an ovum (egg) is replaced by that of an epithelial cell, a cell with the basic number of chromosomes doubled. The ovum is then induced to develop without fertilization, and the resulting embryo is composed entirely of cells derived from the single implanted nucleus.

In the 1980s recombinant DNA technology provided a new means of cloning genes; the technology enabled experimenters to manipulate, change, and transfer genes. A limiting factor in the development of this technology has been establishing a safe means of transferring the altered genes; research has centred on viruses, bacteria, and plasmids for this purpose. The possible applications of recombinant DNA technology for commercial and scientific purposes are many. The potential exists for large-scale and inexpensive production of proteins and other biosynthetic products by gene cloning. Examples of active areas of research are in the development of insulin, the antiviral agent interferon, and vaccines such as that for the hepatitis B virus. (*See also* genetic engineering.)

The practical applications of cloning are economically promising but philosophically unsettling. Animal breeders would welcome the chance to clone top-quality livestock. A single superior animal could be used to create a line of genetic constancy, much as has been done with fruit trees. Clones are also highly useful in biological research because of their genetic uniformity.

The cloning of human beings is a subject fraught with ethical and moral controversy. If cloning can ensure the infinite replication of specific genetic traits, a judgment would need to be made as to which traits are desirable and therefore worthy of perpetuation. The persons empowered to exercise such judgment would be in a position to change the course of human development.

Clonmacnoise, Irish CLUAIN MHIC NÓIS, also spelled CLUAIN MOCCU NÓIS, early Christian centre on the left bank of the River Shannon, in County Offaly, Ireland, south of Athlone. Clonmacnoise became the foremost Irish monastic city after the foundation of



O'Rourke's round tower and a ruined church and abbey at Clonmacnoise, County Offaly

By courtesy of the Tourist Photo Library

an abbey there by St. Ciaran in 545. It had become an important centre of learning by the 9th century, and several books of annals were compiled there. The cathedral, or Great Stone Church, was founded about 900 and rebuilt in the 14th century. Other churches are those dedicated to Finian, Conor, St. Ciaran, Kelly, Ri, and Dowling. Clonmacnoise became a bishopric, and in 1568 the diocese was merged with that of Meath. The ruins of the churches, known as the Seven Churches of Clonmacnoise, still survive and are protected as national monuments. An annual pilgrimage to Clonmacnoise is held on September 9, the feast of St. Ciaran. Pop. (1979) 308.

Clonmel, Irish CLUAIN MEALA, municipal borough and seat of the south riding of County Tipperary, Ireland, on the River Suir. A noted sporting centre, it has fine scenery, with the Comeragh Mountains to the south and the Slievenamon peak to the northeast. Clonmel received its charter in the reign of Edward I (1239–1307). The novelist Laurence Sterne was born there in 1713. Industries include meat processing and the making of enamelware, metal goods, shoes, and cider. Pop. (1986 prelim.) 11,737.

Clonograptus, genus of graptolites (extinct, small floating colonial animals related to the primitive chordates), characterized by a frondlike form. Groups of these animals were connected by stalklike structures to a central region. Various forms or species of *Clonograptus* are important guide, or index, fossils for the correlation of Ordovician rocks (505 to 438 million years ago).

clonorchiasis, chronic infection caused by *Clonorchis sinensis,* or liver fluke, a parasitic worm some 10 to 25 mm (0.4 to 1 inch) long that lives in the bile ducts of the liver in humans and other mammals. Clonorchiasis is a common disease in China, Vietnam, Korea, and Japan and is acquired by eating freshwater fish containing the fluke larvae. The fish are themselves infected by swallowing the larvae, which have earlier undergone a stage of their development in the liver glands of water snails.

Raw as well as smoked, salted, or dried fish may constitute a source of human infestation. Early in the infection, there may be signs of indigestion, followed later by enlargement and tenderness of the liver and a light jaundice. Frequently there are no symptoms. Heavy infestations (as many as 21,000 worms) may involve the pancreas and gallbladder and may be associated with fluid accumulation in the abdomen and signs of general body toxicity. No completely effective treatment is known; some success has been obtained with chemotherapeutic agents, such as chloroquine, that are toxic to the fluke. Infection can be prevented by thoroughly cooking all freshwater fish.

Cloos, Hans (b. Nov. 8, 1885, Magdeburg, Saxony [Ger.]—d. Sept. 26, 1951, Bonn, W.Ger.), German geologist who was a pioneer in the study of granite tectonics (the deformation of crystalline rocks) and in model studies of rock deformation.

Cloos was a professor at the University of Breslau from 1919 until 1926, when he became professor of geology at the University of Bonn. He studied the structure and development of the continents and was one of the first investigators to make use of true scale models to investigate the mechanics of faulting. His publications include *Das Mechanismus tiefvulkanischer Vorgänge* (1921; "The Mechanism of Deep Volcanic Events") and *Gespräch mit der Erde* (1947; *Conversation with the Earth*).

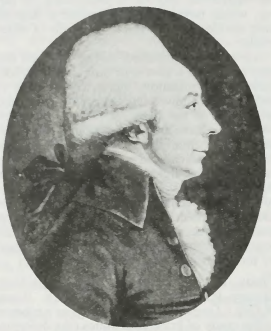
Consult the INDEX *first*

Cloots, Jean-Baptiste du Val-de-Grâce, Baron de, pseudonym ANACHARSIS CLOOTS (b. June 24, 1755, near Kleve, Brandenburg [Germany]—d. March 24, 1794, Paris, Fr.), radical democrat of the French Revolution who became a leading exponent of French expansionism in Europe.

Born into a noble Prussian family of Dutch origin, Cloots went to Paris in 1776 and took part in the compilation of Denis Diderot's *Encyclopédie.* He left France in 1784, traveled throughout Europe, and returned to Paris at the outbreak of the Revolution in 1789. He quickly became an ardent democrat and a member of the Jacobin Club. As head of a delegation of 36 foreigners (his self-proclaimed "embassy of the human race"), he addressed the revolutionary National Assembly on June 17, 1791, declaring that the whole world adhered to the democratic ideals of the Revolution. He henceforth titled himself "The Orator of Mankind" and adopted the pseudonym "Anacharsis." He became a naturalized French citizen and in September 1792 was elected to the National Convention. There he advocated that France "liberate" the rest of Europe. The Convention backed his call for a revolutionary crusade, and France (already at war with Austria and Prussia) was soon at war with most of the European powers.

After the Jacobins took control of the government in June 1793, Cloots identified himself with the Jacobins' left wing under the leadership of Jacques Hébert. In December the Jacobin leader Maximilien Robespierre had Cloots expelled from the Jacobin Club for Cloots's support of the Hébertist "de-Chris-

tianizers," who were attempting to destroy all Roman Catholic institutions. Accused by



Cloots, portrait miniature by Edme Quenedey
By courtesy of the Bibliotheque Nationale, Paris

Robespierre of being a foreign agent, Cloots was guillotined with the leading Hébertists.

close support aircraft: *see* attack aircraft.

closed-end trust: *see* investment trust.

closed shop, in union-management relations, an arrangement whereby the management of a company employs—and retains in employment—only persons who are members in good standing of a specified labour (trade) union. It is the most extreme variant of a series of arrangements for the protection of labour organizations, collectively known as "union security." Less extreme than the closed shop is the union shop (*q.v.*), in which the employer may hire a nonmember of a union provided that the new employee joins the union within a specified time. Another form of union security is known as preferential hiring. Under this arrangement the employer agrees to hire union members if they are available, but, if qualified union members cannot be found, he may hire nonunion workers. Agreements for maintenance of membership provide that all persons in the employ of a company on a specified date who are then members of a union and who do not resign their membership within an "escape period" must remain members of the union for the duration of the agreement, under pain of dismissal from their jobs. These are the basic forms of union security, but in practice there are many detailed variations.

In the United Kingdom and, to a lesser extent, in all other industrial nations, a closed-shop provision is seldom found in a written contract, but it is understood in some industries that union members will walk off the job before they will work with nonunionists. This is so commonly assumed among printers, dockers, and miners in Britain that employers rarely attempt to employ nonunion workers. Throughout the nations of northern Europe, labour-management agreements are usually between large industrial segments and a number of unions. In Britain the closed shop has not been an issue for controversy to the same extent as in the United States because union membership of workers is taken for granted. This is assumed even by government boards and commissions, which traditionally have expected unions to represent all employees in an industry.

Although closed shops were declared illegal in the United States under the Taft-Hartley Act of 1947, they continued to exist in practice even though forbidden by law to exist in a signed agreement. They are particularly prevalent where employers depend on unions for hiring workers and where workers are employed by a particular employer for only a short period of time (*e.g.*, dock workers and construction workers).

Clostridium, genus of rod-shaped, usually gram-positive bacteria, members of which are found in soil, water, and the intestinal tracts of humans and other animals. Most species grow only in the complete absence of oxygen. Dormant cells are highly resistant to heat, dessication, and toxic chemicals and detergents. The species are variable in size. A typical species, *C. butyricum,* ranges from 0.6 micrometres across by 3 to 7 micrometres long. The toxins produced by *C. botulinum,* the causative agent of botulism (*q.v.*), are the most potent poisons known. The toxin of *C. tetani* causes tetanus (*q.v.*) when introduced into damaged or dead tissue. *C. perfringens, C. novyi,* and *C. septicum* can cause gangrene in humans. Other forms of acute clostridial infection commonly occur in livestock and waterfowl.

Clotaire (name of Merovingian kings): *see under* Chlotar.

clotbur (plant): *see* cocklebur.

Cloth of Gold, Field of, in European history, the meeting place, between Guînes and Ardres near Calais in France, where Henry VIII of England and Francis I of France and their entourages gathered between June 7 and 24, 1520. The castles at both villages were in decay, and therefore splendid temporary palaces and pavilions were erected for Henry at Guînes and for Francis at Ardres. Henry's palace covered nearly 2.5 acres (1 hectare) and was sumptuously decorated; it contained a great hall and a spacious chapel; and, outside, a gilt fountain spouted claret, hippocras (spiced wine), and water through separate runlets.

The kings first met at the Val Doré, midway between the two camps, on June 7. The subsequent meetings and entertainments were conducted with much apparent cordiality, although "many persons present could not understand each other." There were jousts and mummers, and on the last day, Sunday, June 24, sections of the mass were sung alternately in French and English. Although its splendour made the meeting vastly impressive to contemporaries, its political result was negligible. Henry met the Holy Roman emperor Charles V, Francis' rival, at Gravelines near Calais on July 10, and each agreed to make no fresh alliance with France for two years.

clothing, also called CLOTHES, garments for the human body. *See* dress.

Clotilda, SAINT, also spelled CLOTILDE, CHLOTHILDE, CHLOTILDE, CHRODECHILDE, CHRODIGILD, or CHROTECHILDIS (d. June 3, *c.* 545, Tours, Fr.; feast day June 3), queen consort of Clovis I, king of the Franks, in whose momentous conversion to Christianity she played a notable part.

Clotilda was the granddaughter of Gundioc, king of Burgundy, who was related to the Visigothic kings and shared their Arian Christian faith. At Gundioc's death his kingdom was divided between his four sons, Gundobad, Godegesil, Chilperic, and Gundomar. Clotilda's father Chilperic and her mother were murdered by Gundobad, and Clotilda and her sister took refuge with Godegesil in Geneva. Clovis, hearing good reports of Clotilda, obtained Gundobad's permission for their marriage in 493. She bore him four sons, Ingomer and the future kings Clodomir, Childebert I, and Chlotar I.

Clotilda was tireless in urging her husband to renounce his idols and acknowledge the true God; his final decision (498?) was made to honour a vow taken during a battle against the Alemanni. After Clovis' death (511), she retired to Tours and became famous for her sanctity of life, generosity to the church, and charity work. She was buried beside Clovis in the church, now Sainte-Geneviève, that they had cofounded in Paris.

cloud, any visible mass of water droplets, ice crystals, or a mixture of both that is suspended in the air, usually at a considerable height. A shallow layer of cloud at or near ground level is designated as fog. (For a table, *see* pages 398–399.)

A brief treatment of clouds follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

Clouds are formed when relatively moist air rises. As a mass of air ascends, the lower pressures prevailing at higher levels allow it to expand. In expanding, the air cools adiabatically (*i.e.*, without heat exchange with the surrounding air) until its temperature falls below the dew point, upon which the air becomes supersaturated. The excess water vapour that it contains then condenses onto microscopic dust or smoke particles called condensation nuclei. This process rapidly gives rise to droplets on the order of 0.01 mm (0.0004 inch) in diameter. These droplets, usually present in concentrations of a few hundred per cubic centimetre, constitute a nonprecipitating water cloud. Clouds generally consist of a mixture of water droplets and ice crystals, with crystals predominating in the colder, upper regions of the cloud.

Because clouds are created and sustained by upward-moving air currents, water droplets must reach a size sufficient to overcome the lifting effect of the currents before they can fall to the Earth as drizzle or rain. Condensation alone cannot generate droplets of sufficient size to produce even drizzle. Drizzle particles and raindrops are formed either by the coalescence of cloud droplets or by the production of ice crystals and their subsequent melting as they descend through the warmer regions of the cloud.

Meteorologists classify clouds primarily by their appearance. The 10 main cloud families are divided into three groups on the basis of altitude. High clouds, which are found at mean heights of from 13 to 5 km (45,000 to 16,500 feet), are, from highest to lowest, cirrus, cirrocumulus, and cirrostratus. Middle clouds, 7 to 2 km (23,000 to 6,500 feet), are altocumulus, altostratus, and nimbostratus. Low clouds, 2 to 0 km (6,500 to 0 feet), are stratocumulus, stratus, cumulus, and cumulonimbus.

Clouds may also be classified according to the air motions that produce them. In this method of classification there are four major types: layer clouds formed by the widespread regular ascent of air; layer clouds produced by widespread irregular stirring or turbulence; cumuliform clouds resulting from penetrative convection; and orographic clouds generated by the ascent of air over hills or mountains.

Precipitation in significant amounts generally falls only from altostratus, nimbostratus, and cumulonimbus clouds. Steady rain that lasts for an entire day or longer is usually produced by the altostratus or nimbostratus variety. In most cases, cumulonimbus clouds are accompanied by showers of rain, snow, or hail, often with a thunderstorm or a tornado. Cirrus, cirrostratus, and cirrocumulus, high clouds composed exclusively of ice crystals, may produce snow, but the snow generally evaporates before reaching the ground if there are no lower clouds present. When thick clouds of waterdrops are present at lower levels, however, the snow from above may become heavier and reach the ground as snow or rain, depending on the temperature. Stratus clouds may produce drizzle, whereas the cumulus type sometimes yields showers, particularly in the tropics.

Clouds are valuable aids in weather forecasting. If the sky, for example, is becoming overcast with cirrus and cirrostratus clouds, thickening and lowering to altostratus clouds, precipitation is imminent, probably from an approaching warm front in temperate latitudes or perhaps a hurricane in the tropics. New active thunderstorms are indicated by cumulus growing rapidly into cumulonimbus on a humid day, even though the Sun may be shining brightly between the clouds. The presence of cloudiness marks smaller diurnal temperature variations. In the evening a low overcast acts like a blanket, preventing the temperature from dropping much at night. A clear evening sky, on the other hand, indicates rapid cooling, which leads to dew, frost, or even fog the following morning.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

cloud chamber, radiation detector, originally developed between 1896 and 1912 by the Scottish physicist C.T.R. Wilson, that has as the detecting medium a supersaturated vapour that condenses to tiny liquid droplets around ions produced by the passage of energetic charged particles, such as alpha particles, beta particles, or protons. In a Wilson cloud chamber, supersaturation is caused by the cooling induced by a sudden expansion of the saturated vapour by the motion of a piston or an elastic membrane, a process that must be repeated with each use.

In a diffusion chamber, a simpler and continuously sensitive cloud chamber, the saturated vapour is cooled to supersaturation as it diffuses into a region kept cold by a coolant such as solid carbon dioxide or liquid helium.

cloud forest, also called MONTANE RAIN FOREST, vegetation of tropical mountainous regions in which the rainfall is often heavy and persistent condensation occurs because of cooling of moisture-laden air currents deflected upward by the mountains. The trees in a cloud forest are typically short and crooked. Mosses, climbing ferns, lichens, and epiphytes (air plants, such as orchids) form thick blankets on the trunks and branches of the trees. Begonias, ferns, and many other herbaceous plants may grow to exceptionally large size in clearings. A forest of extremely stunted, moss-covered trees that occurs in tropical or temperate mountainous regions is sometimes known as an elfin woodland.

cloud rat, any of three species of long-haired, arboreal Philippine rodents of the genera *Phloeomys* and *Crateromys*, belonging to the family Muridae (order Rodentia). Cloud rats are large rodents, roughly 35 to 50 cm (14 to 20 inches) long without the long, hairy tail. There are two species of *Phloeomys: P. cumingi* is more or less cream coloured with variable darker markings, and *P. pallidus* is brownish with dark ears, cheeks, and tail. Little is known of their habits. They are found from sea level to high mountainsides. The bushy-tailed cloud rat (*Crateromys schadenbergi*) is a black or black and white animal with a bushy tail. Found in mountain forests, it is nocturnal and reportedly vegetarian.



Bushy-tailed cloud rat (*Crateromys schadenbergi*)
Painting by Don Meighan

cloud-scraper, any of certain birds of the genus *Cisticola*. *See* cisticola.

cloud seeding, deliberate introduction into clouds of various substances that act as condensation nuclei in an attempt to induce precipitation. The first experiments with cloud seeding were conducted in 1946; since then seeding has been done from aircraft, rockets, cannons, and ground generators. Many substances have been used, but solid carbon dioxide and silver iodide have been the most effective; when used in supercooled clouds (composed of water droplets at temperatures below freezing), they form nuclei around which raindrops coalesce. Attempts have been made to use these substances to prevent hail.

cloudberry, also called SALMONBERRY, YELLOWBERRY, BAKEBERRY, MALKA, or BAKED APPLE BERRY (species *Rubus chamaemorus*), creeping herbaceous plant, native to the Arctic and subarctic regions of the north temperate zone, and its edible, aggregate fruit resembling structurally the raspberry. The yellow or amber-coloured berry grows from a 2.5-centimetre (1-inch) white flower on a creeping rootlike stem, or rhizome. The stalks grow to a height of 7.6–25 cm (3–10 inches).

Eskimos and Lapps collect the sweet, juicy berries in autumn to freeze for winter food. In markets of northern Scandinavia, cloudberries are sold for use in preserves, tarts, and other confections. They may be fermented to make vinegar.

clouded leopard, also called CLOUDED TIGER (species *Leo nebulosa*), strikingly marked cat, family Felidae, very similar in colouring and coat pattern to the smaller, unrelated marbled cat (*Felis marmorata*). The clouded leopard is found in southeastern Asia, Sumatra, Java, Borneo, and Taiwan, particularly in forests and other wooded regions; the population declined sharply in the latter half of the 20th century as a result of hunting and deforestation. It is reported to be nocturnal and to live in trees; it preys on birds and on small mammals, such as pigs and monkeys.



Clouded leopard (*Leo nebulosa*)
Tom McHugh—Photo Researchers/EB Inc

A rather short-legged cat, the clouded leopard has a long head and large upper-canine teeth that are proportionately longer than those of any other cat. The coat of the adult is short and grayish brown, spotted on the body with large, dark patches partly edged with black; the head, legs, and long tail are spotted. The male clouded leopard may attain a length of about 106 cm (42 inches) excluding the 90-centimetre tail, a shoulder height of about 80 cm, and a weight of about 23 kg (50 pounds); the female is smaller.

The clouded leopard, as one of the big, or roaring, cats, was formerly placed in the genus *Panthera*. In other classifications, it is considered a member of the genus *Felis* or of the genus *Neofelis*.

Clouet, François (b. *c.* 1515/20, Tours, Fr.—d. 1572, Paris), French painter who immortalized in his portraits the society of the court of the royal house of Valois.

The son of Jean Clouet, he was known also under his father's byname, Janet, a circumstance that created a persistent confusion between the works of these two painters. François worked with Jean possibly as early as 1536 and replaced him in 1540 as official painter to Francis I. He continued in this office, serving under Henry II, Francis II, and Charles IX. He directed a large workshop in which miniaturists, enamel designers, and decorators carried out his projects. In addition to making portraits, he painted genre subjects, including nude figures (*e.g.*, "Diane de Poitiers") and theatrical scenes—the latter attested by an engraving, as well as by a picture entitled "Scene of the Commedia dell'Arte." He also supervised the decorations for funeral ceremonies and for the triumphal entries of the French kings.

It has been possible to identify his work on the basis of two signed pictures, "Diane de Poitiers" and the "Portrait of Pierre Quthe" (1562), and of another one bearing a 16th-century ascription to him, "Portrait of Charles IX, Full-Length" (probably 1569). The identification of the preparatory drawing for the last picture has enabled experts to attribute 50 portrait drawings and several painted portraits to François.

François Clouet was a typical Renaissance painter, closely related to the humanistic circles and praised by many poets of his day, including Pierre de Ronsard and Joachim du Bellay. As a portrait painter he was less profound than Jean Clouet, although he was able to render a more vivid, fleeting expression of the face. His drawings are characteristic of the French Renaissance with their almost dry precision, elegant stylization, and clear-cut plasticity.

Clouet, Jean, byname JANET, or JEHANNET (b. *c.* 1485—d. *c.* 1540, Paris, Fr.), Renaissance painter of portraits celebrated for the depth and delicacy of his characterization.

Although he lived in France most of his life, records show that he was not French by origin and was never naturalized. He was one of the chief painters to Francis I as early as 1516 and was appointed groom of the chamber from 1523, thus enjoying the salary and social position granted to the most prominent poets and scholars of the time. In the early 1520s he lived in Tours and from 1529 in Paris. He painted chiefly portraits, but, at least in the earlier part of his career, he also produced religious subjects (a "St. Jerome" in 1522; designs for the "Four Evangelists," 1523).

Until recently, the works attributed to Clouet consisted of a group of about 130 preparatory drawings representing members of the French court between 1514 and 1540 and a small group of miniatures and oil paintings, the drawings for which can be found among those of the first group. None of these, however, is signed or documented as the work of Jean Clouet. Consequently, their attribution to Clouet was merely tentative. But the discovery and cleaning of the well-documented "Portrait of Guillaume Budé" enabled the characteristics of Clouet's art to be established. Budé himself stated about 1536 that Jean Clouet had painted a portrait of him. Since the preparatory drawing for this picture exists in Chantilly and is obviously by the same hand as the other drawings, the attribution to



cirrus



cirrocumulus



cirrostratus



altocumulus



altostratus

Classification of clouds

The modern method of cloud classification is derived from a system devised by Luke Howard, an English meteorologist, whose work was published in 1803. Howard distinguished three fundamental classes—cirrus, cumulus, and stratus—which served as the basis for the cloud classification work that followed in the 19th century and which culminated in the first *International Cloud Atlas*, published in 1896. The Atlas, now produced by the World Meteorological Organization (WMO), an agency of the United Nations, has undergone several revisions reflecting continuing modification in cloud classification. The table presented below is based on data provided in the most current publication of the Atlas, now generally accepted as the standard world source for the classification of clouds. The work divides cloud types into the 10 basic genera that form the structure of the first part of the table. Conventionally, the cloud types are subdivided into three "étages" designated in the table as high clouds, middle clouds, and low clouds. Further, each genus according to its peculiar characteristics may be identified as a particular species. A cloud of a certain genus may only have one species name attached to it, but a species name may appear with any of several genera. Following the cloud genera in the table are listings and descriptions of the various species.

Genera and species represent the main categories of characteristics by which clouds are recognized. Cloud forms, however, are broken down in still further ways according to additional sets of characteristics and refinements. These include *varieties*, which apply to the arrangement of macroscopic elements and degree of transparency; *supplementary features and accessory clouds*, which includes characteristics not covered by the previously mentioned categories; and *mother-clouds*, which classifies clouds according to origin. Clouds formed from mother-clouds are distinguished from clouds that form in clear air and are of two types: *genitus*, formed from the extension of another cloud, and *mutatus*, formed from a whole cloud that has undergone an internal transformation, causing it to change from one genus to another.

A group of special clouds is also distinguished, which arise from unknown or unusual origins; these include rare nacreous clouds, condensation trails, and clouds from waterfalls, fires, and volcanic eruptions. Clouds that develop because of air movements over the land, such as orographic clouds, may differ markedly from any of the 10 basic genera, but nevertheless are always classified as one of the genera.

cloud genera

	genera (Latin etymology)	description	abbreviation	symbol	species*
high clouds	**cirrus** (lock of hair, tuft of horsehair, a bird's tuft)	Detached clouds in the form of white delicate filaments or white or mostly white patches or narrow bands. These clouds have a fibrous (hair-like) appearance or a silky sheen or both.	Ci	⟶	fibratus uncinus spissatus castellanus floccus
	cirrocumulus (from the Latin *cirrus* [see above] and *cumulus*, which means a heap, a pile)	Thin white patch, sheet, or layer of cloud without shading, composed of very small elements in the form of grains, ripples, etc., merged or separate, and more or less regularly arranged; most of the elements have an apparent width of less than one degree.	Cc	⟋	stratiformis lenticularis castellanus floccus
	cirrostratus (from the Latin *cirrus* [see above] and *stratus*, past participle of *stenere*, which means to extend, to spread out, to flatten out, to cover with a layer)	Transparent, whitish cloud veil of fibrous (hair-like) or smooth appearance, totally or partly covering the sky, and generally producing halo phenomena.	Cs	⟋	fibratus nebulosus
middle clouds	**altocumulus** (from the Latin *altum*, which means height, upper air, and *cumulus* [see above])	White or gray, or both white and gray, patch, sheet, or layer of cloud, generally with shading, composed of laminae, rounded masses, rolls, etc., which are sometimes partly fibrous or diffuse and which may or may not be merged; most of the regularly arranged small elements usually have an apparent width of between one and five degrees.	Ac	◡	stratiformis lenticularis castellanus floccus
	altostratus (from the Latin *altum* and *stratus* [see above])	Grayish or bluish cloud sheet or layer of striated, fibrous, or uniform appearance, totally or partly covering the sky, and having parts thin enough to reveal the Sun at least vaguely, as through ground glass. Altostratus does not show halo phenomena.	As	⟋	
	nimbostratus (from the Latin *nimbus*, which means rainy cloud, and *stratus* [see above])	Gray cloud layer, often dark, the appearance of which is rendered diffuse by more or less continuously falling rain or snow, which in most cases reaches the ground. It is thick enough throughout to blot out the Sun. Low, ragged clouds frequently occur below the layer, with which they may or may not merge.	Ns	⟋	
low clouds	**stratocumulus** (from the Latin *stratus* and *cumulus* [see above])	Gray or whitish, or both gray and whitish, patch, sheet, or layer of cloud which almost always has dark parts, composed of tessellations, rounded masses, rolls, etc., which are nonfibrous (except for virga) and which may or may not be merged; most of the regularly arranged small elements have an apparent width of more than five degrees.	Sc	⟜	stratiformis lenticularis castellanus
	stratus (from the Latin *stratus* [see above])	Generally gray cloud layer with a fairly uniform base, which may give drizzle, ice prisms, or snow grains. When the Sun is visible through the cloud, its outline is clearly discernible. Stratus does not produce halo phenomena except, possibly, at very low temperatures. Sometimes stratus appears in the form of ragged patches.	St	– –	nebulosus fractus

cloud genera (continued)

genera (Latin etymology)	description	abbreviation	symbol	species*
cumulus (from the Latin *cumulus* [see above])	Detached clouds, generally dense and with sharp outlines, developing vertically in the form of rising mounds, domes, or towers, of which the bulging upper part often resembles a cauliflower. The sunlit parts of these clouds are mostly brilliant white; their base is relatively dark and horizontal. Sometimes cumulus is ragged.	Cu		humilis mediocris congestus fractus
cumulonimbus (from the Latin *cumulus* [see above] and *nimbus*, which means rain cloud, a sudden downpour, cloudburst)	Heavy and dense cloud, with a considerable vertical extent, in the form of a mountain or huge towers. At least part of its upper portion is usually smooth, or fibrous or striated, and nearly always flattened; this part often spreads out in the shape of an anvil or vast plume. Under the base of this cloud, which is often very dark, there are frequently low, ragged clouds either merged with it or not, and precipitation, sometimes in the form of virga.	Cb		calvus capillatus *For details on cloud species, see below.

cloud species

species (Latin etymology)	description
fibratus (fibrous, possessing fibers, filaments)	Detached clouds or a thin cloud veil, consisting of nearly straight or more or less irregularly curved filaments that do not terminate in hooks or tufts. This term applies mainly to cirrus and cirrostratus.
uncinus (hooked)	Cirrus often shaped like a comma, terminating at the top in a hook, or in a tuft the upper part of which is not in the form of a rounded protuberance.
spissatus (past participle of *spissare*, which means to make thick, condense)	Cirrus of sufficient optical thickness to appear grayish when viewed toward the Sun.
castellanus (derived from *castellum*, which means castle)	Clouds that present, in at least some portion of their upper part, cumuliform protuberances in the form of turrets that generally give the clouds a crenelated appearance. The turrets, some of which are taller than they are wide, are connected by a common base and seem to be arranged in lines. The castellanus character is especially evident when the clouds are seen from the side. This term applies to cirrus, cirrocumulus, altocumulus, and stratocumulus.
floccus (tuft of wool, fluff, or nap of a cloth)	A species in which each cloud unit is a small tuft with a cumuliform appearance, the lower part of which is more or less ragged and often accompanied by virga. This term applies to cirrus, cirrocumulus, and altocumulus.
stratiformis (from *stratus*, past participle of *stenere*, which means to extend, spread out, flatten out, and *forma*, which means form, appearance)	Clouds spread out in an extensive horizontal sheet or layer. This term applies to altocumulus, stratocumulus, and, occasionally, to cirrocumulus.
nebulosus (full of mist, covered with fog, nebulous)	A cloud like a nebulous veil or layer, showing no distinct details. This term applies mainly to cirrostratus and stratus.
lenticularis (derives from *lenticula*, diminutive of *lens*, which means lentil)	Clouds having the shape of lenses or almonds, often very elongated and usually with well-defined outlines; they occasionally show irisation (iridescence). Such clouds appear most often in cloud formations of orographic origin, but may also occur in regions without marked orography. This term applies mainly to cirrocumulus, altocumulus, and stratocumulus.
fractus (from the past participle of the verb *frangere*, which means to shatter, break, snap, fracture)	Clouds in the form of irregular shreds, which have a clearly ragged appearance. This term applies only to stratus and cumulus.
humilis (near the ground, low, of small size)	Cumulus clouds of only a slight vertical extent; they generally appear flattened.
mediocris (medium, keeping to the middle)	Cumulus clouds of moderate vertical extent, the tops of which show fairly small protuberances.
congestus (from the past participle of *congerere*, which means to pile up, heap up, accumulate)	Cumulus clouds which are markedly sprouting and are often of great vertical extent; their bulging upper part frequently resembles a cauliflower.
calvus (bald; also stripped or bared)	Cumulonimbus in which at least some protuberances of the upper part are beginning to lose their cumuliform outlines but in which no cirriform parts can be distinguished. Protuberances and sproutings tend to form a whitish mass, with more or less vertical striations.
capillatus (having hair; derives from *capillus*, which means hair)	Cumulonimbus characterized by the presence, mostly in its upper portion, of distinct cirriform parts of clearly fibrous or striated structure, frequently having the form of an anvil, a plume, or a vast, more or less disorderly mass of hair. Cumulonimbus capillatus is usually accompanied by a shower or by a thunderstorm, often with squalls and sometimes with hail; it frequently produces very well defined virga.

Photography by courtesy of National Oceanic and Atmospheric Administration



nimbostratus



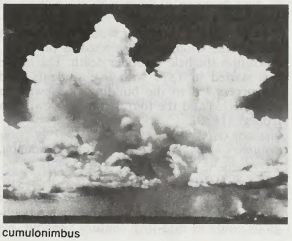
stratocumulus



stratus



cumulus



cumulonimbus

Jean Clouet of all the aforementioned works ceased to be merely hypothetical.

In all these portraits the sitters' hands differ considerably and were probably executed by apprentices in Clouet's workshop. This body of works shows Clouet as one of the best 16th-century portrait painters, both incisive and delicate in the psychological characterization of sitters. His drawings are simple, broad, and subtle; his paintings are fresh in colour, subdued in modeling, and minute in execution. His technique seems fundamentally Flemish (he came probably either from Brussels or from the old Franco-Flemish region of Valenciennes), but the supple drawing, the calm plasticity, and the acute analysis of the individual in his portraits are typically French. In his youth he could have been influenced by the already ancient French tradition of portrait drawing. On the other hand, his monumental composition is influenced by the Italian Renaissance portraiture introduced into France by Andrea Solari. Some of Clouet's portraits also show similarities to those by Holbein, who in his turn borrowed the technique of portrait drawing in coloured chalks, or pastels, from Clouet.

Clough, Anne Jemima (b. Jan. 20, 1820, Liverpool—d. Feb. 27, 1892, Cambridge, Cambridgeshire, Eng.), English educator and feminist who was the first principal of Newnham College, Cambridge. She was the sister of poet Arthur Hugh Clough.

Clough, whose father was a cotton merchant, spent many of her early years in Charleston, S.C. She returned with her family to England in 1836 and began teaching a few years later. In 1852 she opened a school at Ambleside, Westmorland. A strong supporter of the movement for the higher education of women, she worked with Emily Davies, Frances Mary



Anne Clough
BBC Hulton Picture Library

Buss, Henry Sidgwick, and other educators. She played a prominent part in founding the North of England Council for Promoting the Higher Education of Women and was its secretary (1867–70) and president (1873–74). She persuaded James Stuart, the founder of university extension programs, to give lecture courses in the North of England, which led to the admission of women to the colleges at Manchester and Newcastle. When Henry Sidgwick planned a house for women students at Cambridge, Clough was selected as principal, a position she held until her death. The house was started in 1871 with five students, and its success led to the building of Newnham Hall (1875) and the foundation of Newnham College (1880).

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Clough, Arthur Hugh (b. Jan. 1, 1819, Liverpool—d. Nov. 13, 1861, Florence), poet whose work reflects the perplexity and religious doubt of mid-19th century England. He



Arthur Clough, chalk drawing by S. Rowse, *c.* 1860; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

was a friend of Matthew Arnold and the subject of Arnold's commemorative elegy "Thyrsis."

While at Oxford, Clough had intended to become a clergyman, but his increasing religious scepticism caused him to leave the university. He became head of University Hall, London, in 1849, and in 1852, at the invitation of Ralph Waldo Emerson, he spent several months lecturing in Massachusetts. He later worked as a government education official and helped his wife's first cousin, Florence Nightingale, in her philanthropic work. While on a visit to Italy he contracted malaria and died at age 42.

Clough's deeply critical and questioning attitude made him as doubtful of his own powers as he was about the spirit of his age, and he gave his contemporaries the impression of promise unfulfilled, especially since he left the bulk of his verse unpublished. Nonetheless, Clough's *Poems* (1862) proved so popular that they were reprinted 16 times within 40 years of his death. His best verse has a flavour that is closer to the taste and temper of the 20th century than to the Victorian age, however. Among his works are *Bothie of Tober-na-Vuolich* (1848) and *Amours de Voyage* (1858), poems written in classical hexameters and dealing with romantic love, doubt, and social conflict. The long, incomplete poem *Dipsychus* most fully expresses Clough's doubts about the social and spiritual developments of his era, while his sharpest criticisms of Victorian moral complacency are found in "The Latest Decalogue":

> Thou shalt not kill, but need'st not strive
> Officiously to keep alive.

The Poems of Arthur Hugh Clough (1974), edited by F.L. Mulhauser, is the standard edition of Clough's work.

clout shooting, in archery, long-distance shooting at a circular target laid out on the ground, a form of competition practiced for centuries. The target was formerly a patch of cloth (clout).

As practiced by the Royal Company of Archers (the British sovereign's bodyguard in Scotland, formally organized in 1676) and the Woodmen of Arden (English society of archers, founded 1785), traditional longbows are used at distances of 180 to 240 yards (165 to 219 m). The clout is a 31-inch (79-centimetre) white target with a black centre, which is inclined at an angle of about 45° in the centre of five concentric circles drawn on the grass. A hit on the clout itself scores 6 points. The first circle, 1½ feet (called a foot) from the centre of the clout, scores 5; the 3-foot circle (half-bow) scores 4; the 6-foot (bow), 3; the 9-foot (bow and half), 2; and the 12-foot (two bows), 1. Another method of scoring is by ends (2 arrows each); the arrow nearest the centre wins the end.

Elsewhere the clout-shooting target is 48 feet (15 m) in diameter, also drawn on the ground in five concentric circular zones, with a small target or flag in the centre as an aiming mark. The usual distance for men is 180 yards (165 m) and for women 140 yards (128 m). Scoring is as in standard target archery—9, 7, 5, 3, and 1 point, respectively, for hits from the centre outward.

In another variety, called battle clout, a larger, more distant target and hunting arrows are often used.

clove, small, reddish-brown flower bud of the tropical evergreen tree *Syzygium aromaticum* (sometimes *Eugenia caryophyllata*) of the family Myrtaceae, important in the earliest spice trade and believed indigenous to the Moluccas, or Spice Islands, of Indonesia. Strong of aroma and hot and pungent in taste, cloves are used to flavour many foods, particularly meats and bakery products; in Europe and the United States the spice is a characteristic flavouring in Christmas holiday fare, such as wassail and mincemeat.



Clove (*Syzygium aromaticum*)
W.H. Hodge

As early as 200 BC, envoys from Java to the Han-dynasty court of China brought cloves that were customarily held in the mouth to perfume the breath during audiences with the emperor. During the late Middle Ages, cloves were used in Europe to preserve, flavour, and garnish food. Clove cultivation was almost entirely confined to Indonesia, and in the early 17th century the Dutch eradicated cloves on all islands except Amboina and Ternate in order to create scarcity and sustain high prices. In the latter half of the 18th century the French smuggled cloves from the East Indies to Indian Ocean islands and the New World, breaking the Dutch monopoly.

The clove tree is an evergeen that grows to about 25 to 40 feet (8 to 12 m) in height. Its gland-dotted leaves are small, simple, and opposite. The trees are usually propagated from seeds that are planted in shaded areas. Flowering begins about the fifth year; a tree may annually yield up to 75 pounds (34 kg) of dried buds. The buds are hand-picked in late summer and again in winter and are then sun-dried. The island of Zanzibar, which is part of Tanzania, is the world's largest producer of cloves. Madagascar and Indonesia are smaller producers.

Cloves vary in length from about ½ to ¾ inch (13 to 19 mm). They contain 14 to 20 percent essential oil, the principal component of which is the aromatic oil eugenol. Cloves are strongly pungent owing to eugenol, which is extracted by distillation to yield oil of cloves. This oil is used to prepare microscopic slides for viewing and is also a local anesthetic for toothaches. Eugenol is used in germicides, perfumes, and mouthwashes, in the synthesis of vanillin, and as a sweetener or intensifier.

clove pink: *see* carnation.

clove tree, tropical tree, a species of the genus *Eugenia* (*q.v.*).

clover, any member of the genus *Trifolium*, of the pea family (Fabaceae), comprising 300 or more annual and perennial species, occurring in most temperate and subtropical regions (except Southeast Asia and Australia). The alternate leaves are compound, usually



Clover (*Trifolium*)
Ken Brate—Photo Researchers

with three toothed leaflets. The very small, fragrant flowers are crowded into dense heads, or spikes. The small, dry fruit usually contains one or two seeds. Cultivated species of clover originated in the Old World but have become naturalized worldwide in temperate regions.

Clover is highly palatable to livestock and is high in protein, phosphorus, and calcium, thus providing valuable nourishment in either the green or the dry stage. In addition to their principal value as animal feed in the form of hay, pasture, and silage, the clovers are valuable soil-improving and soil-conserving plants. Clover adds about 55–170 kg per hectare (about 50–150 pounds per acre) of nitrogen to the soil and increases availability of other nutrients for following crops.

The most important agricultural species are red clover (*T. pratense*), white clover (*T. repens*), and alsike clover (*T. hybridum*). Red clover, a biennial, or short-lived perennial, bears an oval, purplish flower head about 2.5 cm (1 inch) in diameter. White clover, a low, creeping perennial, is often used in lawn-grass mixtures and bears a white flower head often tinged with pink. Alsike clover, a perennial species sometimes called Swedish clover, or Alsatian clover, bears globular, rosy-pink flower heads.

clover leaf weevil: *see* alfalfa weevil.

Clovio, Giulio (b. 1498, Grižane, Croatia, Hung.—d. January 1578, Rome, Papal States [Italy]), Italian miniature painter and priest.

Clovio is said to have studied at Rome under Giulio Romano and at Verona under Girolamo de' Libri. His book of 26 pictures representing the procession of Corpus Domini, in Rome, was the work of nine years, and the



"Giulio Clovio," portrait by El Greco, *c.* 1570; in the Museo e Gallerie Nazionali di Capodimonte, Naples
SCALA—Art Resource

covers were executed by Benvenuto Cellini. The British Museum has his 12 miniatures of the victories of the emperor Charles V. A manuscript life of Federico, duke of Urbino, in the Vatican Library, is superbly illustrated by him, and many other works are doubtfully attributed to him. He sometimes exceeded the limitations of his medium in attempts to sustain the art of illumination.

Clovis, also called CHLODOVECH, German CHLODWIG, or HLODWIG, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Clovis I** (b. *c.* 466—d. Nov. 27, 511, Paris), Merovingian founder of the Frankish kingdom that dominated much of western Europe in the early Middle Ages.

Clovis was the son, and probably the only son, of Childeric I, king of the Salian Franks of Tournai. To judge from the remains of Childeric's burial at Tournai, he seems to have been a federate chieftain of some standing and certainly a pagan. Under the same pagan gods, his son Clovis, who succeeded him in 481, advanced south to conquer northern Gaul. There survives a letter to him written by Bishop Remigius (Rémi) of Reims, congratulating him on taking over the administration of Belgica Secunda and advising him to listen to the bishops. At Soissons, in 486, Clovis defeated Syagrius, the last Roman ruler in Gaul. This opened to him the whole area of the Somme and the Seine and in particular brought him the extensive properties of the Roman treasury in that area. Clovis appears to have met with some resistance from the cities, and Franks not of his following seem to have been slow in coming to his aid. But he established his power at least as far south as Paris between the years 487 and 494. The Armoricans of western Gaul and the Germanic peoples of the Rhineland offered more serious opposition; and at the Loire he made contact with the Visigoths, protégés of Theodoric, the formidable ruler of Ostrogothic Italy.

Of the history of these early years, virtually nothing is known that is not recorded by Bishop Gregory of Tours, who wrote toward the end of the 6th century. Gregory's aim was to depict a heroic pagan warrior who owed his success to conversion to the true faith of Christianity. The outlines of his story are acceptable as historical fact, being based partly on the epic traditions of the Merovingian family itself and partly on annalistic records kept by the Christian church. (The name Merovingian derives from Merovich, a close relative of Childeric.)

The king whom Gregory portrays is primarily a warrior—bold, subtle, and unscrupulous in dealing with possible rivals among the Frankish chieftains of the northeast. A famous story told of him by Gregory best illustrates his qualities. A splendid vase was seized by Clovis' followers from a church (perhaps Reims), and the bishop begged for its return. At the next division of booty, which took place at Soissons, the king asked for the vase in addition to his agreed share of booty. One Frank objected and smashed the vase with his axe. The king restored it, broken as it was, to the bishop and said nothing. But a year later, at a military assembly, he recognized the offending warrior and took occasion to rebuke him for his ill-kept weapons, flinging his axe to the ground. As the man bent to pick it up, the king split his skull with his own axe, remarking, "Thus you treated the vase at Soissons." Gregory entirely approved: the church was avenged and so was the king; and the rest of Clovis' following was terrified.

But Clovis was also pious and credulous, as befitted a warrior whose gods had brought him great success. Though master of a Roman province effectively controlled by dynasties of able Gallo-Roman bishops, he showed no disposition to seek conversion until after his marriage to a Catholic princess, the Burgundian Clotilda (later St. Clotilda), in about 493. Three years later he undertook a campaign against the Alamanni of the middle Rhine, and at Zülpich (Tolbiac) his forces faced defeat. Only at this point did he think of invoking the help of his wife's god; and defeat was turned to victory. Even then a period of some two years elapsed before the combined efforts of Clotilda and Bishop Remigius (later St. Remigius of Reims) persuaded him to seek baptism. This took place at Reims, after a visit to Tours and due consultation with his warriors, several of whom were baptized with him. The Frankish settlers of the countryside remained pagan, and their conversion was a slow and spasmodic business. Their grave-site goods were to betray a rustic paganism at least until the 7th century.

It was to Catholicism, not to Arianism, that Clovis had turned. This may have affected his abortive intervention in the political affairs of Burgundy shortly afterward, for the Burgundians were mostly Arians. Some Burgundian detachments followed him on his subsequent campaigns, but he cannot be said to have conquered Burgundy or annexed it to Francia. A letter to him from Avitus, bishop of Burgundian Vienne, fully recognizes the risk to his barbarian charisma that the king ran in denying the pagan gods of his ancestors. In place of pagan *fortuna,* the bishop urges, the king has acquired Christian *sanctitas,* which will equally see him to victory.

In 506 Clovis was still active in the Rhineland against both the Alamanni and the Thuringians. In 507 he finally turned against the powerful Visigoths of Gaul south of the Loire. But first he sought the patronage of St. Martin of Tours, greatest of the Gallo-Roman saints. His subsequent victory over the Arian Visigoths at Vouillé, near Poitiers, was attributed by him to that patronage. His family had acquired a spiritual patron revered by all his Gallo-Roman subjects. Though he penetrated as far south as Bordeaux and sent his son to capture the Visigoth capital of Toulouse, he did not expel the Goths from Septimania or turn southern Gaul into a settlement area for his people. He contented himself with returning to Tours, where he gave thanks to St. Martin for victory and received the insignia of an honorary consulate from the Eastern emperor, Anastasius. He abandoned the Gallo-Roman south to its own devices and established himself at Paris, a good forward post from which to control the Armoricans of the west, the Thuringians on the Rhine, and the still-troublesome Franks of the north and east. In Paris he built a church dedicated to the Apostles (later Sainte-Geneviève).

Two revealing actions belong to the last year or so of Clovis' life. The first was the summoning of a church council at Orléans, attended by 32 bishops. Its canons, which survive, reveal the extent to which the king personally concerned himself with its deliberations. The second was the promulgation of Lex Salica, the law of the Salian Franks who accepted his authority. This constitutes 65 clauses regulating the life of the countryside. Uninfluenced by Christianity, they are a political manifesto rather than a precise legal statement of how the Franks ordered their lives. What they certainly reveal is the enhanced authority of the king and his willingness to make use of Gallo-Roman skills in ruling his own barbarians. Clovis died at the age of 45 and was buried in his Church of the Apostles. His Christian grave has never been found.

Making every allowance for Gregory of Tours's intention to represent him as a second Constantine, Clovis still stands out as a barbarian of heroic stature. Starting from small beginnings, he had been accepted as ruler by the Gallo-Romans; with imperial approval he had made the first serious attack on the Arian-Gothic confederation of western Europe; he had taken for his people the momentous decision that they were ultimately to be converted

to Catholicism, not Arianism; and, perhaps most difficult of all, he had made one political people of the various Frankish tribes of modern Belgium and the Rhineland. Henceforward, Frankish power was to penetrate and colonize east of the Rhine. His family was secure in an unrivaled dominance that was to last until the 8th century. (J.M.W.-H.)

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• **Clovis II** (b. *c.* 634—d. October or November 657), Merovingian Frankish king of Neustria and Burgundy from 639, the son of Dagobert I. He was dominated successively by Aega and by Erchinoald, Neustrian mayors of the palace.

• **Clovis III** (b. 682—d. 695), Merovingian king of the Franks from 691, the son of Theodoric III. During his reign actual power was held by the Carolingian Pepin II (of Herstal), mayor of the palace of Austrasia.

Clovis, city, seat (1909) of Curry county, eastern New Mexico, U.S., in the High Plains (4,260 ft [1,298 m] above sea level) near the Texas border. It was founded in 1906 as a division point for the Santa Fe Railway and named for Clovis, king of the Franks. Centre of an irrigated farm and ranch area, it has extensive livestock-auction and cattle-feeding facilities and also markets sugar beets, sorghum, wheat, cotton, vegetables, poultry, and dairy products. Nearby Cannon Air Force Base contributes substantially to the economy. The city gave its name to the Clovis Complex (a Stone Age culture) after artifacts were discovered (1932) in the locality. Inc. 1909. Pop. (1990) 30,954.

Clovis complex, ancient culture centred primarily on the plateau or tableland of Arizona, New Mexico, and western Texas. (It is so named from the first important site examined, in 1932, near Clovis, N.M.) This culture, which probably began sometime prior to 10,000 BC, is generally considered to be ancestral to the later Folsom complex. Like Folsom, the Clovis complex was part of the ancient big-game hunting tradition. In Arizona, Clovis projectile points have been found in undisputable association with mammoth bones. The most problematical Clovis find comes from a site in Texas where a Clovis point was found in hearths that yielded a radioactive-carbon date of greater than 37,000 years. This would mean that Clovis points persisted unchanged for around 27,000 years, an assumption archaeologists find difficult to accept.

The typical Clovis point is leaf shaped, with parallel or slightly convex sides and a concave base. The edges of the basal portions are ground somewhat, probably to prevent the edge from severing the hafting cord. Clovis points range in length from 1½ to 5 inches (4 to 13 centimetres) and are heavy and fluted, though the fluting rarely exceeds half the length. Some eastern variants of Clovis, called Ohio, Cumberland, or Suwannee, depending on their origin, are somewhat fish tailed and also narrower relative to length. Also associated with Clovis are such implements as bone tools, hammerstones, scrapers, and unfluted projectile points.

clown, familiar comic character of pantomime and circus, known by his distinctive makeup and costume, ludicrous antics, and buffoonery, whose purpose is to induce hearty laughter. The clown, unlike the traditional fool or court jester, usually performs a set routine characterized by broad, graphic humour, absurd situations, and vigorous physical action.

The earliest ancestors of the clown flourished in ancient Greece—bald-headed, padded buffoons who performed as secondary figures in farces and mime, parodying the actions of more serious characters and sometimes pelting the spectators with nuts. The same clown appeared in the Roman mime, wearing a pointed hat and a motley patchwork robe and serving as the butt for all the tricks and abuse of his fellow actors.



Joseph Grimaldi as the clown in *Harlequin Padmanada,* or *The Golden Fish,* a Christmas pantomime produced at Covent Garden in 1811, print, 19th century; in the Theatre Museum, Victoria and Albert Museum, London

By courtesy of the Theatre Museum, Victoria and Albert Museum, London

Clowning was a general feature of the acts of medieval minstrels and jugglers, but the clown did not emerge as a professional comic actor until the late Middle Ages, when traveling entertainers sought to imitate the antics of the court jesters and the amateur fool societies, such as the Enfants san Souci, who specialized in comic drama at festival times. The traveling companies of the Italian commedia dell'arte developed one of the most famous and durable clowns of all time, the Arlecchino, or Harlequin, some time in the latter half of the 16th century, spreading his fame throughout Europe. The Harlequin began as a comic valet, or zany, but soon developed into an acrobatic trickster, wearing a black domino mask and carrying a bat or noisy slapstick, with which he frequently belaboured the posteriors of his victims.

The English clown was descended from the Vice character of the medieval mystery plays, a buffoon and prankster who could sometimes deceive even the Devil. Among the first professional stage clowns were the famous William Kempe and Robert Armin, both of whom were connected with Shakespeare's company. Traveling English actors of the 17th century were responsible for the introduction of stage clowns to Germany, among them such popular characters as Pickelherring, who remained a German favourite until the 19th century. Pickelherring and his confederates wore clown costumes that have hardly changed to this day: oversized shoes, waistcoats, and hats, with giant ruffs around their necks.

The traditional whiteface makeup of the clown is said to have been introduced with the character of Pierrot (or Pedrolino), the French clown with a bald head and flour-whitened face who first appeared during the latter part of the 17th century. First created as a butt for Harlequin, Pierrot was gradually softened and sentimentalized. The pantomimist Jean-Baptiste-Gaspard Deburau took on the character in the early 19th century and created the famous lovesick, pathetic clown, whose melancholy has since remained part of the clown tradition.

The earliest of the true circus clowns was Joseph Grimaldi, who first appeared in England in 1805. Grimaldi's clown, affectionately called "Joey," specialized in the classic physical tricks, tumbling, pratfalls, and slapstick beatings. In the 1860s a low-comedy buffoon appeared under the name of Auguste, who had a big nose, baggy clothes, large shoes, and untidy manners. He worked with a whiteface clown and always spoiled the latter's trick by appearing at an inappropriate time to foul things up.

Grock (*q.v.*; Adrien Wettach) was a famous whiteface pantomimist. His elaborate melancholy resembled that of Emmett Kelly, the American vagabond clown.

The clown figure in motion pictures culminated in the immortal "little tramp" character of Charlie Chaplin (*q.v.*), with his ill-fitting clothes, flat-footed walk, and winsome mannerisms.

clown, sacred: *see* sacred clown.

clown fish, species of anemone fish (*q.v.*).

cloxacillin, one of several semisynthetic penicillins, so called because they are made by the addition of a specific substance to the medium in which a culture of *Penicillium* mold is growing. Semisynthetic penicillins have been developed in attempts to circumvent disadvantages of penicillin G. The antimicrobial activity of cloxacillin is similar to that of penicillin G, but it is more resistant than penicillin to inactivation by penicillinase, an enzyme (biological catalyst) occurring in many microorganisms.

Cluain Meala (Ireland): *see* Clonmel.

Cluain Mhic Nóis, also spelled CLUAIN MOCCU NOIS (Irish monastic centre): *see* Clonmacnoise.

club, primitive weapon, a heavy stick, sometimes with a stone or metal head, used as a hand or throwing weapon and usually shaped or selected with an outer end wider and heavier than its handle. Among primitive groups, special designs often characterize particular tribes. Medieval European bishops denied the use of the sword were allowed to enter battle with a mace, an iron or steel club designed for splitting armour. Police continue to employ narrow clubs known as truncheons, nightsticks, or billies in controlling prisoners and crowds. These are sometimes made with lead cores.

club moss, also called GROUND PINE, common name for about 200 species of plants that constitute the genus *Lycopodium,* of the order Lycopodiales (class Lycopsida), mainly native to tropical mountains but also common in northern forests of both hemispheres. Club mosses are evergreen herbs with needlelike leaves and, often, conelike clusters of small leaves (strobili), each with a kidney-shaped spore capsule at its base. An underground sexual phase plant (one that produces gametes, or sex cells), alternates in the life cycle with the spore-producing plant.

Running pine, or stag's horn moss (*L. clavatum*), has creeping stems to 3 metres (about 10 feet) long and has 10-centimetre- (about 4-inch-) high ascending branches. The scalelike green leaves are set closely together. Run-



Club moss (*Lycopodium annotinum*)
Joan E. Rahn—EB Inc.

ning pine is native to open, dry woods and rocky places in the Northern Hemisphere. The spore-producing leaves are arranged in pairs along a stalklike strobilus. Ground cedar (*L. complanatum* variety *flabelliforme*), native to northern North America, produces fanlike branches resembling juniper branchlets. Shining club moss (*L. lucidulum*), a North American species occurring in wet woods and among rocks, has no distinct strobili; it bears its spore capsules at the bases of leaves scattered along the branches. Fir club moss (*L. selago*), a 20-cm-tall plant native on rocks and bog margins in the Northern Hemisphere, also lacks distinct strobili. Ground pine (*L. obscurum*), a 25-cm-tall plant, has underground-running stems. It is native to moist woods and bog margins in northern North America, to mountain areas farther south, and to eastern Asia. Alpine club moss (*L. alpinum*), with yellowish or grayish leaves, is native to cold woods and Alpine mountains in northern North America and Eurasia.

clubfoot, congenital twisting of the foot. In the most common type, called talipes equinovarus, the heel bends upward and the front part of the foot is turned inward and bent toward the heel. The frequency of the disorder is equal in males and females. A mild form, possibly caused by poor position in the womb, may be cured by the use of wrappings, plaster casts, and sometimes a special splint; treatment is begun soon after birth, and the feet are usually normal by the time the child begins to walk. A more severe form requires surgery to free tendons and to position bones.

clubroot, disease of plants of the mustard family (Cruciferae) caused by the fungus *Plasmodiophora brassicae.* Susceptible plants include broccoli, cabbage, cauliflower, kohlrabi, mustard, radish, turnip, alyssum, honesty, rockcress, stock, sweet alyssum, shepherd's purse, and yellow-rocket. Affected plants are stunted, yellowed; they wilt during hot, sunny days and partially recover at night. In the early stages roots are greatly distorted by a mass of small to large "clubs," often spindle-like, but in a variety of shapes. The fungus may survive in infested soil 10 years or more. The disease is spread from one area to another by diseased transplants, infested surface-drainage water, manure, crop refuse, and soil on shoes, tools, and equipment. Clubroot is most severe in cool, poorly drained, acid to neutral soils.

The disease can be avoided by using disease-free transplants; growing plants in clean soil and preventing contamination of such soil; applying, where feasible, large amounts of hydrated lime six or more weeks before planting; applying a fungicide in the transplant water; and growing resistant varieties.

Cluj, *judeţ* (district), northwestern Romania, occupying an area of 2,567 sq mi (6,650 sq km). The Western Carpathians rise above settlement areas in the valleys. The district is drained by the Borşa, Someşul Mic, Someşu Rece, Someşu and Cald tributaries of the Somes River. Cluj-Napoca (*q.v.*) is the district capital. Machinery, metal products, and chemicals are produced there and in Huedin. Building materials and glass are manufactured in Turda; and several towns have timber, textile, and footwear industries. Iron is mined at Capuşu Mic. Coal mines operate at Ticu, Tămasa, Surduc, and Cristoltel; and salt is quarried at Ocna Dejului. A hydroelectric plant operates on the Someşu Rece River near Tarniţa, and construction on a hydroelectric project near Marişel began during the late 1970s.

Neolithic, Iron Age, and Roman remnants have been found in Cluj-Napoca and Gilan. In 1437 a Catholic bishop built a fortress in Gilan that was destroyed by fire in 1861. A church in Turda town was built of stones from the Roman settlement on which the town was built. A wooden church is found in the village of Filea de Jos. Huedin has an ethnographic museum. The Turda Gorges (Cheile Turzii), located near Turda town, are an example of Karst geology. A university and several technical and professional institutes are found in Cluj-Napoca. Highway and railway connections extend through Cluj-Napoca, and an airport is located near the city. Pop. (1982 est.) 741,580.

Cluj-Napoca, city, capital of Cluj *judeţ* (district), northwestern Romania. The historic



Church of St. Michael, Cluj-Napoca, Romania
Art Resource—EB Inc

capital of Transylvania, it is approximately 200 mi (320 km) northwest of Bucharest in the Someşul Mic River Valley. The city stands on the site of an ancient Dacian settlement, Napoca, which the Romans made a *municipium.*

In the Middle Ages the name of the city was Culus, as attested in documents of 1173, but by the beginning of the 15th century it was known as Cluj (probably from Castrum Clus, a small fortification dating from 1213). The city has also been known by its German name, Klausenburg, and its Hungarian name, Kolozsvár. It became a thriving commercial and cultural centre, and in 1405 it was declared a free town. After the constitution of the autonomous principality of Transylvania in the 16th century, Cluj became its capital. In 1920 the city, with the rest of Transylvania, was incorporated into Romania, and in the mid-1970s it was joined with neighbouring Napoca.

Among the historic monuments are the house in which Matthias I Corvinus (king of Hungary, 1458–90) was born; the church of St. Michael (1321–1444), one of the largest Gothic churches in Romania; and the Bánffy Palace (1774–85), now a fine arts museum. The city is the location of the Babeş-Bolyai University, several technical and professional institutes, the Ion Andreescu Institute of Fine Arts, the Gheorghe Dima Conservatory, and a branch of the Academy of Romania. The institute of speleology was the first of its kind in the world. The botanical gardens are considered to be the richest in Romania.

Industrial progress has been substantial since the union with Romania. Cluj-Napoca's products include refrigerating equipment for industrial and domestic use, footwear and leather products, china, cigarettes, and foodstuffs. Pop. (1982 est.) 265,824.

Clunies-Ross FAMILY, first settlers, of the Cocos, or Keeling, Islands in the eastern Indian Ocean. John Clunies-Ross, a Scotsman, settled (1827) with his family in the Cocos and set about developing the islands' natural coconut groves. Although the islands became a British possession in 1857, the family retained complete control, which was recognized by a royal grant in 1886. The family's position as owner of nearly all the property and sole employer of the inhabitants led to their designation in the press as "Kings of the Cocos" and continued through the transfer of the islands from Great Britain to Australia in 1955. In late 1972, John Clunies-Ross, fifth in the line of succession, agreed to relinquish his authority to the Australian government, which in 1978 bought his estate, with the exception of a few acres and the family mansion Oceania House.

George Clunies-Ross, beneficiary of the grant of 1886, established the first settlement on Christmas Island, about 750 miles east of the Cocos (and not to be confused with its namesake in the central Pacific), in 1888. His son Sidney Clunies-Ross discovered large deposits of phosphate of lime there in 1895–96 and received a concession to work the deposits in 1897. The Australian and New Zealand governments acquired the remaining Clunies-Ross family mining interests and assets in 1948.

Cluny, town, east central France, Saône-et-Loire *département,* Bourgogne region, northwest of Mâcon. It owed its early importance to its celebrated Benedictine abbey, founded in 910 by Duke William the Pious of Aquitaine. The newly founded order introduced reform in a period of general monastic laxity, returning to a strict observance of the Benedictine Rule. The abbey, subject to no authority but that of the pope, developed a centralization

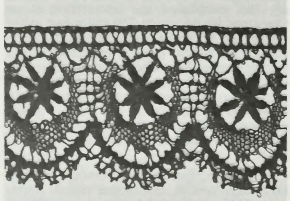


Octagonal belfry tower and smaller belfry of the surviving south transept of the abbey church of St. Peter and St. Paul at Cluny, Fr., 1088–1130
Actualit, Brussels

previously unknown in the Benedictine order, and all Cluniac houses, called priories, remained subject to the mother abbey. The surrounding town of Cluny prospered from the prominence of the abbey and received a communal charter in 1090 from the abbot St. Hugh. Both town and abbey suffered during the religious wars of the 16th century, and the abbey was suppressed during the French Revolution and closed in 1790.

The Romanesque Basilica of St. Peter and St. Paul, built principally between 1088 and 1130, was the largest church in the world until the erection of St. Peter's in Rome. Cluny's basilica was in great part demolished in the early 19th century, but the ruins of the main southern transept, dominated by a great belfry tower, testify to its former glory. The economy of the modern town is based on the servicing of Cluny's agricultural hinterland: there is a national stud farm, a livestock market, and woodworking industries. Pop. (1990) 4,724.

Cluny guipure, French bobbin lace first made in the mid-19th century. It is called Cluny because it was inspired by examples of 16th- and 17th-century scalloped lace with geometric patterns displayed in the Cluny Museum,



Cluny guipure lace from France or Belgium, *c.* 1900–30; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Paris. Cluny guipure was made from about 1862 in Lorraine. It was also made in England (at Nottingham) and at many centres in Belgium, including Bruges, Ypres, and Courtrai.

Cluny Museum, French MUSÉE DE CLUNY, in Paris, museum of medieval arts and crafts housed in the Hôtel de Cluny, a Gothic mansion built about 1490 as the town residence of the abbots of Cluny. The collection assembled by Alexandre du Sommerard, owner of the mansion from 1833, was the basis of the museum. The French government acquired the property on du Sommerard's death in 1842. The collection was reorganized in the early 1950s to present a coherent history of medieval civilization and includes gold- and silverwork, stained glass, sculpture, jewelry, textiles, and everyday articles.

clupeiform, any member of the order Clupeiformes, a group of bony fishes that includes some of the most numerous and heavily exploited of fishes, such as the herring, anchovy, and sardine. More than half of the 400 species of clupeiforms, found mainly in the tropics, are marine; the rest are divided equally between freshwater and anadromous species.

A brief treatment of clupeiforms follows. For full treatment, *see* MACROPAEDIA: Fishes.

Clupeiform fish are usually small, less than 30 cm (12 inches) in length, with slender, streamlined bodies. Only a few species exceed 50 cm (20 inches), although one wolf herring (species *Chirocentrus dorab*) reaches 3.6 m (12 feet) in length. Characteristic features include an internal passage between the inner ear and the swim bladder, peculiarities of the skull relating to the lateral lines and their connection to the ear, and certain features of the tail (caudal) skeleton. The body of most clupeiforms is keeled on the bottom. This shape prevents the ventral portion of the fish from being in shadow against the light backdrop of the sky, which would make it an easy target for a predator from below. The dorsal fin may be located anteriorly, posteriorly, or centrally on the back. Those species with the best-developed lateral line system and an anterior dorsal fin are the strongest swimmers and undertake the longest migrations. Newly hatched larvae differ in shape from the adults. They are long and wormlike, with the dorsal fin always placed posteriorly.

All marine species feed on plankton. Many species change their feeding habits seasonally, while all herrings and some other forms are known to cease feeding altogether during the breeding season. In general, clupeiforms feed intensively in summer, after spawning, but less in the spring before the spawning season.

Almost all clupeiforms are schooling fish. In large schools the bigger individuals remain toward the bottom, allowing light to filter down through the massed fish. At the approach of a predator all the fish clump together. Although there are no particular leaders, the entire school turns as though it were one organism. The leading fish remain there and have first access to new food sources. The schools tend to remain in deep water during the day and migrate vertically to the surface at night, following the movements of the plankton.

The majority of marine clupeiforms lay their eggs in shallow, inshore waters. Freshwater and anadromous forms choose shallow lakes and the beds of slow-moving rivers. The eggs are usually free-floating, although some genera, such as *Clupea* and *Pomolobus,* have sticky eggs that adhere to gravel or plants. The eggs of freshwater species usually sink to the bottom.

Clurman, Harold (b. Sept. 18, 1901, New York, N.Y., U.S.—d. Sept. 9, 1980, New York City), influential and respected American theatrical director and drama critic.

Clurman attended Columbia University in New York City, then the University of Paris, where he received a degree in letters in 1923. He made his stage debut the following year as an extra at the Greenwich Village Theatre in New York City. In 1931 Clurman became a founding member of the Group Theatre, an experimental company, for which he directed several plays, notably *Awake and Sing!* (1935) by Clifford Odets. Clurman's achievements as a director range over many categories of drama, including Carson McCullers' *Member of the Wedding* (1950), Jean Giraudoux's drama of ideas *Tiger at the Gates* (1955), and Jean Anouilh's farce *Waltz of the Toreadors* (1957). He also directed Eugene O'Neill's *Touch of the Poet* (1957) and Arthur Miller's *Incident at Vichy* (1965). Financed by a grant from the U.S. State Department, Clurman directed the Kumo Theatre Company of Japan in O'Neill's *Long Day's Journey into Night* (1965) and *The Iceman Cometh* (1968).

Clurman also became a drama critic, writing for the weekly magazine *The New Republic* in 1948–52, then for the weekly *The Nation* from 1953 until his death. He also wrote *On Directing* (1972); *The Divine Pastime* (1974), theatrical essays; and his memoirs, *All People Are Famous* (1974).

Clusiaceae, the garcinia family, in the tea order (Theales), comprising about 40 genera of tropical trees and shrubs. Several are important for their fruits, resins, or timbers.

Members of the Clusiaceae family usually have broad-ended, oblong, leathery leaves with a strong, central vein from which branch many delicate, horizontal veins. The plants have resinous, sticky sap, flowers with numerous stamens often united in bundles, and separate petals and sepals. Male and female organs often occur in separate flowers.

Scotch attorney, or cupey (*Clusia rose*), which is native to the Caribbean area, grows to about 10 m (30 feet). It has leaves 10 cm (4 inches) long, flatly open flowers with six waxy, rosy-white petals, and many-seeded, multicelled, golfball-sized fruits. Scotch attorney is planted as a beach shrub in areas exposed to salt spray.

C. grandiflora, which is native to Suriname, has larger flowers and ivory-white central stamen masses. Many members of the genus *Clusia* begin as epiphytes, or air plants, and eventually send roots over the host tree to the ground. All of the 145 members of the genus are tropical American, except for one species that is found in Madagascar and two found in New Caledonia.

Mammee apple, or mamey (*Mammea americana*), native to tropical America, produces a grapefruit-sized, rough, russet-skinned, edible fruit. The other members of the genus *Mammea* are native to Madagascar.

Fruits of many members of the genus *Rheedia* also are edible. Waika plum (*R. intermedia*), native to Central America, has a small, oval yellow fruit. There are 38 tropical American species and 4 native to Madagascar.

Several trees of the genus *Garcinia* produce valuable fruits, such as the mangosteen (*G. mangostana*). Other members of the family, including beauty leaf (*Calophyllum inophyllum*) and Ceylon ironwood (*Mesua ferrea*), are cultivated as ornamentals in tropical regions.

In some classifications the families Clusiaceae and Hypericaceae are combined into a larger family, the Guttiferae.

Clusium, ancient Etruscan town on the site of modern Chiusi, in Tuscany *regione,* north-central Italy.

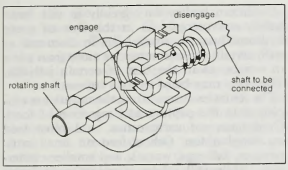
Clusium was founded in the 8th century BC on the site of an older Umbrian town known as Camars. In the early 6th century BC it entered into an alliance with Arretium (Arezzo) and other Etruscan towns against Tarquinius Priscus of Rome. At the end of the 6th century BC, Clusium's king, Lars Porsena, attacked Rome and may even have captured the city in an attempt to restore the power of the Tarquins there. In 391 BC Clusium was allied with Rome against invading Gauls led by the chieftain Brennus, who was able to capture Rome the following year.

Like other Etruscan cities, Clusium was surrounded by cemeteries and tombs. The modern excavation of Clusian tombs has yielded earthenware funerary jars with lids molded in the form of human heads, as well as ceramic human figures and Greek and locally made pottery. The decorations on sarcophagi found in the tombs have proved a major source of inscriptions in the Etruscan language. The modern town of Chiusi is a market centre with a growing tourist industry based on its Etruscan remains.

Clusius, Carolus (Latin), French CHARLES DE L'ÉCLUSE, or LESCLUSE (b. Feb. 19, 1526, Arras, Fr.—d. April 4, 1609, Leiden, Neth.), botanist who contributed to the establishment of modern botany.

Clusius developed new garden cultures and cultivated plants, such as the tulip, potato, and chestnut, from other parts of the world. He was the director of the Holy Roman emperor's garden in Vienna (1573–87) and spent the later years of his life teaching in Leiden, where his cultivation of tulips in the botanic garden was the beginning of the Dutch tulip bulb industry.

clutch, device for quickly and easily connecting or disconnecting a pair of rotatable coaxial shafts. Clutches are usually placed between the driving motor and the input shaft to a machine and provide a convenient means for starting and stopping the machine and permit-



Cone clutch

From P.H. Black and O.E. Adams, *Machine Design* (Copyright 1968), used with permission of McGraw-Hill Book Co.

ting the driving motor or engine to be started in an unloaded state (as in an automobile).

Mechanical clutches provide either a positive (no-slip) or a friction-dependent drive. Positive clutches are collars with jaws that interlock, one member being rigidly attached to its shaft while the other slides on its shaft.

Friction clutches have pairs of conical (*see* illustration), disk, or ring-shaped mating surfaces and means for pressing the surfaces together. The pressure may be created by a spring or a series of levers locked in position by the wedging action of a conical spool.

Automatic engagement is obtained with a centrifugal clutch in which the friction shoes are segments of rings that are pivoted to or carried around by the driving member and make firmer and firmer contact with the internal cylindrical surface of the driven member as the driver's speed increases.

An overrunning clutch transmits torque in one direction only and permits the driven shaft of a machine to freewheel, or keep on rotating when the driver is stopped. On bicycles, such clutches permit the rider to coast without moving the pedals.

Clutha River, river, the longest in South Island, New Zealand. Rising in the Southern Alps, 210 miles (340 km) from the sea, the stream issues from Lake Wanaka and, fed by the Pomahaka, Lindis, and Manuherikia rivers, flows southeast through a narrow gorge. It drains a basin some 8,480 square miles (21,960 square km) in area and has a mean annual discharge of 23,000 cubic feet (650 cubic m) per second. Ten miles (16 km) from the Pacific, the river splits to flow around Inch Clutha Island and enters the ocean by two mouths. Major settlements of the valley, which supports sheep, beef, grain, and fruit farming in the upper reaches and vegetable and dairy farming in the delta, include Clyde, Cromwell, Alexandra, Balclutha, and Kaitangata. At the limit of navigation (45 miles [72 km] upstream) is the large Roxburgh hydroelectric station and its 20-mile- [32-kilometre-] long storage reservoir. The river's name is derived from the Gaelic for Clyde River. It was the site of gold placer mining during the 1860s.

Clüver, Philipp, Latin PHILIPPUS CLUVERIUS, Polish FILIP CLUWER (b. 1580, Danzig [now Gdańsk], Pol.—d. Dec. 31, 1622, Leiden, Neth.), German geographer, a principal figure in the revival of geographic learning in Europe and the founder of historical geography.

After becoming a soldier and then traveling throughout most of Europe, Clüver in 1615 settled in Leiden, where the following year he was appointed *geographus academicus* ("academic geographer"), with an annual stipend. He approached geography through history and classical authors. Among his works the most important is *Introductio in Universam Geographiam* (1624; "Introduction to Universal Geography"). The first of its six volumes deals in general with the Earth, but it is the remaining five on which his reputation rests. They contain short descriptions of countries and stress human and historical considerations. The *Introductio* remained a standard work through the mid-18th century.

Clwyd, county of northeastern Wales, created in 1974 from the former county of Flintshire and most of the former county of Denbigh. The administrative seat is Mold. Clwyd has six administrative districts: Alyn and Deeside, Colwyn, Delyn, Glyndŵr, Rhuddlan, and Wrexham Maelor.

The county fronts the Irish Sea to the north and straddles the frontier between the lowland of central Britain and the highland of North Wales. There is a marked contrast between the low area near the Dee Estuary in the east and the Vale of Clwyd and the Clwydian hills in the west.

Prehistoric remains from before the Bronze Age are scant, but there are Iron Age forts in the Clwydian hills, and the Romans mined lead and built a road to link Deva (Chester) with Segontium (Caernarvon). The Normans established a network of strategic control, and their castles at Flint, Rhuddlan, and Denbigh remain in an excellent state of preservation.

The county is characterized by three distinctive and contrasting geographic areas. As a result of the exploitation of the rich deposits of the Coal Measures in the 19th century, the south and east of the county was industrialized, with ironworks and shipbuilding (on Deeside); more recently engineering, chemical, and synthetic-textile industries have been established. The coastal resorts of Prestatyn, Rhyl, and Colwyn Bay, like the industrial development of the Dee Estuary, date from the opening of the Chester to Holyhead Railway in 1848. The major commercial centre is Wrexham.

Residential development for commuters from Merseyside and for retired people, as well as resort (especially caravan, or camper) accommodations for holidaymakers from Lancashire, have intensified the "Anglicization" of this northeastern corner of Wales. Area 938 square miles (2,430 square km). Pop. (1991 prelim.) 401,900.

Clwyd, River, principal river of northeastern Wales, flowing entirely in Clwyd county (created and named for the river, 1974). It rises 7 miles (11 km) southwest of the town of Ruthin and falls about 1,200 feet (370 m) as it flows 35 miles (55 km) through the Vale of Clwyd, past St. Asaph, to the Irish Sea at Rhyl. Beneath a covering of glacial material, relatively soft sandstones make up the floor of the vale, which forms a deep trough in the Welsh uplands.

Clyde, River, Scotland's most famous and important river (and firth, or estuary), about 106 miles (170 km) in length, discharging to the Atlantic on the western coast. The upper Clyde is a clear fishing stream rising in the moorlands of the Southern Uplands and flowing northward through a valley bordered by river terraces for about 30 miles (48 km) to the neighbourhood of Biggar, where it abruptly changes course. From Biggar the Clyde winds northwestward, falling less than 100 feet (30 m) in 15 miles (24 km) until at the Falls of Clyde it drops 250 feet (75 m) in 4 miles (6.4 km). Waterpower from these falls was important in the siting of local cotton mills in the early 19th century, and there are now some small hydroelectric stations.

Near Crossford, the widening Vale of Clyde, famous for the breeding of Clydesdale horses, is intensively cultivated. From Hamilton northward, coal mining and heavy industry become dominant. Following the development of trade with the New World in the 18th century, the Clyde was dredged, deepened, and made navigable to the centre of Glasgow, which soon became a major industrial city and the world's largest shipbuilding centre. The famous Clydeside shipyards, which still border the river for 20 miles (32 km) below Glasgow, suffered severely from foreign competition after World War II.

The river reaches its estuary, the Firth of Clyde, through hilly country near the coastal towns of Dumbarton and Greenock. From Dumbarton the firth extends about 65 miles (105 km) to the small island of Ailsa Craig. The attractive estuary region has long been popular with tourists. The chief Clydeside ports are Glasgow, Port Glasgow, and Greenock.

Clyde (of Clydesdale), Colin Campbell, Baron, also called (1849–58) SIR COLIN CAMPBELL (b. Oct. 20, 1792, Glasgow, Scot.—d. Aug. 14, 1863, Chatham, Kent, Eng.), British soldier who was commander in chief of the British forces in India during the Indian Mutiny of 1857.

The son of a carpenter named Macliver, he assumed his mother's name of Campbell in 1807 when he was promised a military commission by Frederick Augustus, the Duke of York, then commander in chief. At age 15 he received the commission of ensign, but, lacking social influence, his promotions were slow. He served in the War of 1812 against the United States, in the quelling (1823) of the Demerara insurrection (named for the Demerara River in British Guiana), and in the Opium War against China in 1842. Knighted for his service in the Second Sikh War of 1848–49, he was appointed commander in



Clyde, detail of an engraving by D.J. Pound, after a photograph

BBC Hulton Picture Library

chief on the outbreak of the Indian Mutiny. Always concerned for the well-being of his men, he was nicknamed "Old Careful" and set an example of sober economy. Though criticized for overcaution during the mutiny, his successes were not costly and his campaigns were thorough. He was raised to the peerage in 1858 as Baron Clyde and granted a generous pension of £2,000 a year. He was buried in Westminster Abbey.

Clydebank, district, Strathclyde region, southwestern Scotland, created by the reorganization of 1975 from part of the former county of Dunbarton. The district lies on the northern bank of the River Clyde, northwest of Glasgow, and includes both the industrial town of Clydebank, an area of declining heavy industry in the southeast, and rural areas to the north and west, producing sheep on the higher land and dairy foods, pigs, and poultry in lower areas. The wet northern hills of the district serve as a water catchment area for the Glasgow conurbation. Clydebank, the seat of the district authority, has suffered severely from the decline of its shipbuilding and heavy-engineering industries. The shipyard responsible for the great Cunard liners, culminating with the *Queen Elizabeth II* (1967), now manufactures offshore oil-drilling rigs and related equipment. Area 14 square miles (36 square km). Pop. (1991 prelim.) 44,658.

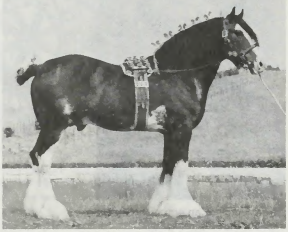
Clydesdale, formerly (1975–80) LANARK, district, Strathclyde region, southwestern Scot-

land; it was created by the reorganization of 1975 from part of the southern area of the former county of Lanark. The district covers an area of 511 square miles (1,323 square km) of mainly agricultural land and centres on the small burgh of Lanark, which functions as the seat of the district authority and as a livestock market for a large agricultural hinterland that is important for both dairying and stock rearing.

Clydesdale supports intensive cultivation of fruit and vegetables (often under glass) for the Glasgow market and soft fruit for the jam-making industries of Carluke. Other important arable crops include barley, turnips, and fodder for the considerable numbers of beef and dairy cattle, sheep, and pigs. Pop. (1989 est.) 58,440.

Clydesdale, heavy draft-horse breed that originated in Lanarkshire, Scotland, near the River Clyde. The breed was improved about 1715 by mating a Flemish stallion with local mares; Shire blood was later introduced. Clydesdales were taken to North America about 1842 but never became a popular draft horse there.

The Clydesdale averages 17 to 18 hands (68 to 72 inches [173 to 183 cm]) tall and 2,000 pounds (900 kg) in weight. The colour is usually bay, dark brown, or black, with prominent white markings. Noted for its high leg action while walking or trotting, the breed



Clydesdale
Sally Anne Thompson

is characterized by feather (long hair) on the legs, attractive heads, and well-formed legs and feet.

The British breed association is the Clydesdale Horse Society of Great Britain and Ireland, organized in 1877. The American Clydesdale Horse Association, organized in 1879, was later succeeded by the Clydesdale Breeders of the United States.

Clynes, John Robert (b. March 27, 1869, Oldham, Lancashire, Eng.—d. Oct. 23, 1949, London), one of the original members of the British Labour Party. He served as the party's leader in Parliament (1921–22) and held Cabinet office in the first two Labour governments: lord privy seal and deputy leader of the House of Commons (January–October 1924) and secretary of state for home affairs (1929–31).

The son of an Irish labourer, Clynes went to work in a cotton mill at the age of 10. From 1889 he was a trade-union officer, and, during his parliamentary career (1906–31, 1935–45), he was president of the National Union of General and Municipal Workers (1912–37). He served as minister of food briefly in 1918.

In 1919 Clynes served as deputy leader of the Labour Party in Parliament, and he then became leader (1921–22) until he was defeated by Ramsay MacDonald and thereafter was deputy again. When MacDonald formed his coalition National Government in August 1931, Clynes joined most of his fellow Cabinet members in opposition and was defeated for reelection to Parliament in October of that year. Although eventually returned to the



Clynes, 1947
Keystone

House of Commons, he was never again in a Cabinet office. His two-volume *Memoirs* appeared in 1937.

CMA (Cia. Mexicana de Aviación, SA): *see* Mexicana Airlines.

CMEA: *see* Mutual Economic Assistance, Council for.

C.M.G., companion of St. Michael and St. George, member of a British order of knighthood, though this class of the order does not confer knighthood. *See* Saint Michael and Saint George, The Most Distinguished Order of.

CMS (Church of England): *see* Church Missionary Society.

Cneius, also spelled GNAEUS (ancient Roman personal name, or praenomen): *see under* gens or family name or honorific (*e.g.,* under Ahenobarbus for Gnaeus [Cneius] Domitius Ahenobarbus).

cnidarian, also called COELENTERATE (phylum Cnidaria, or Coelenterata), any of about 9,000 species of aquatic, mostly marine invertebrates including the corals, hydras, jellyfish, Portuguese men-of-war, sea anemones, sea pens, sea whips, and sea fans.

A brief treatment of cnidarians follows. For full treatment, *see* MACROPAEDIA: Cnidarians.

The Cnidaria include some of the most beautifully coloured marine species, many having elegant and symmetrical body forms. Cnidaria are found both along the coastline (coral and sea anemones) and farther out in the ocean (jellyfish and Portuguese men-of-war).

The cnidarians are the most primitive types of animals whose cells are organized into different layers—the ectoderm, or outer skin, and the endoderm, or inner skin. Between these two layers is a noncellular film called the mesoglea. Cnidarians are roughly cup-shaped, and the tissues composed of these two layers surround a cavity known as a coelenteron, or hollow gut. For this reason, the phylum is sometimes called the Coelenterata. The cnidarians are the only phylum whose members have only two layers of cells; besides the protozoans, sponges, and mesozoans, whose members have only one layer, the members of all other phyla also have a third layer of skin, called the mesoderm.

The gastrovascular cavity, or coelenteron, is the basic internal organ of the cnidarians. There is no well-defined respiratory, circulatory, or excretionary organ apart from this, nor is there a well-defined head or nervous system. At one end of the body there is the mouth, the only opening into the coelenteron. Tentacles, which surround the mouth, radiate outward. The radial symmetry of cnidarian bodies also characterizes the ctenophores; for this reason, the two phyla are sometimes grouped together as the Radiata.

Cnidarian bodies vary greatly in size from nearly microscopic, as in the case of some hydromedusae, to several feet in diameter, as with certain sea anemones, or more than a ton in weight, as in the case of certain jellyfish. The body may be of various colours.

The tentacles surrounding the mouth are employed in the capture and ingestion of food. Cnidarians are carnivorous, and most feed on zooplankton. Others feed on small crustaceans, fish eggs, worms, and smaller cnidarians, while still others consume even larger animals, up to the size of small fish. The tentacles possess numerous toxin-containing capsules called nematocysts, which are used to paralyze the prey. When these nematocysts come into contact with another animal, a fine-pointed thread or hollow spear is ejected from each capsule, piercing the tissue of the prey and allowing the poison to penetrate. Many capsules are triggered at once, and the toxin is quickly replaced. A number of cnidarians have toxins powerful enough to cause severe rashes on the skin of swimmers who encounter them, and the toxins of a small number of cnidarians are lethal to humans. Once immobilized, the prey is conveyed to the coelenteron, where it is broken down and absorbed into the body.

There are two basic body forms of cnidarians, the polyp form and the medusa form. The polyp is sessile—it fixes itself to another body or surface. A polyp body is cylindrical, with the mouth and tentacles directed upward. Many polyps are colonial, occurring in bunches. Coral is the most notable example of a cnidarian colonial polyp. A coral secretes a calcareous exoskeleton to which other corals may also attach themselves. Atolls and reefs in certain parts of the world, including the 1,000-mile- (1,600-kilometre-) long Great Barrier Reef along the northern coast of Australia, are made of these skeletons.

The other body form is the medusa, which is usually free-swimming but may also be colonial. The medusa body resembles a bell or saucer, with the tentacles hanging down from the base or margin. A medusa swims by a form of jet propulsion powered by successive contractions of muscles around the mouth. In certain cnidarian species, the members may be of either body form. This may happen within the same colony or sometimes even in alternating generations.

The four classes of Cnidaria are Hydrozoa, Scyphozoa, Anthozoa, and Cubozoa. Hydrozoans are thought to be the most primitive of the cnidarians. They may be polyps, medusae, or both and may occur singly or in colonies. There are about 2,700 known species of Hydrozoans. Individual members are relatively small. This class includes the Portuguese man-of-war.

Scyphozoans are more familiarly known as jellyfish. They are mostly medusae and generally range in size from 1 to about 16 inches (2 to 40 cm). There are about 200 known species, and they inhabit all seas, from coastal to deeper waters.

Anthozoans are polyps, either solitary or colonial. These are found along coastal waters and include sea anemones, coral, sea fans, and sea pansies. This is the largest class of Cnidaria, with about 6,000 known species. This class is unique in that some of its members, such as various types of coral, secrete calcareous exoskeletons.

Cubozoa contains only one order, Cubomedusae, which was, until recently, placed under the class Scyphozoa. Cubozoans belong evolutionarily between the Scyphozoa and the Hydrozoa. They take their name from the boxlike shape of the medusa, which is the dominant form of the class.

Cnidus, ancient Greek city on the Carian Chersonese, on the southwest coast of Anatolia. The city was an important commercial centre, the home of a famous medical school,

and the site of the observatory of the astronomer Eudoxus. Cnidus was one of six cities in the Dorian Hexapolis and hosted the Dorian games every four years. The Cnidians claimed they were of Spartan origin.

First founded on the southern coast of the Reşadiye peninsula, it was moved in *c.* 330 BC to Deveboynu Burnu (Cape Kriyo), where a small island was artificially joined to the mainland. One of the two harbours thus created served ships of war, the other merchant shipping. Cnidus founded colonies on Lipara, north of Sicily, and at Black Corcyra (modern Korčula, Croatia) in the Adriatic Sea.

After a vain attempt to convert their peninsula into an island, the Cnidians submitted to the Persians soon after 546 BC; they supported Athens in the Delian League against Persia but revolted against Athens in 412. Cnidus became a democracy in the 4th century BC and was under Ptolemaic control in the 3rd century. It was a free city within the Roman province of Asia, enduring until the 7th century AD, when it was abandoned.

C.T. Newton, excavating the site in 1857–59, found a marble statue of the seated Demeter there. Later excavation revealed the axial plan of the ancient city, a few private dwellings, and numerous public buildings. The most significant of these is the Temple of Aphrodite, a circular Doric temple, excavated by Iris C. Love in 1970. At this site Love found the marble base and fragments of the famous statue of Aphrodite sculpted by Praxiteles in the 4th century BC. The statue, one of the most celebrated in classical antiquity, was purchased by the people of Cnidus after the citizens of the Cos had rejected it on account of its nudity.

CNIP (French political party): *see* National Centre of Independents and Peasants.

Cnossus (ancient city, Crete): *see* Knossos.

Cnut (personal name): *see under* Canute.

Co-operative Commonwealth Federation (CCF), left-wing political party prominent in western Canada during the 1930s and 1940s. Founded at Calgary, Alta., on Aug. 1, 1932, by a federation of various farmer, labour, and Socialist parties in western Canada plus one labour union (the Canadian Brotherhood of Railway Employees), its avowed aim was to transform the capitalist economic system into a "cooperative commonwealth" by democratic means.

The Regina Manifesto, adopted at the party's first annual convention at Regina, Sask., in 1933, was based on broad Socialist principles. It called for economic planning on a national scale; socialization of banks and other financial institutions; and public ownership in transportation, communication, and natural resources.

In the period between 1933 and 1940, it spread to the other Canadian provinces and became the official opposition party in British Columbia, Saskatchewan, and Manitoba, electing several members to the House of Commons. In 1944 it won the provincial general election in Saskatchewan and took over the government of that province. In subsequent years the CCF regime in Saskatchewan encouraged cooperative institutions; established state automobile and fire insurance; and socialized electric power, natural-gas distribution, and bus transportation.

Although the CCF continued to win provincial elections in Saskatchewan in 1948, 1952, 1956, and 1960, it declined elsewhere in Canada in the period from 1946 to 1961. In August 1961 the CCF was merged into the New Democratic Party.

coach, four-wheeled, horse-drawn carriage, popularly thought to have originated in Hungary in the 15th century. The word coach often is used interchangeably with "carriage," but a coach is generally either a public carriage—such as a stagecoach, Concord coach, mail coach, or the modern railway coach—or an opulent carriage of state. A coach has a suspended, enclosed body, with a roof forming part of its framing, and two inside transverse seats facing one another, for carrying four or six passengers.

Various authorities date the introduction of the coach to England at 1555–80. In Germany coaches were numerous in the 16th century, and the Berlin coach, which was characterized by its two-perch running gear and thoroughbrace suspension, was introduced in about 1660. In Paris, in 1645, there were fiacre coaches or cabs for hire, although there had been private carriages in Paris as early as 1550. In 16th-century England, poets derogated coaches as ostentatious vehicles employed by wantons and rakes, and the Thames watermen (boatmen), whose living suffered, also complained bitterly of them.



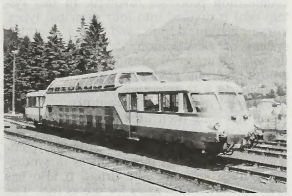
Coachella Valley near Palm Springs, Calif.
David Muench

In colonial America, the few coaches of the late 17th century were used primarily by governors and only in such places as Boston and New York City, which had roads. Bostonians later attacked coaches as works of the devil, thereby unwittingly echoing the edict of the German noble, Julius of Brunswick, who, in an edict of 1588, had forbidden his vassals to ride in coaches.

coach, railroad passenger car. In early railroad operation, passenger and freight cars were often intermixed, but that practice very soon gave way to running separate freight and passenger trains. The flexible gangway between coaches, introduced about 1880, made the entire train accessible to passengers and so made possible the introduction of the dining car and the club or lounge car. Early coaches were built of wood and usually heated with stoves, making them vulnerable to fire in case of accident; modern coaches are made of steel and heated electrically.

Until recently the standard coach in Europe was divided into six- or eight-seat compartments, with a corridor extending along one side. These have now been largely replaced with coaches on the U.S. model, which have a centre-aisle arrangement, uncompartmented seats, and doors usually at each end of the car.

Among specialized types of coaches, the dome car, developed in the United States in the 1950s, gives passengers a wide-range view from under a raised, glassed-in roof.



Self-propelled diesel dome of the French railways
Authenticated News International

Coachella Valley, part of the Colorado Desert, extending northwestward for 45 mi (72 km) from the Salton Sea (a shallow saline lake) through Riverside County, southern California, U.S.

The valley is 15 mi wide and lies between the Little San Bernardino Mountains (east) and the San Jacinto and Santa Rosa mountains (west). Irrigation, notably from the Coachella Canal, has created a productive agricultural region, specializing in date gardens and also supporting citrus fruits, truck crops, cotton, and alfalfa. The city of Coachella sprawls in the heart of the valley and is a shipping point for its produce. In the northern part are popular desert resorts, including Palm Springs. The valley had two names before 1900: Cahuilla, after the Cahuilla Indians who inhabited the vicinity; and Conchilla (Spanish: "little shell"), referring to the existence of fossil shells in the area. Erroneous spelling of the latter name on an official map resulted in the current name.

coaching (horses): *see* driving and coaching.

coachwhip (*Masticophis,* sometimes *Coluber, flagellum*), snake of the family Colubridae that ranges from the southern half of the United States to west central Mexico. It averages 1.2 metres (4 feet) long, but it is occasionally twice that length. It is slender, and its tail is marked like a plaited whip. The eastern subspecies is brownish; western subspecies tend to be reddish ("red racer") or black ("western black racer").

The swift-moving coachwhip captures lizards, small mammals, large insects, and occasionally rattlesnakes; it kills by biting while the prey is pinned under its coils. In defense it bites with a jerk of the head, causing a torn wound.

coachwhip (plant): *see* ocotillo.

coachwhipbird (songbird): *see* whipbird.

coagulation, in physiology, the process by which a blood clot is formed. The formation of a clot prevents blood loss from a ruptured blood vessel. Under abnormal circumstances, clots can also form in a vessel that has not been breached; such clots can result in the occlusion of the vessel.

Clotting is a sequential process that involves the interaction of numerous blood components called coagulation factors. Among the

better-known factors are fibrinogen (*see* fibrin) and prothrombin (*q.v.*) (factors I and II) and antihemophilic globulin (factor VIII). There are 13 principal coagulation factors in all, and each of these has been assigned a Roman numeral up to XIII.

The first step in coagulation is the formation of prothrombin activator. This substance forms in response to compounds released by the damaged vessel wall. Prothrombin activator also forms in response to changes in the blood itself; these changes result from the blood contacting the collagen fibres of the ruptured vessel.

Once formed, prothrombin activator initiates the conversion of prothrombin to thrombin. Thrombin, in turn, catalyzes the conversion of fibrinogen—a soluble plasma protein—into long, sticky threads of insoluble fibrin. The fibrin threads form a mesh that traps platelets, blood cells, and plasma. Within minutes, the fibrin meshwork begins to contract, squeezing out its fluid contents. This process, called clot retraction, is the final step in coagulation. It yields a resiliant, insoluble clot that can withstand the friction of blood flow.

Coahuila, state, northern Mexico, bounded north and northeast by the United States, east by Nuevo León, south by San Luis Potosí and Zacatecas, and west by Durango and Chihuahua. Its territory of 57,908 square miles (149,982 square km) is a roughly broken plateau traversed by several mountain ranges. The climate is hot and dry; rainfall is slight, and rivers are small. The western part of the state was a barren desert until irrigation projects made the soil productive.

The first Spanish settlement in the region was at Saltillo, the state capital, in 1575, when the area formed part of Nueva Vizcaya province. Coahuila and Texas formed a single state in 1824, but dissatisfied U.S. settlers in Texas declared their independence in 1836. In 1857 Coahuila was combined with Nuevo León, and in 1868 it became a separate state.

Livestock raising was for a time the principal industry, but irrigation has permitted the development of agriculture in several localities. The chief products are cotton, corn (maize), wheat, beans, sugarcane, and grapes. Southern Coahuila has long been celebrated for its wines and brandies; mineral products include silver, lead, coal, copper, and iron. The modern industrial development of the state was made possible by the railway communications that were developed late in the 19th century and by investments of foreign capital in its local enterprises. In addition to Saltillo, principal towns in Coahuila include Parras de la Fuente, a large rail centre; Piedras Negras, on the Río Grande (Río Bravo del Norte); and Torreón, one of Mexico's most modern cities. Coahuila has excellent air and rail connections, and a superhighway between Piedras Negras and Mexico City traverses the state. Pop. (1985 est.) 1,806,742.

Consult the INDEX *first*

coal, solid, dark-coloured, carbon-rich material that occurs in stratified, sedimentary deposits. It is one of the most important of the primary fossil fuels.

A brief treatment of coal follows. For full treatment, *see* MACROPAEDIA: Fuels, Fossil; Industries, Extraction and Processing. For statistical data on coal production, reserves, and trade, *see* MICROPAEDIA: mining (table).

Coals are found in many parts of the world. They occur in stratified deposits both near the Earth's surface and at various depths. They include a rather broad range of substances, all owing their origin to the partial decomposition and chemical conversion of immense masses of organic matter. This process is known as coalification.

Two major eras of coal formation are known in geologic history. The older includes the Carboniferous and Permian periods (from about 350,000,000 to 250,000,000 years ago). Much of the bituminous coal of eastern North America and Europe is Carboniferous in age. Most coals in Siberia, eastern Asia, and Australia are of Permian origin. The younger era began in the Cretaceous Period (about 135,000,000 years ago) and culminated during the Tertiary Period (about 65,000,000 to 2,500,000 years ago). From this era came nearly all of the world's lignites and subbituminous (brown) coals.

The plant matter from which coals are derived has left few recognizable traces. However, the rocks directly above and below coal deposits bear fossil remains of plants belonging to the fern, horsetail, club moss, and gymnosperm groups.

The first stage of coalification is the formation of peat. Ancient swamps covered huge areas of flat land, and the climate was mild and rainy. Vast expanses of stagnant water must have covered the land much of the time. These conditions favoured the transformation of vegetable debris into peat. In time the land subsided, the seas covered the land, and sediments were laid down on top of the submerged peat bogs. According to the most widely accepted theory of coal formation, the increase in temperature that accompanies depth of burial is primarily responsible for the metamorphosis apparent in the chain that begins with peat and ends with anthracite (the hardest coal and the one representing the highest degree of coalification). In addition, conditions such as the length of time and increase in pressure due to depth of burial seem to affect the properties of the coal formed.

Coals vary in density, porosity, hardness, and reflectivity (*i.e.,* the degree to which a coal reflects light). In colour, coals tend to be dark, usually black. All coals contain some inorganic matter, usually clays, sulfides, and chlorides. Trace elements found in coal include mercury, titanium, and manganese.

Coals can be classified in various ways. The most widely used classification schemes are based on the degree to which coals have undergone coalification. Such varying degrees of coalification are called coal ranks, the major ones being lignite, subbituminous, bituminous, and anthracite. Because the amount of fixed carbon contained in a coal increases with rank (from lignite to anthracite) while the amount of its volatile matter released upon heating decreases, many of the properties of coal are at least in part rank dependent (*e.g.,* the amount of gaseous products released by a coal upon heating or its suitability for producing metallurgical coke).

Coal is also classified into rock types on the basis of petrological components called macerals. This classification is essentially genetic in nature because it deals with the materials from which coal was formed and the various coalification processes involved. In this system coal is divided into four principal types: vitrain, clarain, durain, and fusain. Another system of classification, developed primarily with commercial considerations in mind, groups coal into grades according to quality, particularly with reference to the amount of impurities present (*e.g.,* low-sulfur).

Coal has long been used for power generation, for the production of metallurgical coke, and as a source of various aromatic compounds employed as intermediates in synthesizing dyes, solvents, and drugs. It also has been converted into gases for use as fuel. The first such coal gas was manufactured in England in the late 18th century by destructive distillation. This type of gas was widely used for street lighting and home illumination until gaslight was displaced by electricity, and for heating and gas appliances until it was displaced by natural gas. The increasing cost of natural gas in the late 20th century, however, has led to the exploration of both new and old methods for producing gas from coal, among them a process developed in the 1870s in which coal is pulverized and mixed with air and steam at high temperatures.

The continuing concern for finding alternative energy sources also has revived interest in the conversion of coal into liquid fuels similar to crude oil. A method that has been extensively evaluated involves pyrolysis and hydrogenation—*i.e.,* causing coal to react with hydrogen at high pressures, usually in the presence of a catalyst. Coal hydrogenation was extensively used in Germany during World War II, but the process has remained commercially unattractive because its cost is significantly higher than that of producing gasoline from petroleum. Since the late 1970s, various other technologies for economical liquefaction of coal have been investigated, particularly in oil-dependent countries possessing extensive coal reserves.

coal ball, a lump of petrified plant matter, frequently spheroid, found in coal seams of the Upper Carboniferous Period (from 325,000,000 to 280,000,000 years ago). Coal balls are important sources of fossil information relating to the forests preceding the Coal Age. As a result of a variety of conditions, small pockets of plant debris in Carboniferous swamps, infiltrated by mineral salts, became petrified rather than changed into coal. These petrifactions, ranging from a few grams to several hundred kilograms, have been uncovered in the central United States, in England, in a broad area from Belgium to the Ukraine, and in Spain.

coal gas, gaseous mixture—mainly hydrogen, methane, and carbon monoxide—formed by the destructive distillation (*i.e.,* heating in the absence of air) of bituminous coal and used as a fuel. Sometimes steam is added to react with the hot coke, thus increasing the yield of gas. Coal tar and coke (*qq.v.*) are obtained as by-products.

Coal Measures, major division of Upper Carboniferous rocks and time in Great Britain (the Upper Carboniferous Period began about 325,000,000 years ago and lasted about 45,000,000 years). The Coal Measures, noted for the great amounts of coal they contain, account for the major portion of England's production of coal. They are the uppermost division of the Upper Carboniferous and consist of a repetitive sequence of marine and nonmarine strata. The marine rocks consist of black carbonaceous shales and some fossiliferous limestones characterized by distinctive cephalopods and beds in which the brachiopod genus *Lingula* is the dominant form. The largest portion of the Coal Measures, however, consists of nonmarine shales and mudstones in which plant and freshwater invertebrate fossils are found.

The productive coal deposits occur in the marine strata and consist largely of soft, bituminous coal; anthracite coals, however, occur in South Wales. Though local variation in the coal seams occurs, great uniformity is evident on a regional scale, and some coal beds can be identified throughout Great Britain and even on the European continent. The upper limits of the Coal Measures have been obscured by deformation of the strata during the Hercynian mountain-building episode and subsequent erosion.

coal oil (fuel): *see* kerosine.

coal tar, principal liquid product resulting from the carbonization of coal, *i.e.,* the heating

of coal in the absence of air, at temperatures ranging from about 900° to 1,200° C (1,650° to 2,200° F). Many commercially important compounds are derived from coal tar.

Low-temperature tars result when coal, peat, lignite, or wood are carbonized at temperatures not exceeding 700° C (1,300° F). Tar acids, phenolic compounds that react with caustic soda to form water-soluble salts, are extracted from coal tar after it has been distilled.

Tar bases are the alkaline constituents of distillate oils, remaining after tar acids have been removed. One of the bases that is recovered is pyridine, a colourless nitrogenous liquid that has a pungent odour and produces derivatives that are of pharmaceutical value. Pitch is the material remaining after the removal of pyridine and other distillates; it is useful in the aluminum industry for the manufacture of electrodes.

Coalport porcelain, ware from the porcelain factory in Shropshire, England, founded by John Rose in 1795. "Coalbrookdale Porcelain" was used sometimes as a trade description and a mark because the factory was located at Coalbrookdale. Coalport's glazed bone china was in great demand and improved greatly in quality about 1820 with the refinement of a hard, white porcelain. A Willow pattern and transfer prints were characteristic until a growing tendency toward richness of style was confirmed by the introduction of a maroon ground in 1821. John Rose II, succeeding in 1828, lavishly imitated the French Sèvres style as well as the styles of Chelsea and Derby, with versions of their respective turquoise, claret, and mazarine blue. Gilded and molded ornamental ware with mass incrustations of flowers, after Meissen, was frequent. By 1830 Coalport was among the leading potteries of England. In 1849 a fine Sèvres pink (imitative *rose Pompadour* and called rose du Barry) attracted many orders; plausible imitations of German Meissen or copies of Sèvres



Coalport porcelain jardiniere with a Sèvres pink (so-called rose du Barry) ground decorated with a Neoclassical painting based on a design by John Flaxman, Shropshire, England, *c.* 1850; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph

and Chelsea with their marks were numerous. Some eggshell porcelain was made beginning in 1845. In the 1860s Coalport turned to domestic ware and the Victorian decoration of earlier biscuit (unglazed) china. Interest in fine porcelain revived in the 1880s, and production of elaborate pieces has continued to the present.

Coalsack, a dark nebula in the Crux constellation (Southern Cross). Easily visible against a starry background, it is perhaps the most conspicuous dark nebula. Starlight coming to Earth through it is reduced by 1 to 1.5 magnitudes. The Coalsack is probably about 550–600 light-years from Earth and 20–30 light-years in diameter. It figures in legends of peoples of the Southern Hemisphere and has been known to Europeans since about 1500. The Northern Coalsack, in the constellation Cygnus, is similar in nature and appearance but somewhat less prominent.

Coamo, town, south-central Puerto Rico. It lies in the southern foothills of the Cordillera Central, on the Coamo River, southwest of San Juan. It was founded as a religious community in 1579, made a town in 1616, and given the title *villa* by Spanish royal decree in 1778. During the Spanish-American War (1898), it was the scene of a decisive battle. The town is an agricultural trading centre and manufactures coffee machinery, aircraft radio components, and sweaters. It has an 18th-century parish church, and sulfur springs are located nearby. The surrounding region is chiefly agricultural, with sugar and tobacco as its main products. Pop. (1990) 13,266.

Coanza River (Angola): *see* Kwanza River.

coarctation of the aorta (heart disorder): *see* aorta, coarctation of the.

Coase, Ronald, in full RONALD HARRY COASE (b. Dec. 29, 1910, Willesden, Middlesex, Eng.), British-born American economist, who was awarded the Nobel Prize in Economics in 1991.

Coase received a bachelor of commerce degree from the London School of Economics in 1932 and a doctorate in economics from the same school in 1951. After lectureships in various schools, he taught at the London School of Economics (1935–51), the University of Buffalo (New York, U.S.; 1951–58), the University of Virginia, Charlottesville (1958–64), and the University of Chicago (from 1964), where he became professor of economics in the law school, taught at the Graduate School of Business, and was editor of the *Journal of Law and Economics* from 1964 to 1982.

Coase did pioneering work on the ways in which transaction costs and property rights affect business and society. In his most famous paper, "The Problem of Social Cost" (1960), he challenged the classic logic of prohibiting behaviour that damages others. His work was a call to legal scholars to pay attention to the importance of an efficient marketplace and to negotiation rather than litigation. The Royal Swedish Academy of Sciences cited Coase for this research and also for "pioneering the study of how property rights are distributed among individuals by law, contract, and regulations, showing that this determines how economic decisions are made and whether they will succeed."

coast, also called SHORE, broad area of land that borders the sea.

A brief treatment of coasts follows. For full treatment, *see* MACROPAEDIA: Oceans; Continental Landforms.

The coastlines of the world's continents measure about 312,000 km (193,000 miles). They have undergone shifts in position over geologic time because of substantial changes in the relative levels of land and sea. Studies of glaciations during the Pleistocene Epoch (1,600,000 to 10,000 years ago) indicate that drops in sea level caused by the removal of water from the oceans during glacial advances affected all coastal areas. During the last Pleistocene glacial period, the sea level is thought to have been almost 122 m (400 feet) lower than it is today, resulting in the exposure of large portions of what is now the continental shelf.

Such changes in sea level have also played an important role in shaping the coasts. Glacial ice descending from coastal mountains in Alaska, Norway, and certain other areas excavated deep U-shaped depressions in times of lowered sea level. When the glacial ice melted and the level of the sea rose again, these steep-sided valleys were inundated, forming fjords. Estuaries, formed by the flooding of coastal river valleys, also are found in regions where the sea level has risen significantly.

Other factors that are instrumental in molding the topography of coasts are destructive erosional processes (*e.g.*, wave action and chemical weathering), deposition of rock debris by currents, and tectonic activity that causes an uplifting or sinking of the Earth's crust. The configuration and distinctive landforms of any given coast result largely from the interaction of these processes and their relative intensity, though the type and structure of the rock material underlying the area also have a bearing. For example, coastal terrains of massive sedimentary rock that have been uplifted by tectonic forces and subjected to intense wave erosion are characterized by steep cliffs extending out into the water. These nearly vertical sea cliffs generally alternate with irregularly shaped bays and narrow inlets. By contrast, wide sandy beaches and relatively smooth plains of unconsolidated sediment prevail in areas of crustal subsidence where deposition is intense. Such coasts are characterized by sandbars paralleling the shoreline, as well as by tidal flats.

coast guard, a force, usually naval, that enforces a nation's maritime laws and assists vessels wrecked or in distress on or near its coasts. Such forces originated during the early 19th century as a restraint on smuggling.

A coast guard may also be responsible for the maintenance of lighthouses, buoys, and other navigational aids and for administering emergency aid to merchant seamen and to victims of natural disasters, such as floods and hurricanes. In some countries coast guard duties include icebreaking in inland waterways and the collection and dissemination of meteorological data pertaining to floods, hurricanes, and storms. The International Ice Patrol, operated by the U.S. Coast Guard, maintains surveillance of icebergs in the North Atlantic shipping lanes.

Nearly all coastal countries have some form of coast guard. Among the best known are the U.S. Coast Guard, the Coastguard Service in Britain, the Canadian Coast Guard, and the Japanese Maritime Service Agency. All are under the supervision of their respective governments; in several European countries, coast guard duties are performed by volunteer lifeboat associations.

Coast Guard, United States: *see* United States Coast Guard, The.

Coast Mountains, segment of the Pacific mountain system (*q.v.*) of western North America. The range extends southeastward through western British Columbia, Can., for about 1,000 miles (1,600 km) from just north of the border with Yukon Territory, Can., along the border of the panhandle of Alaska, U.S., to the Fraser River. Many peaks exceed 11,000 feet (3,400 m), including Monarch Mountain and Mounts Munday, Tiedemann, and Waddington. The last, at 13,176 feet (4,016 m), is the highest point in the range. Many glaciers have carved canyonlike valleys, resulting in the formation of numerous fjords along the Pacific coast. The Garibaldi, Mount Seymour, and Tweedsmuir provincial parks are popular tourist attractions.

Coast Ranges, also called PACIFIC COAST RANGES, segment of the Pacific mountain system (*q.v.*) of western North America, consisting of a series of ranges in the United States running parallel to the Pacific coast for more than 1,000 miles (1,600 km) from west-central Washington in the north to southern California in the south. The Coast Ranges are separated from the higher mountains of the Cascade Range and the Sierra Nevada to the east by broad depressions known as the Puget Sound Lowland in Washington, the Willamette Valley in Oregon, and the Central

Valley in California; the Klamath Mountains of northern California and the Transverse Ranges of southern California, however, serve as links to the eastern ranges. The average elevation of the ranges is about 3,300 feet (1,000 m) above sea level, but some peaks and ridges rise to more than 6,600 feet (2,000 m). The region, especially in the south, is subject to occasional earthquakes and landslides.

The climate of the Coast Ranges is characterized by cool summers and mild winters in the north and drier summers in the south. Forests along the coasts of southern Oregon and northern California are dominated by giant redwoods, while farther inland there are mixed forests of broad-leaved hardwoods and conifers. Wildlife includes bears, elk, deer, beavers, muskrats, rabbits, and bobcats.

Coast Salish, Salish-speaking Indians of the Northwest Pacific Coast of North America, living around the Strait of Georgia, Puget Sound, southern Vancouver Island, much of the Olympic Peninsula, and most of western Washington state. One Salishan group, the Tillamook, lived south of the Columbia River in Oregon. The Bella Coola (*q.v.*), a group living farther to the north in British Columbia, probably migrated from the main body of Coast Salish. The coastal peoples, in turn, probably came from the interior, where other Salishan peoples lived. They were culturally similar to the Chinook (*q.v.*).

Like other peoples of the Northwest Pacific Coast, they lived principally on fish, although some groups living along the upper rivers relied more heavily on land hunting than was typical of the area. The Coast Salish built permanent wooden winter houses and sometimes mat lodges like the Interior Salish for camps and temporary stations.

The basic social unit was the local group consisting of close relatives. Each group, or extended family, usually lived in one large house, and groups of houses formed a winter village of people who scattered during the summer for fishing, hunting, and berrying.

The ceremonial distribution of gifts in the potlatch (*q.v.*) was made to acquire prestige. Elaborate ceremonies held during the winter consisted of dances inspired by spirits in dreams or trances and also of certain privileged performances to which individuals or groups acquired exclusive rights by inheritance, marriage, or purchase. Many of these distinctive features of their culture have gradually faded.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

coastal artillery, also called COAST ARTILLERY, weapons for discharging missiles, placed along the shore for defense against naval attack.

In the 15th century the Turks used coastal artillery when they positioned guns to defend the Dardanelles. By the 19th century all leading military powers had defensive artillery emplacements to protect their coastal cities, harbours, and strategic waterways. Coastal artillery reached its peak of development in the first quarter of the 20th century, when important harbours and naval bases were protected by fixed or mobile artillery that was capable of firing high-explosive shells at enemy ships far out to sea with a fair degree of accuracy. Big coastal guns were protected from enemy fire by emplacement behind thick earth-and-concrete fortifications that were equipped with underground storage rooms and electrical systems. Complicated mechanisms were installed to raise the guns above ground long enough to fire; the huge gun tubes were then quickly retracted into their concealed and well-protected pits. The largest guns used in coastal defenses were generally of 16-inch diameter.

Coastal artillery played only a minor role in World War I, however, and in the following two decades it became apparent that coastal batteries were an easy target for air and ground forces and could also be bypassed altogether. By the end of World War II fixed coastal artillery had become obsolete, and its function was eventually taken over by mobile surface-to-surface missiles.

coat of arms: *see* arms, coat of.

Coatbridge, large industrial town ("burgh"), Monklands district, Strathclyde region, Scotland. It lies 9 miles (14 km) east of the city of Glasgow. The town's industrial prosperity was originally based on local coal production for the Glasgow market. The important iron and steel industry now centred on Coatbridge developed in the early 19th century when iron deposits were discovered near the coal. The Scottish ironmaster James Baird was primarily responsible for developing this iron industry. Coatbridge became a burgh in 1885. The manufacture of tinplate, tubes, and wire rope remains economically important. Pop. (1991) 42,947.

Coatepeque, city, far southwestern Guatemala. It lies along the Naranjo River at an elevation of 2,300 feet (700 m) above sea level. Coatepeque is an important commercial and manufacturing centre for a rich agricultural hinterland that is one of Guatemala's richest coffee-growing areas. Coatepeque lies about 1 mile (2 km) from the Suchiate River, which for about 40 miles (65 km) forms the border between Guatemala and Mexico. The city is a transportation centre on the Pacific Coast Highway and is the hub of several feeder roads. It is also accessible by railroad. Pop. (1981) 19,307.

Coates, Joseph Gordon (b. Feb. 3, 1878, Pahi, N.Z.—d. May 27, 1943, Wellington), prime minister of New Zealand from 1925 to 1928, who later, as minister of public works (1931–33) and of finance (1933–35), instituted rigorous policies to combat the economic depression of the 1930s.

While farming in Auckland, Coates became active in farmers' organizations and was elected to Parliament in 1911. After distinguished service during World War I, he was named minister of justice and postmaster general in the Reform administration of W.F. Massey (1919). He led the ministries of public works (1920–26) and native affairs (1921–28) and became prime minister in 1925 on Massey's death. In public works, he stressed mechanization, accelerated hydroelectric power development, and unified authority for highway construction. He also improved relations with the Maori. Defeated in the elections of 1928, Coates returned to power in 1931 as the key figure in the coalition ministry of George Forbes.

Coates's economic measures, largely designed to help farmers, included devaluation of the New Zealand pound to increase export receipts, establishment of the Mortgage Corporation to supply cheap credit, and the setting up of a partly state-controlled reserve bank to control credit. He also forced interest rates down and encouraged trade within the British Empire, taking a leading part in the Ottawa Conference of 1932. Unemployment, especially in the cities, remained high, leading to Coates's defeat by the Labour Party in the elections of 1935 and 1938. He transcended party differences to become a trusted member of Peter Fraser's wartime administration from August 1940, serving as minister of armed forces and war coordination until his death.

coati, also called COATIMUNDI, or COATIMONDI, any of three species of raccoonlike omnivores, genus *Nasua,* related to the raccoon (family Procyonidae). Coatis are found in wooded regions from the southwestern United States through South America.

The coati has a long, flexible snout and a slender, darkly banded tail that it often carries erect as it moves about. It has coarse fur that is gray to reddish or brown with lighter underparts and light facial markings. The male coati measures about 73 to 136 cm (29 to 54 inches) in length—half of which is tail—and weighs roughly 4.5 to 11 kg (10 to 24 pounds). The female is somewhat smaller.



Coati (*Nasua nasua*)
Dick Robinson—Bruce Coleman Ltd.

Female and young coatis commonly live in bands of 5 to 40 and travel together. The males are solitary and join the bands only during the short mating season of approximately a month. The gestation period is about 77 days long, and litters usually consist of two to six young.

Coatis are most active during the day. Like their raccoon relatives, they are curious and resourceful creatures and are good climbers. When foraging, they comb the trees as well as the ground for seeds, fruits, eggs, and a wide variety of small animals ranging from insects to mice.

Coatlicue (Nahuatl: "Serpent Skirt"), Aztec earth goddess, symbol of the earth as creator and destroyer, mother of the gods and mortals. The idea that she embodies is powerfully concretized in her statue (National Museum of Anthropology, Mexico City)—her face is of two fanged serpents; her skirt is of interwoven snakes (snakes symbolize fertility); her breasts are flabby (she nourished many); her necklace is of hands, hearts, and a skull; her fingers and toes are claws (she feeds on corpses,



Coatlicue, stone sculpture; in the National Museum of Anthropology, Mexico City
By courtesy of the Instituto Nacional de Antropologia e Historia, Mexico City

as the earth consumes all that dies). Called also Teteoinnan ("Mother of the Gods") and Toci ("Our Grandmother"), she was but a manifestation of the earth goddess, who also appeared as Cihuacóatl ("Snake Woman"; like Coatlicue, called Tonantzin ["Our Mother"]), fearsome goddess of childbirth, and as Tlazoltéotl (*q.v.*), goddess of sexual impurity and wrongful behaviour.

Coats Land, region of Antarctica bordering the southeastern shore of the Weddell Sea. It extends about 300 miles (500 km) from Filchner Ice Shelf (southwest) to Queen Maud Land (east) and includes the coasts of Luitpold and Caird. It was discovered in 1904 by the Scottish explorer William Speirs Bruce while on an investigation of the Weddell Sea and was named for the expedition's backers. The site of a British research station, it is claimed in part by Norway (eastern sector), the United Kingdom (central sector), and Argentina (western sector).

Coatzacoalcos, city, southeastern Veracruz *estado* ("state"), south-central Mexico. Formerly known as Puerto México, it lies at the mouth of the Coatzacoalcos River on the Gulf of Campeche, at the narrowest segment of the Isthmus of Tehuantepec. A transportation centre, it is served by the main rail line and highway from Veracruz to Campeche and Mérida and is also the northern terminus of the trans-Isthmian railway. Coatzacoalcos is also an important port. Petroleum products from Minatitlán to the south are transported via the river; the city exports local hardwoods, cereals, and manufactured items, principally to Yucatán. Pop. (1980) 127,170.

cobalt (Co), chemical element, ferromagnetic metal of Group VIII of the periodic table, used especially for heat-resistant and magnetic alloys.

The metal was isolated (*c.* 1735) by a Swedish chemist, Georg Brandt, though cobalt compounds had been used for centuries to impart a blue colour to glazes and ceramics. Cobalt has been detected in Egyptian statuettes and Persian necklace beads of the 3rd millennium BC, in glass found in the Pompeii ruins in China as early as the T'ang dynasty (AD 618–907) and later in the blue porcelain of the Ming dynasty. The name kobold was first applied (16th century) to ores thought to contain copper but eventually found to be poisonous, arsenic-bearing cobalt ores. Brandt finally determined (1742) that the blue colour of these ores was due to the presence of cobalt.

Occurrence, properties, and uses. Cobalt, though widely dispersed, makes up only 0.001 percent of the Earth's crust. It is found in small quantities in terrestrial and meteoritic native nickel-iron, in the Sun and stellar atmospheres, and combined with other elements in natural waters, in nodules beneath the oceans, in soils, in plants and animals, and in such minerals as cobaltite, linnaeite, skutterudite, smaltite, heterogenite, and erythrite. Traces of cobalt are present in many ores of iron, nickel, copper, silver, manganese, zinc, and arsenic, from which it is often recovered as a by-product.

For information on the mining, refining, and recovery of cobalt, *see* MACROPAEDIA: Industries, Extraction and Processing.

Cobalt is a trace element essential in the nutrition of ruminants (cattle, sheep) and in the maturation of human red blood cells in the form of vitamin B_{12}, the only vitamin known to contain such a heavy element.

Polished cobalt is silver-white with a faint bluish tinge. Two allotropes are known: the close-packed-hexagonal structure stable below 417° C (783° F) and the face-centred-cubic, stable at high temperatures. It is ferromagnetic up to 1,121° C (2,050° F, the highest known Curie point of any metal or alloy) and may find application where magnetic properties are needed at elevated temperatures. Natural cobalt is all stable isotope cobalt-59, from which the longest lived artificial radioactive isotope cobalt-60 (5.3-year half-life) is produced by neutron irradiation in a nuclear reactor. Gamma radiation from cobalt-60 has been used in place of X rays or alpha rays from radium in the inspection of industrial materials to reveal internal structure, flaws, or foreign objects; in cancer therapy; in sterilization studies; and in biology and industry as a radioactive tracer. It is in turn being replaced in both industrial and medical radiology by cesium-137 because of the long (30-year) half-life of the latter.

Most of the cobalt produced is used for special alloys. A relatively large percentage of the world's production goes into magnetic alloys such as the Alnicos for permanent magnets. Sizable quantities are utilized for alloys that retain their properties at high temperatures and superalloys that are used near their melting points (where steels would become too soft). Cobalt is also employed for hard-facing alloys, tool steels, low-expansion alloys (for glass-to-metal seals), and constant-modulus (elastic) alloys (for precision hairsprings). Cobalt is the most satisfactory matrix for cemented carbides.

Finely divided cobalt ignites spontaneously. Larger pieces are relatively inert in air, but above 300° C (570° F) extensive oxidation occurs.

Compounds. In its compounds cobalt nearly always exhibits a +2 or +3 oxidation state, although states of +4, +1, 0, and −1 are known. The compounds in which cobalt is divalent (Co^{2+}, the ion being stable in water) are called cobaltous, while those in which cobalt is trivalent (Co^{3+}) are termed cobaltic.

Both the divalent and trivalent states form numerous coordination compounds, or complexes. Cobalt(III) forms more known complex ions than any other metal except platinum. The coordination number of the complexes is generally six.

Cobalt forms two well-defined binary compounds with oxygen: cobaltous, or cobalt(II) oxide, CoO, and tricobalt textroxide, or cobalto-cobaltic oxide, Co_3O_4. The latter contains cobalt in both valences and comprises up to 40 percent of the commercial cobalt oxide used in the manufacture of ceramics, glass, and enamel and in the preparation of catalysts and cobalt metal powder.

One of the more important salts of cobalt is the sulfate $CoSO_4$, which is employed in electroplating, in preparing drying agents, and for pasture top-dressing in agriculture. Other cobaltous salts have significant applications in the production of catalysts, driers, cobalt metal powders, and other salts. Cobaltous chloride ($CoCl_2 \cdot 6H_2O$ in commercial form), a pink liquid that changes to blue as it dehydrates, is utilized in catalyst preparation and as an indicator of humidity. Cobaltous phosphate, $Co_3(PO_4)_2 \cdot 8H_2O$, is used in painting porcelain and colouring glass.

atomic number	27
atomic weight	58.9332
melting point	1,495° C (2,723° F)
boiling point	2,870° C (5,198° F)
density	8.9 (20° C)
valence	2, 3
electronic config.	2-8-15-2 or $(Ar)3d^74s^2$

cobalt bloom (mineral): *see* erythrite.

cobalt deficiency, condition in which an organism fails to take in an adequate supply of cobalt, a trace metal bound to the vitamin B_{12} molecule in a compound known as cobalamin. The pancreas contains a high concentration of the metal, which is used on demand by the body system to synthesize insulin and certain other enzymes essential to proper digestion of carbohydrates and fats. Action of this metal is counteracted by vitamin C (ascorbic acid). Diets deficient in cobalt may also be deficient in other elements important in the control of anemias. Cobalt sources of supply are widely spread in foods grown in soil areas that contain high concentrations of the metal. Generally, a diet sufficient in vitamin B_{12} is sufficient in cobalt as well. *See also* vitamin B_{12} deficiency.

cobaltite, a cobalt sulfoarsenide mineral in which iron commonly replaces part of the cobalt [(Co,Fe)AsS], that occurs in high-temperature deposits. Notable occurrences are at Dashkesan, in the lesser Caucasus, Azerbaijan; Tunaberg, Swed.; and Rājasthān, India. Cobaltite, like its relatives gersdorffite and ullmannite, crystallizes in the isometric system and is closely related to pyrite. They differ from the pyrite group minerals only because the S_2 groups are replaced by AsS or SbS and are distinguishable because they are not as hard. For detailed physical properties, *see* sulfide mineral (table).

Cobán, city, north-central Guatemala, situated 4,331 feet (1,320 m) above sea level in the Sierra de Chamá on the Cahabón River. Founded about 1538 near Mayan ruins and named for the Indian chieftain Cobaóu, the city developed as the major urban centre of northern Guatemala. A 17th-century church still stands. The agricultural hinterland is best known for its coffee, but tea, cacao, vanilla, spices, grains, livestock, and hardwoods are also significant. The city was formerly an important commercial and manufacturing centre. Much of the agricultural produce now bypasses Cobán and goes directly to Guatemala City, 130 miles (210 km) south, by a highway opened in 1958.

Nearby Mayan ruins include pyramids and ornamental friezes. Also nearby are the Lanquín Caves, a vast network of underground grottoes about 250 miles (400 km) long with stalactites and stalagmites and penetrated by the Lanquín River with its blind white fish. A nearby natural bridge extends 200 feet (60 m) across Cahabón Gorge. The city is transformed every August by a fiesta drawing many tourists. Pop. (1990 est.) 23,986.

Cobar, town, central New South Wales, Australia, in the Western Plains region. Cobar (the name is from an Aboriginal word meaning "red earth") serves a pastoral district and has a sawmilling industry. It was once known for its gold and remains important for its copper. The copper mines, which operated from 1871 to 1952, were reopened in 1965 after an 81-mile (130-kilometre) water pipeline from the Bogan River was completed. The Barrier Highway runs through the town, and a rail line links Cobar to Sydney (354 miles [570 km] southeast). Pop. (1986) 4,287.

Cobb, Frank I(rving) (b. Aug. 6, 1869, Shawnee county, Kan., U.S.—d. Dec. 21, 1923, New York, N.Y.), American journalist who succeeded Joseph Pulitzer as editor of the *New York World,* and who became famous for his "fighting" editorials. He was described as "liberal but sane, brilliant but sound."

Cobb was a youthful high school superintendent in 1890, when his interest turned to journalism. He quit the field of education to become a reporter for the *Grand Rapids* (Mich.) *Herald* at a salary of $6 a week. He moved to the *Grand Rapids Eagle* in 1893 and the *Detroit Evening News* the next year. By 1899 he was the leading editorial writer for the *Detroit Free Press.*

When he was in his late 50s, Joseph Pulitzer conducted a nationwide search for the best person to succeed him as editor in chief of the *World.* The search turned up Cobb in Detroit, and, after days of withering examination by Pulitzer, Cobb got the job. He joined the *World* in 1904 and became its chief editorial

writer, assuming the post of editor in chief on Pulitzer's death in 1911. Cobb remained with the *World* until his own death, keeping the paper generally on the liberal course charted by Pulitzer. He took a leave of absence from the *World* in 1919 to serve as member of the U.S. Press Department staff at the Paris Peace Conference. Cobb was a friend and adviser to Pres. Woodrow Wilson, and one of the scant handful of newsmen the president trusted.

Cobb, Howell (b. Sept. 7, 1815, Jefferson County, Ga., U.S.—d. Oct. 9, 1868, New York City), Georgia politician who championed Southern unionism during the 1850s but then advocated immediate secession following the election of Abraham Lincoln.

Cobb was born into the antebellum plantation elite and grew up in Athens, Ga. He was graduated from the University of Georgia in 1834, studied law for two years, and in 1836 was admitted to the bar. The following year (1837), Cobb was elected solicitor general of a strongly pro-Union district in northeastern Georgia. Cobb held the office of solicitor for three years; in 1842 he was elected to the U.S. House of Representatives from essentially the same district.

Cobb served in Congress from 1842 to 1851 and again from 1855 to 1857; he supported the annexation of Texas, the war with Mexico, and the extension of slavery into the territories. But he broke with the most extreme proslavery Southerners when he advocated extending the Missouri Compromise line to the Pacific, opposed the creation of a sectional political party, and supported the Compromise of 1850.

In 1851 Cobb ran for governor of Georgia on the ticket of the newly formed Constitutional Union Party and won a solid victory over a pro-secession candidate. But in so doing, he severed all ties with pro-secessionist Democrats, became politically isolated, and was overwhelmingly defeated in 1854, when he ran for a seat in the U.S. Senate.

His pro-Union district returned Cobb to Congress in 1855, and the following year he played a major role in the nomination and election of James Buchanan as president. Buchanan made Cobb secretary of the treasury, a position Cobb held until Lincoln was elected president in 1860.

Immediately following Lincoln's election, Cobb resigned his Cabinet post, returned to Georgia, and became an ardent spokesman for secession. He served as chairman of the Montgomery, Ala., convention called to organize the Confederacy, then organized his own regiment and led it to the front. He eventually rose to the rank of major general and commanded the District of Georgia until forced to surrender at the end of the war.

A bitter opponent of Reconstruction, Cobb in his last years practiced law in Macon, Ga.

Cobb, Irvin S(hrewsbury) (b. June 23, 1876, Paducah, Ky., U.S.—d. March 10, 1944, New York City), U.S. journalist and humorist best known for his colloquial handling of familiar



Irvin S. Cobb

By courtesy of the Library of Congress, Washington, D.C.

situations with ironical, penetrating humour.

At 19 Cobb became managing editor of the *Paducah Daily News* and in 1904 went to New York City, where he became a staff writer for the *Evening World* and *Sunday World*. First through syndicated newspaper features and later in magazines, he became widely known for such articles as "Speaking of Operations," which in book form sold more than 500,000 copies, and for short stories, of which he wrote more than 300.

Cobb's stories about a shrewd and kindly Kentucky judge, Judge Priest, first brought him fame. Some of them were collected in *Back Home* (1912) and *Old Judge Priest* (1916). He wrote more than 60 books and thousands of columns for journals and travelled throughout the country as a lecturer and after-dinner speaker. He also wrote plays and, with the filming of the Judge Priest stories, he went to California where he wrote scenarios and acted in motion pictures.

Cobb, John (b. *c.* 1710—d. 1778), English cabinetmaker of unexcelled craftsmanship, whose work was once overshadowed by that of Thomas Chippendale but who is now regarded as being among England's greatest furniture makers.

He was in partnership (*c.* 1750–65) with William Vile, their firm becoming one of the most important among London's cabinetmakers. While Vile created works in an Anglicized Rococo style, Cobb's furniture of the 1770s was executed in an elegant Neoclassical style. Vile retired in 1765, and Cobb continued alone until his death. Up to 1765 the firm supplied furniture to King George III of England, but after Vile's retirement Cobb apparently ceased work for royalty. The firm's records are rare, but a ledger from Edgcote House, Northamptonshire, notes payment to them of more than £1,000 in 1758, and Cobb supplied, in 1770, furniture to the English connoisseur and man of letters Horace Walpole.

Work certified as Cobb's is Neoclassical after the style of the great English designer Robert Adam. A bill dated 1772 shows that he supplied the marquetried commode with gilt bronze mounts and pair of vase stands at Corsham Court, Wiltshire; a similar commode in the Victoria and Albert Museum, London, may also be his. A colourful and proud individual, he was admired by King George. Among the masterpieces he and Vile created for the crown are the superb mahogany jewel cabinet (1761) inlaid with ivory for Queen Charlotte and a secretaire (1761), now at Buckingham Palace, London. Affluent as well as artistically successful, Cobb owned houses in St. Martin's Lane (then London's cabinetmaking centre) and in fashionable Highgate and Islington. His last will (1776) revealed a personal fortune in his company's stock of £22,000.

Cobb, John Rhodes (b. Dec. 2, 1899, Esher, Surrey, Eng.—d. Sept. 29, 1952, Loch Ness, Inverness, Scot.), automobile and motorboat racer, first to reach a speed of 400 mph on land. On Sept. 16, 1947, at the Bonneville Salt Flats, Utah, U.S., he set world speed records (not broken until 1964) for Class A (unlimited engine size) automobiles: 394.196 mph for one mile and 393.825 mph for one kilometre. Each record was the average of speeds attained in a round trip over a measured mile and kilometre; on the return lap he was timed at 403.135 mph for the mile. Both of his world records surpassed standards that he had set in 1939. While trying to establish a world speed record for motorboats, he was killed when his jet-propelled craft, travelling at more than 200 mph, disintegrated.

Cobb, Ty, byname of TYRUS RAYMOND COBB, also called THE GEORGIA PEACH (b. Dec. 18, 1886, Narrows, Ga., U.S.—d. July 17, 1961, Atlanta, Ga.), professional baseball player, frequently considered the greatest offensive player in baseball history and generally regarded as the fiercest competitor in the game. During his 24-season playing career in the American League, Cobb set a batting record for runs of 2,244 and of runs batted in of 1,959, not surpassed until the mid-1970s. Cobb's mark of 892 stolen bases was surpassed only in 1979 and his lifetime batting average of .367 remained unequalled in the 1980s. He led the American League in batting 12 times, gaining nine titles in a row (1907–15). Three times he hit over .400 (1911, .420; 1912, .410; and 1922, .401), and for 23 straight years he batted at least .300. His record of 96 stolen bases in 1915 was unbroken until 1962.



Ty Cobb

Pictorial Parade—EB Inc.

Cobb became a major league player with the Detroit Tigers of the American League in 1905, when he was 18. He spent 22 seasons as an outfielder with the Tigers and managed them from 1921 through 1926. A member of the Philadelphia Athletics when he retired in 1928, Cobb hit .323 in his last season. He was a left-handed batter and right-handed thrower, stood about six feet one inch, and weighed 175 pounds. In the first election to the Baseball Hall of Fame, in 1936, Cobb received the most votes. He invested his baseball earnings shrewdly and was affluent in private life. His autobiography *My Life in Baseball* was published in 1961.

Cobbett, William, pseudonym PETER PORCUPINE (b. March 9, 1763, Farnham, Surrey, Eng.—d. June 18, 1835, London), English popular journalist who played an important political role as a champion of traditional rural England against the changes wrought by the Industrial Revolution.

His father was a small farmer and innkeeper. Cobbett's memories of his early life were pleasant, and, although he moved to London when he was 19, his experiences on the land



Cobbett, detail of a painting by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

left their impressions on his life. Cobbett's careers as a journalist and, for the last three years of his life, as a member of the House of Commons were devoted to restoring his ideal of rural England in a country rapidly being transformed by the Industrial Revolution into the world's foremost manufacturing nation.

Although he embraced advanced political ideas, Cobbett was at heart not a radical but instead deeply conservative, even reactionary. His object was to use radical means to break the power of what he regarded as a selfish oligarchy and thus establish the earlier England of his imagination. In his England, political parties, the national debt, and the factory system would not exist. Instead, all classes would live in harmony on the land. Despite this seemingly backward-looking viewpoint, Cobbett's writings were widely read, in part because of his lucid, racy style but mainly because he struck a powerful chord of nostalgia at a time when rapid economic changes and war with France had produced widespread anxiety.

At the age of 21, Cobbett joined the army, in which he eventually rose to the rank of sergeant major. He taught himself English grammar and thus laid the foundation of his future career as a journalist. After serving in Canada, he returned to England in 1791 and charged certain of his former officers with corruption. Although venality was all but general in the army, indeed in the whole of public life, his charges boomeranged when the officers sought to bring countercharges against him. Rather than appear at a court-martial, Cobbett fled to France. Quickly realizing that France in the throes of revolution was no place for an Englishman, he sailed for America, settling in Philadelphia, where he supported himself and his family by teaching English to French émigrés.

An effusive welcome accorded Joseph Priestley by radical republican groups in the United States after the radical scientist had left England in 1794 drew Cobbett into controversy. Convinced that Priestley was a traitor, Cobbett wrote a pamphlet, *Observations on the Emigration of Joseph Priestley.* It launched his career as a journalist. For the next six years he published enough writings against the spirit and practice of American democracy to fill 12 volumes. His violent journalism won him many enemies and the nickname "Peter Porcupine." After paying a heavy fine in a libel judgment, Cobbett returned to England in 1800.

The Tory government of William Pitt welcomed Cobbett and offered to subsidize his powerful pen in further publishing ventures. But Cobbett, whose journalism was entirely personal and always incorruptible, rejected the offer and in 1802 started a weekly, *Political Register,* which he published until his death in 1835. Though the *Register* at first supported the government, the Treaty of Amiens (1802) with France disgusted him, and he promptly called for a renewal of the war. Cobbett believed that commercial interests were dictating English foreign policy and were responsible for all that was wrong with the country. In 1805 he announced that England was the victim of a "System," which debauched liberty, undermined the aristocracy and the Church of England, and almost extinguished the gentry. His conviction grew in the following year after he witnessed the widely accepted corruption in parliamentary elections. Cobbett's career as an orthodox Tory was over. Advocacy of radical measures brought him into an uneasy association with reformers. Cobbett and the radicals could never be close, however, since his goals were so different from theirs.

Cobbett was at his best when condemning specific abuses. He spent two years in jail (1810–12) and paid a fine of £1,000 after denouncing the flogging of militiamen who had protested against unfair deductions from their pay. He also recognized that unrest among the poor was caused by unemployment and hunger and not, as the government had alleged, by a desire to overthrow English society. Cobbett could see no solution to economic distress without a reform of Parliament and reduction of interest on the national debt. In 1816, at the height of his influence, he was able to reach the common man by putting out the *Political Register* (denounced as Cobbett's "two-penny trash") in a cheap edition that avoided the heavy taxes on ordinary newspapers. The government, seeing sedition in even the most moderate proposals for change, repressed dissent, and the following year Cobbett was forced to flee to the United States to avoid arrest.

Renting a farm on Long Island, New York, Cobbett continued to edit and write for the *Political Register,* which was published by his agents in England. When he returned to England at the end of 1819, his influence had waned and he was insolvent. During the 1820s he supported many causes in an attempt to regain his standing and in the hope that they would lead to the changes in England's political and economic system that he desired. He unsuccessfully tried to be elected to the House of Commons in 1820 from Coventry and in 1826 from Preston. His famous tours of the countryside began in 1821 and were to lead to his greatest book, *Rural Rides,* which was an unrivalled picture of the land.

Although he had no love for the Whigs, Cobbett supported the parliamentary Reform Bill of 1832, which, despite its limited nature, he sensed was the best that could be had. In 1830 agricultural labourers in his beloved southern England had rioted in protest against their low wages. Cobbett defended them and as a result was prosecuted in 1831 by a Whig government that was anxious to prove its zeal in moving against "sedition." Acting as his own counsel, Cobbett confounded his opponents and was set free. Yet, despite this threat of another jail term, he supported his persecutors on the issue of parliamentary reform.

In 1832 Cobbett was elected to Parliament as a member from Oldham. At 69 years of age he found the nocturnal schedule of Parliament an unpleasant contrast to his lifelong preference for early rising and working in the morning. Essentially an individualist and a man of action, he chafed at parliamentary routine. Most members of the House of Commons did not respect him, and Cobbett's parliamentary career was a failure. The unnatural hours hastened his death, from influenza, in 1835.

Passionate and prejudiced, Cobbett's prose, full of telling phrases and inspired ridicule, was completely personal. He had no theoretical understanding of the complicated issues about which he wrote. While his views of the ideal society were retrograde, no one could excel him in specific criticisms of corruption and extravagance, harsh laws, low wages, absentee clergymen—indeed, nearly everything that was wrong with England. (J.W.O.)

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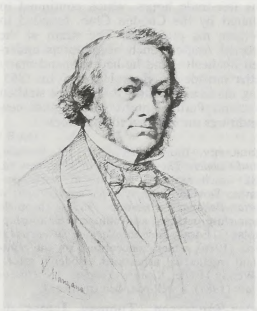
Cobden, Richard (b. June 3, 1804, Dunford Farm, near Midhurst, Sussex, Eng.—d. April 2, 1865, London), British politician best known for his successful fight for repeal (1846) of the Corn Laws and his defense of free trade.

Cobden was the fourth of 11 children of a poor farmer. Raised by relatives, he attended a second-rate boarding school and then entered his uncle's warehouse in London. In 1828 he and two other young men set up a calico wholesale business and in 1831 opened a calico-printing mill in industrial Lancashire. He made enough money to enable him to travel abroad, and, between 1833 and 1839, he visited France, Germany, Switzerland, the United States, and the Middle East. During that period he wrote two influential pamphlets—*England, Ireland, and America* (1835) and *Russia* (1836)—in which he demanded a new approach to foreign policy, based not on attempts to maintain a balance of power but on the recognition of the prime necessity of promoting international economic expansion through the free movement of men and materials. He continued to advance similar free-trade arguments throughout his life.

Between 1839 and 1846 he became a prominent figure in British politics, devoting most of his energies to the repeal of the British Corn Laws, which he maintained were both economically disastrous and morally wrong. In his view, the only class that benefitted from protection were the landlords, and they were enriched at the expense of the middle classes and working classes alike. He proved himself a brilliant organizer, building up the Anti-Corn Law League, which became a national organization in 1839 and the most efficient and successful of all 19th-century British pressure groups. He entered Parliament in 1841, one year after he had married a Welsh girl, Catherine Williams. Thereafter, he could conduct his political campaign not only by mobilizing public opinion but also by directly confronting Sir Robert Peel, the prime minister, in debate. Cobden played a considerable part in converting Peel to take the momentous and controversial decision to repeal the Corn Laws in 1846. Peel then paid a remarkable tribute to Cobden as the man whose name, above all others, ought to be associated with the measure.

The seven-year struggle established Cobden's reputation but left him financially ruined. A public subscription was raised for him in 1847, and, with part of the proceeds, he bought the house in Sussex where he had been born and continued to live there for the rest of his life with his wife and five daughters (his only son died suddenly in 1856). Unlike most of the radicals who shared his views, Cobden came from the south of England. Nor was he—as most of them were—a religious dissenter but rather was a member of the Church of England. Yet he and the Quaker John Bright were the acknowledged leaders of what came to be called the Manchester school, which espoused free trade and an economic system free of government interference. He sat in Parliament for the West Riding of Yorkshire from 1847 to 1857 and for Rochdale, Bright's hometown, from 1859 to his death.



Cobden, pencil sketch by V. Manzano; in the West Sussex Record Office (Cobden Papers 762)

By courtesy of the Governors of Dunford and the County Archivist of West Sussex

His association with Bright was close. They were at one in believing that free trade would result in the reduction of armaments and the promotion of international peace. They were at one also in demanding a reduction of taxation and a check on imperial expansion. One of Cobden's most powerful pamphlets, *1793 and 1853, in Three Letters* (1853), was a plea to his contemporaries to avoid "past errors" and keep out of war with France. During the next three years, he argued eloquently that Britain should be friendly with Russia, even after the Crimean War had begun. He was bitterly attacked for his opinions during the war, when he and Bright often seemed to be standing alone in face of belligerent public opinion. In 1857 he was successful in rallying members from all sides of the House of Commons to support a motion criticizing the aggressive China policy of Lord Palmerston, the prime minister. At the general election that followed, however, Palmerston won overwhelming national support, and Cobden lost his seat.

The attacks and his defeat strengthened his radicalism on domestic issues, and he was openly scornful of Palmerston's middle-class supporters. He was ill at ease during the political lull of the early 1860s, when there seemed to be little interest in political reform. Indeed, he asked the working classes in 1861 why they did not have a leader among them who could lead a revolt against their political tormentors. He demanded a system of universal education and, after some initial hesitation, was a staunch supporter of the North during the American Civil War. There was no 19th-century Englishman who had a more confident belief in the future of America than Cobden. His correspondence with Charles Sumner, an American statesman and abolitionist, provided an important unofficial contact between Britain and the United States.

The most important activity of the last years of his life was his successful attempt to improve relations between Britain and France. Despite the differences in their political views, Palmerston had invited Cobden to join his broad-based ministry in 1859 as president of the Board of Trade. Cobden declined, but he worked indefatigably for a commercial treaty with France in 1860. The "most favoured nation" clause incorporated in the treaty, which stipulated that neither party could enforce against the other any prohibition on imports or exports that did not also apply to other nations, was to be duplicated in many later agreements with other nations. Cobden did not live long enough to see the eclipse of his free-trade hopes, which continued to be shared by the Cobden Club, founded to perpetuate his principles. The strain of the protracted Anglo-French negotiations undermined his health, and he had to spend many months outside London. He died in 1865, having made a last effort to leave his sickbed and attend Parliament to vote against new expenditures on national fortifications.

(As.B.)

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Cobden-Sanderson, Thomas James (b. Dec. 2, 1840, Alnwick, Northumberland, Eng.—d. Sept. 7, 1922, London), English book designer and binder who contributed much to the success of the Arts and Crafts Movement. Though initially a barrister, he turned in 1883 to bookbinding, a field in which he rapidly won distinction. He established the Doves Bindery at Hammersmith, London (1893), confining himself thereafter to designing; and in 1900 he founded, with Emery Walker, the Doves Press. The restrained splendour of its books is unsurpassed. The Doves Bible (1903–05) is considered the masterpiece of the press. He and Walker designed an outstanding type, which was based on the roman type of the 15th-century printer Nicolas Jenson. The partnership ended in 1909; and after the press closed in 1916, Cobden-Sanderson, to make certain that no one could use his special type, threw it into the Thames.

cobego (mammal): *see* colugo.

Cobenzl, (Johann) Ludwig (Joseph), Graf von (count of) (b. Nov. 21, 1753, Brussels [Belgium]—d. Feb. 22, 1809, Vienna [Austria]), Austrian diplomat and foreign minister



Ludwig von Cobenzl, engraving, 1785

By courtesy of the Bild-Archiv, Österreichische Nationalbibliothek, Vienna

who played a leading role in the Third Partition of Poland (1795) and the negotiations of several treaties with Napoleonic France. He was the cousin of Philipp, Graf von Cobenzl, an Austrian chancellor.

A protégé of the Austrian chancellor Wenzel Anton von Kaunitz, Cobenzl became minister at St. Petersburg in 1779. At the Third Partition of Poland in 1795, he gained sizable territories for his country in compensation for Austria's exclusion from the Second Partition. At the peace negotiations with France at Campo Formio (1797), Rastatt (1797–99), and Lunéville (1801), the Holy Roman Empire lost the left bank of the Rhine to France. As foreign minister from 1800, Cobenzl, attempting to relieve tensions with France, recognized Napoleon's imperial title in 1804 but nevertheless became embroiled in the War of the Third Coalition (1805), in which Napoleon again defeated Austria. Cobenzl was dismissed a few weeks after the disastrous Battle of Austerlitz in 1805.

Cobenzl, (Johann) Philipp, Graf von (count of) (b. May 28, 1741, Laibach, Carniola, Austrian Empire [now Ljubljana, Slovenia]—d. Aug. 30, 1810, Vienna [Austria]), Austrian statesman and chancellor who unsuccessfully attempted to gain Bavaria for Austria in exchange for the Austrian Netherlands. He was a cousin of Ludwig, Graf von Cobenzl, an Austrian foreign minister.

Rising rapidly under the patronage of Chancellor Wenzel Anton von Kaunitz, Cobenzl negotiated the Treaty of Teschen (1779), in which Austria concluded the War of the Bavarian Succession by renouncing its claim to Bavaria in return for territorial concessions. Appointed vice chancellor, he was sent to pacify the rebellious Austrian Netherlands in 1787. Replacing the retiring Kaunitz as chancellor in 1792, he advocated a policy of cooperation with Prussia to win that power's agreement to Austria's ambitions to absorb Bavaria in exchange for the Austrian Netherlands. Prussia never explicitly agreed to this proposition, and Cobenzl's policy was discredited after Russia and Prussia, excluding Austria, acquired extensive Polish territories in the Second Partition of Poland of 1793. After his dismissal in March of 1793, Cobenzl served as Austrian ambassador to Paris from 1801 to 1805.



Philipp von Cobenzl, detail from a portrait by an unknown artist, 1779

By courtesy of the Bild-Archiv, Österreichische Nationalbibliothek, Vienna

Cobergher, Wenceslas, also called WENSEL COEBERGER (b. 1557/61, Antwerp [Belgium]—d. Nov. 24, 1634, Brussels), Flemish architect, painter, and engraver who was a leader in the development of the Flemish Baroque style of architecture, based on the early Italian Baroque buildings of the Roman school.

Cobergher received his education as a painter in the workshop of Maarten de Vos and by studying works of art in Paris, Rome, and Naples (1583–1604). From 1605 until his death, he was painter, architect, and engineer to the governors of the Spanish Netherlands. He painted altarpieces for churches in Italy and in Flanders, but his pictures are far less important than his few surviving buildings. Of these the most famous are St. Augustin in Antwerp (begun 1615) and the church of Notre Dame (1609) in Montaigu, which show the influence of the design of St. Peter's in Rome. He also wrote on archaeology.

Cobh, Irish AN CÓBH, seaport and naval station, County Cork, Ireland, on the south side of Great Island and on a hill above the harbour of Cork city. The Cathedral of St. Colman crowns the hill. In 1838 the steamer *Sirius* set out from here to become the first steamship to cross the Atlantic, taking 18½ days. Renamed Queenstown in honour of Queen Victoria in 1849, the town retained this name until 1922. Cobh became a military and naval centre and port of embarkation for troops, and it remains the chief Irish port of call for transatlantic liners. Pop. (1986) 6,369.

Cobham, Sir Alan (John) (b. May 6, 1894, London, Eng.—d. Oct. 21, 1973, Bournemouth, Dorset), British aviator and pioneer of long-distance flight who promoted "air-mindedness" in the British public.

Cobham entered the Royal Flying Corps in 1917 and in 1921 joined Geoffrey de Havilland's new aircraft company, for which he undertook a succession of long-distance flights: 5,000 miles (8,000 km) around Europe; 8,000 miles (12,800 km) across Europe and North Africa; 12,000 miles (19,300 km) through Europe to Palestine, Egypt, along the North African coast, and back through Spain; to the Cape of Good Hope and back; to Australia and back. From 1926, the year in which he was knighted, he operated his own firm. For Imperial Airways he flew 23,000 miles (37,-

000 km) around Africa in 1927, and in 1931 he made a survey flight up the Nile River and across the Belgian Congo (now Zaire) for the Air Ministry. During the next four years his flying circus team of pilots toured Britain and gave many their first thrills of aerial display. He worked out a system for refueling aircraft from aerial tankers that was first used off Ireland in 1939. He wrote a number of books about his activities, including *My Flight to the Cape and Back* (1926) and *Twenty Thousand Miles in a Flying Boat* (1930). His memoirs, *A Time to Fly*, were edited by C. Derrick and published in 1978.

cobia, also called SERGEANT FISH, or CRABEATER (species *Rachycentron canadum*), swift-moving, slim marine game fish, the only member of the family Rachycentridae (order Perciformes). The cobia is found in most warm oceans. A voracious, predatory fish, it may be 1.8 m (6 feet) long and weigh 70 kg (150 pounds) or more. It has a jutting lower



Cobia (*Rachycentron canadum*)
Painted especially for *Encyclopaedia Britannica* by Tom Dolan, under the supervision of Loren P. Woods, Chicago Natural History Museum

jaw, a rather flat head, and light-brown sides, each with two lengthwise, brown stripes. The dorsal fin, a distinctive feature, consists of a row of short spines followed by a long, soft-rayed fin.

Coblentz, William W(eber) (b. Nov. 20, 1873, North Lima, Ohio, U.S.—d. Sept. 15, 1962, Washington, D.C.), American physicist and astronomer whose work lay primarily in infrared spectroscopy. Coblentz measured the infrared radiation from stars, planets, and nebulae and was the first to determine accurately the constants of blackbody radiation, thus confirming Planck's law. From 1905 until 1945 Coblentz was chief of the Radiometry Section of the U.S. National Bureau of Standards and is considered responsible for the adoption of radiometric standards. In 1937 he was awarded the Rumford Gold Medal by the American Academy of Arts and Sciences.

Coblenz (Germany): *see* Koblenz.

Cobourg Peninsula, also spelled COBURG, northwestern extremity of Arnhem Land, Northern Territory, Australia. The peninsula consists of a narrow neck of land extending about 60 miles (100 km) to Cape Don on Dundas Strait, which separates it from Melville Island in the Timor Sea. The island encloses Van Diemen Gulf on the north and east. It is chiefly a low, undulating plateau, and its northern coast is deeply indented by inlets, the largest of which is Port Essington (19 miles by 7 miles [31 km by 11 km]), site of an early settlement. The peninsula was seen in 1818 by Captain Phillip Parker King of the Royal Navy and was named after Prince Leopold of Saxe-Coburg, uncle of Queen Victoria. It is now part of a wildlife sanctuary and a flora and fauna reserve.

Cobra, Expressionist group of painters whose name is derived from the first letters of the three northern European cities—Copenhagen, Brussels, Amsterdam—that were the homes of its members. The first of the group's two large exhibitions, organized by the Danish painter Asger Jorn, was held in 1949 at the Stedelijk Museum, Amsterdam; the second exhibition was held in 1951 at the Palais des Beaux-Arts in Liège, Belg. Cobra included among its members Karel Appel, Corneille (Corneille Guillaume Beverloo), Constant (Nieuwenhuis), Pierre Alechinsky, Lucebert (Lubertus Jacobus Swaanswijk), and Jean Atlan. Influenced by poetry, film, folk art, children's art, and primitive art, the semiabstract canvases by these artists display brilliant colour and spontaneous, violent brushwork that is akin to

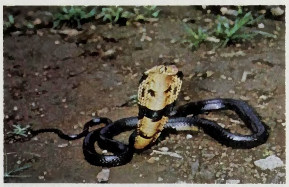


"Portrait of Willem Sandberg," oil painting by Karel Appel, one of the members of the Cobra group, 1956; in the Museum of Fine Arts, Boston
By courtesy of the Museum of Fine Arts, Boston, Tompkins Collection

American Action Painting. The human figure, treated in a wildly distorted, Expressionistic manner, is a frequent motif in their art. Cobra had a great impact on the development of subsequent European Abstract Expressionism.

cobra, any of a number of highly venomous snakes of the family Elapidae that expand the neck ribs to form a hood. Cobras are found in warm regions of Africa, Australia, and Asia. They are favourites of snake charmers, who tease them into assuming the upreared defense posture. The snake sways in alert response to the charmer's movements, not to the sound of his pipe—snakes are deaf to high frequencies—and the charmer knows how to avoid the relatively slow strike. The mongoose, famous enemy of cobras, wins by superior agility.

The short fangs are always at the front of the mouth and contain a closed groove. The venom they produce in general contains neurotoxins, which act against the nervous system. Cobra bites are fatal in about 10 percent



Black-necked cobra (*Naja nigricollis*)
E.S. Ross

of human cases, but from certain species the rate is much higher.

Cobras feed primarily on small vertebrates. They are ovoviviparous (live-bearing) or oviparous (egg-layers).

The world's largest venomous snake is the king cobra, or hamadryad (species *Ophiophagus hannah*), found from southern China to the Philippines and Indonesia. It is often more than 3.6 m (12 feet) long; one is reported to have measured 5.6 m (18 feet). This species guards its 20 to 40 eggs, which are laid in a nest of leaves. It preys chiefly on other snakes and is known to have pursued people; however, relatively few bites are reported.

The 1.7-metre (5.5-foot) Indian cobra (*Naja naja*) kills several thousand people every year, mostly because it visits houses at twilight to catch rats. It is found from Iran eastward. In India this species (thought by some authorities to be a complex of several species) has a spectacle-like mark on its exceptionally wide hood; elsewhere, the hood shows a ring or bars. Eastern populations have the openings in the fangs facing forward for spitting—a condition perfected in the ringhals, or spitting cobra (*Hemachatus hemachatus*), of southern Africa. The black-necked cobra (*Naja nigricollis*), a small form widely distributed in Africa, is also a spitter. Venom is accurately directed at the victim's eyes at distances of more than 2 m (7 feet) and may cause temporary, or even permanent, blindness unless promptly washed away. The Egyptian cobra (*N. haje*)—probably the asp of antiquity—is a dark, narrow-hooded species, about 2 m long, that ranges over much of Africa and eastward to Arabia. Its usual preys are toads and birds. In equatorial Africa there are tree cobras (genus *Pseudohaje*), which, with the mambas, are the only arboreal elapids.

cobra plant, also called COBRA LILY, or CALIFORNIA PITCHER PLANT (species *Darlingtonia californica*), the only species of the genus *Darlingtonia* of the pitcher-plant family (Sarraceniaceae) native to swamps in mountain areas of northern California and southern Oregon. The red-veined, yellowish green, hoodlike leaf has a purple-spotted appendage resembling a



Cobra plant (*Darlingtonia californica*)
Verna R. Johnston

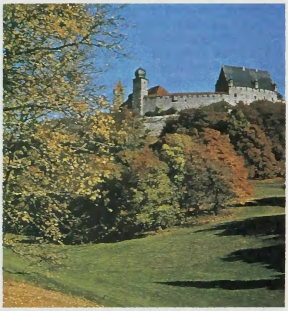
snake's tongue. The entire plant has the appearance of a striking cobra. The stalkless leaf springs from the rootstalk and is 40 to 85 cm (16 to 33 inches) tall. An insect or similar small animal is drawn to the mouth of the hollow leaf by nectar glands in the ramplike tongue. When inside it tries to crawl or fly through the translucent patches on the hood, which are bright and resemble windows; the true exit from the trap is concealed. The victim soon tires and drops into water that has accumulated at the base of the hood. Escape is prevented by slippery walls and downward-pointing hairs, and the captive is eventually digested by bacteria present in the fluid.

The solitary, yellowish purple, nodding flower is borne on a stalk as long as the leaf. It has five green sepals that are longer than the five red-veined, green petals.

Coburg, also spelled KOBURG, city, northern Bavaria *Land* (state), central Germany, situated on the Itz River, in the foothills of

the Thuringian Forest, some 80 miles (130 km) west of the Czech border.

Coburg was an imperial possession in the 10th century, and it was first mentioned in a document of 1056. The counts of Henneberg inherited the city in 1248, and it was chartered in 1331. From 1353 to 1918 it belonged to the margraves of Meissen, members of the Wettin family, who, after 1826, took the title of dukes of Saxe-Coburg-Gotha; their line has supplied Europe with many of its crowned heads. Coburg was of considerable importance in the 15th and 16th centuries, largely because of its strongly fortified Veste, or castle, situated on a busy trade route. Martin Luther resided



The Veste (castle) Coburg in Coburg, Ger.
Schuster—De Wys Inc.

there in 1530, and during the 17th century the castle successfully withstood several sieges in the Thirty Years' War.

The castle was completely renovated in 1909–24; it houses art collections formed by the dukes and has a natural-history museum on its grounds. The ducal residence, the Ehrenburg, was converted in 1543 from a monastery proscribed during the Protestant Reformation; it houses a library and several collections. The 16th-century town hall is a notable landmark. Neighbourhood castles include Rosenau, the ducal country seat where Prince Albert, the consort of Queen Victoria of Great Britain, was born.

Coburg's industries include lumber and paper milling, breweries, and the manufacture of glass, machinery, electrotechnical equipment, textiles, and toys. Pop. (1991 est.) 44,246.

Coburg Peninsula (Australia): *see* Cobourg Peninsula.

Coburn, Alvin Langdon (b. June 11, 1882, Boston, Mass., U.S.—d. Nov. 23, 1966, Rhos-on-Sea, Denbighshire, Wales), American-born British photographer and the maker of the first completely nonobjective photographs.

Coburn began taking photographs when he received a camera as a gift on his eighth birthday, but it was not until 1899, when he met the photographer Edward Steichen, that he became a serious photographer. In the same year, Coburn contributed to two important exhibitions: the New School of American Pictorial Photography exhibition and the Salon of the Linked Ring, a group of English photographers who worked to establish photography as an art.

In 1902 Coburn opened a studio in New York City to exhibit his prints, and in that same year he was elected to the newly formed Photo-Secession Group, made up of American photographers whose aims were similar to those of the Linked Ring. The following year, he was elected a member of the Linked



"The Octopus, New York," by Alvin Langdon Coburn, 1912
The International Museum of Photography at George Eastman House

Ring. After working for a year in the New York studio of Gertrude Käsebier, a leading Photo-Secessionist, Coburn returned to Boston, where his style was influenced by his discovery of the ink paintings of the Japanese master Sesshū.

In 1904 Coburn left for London with a commission to photograph celebrities. Among his memorable portraits were those of George Meredith (1904), Auguste Rodin (1906), and Henry James (1906). He even made a nude portrait of George Bernard Shaw (1906) posed as Rodin's well-known sculpture "The Thinker." Coburn's portraits were collected and published in the books *Men of Mark* (1913) and *More Men of Mark* (1922).

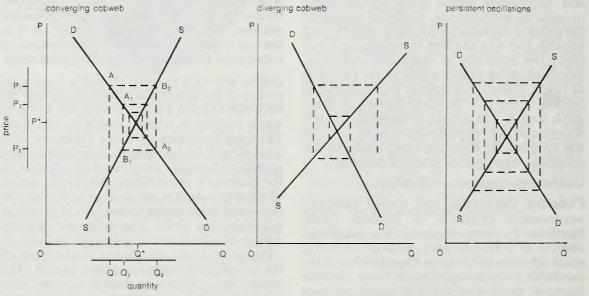
In 1913 Coburn exhibited five photographs collectively titled "New York from Its Pinnacles," showing street scenes viewed from above. These photographs, especially "The Octopus, New York," display a novel use of perspective and an emphasis upon abstract pattern. Shortly thereafter (1917), he began taking the first completely nonobjective photographs. He called them vortographs (*q.v.*), to connect them with an English group of writers and painters, the Vorticists, who had been influenced by Cubism and Futurism, as Coburn himself had been. Vortographs were a deliberate attempt to prove that photographers could fracture space into abstract compositions as Cubist painters and sculptors had done.

During the 1920s Coburn, who had by this time moved to England, became increasingly interested in mysticism, and he abandoned the camera in favour of spiritual pursuits. In the 1950s, however, he resumed photography and produced a number of mysteriously ambiguous photographs, such as "Tree Interior" (1957) and "Reflections" (1962).

cobweb cycle, in economics, fluctuations occurring in markets in which the quantity supplied by producers depends on prices in previous production periods. The cobweb cycle is characteristic of industries in which relatively large time lapses occur between the decision to produce and the finished product and is thus most commonly found in agricultural markets.

The lag in the adjustment of supply to demand is demonstrated in the accompanying figures. The demand curve DD reflects the quantities consumers are willing to buy at various prices, and the supply curve SS reflects the quantities producers will choose to supply in view of various prices. In the accompanying example, if OQ_1 is the quantity produced in the first period, the price as determined by the demand for the product will be P_1. In response to this high price, suppliers will decide to produce P_1B_2 during the second period. With this increased quantity, however, the price that consumers are willing to pay falls to P_2. Responding to this price decrease, producers decide to produce less in period three. If the quantity produced is P_2B_3, consumers will bid the price up to P_3. The cycle continues in this way.

The cobweb cycle will converge toward the intersection of the two curves if the slope of the supply curve is greater than that of the demand curve. If it is less, price-quantity combinations will move farther and farther from this point. If the slopes are equal, a constant cobweb cycle results.



Cobweb cycles
From P.A. Samuelson, *Economics*. Copyright © 1970. Used with permission of McGraw-Hill Book Co.

cobweb weaver: *see* comb-footed spider.

coca (*Erythroxylum coca*), tropical shrub, of the family Erythroxylaceae, the leaves of which are the source of the drug cocaine (*q.v.*).



Coca (*Erythroxylum coca*)
W.H. Hodge

The plant, cultivated in Africa, northern South America, Southeast Asia, and Taiwan, grows about 2.4 m (8 feet) tall. The branches are straight, and the lively green leaves are thin, opaque, oval, and more or less tapering at the extremities. A marked characteristic of the leaf is an areolated portion bounded by two longitudinal curved lines, one on each side of the midrib, and more conspicuous on the under face of the leaf. The flowers are small and disposed in little clusters on short stalks; the corolla is composed of five yellowish white petals, the anthers are heart-shaped, and the pistil consists of three carpels united to form a three-chambered ovary. The flowers are succeeded by red berries.

The plants thrive best in hot, damp situations, such as the clearings of forests; but the leaves most preferred are obtained in drier localities, on the sides of hills. The leaves are considered ready for plucking when they break on being bent. The green leaves (*matu*) are spread in thin layers and dried in the sun; they are then packed in sacks, which, in order to preserve the quality, must be kept from damp.

The composition of different specimens of coca leaves is very inconstant. Good samples have a strong tealike odour; when chewed they produce a sense of warmth in the mouth and have a pleasant, pungent taste. Besides the important alkaloid cocaine, there are several other alkaloids. Coca leaves and preparations of them have physiologically no external action. Internally their physiological action is similar to that of opium.

Coca-Cola Company, The, American corporation founded in 1892 and today engaged primarily in the manufacture and sale of syrup and concentrate for Coca-Cola, a sweetened, carbonated beverage that is a cultural institution in the United States and a symbol around the world of American tastes. The company also produces and sells other soft drinks and citrus beverages. Corporate headquarters are in Atlanta, Ga.

The drink Coca-Cola was originated in 1886 by an Atlanta pharmacist, John S. Pemberton (1831–88), at his Pemberton Chemical Company; his bookkeeper, Frank Robinson, chose the name for the drink and penned it in the flowing script that became the Coca-Cola trademark. Pemberton originally touted his drink as a tonic for most common ailments, basing it on cocaine from the coca leaf and caffeine-rich extracts of the kola nut. (The cocaine was removed from Coca-Cola's formula in 1905.) He sold his syrup to local soda fountains, and, with advertising, the drink became phenomenally successful. By 1891 another Atlanta pharmacist, Asa Griggs Candler (1851–1929), had secured complete ownership of the business (for a total cash outlay of $2,300 and the exchange of some proprietary rights), and he incorporated the Coca-Cola Company the following year.

Under Candler's leadership, sales rose from about 9,000 gallons of syrup in 1890 to 370,877 gallons in 1900, and during the decade syrup-making plants were established in Dallas, Texas, and in Los Angeles and Philadelphia, selling in every U.S. state and territory and to Canada. In 1899 the Coca-Cola Company signed its first agreement with an independent bottling company, which was allowed to buy the syrup and produce, bottle, and distribute the Coca-Cola drink. Such licensing agreements formed the basis of a unique distribution system that now characterizes most of the American soft-drink industry.

Capitalized at $100,000 in 1892 upon incorporation, the Coca-Cola Company was sold in 1919 for $25,000,000 to a group of investors led by Atlanta businessman Ernest Woodruff, whose son, Robert Winship Woodruff, as president and chairman, guided the company for three decades (1923–55).

The post-World War II years saw diversification in the packaging of Coca-Cola and also in the development or acquisition of new products. In 1946 the company purchased rights to the Fanta soft drink, previously developed in Germany. It introduced the lemon-lime drink Sprite in 1961 and the sugar-free cola Tab in 1963. By purchase of Minute Maid Corporation in 1960, it entered the citrus beverage market. In 1982 the company acquired a controlling interest in Columbia Pictures, a motion-picture and entertainment company, but sold its interest to Sony Corporation in 1989.

The trademark "Coca-Cola" was registered in the U.S. Patent Office in 1893; the trademark "Coke" (first used in advertising in 1941) was registered in 1945; the contoured Coca-Cola bottle (introduced in 1916) was registered in 1960.

cocaine, white, crystalline alkaloid that is obtained from the leaves of the coca plant (*Erythroxylum coca*), a bush commonly found growing wild in Peru, Bolivia, and Ecuador and cultivated in many other countries. The chemical formula of cocaine is $C_{17}H_{21}NO_4$. Cocaine acts as an anesthetic because it interrupts the conduction of impulses in nerves, especially those in the mucous membranes of the eye, nose, and throat. More importantly, cocaine when ingested in small amounts produces feelings of well-being and euphoria, along with a decreased appetite, relief from fatigue, and increased mental alertness. When taken in larger amounts and upon prolonged and repeated use, cocaine can produce depression, anxiety, irritability, sleep problems, chronic fatigue, mental confusion, paranoia, and convulsions that can cause death.

For centuries the Indians of Peru and Bolivia have chewed coca leaves mixed with pellets of limestone or plant ashes for pleasure or in order to withstand strenuous working conditions, hunger, and thirst. In other cultures the active alkaloid is chemically extracted from coca leaves and is converted into the hydrochloric salt of cocaine, cocaine hydrochloride. This fine white powder is sniffed through a hollow tube and is readily absorbed into the bloodstream through the nasal mucous membranes. Cocaine is an irritant, however, and acts to constrict blood vessels, causing a chronic runny nose or, in severe cases, ulcerations in the nasal cavity. The euphoric effects of sniffing cocaine are relatively transitory and wear off after about 30 minutes. Cocaine is habit-forming and may also be physically addicting. Cocaine is also injected in solution or smoked in a chemically treated form known as freebase; either of these methods produces a markedly more compulsive use of the drug. In the 1980s a new preparation of cocaine appeared, called crack; the smoking of crack produces an even more intense and even more short-lived euphoria that is extremely addicting. This form of cocaine consumption is also the one most detrimental to health. Another smokable and highly addictive form is cocaine paste, which is an intermediate stage in the processing of coca leaves into cocaine.

The prolonged or compulsive use of cocaine in any of its purified forms can cause severe personality disturbances, inability to sleep, and loss of appetite. A toxic psychosis can develop involving paranoid delusions and disturbing tactile hallucinations in which the user feels insects crawling under his skin. Cocaine abuse, which had been a marginal drug problem throughout much of the 20th century, grew alarmingly in the late 20th century in several countries, and cocaine has become responsible for a markedly increased proportion of drug-induced deaths.

Cocanada (India): *see* Kākināda.

Cocceianus, Cassius Dio (Roman historian): *see* Dio Cassius.

Cocceius, Johannes, German JOHANNES KOCH, or COCH (b. Aug. 9, 1603, Bremen [Germany]—d. Nov. 5, 1669, Leiden, Neth.), Dutch theologian of the Reformed Church, biblical scholar, prolific writer, and a leading exponent of covenant theology, a school of religious thought emphasizing the compacts between God and man.

Educated in biblical languages, Cocceius was appointed in 1630 to the professorship of biblical philology at the Gymnasium Illustre at Bremen. Six years later he accepted an offer to teach Hebrew at the university at Franeker, Neth., and in 1650 he moved to Leiden, where he taught until his death.

Biblical interpretation forms both the central theme of Cocceius' many writings and the starting point of his systematic theology. His *Summa doctrinae de foedere et testamento Dei* (1648; "Comprehensive Treatise on the Doctrines of the Covenant and Testament of God") is based on the conception that the relation between God and man, both before the Fall and after it, was a covenant. In the original paradise there was a covenant of works by which salvation was promised for perfect obedience. After sin made obedience impossible for man, the covenant of works was "abrogated" by the covenant of grace, by which salvation was given as a free gift of God. This gracious covenant originated in a pact within the Trinity between the Father and the Son and is realized in a succession of historical steps culminating in the eternal Kingdom of God. The covenant of works that is reflected in the conscience of mankind provided a basis for Cocceius' theological treatment of the broader social and political areas of life, while the gracious covenant permitted his interpretation of many Old Testament symbols as prefigurations of the New Testament Christ. Thus Cocceius was able to strengthen biblical piety and to introduce the idea of the history of salvation, including an uncharacteristic millennialism, within scholastic Reformed theology.

Articles are alphabetized word by word, not letter by letter

coccidiosis, any of several gastrointestinal infections of humans and other animals produced by members of the sporozoan parasite coccidium (class Coccidea). Human coccidiosis is produced by species of *Isospora;* in its severe form it is characterized by diarrhea (sometimes alternating with constipation), fever, abdominal pain, nausea, headache, loss of appetite, and loss of weight. The symptoms appear about one week after ingestion of spores and subside spontaneously after one to four weeks. Wildlife such as bony fishes, amphibia, reptiles, birds, and mammals harbour *Isospora* and other genera, and each category of livestock—chickens, cattle, sheep, rabbits, pigs, etc.—has its own coccidian parasites. Coccidiosis may be controlled by sanitary conditions and possibly by administration of certain sulfonamides, arsenicals, and antibiotics. *See also* cryptococcosis.

coccolith, minute calcium carbonate platelet or ring secreted by certain organisms (classed either as protozoans or algae) and imbedded in their cell membranes. When the organisms die, the coccoliths are deposited (at an estimated 60,000,000,000 per square m [10 square feet] annually) onto the ocean floor and form, along with organic debris, a gray sediment. Fossil forms of coccoliths date from as far back as the Cambrian Period (570 to 505 million years ago).

The taxonomy of these organisms is not yet established. Zoologists place them either in

the protozoan order Chrysomonadida or in their own order Coccolithophorida; botanists include them in the algal division Chrysophyta because they contain yellow to brown chromatophores.

coccus, plural cocci, in microbiology, a spherical-shaped bacterium. Many species of bacteria have characteristic arrangements that are useful in identification. Pairs of cocci are called diplococci; rows or chains of such cells are called streptococci; grapelike clusters of cells, staphylococci; packets of eight or more cells, sarcinae; and groups of four cells in a square arrangement, tetrads. These characteristic groupings occur as a result of variations in the reproduction process in bacteria. *See also* Staphylococcus; Streptococcus.

coccygeus muscle, muscle of the lower back that arises from the ischium (lower, rear portion of the hipbone) and from the ligaments that join the spinal column and the sacrum (triangular bone at the base of the spine). It is attached to the lower sacrum and the coccyx (tailbone). In humans its major function is to support the pelvic viscera, especially in the female. It also raises the coccyx.

coccyx, also called TAILBONE, curved, semiflexible lower end of the backbone (vertebral column) in apes and humans, representing a vestigial tail. It is composed of three to five successively smaller caudal (coccygeal) vertebrae. The first is a relatively well-defined vertebra and connects with the sacrum; the last is represented by a small nodule of bone. The spinal cord ends above the coccyx. In early adulthood the coccygeal vertebrae fuse with each other; in later life the coccyx may fuse with the sacrum. A corresponding structure in other vertebrates, such as birds, may also be called a coccyx.

Coch, Johannes: *see* Cocceius, Johannes.

Cochabamba, city, central Bolivia. It lies in the densely populated, fertile Cochabamba Basin, at 8,432 feet (2,570 m) above sea level. Founded as Villa de Oropeza in 1574 by the conquistador Sebastián Barba de Padilla, it was elevated to city status in 1786 and renamed Cochabamba, the Hispanicized Quechua name (Khocha Pampa) for the area, meaning "a plain full of small lakes." A favourable climate and attractive setting have helped make it Bolivia's third largest city. It is the site of the Major University of San Simón (established in 1826) and has a museum, municipal library, cathedral, and government palace. A large plaza in the centre of the city commemorates the date on which the local patriots took up arms in the War of Independence against Spanish rule. Except for an oil refinery (connected by pipelines with Oruro, Sucre, and Santa Cruz), its industries are varied and small, mainly supplying the local market.

The area in which Cochabamba is situated is commonly referred to as the granary of Bolivia. Its climate is milder than that of the Altiplano region to the west and thus permits an extensive agriculture, including grains, potatoes, and coffee in the highlands and sugarcane, cacao, tobacco, and fruit in the lowlands.



14 de Septiembre Plaza, Cochabamba, Bolivia
Walter Aguiar—EB Inc

Cochabamba is accessible by air, rail, and highway from La Paz, the national capital (220 miles [354 km] north-northwest), and from the highlands and by highway from Sucre, Santa Cruz, and the lowlands. Important satellite towns are Vinto, Quillacollo, Sipesipe, and Sacaba. Pop. (1990 est.) 413,274.

Cochem, city, Rhineland-Palatinate *Land* (state), western Germany. It lies along the Moselle (Mosel) River, southwest of Koblenz. First mentioned in 866, it developed around an imperial castle and in 1332 was chartered. The castle, given to the archbishops of Trier in 1294, was destroyed by the French in 1689 but was rebuilt in 1869–77. The city's Capuchin church dates from 1628 and its city hall from 1739. Nearby are the ruins of Winneburg Castle (13th century), an old residence of the Metternich family. Cochem is noted for its wines and has a small textile industry. Pop. (1989 est.) 5,094.

Cochet, Henri (b. Dec. 14, 1901, Lyon, Fr.—d. April 1, 1987, Saint-Germain-en-Laye), French tennis player who, as one of the Four Musketeers (with Jean Borotra, René Lacoste, and Jacques Brugnon), helped establish the French domination of world tennis in the mid-1920s.

Cochet's father was the secretary of a local tennis court, and as a youth Cochet spent much time chasing balls and practicing in the club's off-hours. In 1921 he moved to Paris, where he won the indoor court championships and the 1922 French championships. With the other three "musketeers," he helped secure the Davis Cup for France six consecutive times (1927–32). In 1928 he became one of the top world players. Cochet also won the French championship five times (1922, 1926, 1928, 1930, and 1932) and Wimbledon twice (1927 and 1929).

One of Cochet's best-known matches was his defeat of Bill Tilden for the 1926 U.S. championship, preventing Tilden from winning the event for the seventh straight year. Cochet also won several doubles titles in the late 1920s. Although he turned professional in 1933, he was reinstated as an amateur in 1945. He and the other "musketeers" were elected to the International Tennis Hall of Fame in 1976. Cochet published a number of books about tennis and produced a film on the history of tennis, and in his later years he operated a sporting-goods store.

Cochin, town and major port on the Arabian Sea, west-central Kerala state, southwestern India. Also the name of a former princely state, "Cochin" is sometimes used today to refer to a cluster of islands and towns, including Ernākulam, Mattāncheri, Fort Cochin, Willingdon Island, Vypīn Island, and Gundu Island. The urban agglomeration includes the localities of Trikkakara, Eloor, Kalamassery, and Trippunithura.

Cochin was an insignificant fishing village until the backwaters of the Arabian Sea and the streams descending from the Ghāts caused the separation of the village from the mainland, turning the landlocked harbour into one of the safest ports on India's southwestern coast. The port assumed a new strategic importance and began to experience commercial prosperity. When the Portuguese penetrated the Indian Ocean in the late 15th century and reached India's southwestern coast, the Portuguese navigator Pedro Alvares Cabral founded the first European settlement on Indian soil at Cochin in 1500. Vasco da Gama, discoverer of the sea route to India, established the first Portuguese factory (trading station) there in 1502, and the Portuguese viceroy Afonso de Albuquerque built the first European fort in India there in 1503. The city remained a Portuguese possession until it was conquered by the Dutch in 1663. Much Portuguese architecture still exists in the city.

Under Dutch rule (1663–1795) Cochin had its greatest prosperity. Through its harbour were shipped pepper, cardamom, and other spices and drugs as well as coir, coconut, and copra. All of the city's racial and religious groups, including its Hindu majority and Muslim, Syrian Christian, and Jewish minorities, shared in the city's prosperity.

British rule over Cochin lasted from 1795 until 1947, when India became independent. At the beginning of the 20th century a modern port with dry docks and ship repair yards was constructed, and Willingdon Island (connecting Fort Cochin with Ernākulam and other townships by a rail bridge and road) was built from the dredgings of the harbour's inner channels. After India's independence, Cochin became the major training centre for the Indian Navy.

A system of inland waterways running parallel to the coast provides Cochin with cheap transportation, encouraging trade. The deep-water harbour is open year-round, even in the monsoon season, and is served by a railway that connects it with Ernākulam. An airport has flights from Cochin to such major Indian cities as Bombay, New Delhi, Bangalore, and Madras.

Cochin, set among picturesque lagoons and backwaters, attracts a considerable tourist trade. At Fort Cochin is St. Francis Church, built by the Portuguese in 1510 and reputedly the first European church on Indian soil. It was for a time the burial place of Vasco da Gama before his remains were taken to Portugal. Other churches as well as Hindu temples, mosques, and the historic synagogue at Mattāncheri all stand in the area. The Jewish community in Cochin was the oldest in India, claiming to date from the 4th century AD. Almost all of its several thousand members had emigrated to Israel by the late 20th century, however. Pop. (1981) town, 513,249; metropolitan area, 685,836.

Cochin, Charles-Nicolas, THE YOUNGER (b. Feb. 22, 1715, Paris, Fr.—d. April 29, 1790, Paris), outstanding French engraver of the 18th century.

The son of Charles-Nicolas the Elder (1688–1754), from whom he learned engraving, Cochin rose to national prominence early in his career. As a member of the academy (admitted in 1751) and the keeper of the king's drawings (a post he was given in 1752), he was officially enabled to exert his influence on the artistic taste of his day. Among his more famous works are the illustrations for La Fontaine's *Fables,* the engravings of the fetes staged by Louis XV, and his numerous engraved vignettes and portraits.

Cochinchina, French COCHINCHINE, the southern region of Vietnam during the French colonial period, known in precolonial times as Nam Ky ("Southern Administrative Division"), the name that the Vietnamese continued to use.

Cochinchina was bounded on the northeast by the part of central Vietnam that the French called Annam (*q.v.*), on the southeast by the South China Sea, on the southwest by the Gulf of Thailand, and on the northwest by Cambodia. Its chief city was Saigon (now Ho Chi Minh City).

Largely comprising a flat, deltaic plain created by the historically shifting channels of the Mekong, Cochinchina extended from the canal-checkered Ca Mau Peninsula northward through the Mekong channels and the swampy Dong Thap Muoi ("Plain of Reeds") west of Saigon. At its northwestern and western extremities, outliers of the Plateau du Mnong and the Cambodian Dâmrei Mountains (formerly Elephant Mountains; French: Chaîne

de l'Éléphant) rose to more than 2,300 ft (700 m).

The Ca Mau is still one of the world's richest rice-producing regions, and as a whole is predominantly Vietnamese, with Khmer (Cambodian) and (until 1975) Chinese minorities, the latter principally in the Cho Lon sector of Ho Chi Minh City.

For centuries divided between the Champa and Khmer kingdoms, Cochinchina was occupied in 1471 by the Vietnamese emperor Le Thanh Tong (reigned 1460–97); after two centuries of dynastic rivalries it was annexed piecemeal by the Nguyen family of Hue at the expense of the Khmers. Following the French occupation of Saigon in 1859, it was ceded in 1862 to France and in 1887 was joined to the French Indochinese Union. Cochinchina was a French overseas territory from 1946 to 1949, when it merged officially with Vietnam.

cochineal, red dyestuff consisting of the dried, pulverized bodies of certain female scale insects, *Dactylopius coccus*, of the Coccidae family, cactus-eating insects native to tropical and subtropical America. Cochineal is used to produce scarlet, crimson, orange, and other tints and to prepare pigments such as lake and carmine (*qq.v.*). The dye was introduced into Europe from Mexico, where it had been used long before the coming of the Spaniards.

Cochineal has been replaced almost entirely by synthetic dyes, but it continues to be used principally as a colouring agent in cosmetics and beverages. Its dyeing power is attributed to cochinealin, or carminic acid, obtained by boiling cochineal in water. Cochineal also contains glyceryl myristate (a fat) and coccerin (cochineal wax).

The insects are carefully brushed from the cacti into bags and are then killed by immersion in hot water or by exposure to sunlight, steam, or the heat of an oven; much of the variety in the appearance of commercial cochineal is caused by the differing modes of treatment. It takes 70,000 insects to make one pound of cochineal. *See also* kermes.

Cochise (d. June 8, 1874, Chiricahua Apache Reservation, Arizona Territory, U.S.), Chiricahua Apache chief who led the Indians' resistance to the white man's incursions into the U.S. Southwest in the 1860s; the southeasternmost county of Arizona bears his name.

Nothing is known of Cochise's birth or early life. His people remained at peace with white settlers through the 1850s, even working as woodcutters at the Apache Pass stagecoach station. Trouble began in 1861, when a raiding party drove off cattle belonging to a white rancher and abducted the child of a ranch hand. An inexperienced U.S. Army officer ordered Cochise and five other chiefs to appear for questioning. Steadfastly denying their guilt, the Indians were seized and arrested. One was killed on the spot, but Cochise escaped by cutting through the side of a tent, despite three bullets in his body. Immediately he laid plans to avenge the death of his friends, who had been hanged by federal authorities. The warfare of his Apache bands was so fierce that troops, settlers, and traders alike were all forced to withdraw. Upon the recall of army forces to fight in the U.S. Civil War (1861–65), Arizona was practically abandoned to the Apaches.

In 1862, however, an army of 3,000 California volunteers under Gen. James Carleton marched to Apache Pass to reestablish communications between the Pacific coast and the East, putting the Indians to flight with their howitzers.

Upon the death of his co-fighter Mangas Coloradas, Cochise became principal chief of the Apaches. From that time on a war of extermination was waged against the Indians. Cochise and 200 followers eluded capture for more than 10 years by hiding out in the Dragoon Mountains of Arizona, from which they continued their raids, always melting back into their mountain strongholds.

In June 1871 command of the Department of Arizona was assumed by Gen. George Crook, who succeeded in winning the allegiance of a number of Apaches as scouts and bringing many others onto reservations. Cochise surrendered in September, but, resisting the transfer of his people to the Tularosa Reservation in New Mexico, he escaped in the spring of 1872. He gave himself up when the Chiricahua Reservation was established that summer.

Cochise culture, an ancient North American Indian culture that existed perhaps 9,000 to 2,000 years ago, known from sites in Arizona and western New Mexico and named for the ancient Lake Cochise, now a dry desert basin called Willcox Playa, near which important finds were made. The Cochise was a desert culture, contrasting with the big-game hunting cultures to the east (*see* Clovis complex; Folsom complex), and emphasized gathering and collecting wild plant foods rather than hunting; in later stages, there are evidences of incipient agriculture.

The Cochise culture has been customarily divided into three developmental periods. The earliest stage, Sulphur Spring, dates from 6000 or 7000 BC to about 4000 BC and is characterized by milling stones for grinding wild seeds and by various scrapers, but no knives, blades, or projectile points, although the remains of food animals, both extinct and modern, indicate that some hunting was done. During the second stage, Chiricahua, lasting from 4000 to perhaps 500 BC, the appearance of projectile points would seem to indicate an increased interest in hunting, and the remains of a primitive form of maize suggest the beginnings of farming; food-gathering was still important, however. In the final or San Pedro stage, from 500 BC to about the time of Christ, milling stones were replaced by mortars and pestles, and pit houses (houses of poles and earth built over pits) appeared. During the San Pedro stage, pottery appeared in the area of the Mogollon Indians (*see* Mogollon culture). The Cochise tradition may be taken as the base for subsequent cultural developments among various Indians in the Southwest.

Cochlaeus, Johannes, original name JOHANNES DOBENECK, or DOBNECK (b. 1479, Wendelstein, near Nürnberg—d. Jan. 10, 1552, Breslau, Silesia), German Humanist and a leading Roman Catholic opponent of Martin Luther.

Educated at the University of Cologne (1504–10), Cochlaeus became rector of the Latin School of St. Lawrence, Nürnberg (1510–15), where he published several textbooks that notably improved instructional methods. Ordained priest while in Rome (1517–19), Cochlaeus returned to Germany to become, successively, dean at Frankfurt am Main (where in 1520 he first engaged in the Reformation controversies), canon at Mainz (1526), and court chaplain to Duke George of Saxony (1529). A pamphlet against King Henry VIII of England caused him to be transferred to Meissen as canon (1535). When George died in 1539, he was succeeded by his Lutheran brother Henry, and Cochlaeus was compelled to leave Saxony, where he was no longer safe. He became canon at Breslau (1539) and, after holding benefices in Eichstätt and Mainz, he returned to Breslau in 1549.

Cochlaeus' early sympathy with Luther changed *c.* 1520 into unremitting criticism. As adviser to papal nuncios and other ecclesiastical and secular dignitaries, he was prominent at several assemblies that strove to mend the religious split, including the Diet of Worms (1521); the diets of Nürnberg (1522–23) and Speyer (1526); the Diet of Augsburg (1530), where he was one of the theologians selected to refute the Lutheran *Augsburg Confession;* and a famous, if indecisive, conference at Worms (1540).

Cochlaeus ranked among the most zealous theologians of his time, completely dedicated to his cause. Though uneven, his production of articles on religious controversy was prolific. Noteworthy among his historical works were the *History of the Hussites* (1549) and *Acts and Writings of Luther* (1549), considered his best known book.

Cochlospermum, genus of tropical trees belonging to the family Cochlospermaceae. About 15 or 20 species are known, 3 occurring as far north as northern Mexico and southwestern United States. The buttercup tree (*C. vitifolium*), found in Central America and the West Indies, has bright-yellow, cup-shaped flowers about 10 centimetres (4 inches) across. In some areas rope is made of its bark. Several species yield dye. The seeds of *C. angolense,*



Cochlospermum gossypium
Ivan Polunin—EB Inc

an African species, yield a red dye. The roots of *C. planchoni,* also African, yield a yellow dye.

Cochran, Sir Charles Blake (b. Sept. 25, 1872, Lindfield, Sussex, Eng.—d. Jan. 31, 1951, London), leading British impresario and theatrical producer between World Wars I and II, best known for his musical revues. A colourful showman, he also owned a flea circus and produced boxing matches, circuses, rodeos, and a travelling medicine show during his long and varied career.

An actor at 17, before World War I Cochran was an agent, promoter, and producer of such lavish spectacles as Max Reinhardt's *Miracle* (1911). During the war he introduced the small-scale intimate revue at the Ambassadors' Theatre in London (*Odds and Ends,* 1914). He later produced more spectacular revues at the London Pavillion, introducing and promoting such famous stars as Beatrice Lillie, Noel Coward, Eleonora Duse, and Sacha Guitry. Cochran and Coward collaborated in several productions, including *This Year of Grace* (1928), *Private Lives* (1930), and *Cavalcade* (1931). Altogether Cochran produced 128 plays and revues in London and several in New York. He was knighted in 1948.

Cochran, Jacqueline, married name JACQUELINE COCHRAN ODLUM (b. 1910?, Pensacola, Fla., U.S.—d. Aug. 9, 1980, Indio, Calif.), U.S. pilot who held more speed, distance, and altitude records than any other flyer during her career. She flew aircraft faster than any woman in previous history, flying at 1,429 mph in 1964.

Orphaned as a child, Cochran was reared in poverty by foster parents. She went to work when eight years old in a Georgia cotton mill, became a beauty shop operator, and worked in cosmetics, ultimately founding her own firm. She learned to fly in 1932, partly to promote her cosmetics company. In 1936 she married the industrialist and banker Floyd Odlum.

Cochran became a record breaker in air his-

tory as well as a business success. She established one of two speed records set in 1938, flying a converted P-35 racer. On Sept. 3, 1938, Cochran established a record time for women, crossing North America in 10 hr 12 min 55 sec in a plane similar to the P-35 Pursuit. In 1935 Cochran became the first woman to enter the Bendix Transcontinental Air Race and in 1938 the first woman to win it.

In World War II, Cochran was a captain in the British Air Force Auxiliary and organized a women's group of pilots who flew military aircraft throughout Europe from their places of manufacture to their places of deployment. When the U.S. intervened as an ally, Cochran instructed U.S. women to fly transport planes and in 1943 was made director of the Women's Air Force Service Pilots.

In 1953 she broke the world speed records for both men and women in a Sabre jet, flying 652.552 mph on a 100-kilometre course, 590.321 mph on a 500-km course, and 675.471 mph on a 15-km course. In 1953 she also became the first woman to fly faster than the speed of sound (Mach 1). She broke her 100- and 500-km records in 1961 and became the first woman to fly at Mach 2 (twice the speed of sound). Upon her retirement from the Air Force Reserve in 1970, as a colonel, Cochran continued as a special National Aeronautics and Space Administration (NASA) consultant.

Her autobiography, *Stars at Noon,* was published in 1954.

Cochran, Welker (b. 1897—d. July 26, 1960, Belmont, Calif., U.S.), prominent U.S. billiards player who, with his rivals Willie Hoppe and Jake Schaefer, Jr., dominated the game for the first three decades of the 20th century.

Cochran began playing billiards at the age of 13 in his father's billiards room in Manson, Iowa. He studied the game under Lanson W. Perkins in Chicago, and by the time he was 17, he outclassed everyone except Hoppe. In 1925 and 1927 he won the balkline billiards title. Cochran took up three-cushion carom billiards after balkline lost popularity in the 1930s and went on to win the three-cushion title in 1933, 1935, and 1936. From 1936 to 1940 he operated a billiards academy. In 1944 he reclaimed the three-cushion title from Hoppe.

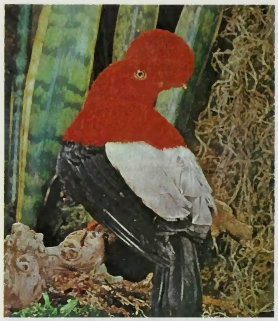
Cochrane, Elizabeth: *see* Bly, Nellie.

Cochrane, Thomas (British admiral): *see* Dundonald, Thomas Cochrane, 10th earl of.

Cocibolca, extinct city, Rivas department, Nicaragua, on the western shore of Lake Nicaragua. The last capital of the indigenous tribes that lived around the lake, it apparently declined following the Spanish conquest in the 16th century.

The Nicaraguan artist Rodrigo Peñalba immortalized Cocibolca in murals depicting the final battle between its Indian inhabitants and the Spaniards. Cocibolca, meaning "sweet sea," was also the Indian name for the lake.

cock-of-the-rock, either of two species of brilliantly coloured birds of tropical South America, usually included in the family Cotingidae (*q.v.*; order Passeriformes) but sometimes placed in a family of their own, Rupicolidae. They are noted for the males' flattened circular crest extending over the bill. During much of the year, males display in open glades near the forest floor, maintaining and defending communal display areas. Much of the individual display consists of static posturing, interspersed with stylized eye-catching movements, especially when the display arena is visited by a female. The plain-brown female builds the nest of plant materials plastered



Peruvian cock-of-the-rock (*Rupicola peruviana*)
Ruhe-Roth—Photo Researchers

with mud against a rock wall, usually in a cave.

The Guianan cock-of-the-rock, *Rupicola rupicola,* about 30 centimetres (12 inches) long, is orange, with some dark marked feathers on wings and tail.

cockade, French COCARDE, a bow or knot of ribbons worn in the hat.

Though originally ornamental, cockades soon came to be used as party badges. Prior to the introduction of uniforms, a ribbon or sprig



A partisan of the new order in the French Revolution wearing a blue, white, and red cockade, detail of an engraving by Duhamel in *Cabinet des modes,* 1790; in the Cabinet des Estampes, Bibliothèque Nationale, Paris

From *20,000 Years of Fashion* by Francois Boucher; photograph, Flammarion

of foliage was occasionally worn in soldiers' hats to distinguish members of opposing sides. Before the brim of the soldiers' felt hat was looped up, it was sometimes ornamented with a band or a ribbon knot; when the brim was cocked up on three sides, a bow of black ribbon was fastened on the left side with a button and loop. Initially the bow had no national significance: the Duke of Marlborough's troops wore black cockades in their hats, as did many of the regiments of the French Army. In the French Revolution the partisans of the new order wore a blue, white, and red cockade adopted from the colours of the royal livery. Later, French émigrés fighting against the Revolution assumed white, orange, or black and yellow cockades, depending upon the nationality of the army in which they were serving.

In the armed forces, cockades went out of use when the army and navy ceased wearing cocked hats. A leather cockade, however, survived in the headgear of many liveried coachmen and chauffeurs.

Cockaigne, also spelled COCKAYNE, imaginary country, especially prominent in medieval European lore, where life is a round of luxurious idleness. In Cockaigne there are rivers of wine, houses built of cake and barley sugar, and streets paved with pastry, and the shops gratuitously give goods to everyone. Roast geese wander about inviting people to eat them, and buttered larks fall from the skies like manna.

The origin of the word Cockaigne has been much disputed, but all versions tend toward a literal meaning of Land of Cakes. An outstanding early Irish version of the legend is *Aislinge Meic Conglinne* (*The Vision of Mac-Conglinne*), a parody of the traditional saint's vision in which a king possessed by a demon of gluttony is cured by a vision of the land of Cockaigne. There is a 13th-century French fabliau, *Cocagne,* which was possibly intended to ridicule the idea of the mythical Avalon, the Island of the Blest. An English poem "The Land of Cockaygne," also dating from the 13th century, is a satire on monastic life. The name Lubberland displaced it in the 17th century. The U.S. Big Rock Candy Mountain of hobo folklore expresses the same idea.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

cockatiel, species of small parrot (*q.v.*).

cockatoo, any of several species of crested parrots, subfamily Cacatuinea (family Psittacidae), of Australia and from Malaya to the Solomon Islands. Most of the 17 species are white, with touches of red or yellow; some are black. All have a massive scimitar-like beak for cracking nuts, digging up roots, or prying grubs from wood; feeding is aided by a worm-like tongue. Cockatoos are treetop, hole-nesting birds; at times they form large, noisy flocks that damage crops. They rarely become good talkers. Some live more than 50 years.

Cacatua (or *Kakaioe*) species are mainly white. The 38-centimetre (15-inch) Leadbeater's, or pink, cockatoo (*C. leadbeateri*) is washed with pink, and a yellow and red band crosses its forward-sweeping crest. Inhabiting much of interior Australia, it is the most beautiful cockatoo and the hardest to train.

Largest of cockatoos and with the biggest beak among psittaciform birds is the palm, or great black, cockatoo, *Probosciger aterrimus,* 65 to 75 cm (about 25 to 30 in.) long. This solitary bird of northeastern Australia, New



Sulfur-crested cockatoo (*Cacatua galerita*)
Warren Garst—Tom Stack & Associates

Guinea, and the Aru Islands has a threadlike crest, and its bare red cheeks turn blue when it is excited.

cockatrice, also called BASILISK, in the legends of Hellenistic and Roman times, a small serpent, possibly the Egyptian cobra, known as a *basilikos* ("kinglet") and credited with

powers of destroying all animal and vegetable life by its mere look or breath. Only the weasel, which secreted a venom deadly to the cockatrice, was safe from its powers.

By the beginning of the 17th century more marvels had been added to the legend. The snake was said to be generated from an egg laid by a cock and hatched by a serpent. In addition to the weasel, another enemy was the cock; if the basilisk heard a cock crow, it would shortly die. Thus travelers in regions allegedly infested by the basilisk took cocks with them.

Cockayne (folklore): *see* Cockaigne.

Cockburn, Sir Alexander James Edmund, 10TH BARONET (b. Dec. 24, 1802—d. Nov. 21, 1880, London, Eng.), lord chief justice of the Court of Queen's Bench from June 24, 1859, and lord chief justice of England from 1874 until his death. He was the first to be legally styled lord chief justice of England, a



Alexander Cockburn, detail of an oil painting by A.D. Cooper; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

title used informally by lord chief justices of King's or Queen's Bench since Edward Coke's tenure (1613–16).

Of distinguished Scottish-French ancestry, Cockburn (pronounced co'burn) was an amiable man of considerable intellectual attainments. Called to the bar in 1829, he earned a high reputation as a trial lawyer and as a reporter of cases. He served as a member of the House of Commons (1847–56), solicitor general (1850–51), attorney general (1851–56), and chief justice of the Court of Common Pleas (1856–59) before Prime Minister Lord Palmerston appointed him to the Queen's Bench. He inherited the baronetcy from an uncle in 1858.

In the United States Cockburn is probably best known for his landmark definition of obscenity (*Regina* v. *Hicklin,* 1868), in which he stated the test of obscenity as, "whether the tendency of the matter charged as obscenity is to deprave and corrupt those whose minds are open to such influences, and into whose hands a publication of this sort may fall." Cockburn's definition of obscenity became standard in Britain and in the United States as well, where it stood until rejected in 1933 by Federal Judge John Woolsey in the case involving James Joyce's *Ulysses.* Another of his landmark cases, *McNaghten's Case* (1843)—in which Cockburn successfully defended the killer of Sir Robert Peel's secretary (thought by the assassin to be the prime minister himself)—established the customary test of insanity in Anglo-American criminal proceedings: whether the defendant was so mentally disturbed that he did not know the "nature and quality" of his action or whether he was capable of realizing that what he did was wrong.

As chief of Queen's Bench, Cockburn presided over the perjury conviction of the claimant to the Tichborne baronetcy and property (*Regina* v. *Castro,* 1873–74). In this famous trial, which lasted 188 days, 400 witnesses were heard before Cockburn delivered an 18-day charge to the jury. Previously (1871–72) he had been the British member of the international arbitration panel that decided the *Alabama* claims pressed by the United States against Great Britain for permitting the construction of Confederate warships by British firms during the U.S. Civil War (1861–65).

He did not marry, and the Cockburn baronetcy became extinct upon his death.

Cockburn Harbour, port on South Caicos Island and largest settlement in the Caicos Islands, part of the British colony of the Turks and Caicos Islands in the West Indies, north of Hispaniola. The settlement dates from 1850, when salt ponds were developed; it was the island's major exporter of salt until it became increasingly noncompetitive in the world market. Production ceased altogether in 1964. Crawfish and conch are processed for export. Pop. (1990) 1,198.

Cockburn Sound, inlet of the Indian Ocean, southwestern Western Australia. The inlet extends 14 miles (23 km) south from the mouth of the Swan River to Point Peron. An important part of Fremantle's outer harbour, it is 3–6 miles (5–9 km) wide and is bounded on the east by the mainland and on the west by Garden, Penguin, and Green islands and numerous well-developed coral reefs. It varies in depth from 30 to 72 feet (9 to 22 m) and is entered through a channel south of Garden Island. Within the sound, dredged artificial channels lead to the ports of Rockingham and Fremantle and to the coastal industrial strip around Kwinana. Named after Admiral Sir George Cockburn, it was in use as a whaling base as early as 1837. Since 1978 it has been the site of a naval base.

cockchafer, also called COMMON COCKCHAFER, MAY BUG, MAYBUG, OF MAY BEETLE (species *Melolontha melolontha*), a large European beetle that is destructive to foliage, flowers, and fruit as an adult and to plant roots as a larva. In the British Isles, the name "cockchafer" refers more broadly to any of the beetles in the subfamily Melolonthinae (family Scarabaeidae), which are known in North America as June beetles, June bugs, or May beetles. *See also* chafer; June beetle.

Cockcroft, Sir John Douglas (b. May 27, 1897, Todmorden, Yorkshire, Eng.—d. Sept. 18, 1967, Cambridge, Cambridgeshire), British physicist, joint winner, with Ernest T.S. Walton of Ireland, of the 1951 Nobel Prize for Physics for pioneering the use of particle accelerators in studying the atomic nucleus.

Educated at Manchester University and St. John's College, Cambridge, Cockcroft was Jacksonian professor of natural philosophy at



Cockcroft

BBC Hulton Picture Library

Cambridge University from 1939 to 1946. In 1932 he and Walton designed the Cockcroft-Walton generator and used it to disintegrate lithium atoms by bombarding them with protons. This type of accelerator proved to be one of the most useful in the world's laboratories. They conducted further research on the splitting of other atoms and established the importance of accelerators as a tool for nuclear research. During World War II Cockcroft was director of the Atomic Energy Division, National Research Council of Canada. In 1946 he became director of the Atomic Energy Research Establishment, Ministry of Supply, at Harwell, Berkshire, and was a chairman in the Ministry of Defence from 1952 to 1954. Cockcroft was knighted in 1948 and was created Knight Commander of the Bath in 1953. In 1960 he became master of the newly founded Churchill College at Cambridge.

cocked hat, bowling game played on a standard tenpin lane with three tenpins and a duckpin ball (4–5 inches [10–12.5 cm] in diameter). The pins are set 36 inches apart at the three corners of a normal tenpin formation. Two balls are allowed per frame, and scoring is as in tenpin bowling, except that 3 instead of 10 plus the total felled with the next two balls is the maximum score per frame. Thus, a perfect game is 90 instead of 300.

Cocker, Edward (b. 1631—d. 1675, London, Eng.), reputed English author of *Cocker's Arithmetic,* a famous textbook, the popularity of which gave rise to the phrase "according to Cocker," meaning "quite correct."

Cocker worked very skillfully as an engraver and is mentioned favourably in Samuel Pepys' *Diary.* His other works include several writing



Cocker, portrait by an unknown artist based on an engraving by Richard Gaywood; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

manuals, poems for transcription or translation, and an English dictionary. In 1657 Cocker was living in London, where he also taught writing and arithmetic. The *Arithmetic* was edited and published in 1678 and passed through more than 100 editions. A 19th-century writer declared the editor of the 1678 edition, John Hawkins, to have been the author, rather than Cocker.

Cockerill, William (b. 1759, Lancashire, Eng.—d. 1832, Aachen, Prussia [Germany]), English inventor and manufacturer who brought the Industrial Revolution to present-day Belgium.

As a youth in England Cockerill revealed unusual mechanical ability by constructing models of a great number of machines. In 1794 he went to Russia as an artisan and two years later to Sweden to construct lock gates for its government, but he could not arouse interest in his own field of spinning machines. In 1799 he moved to Verviers, Fr., now in Liège province (Belgium), where, under contract to the firm of Simonis and Biolley, he constructed the first wool-carding and wool-spinning machines on the Continent. In 1807, with two of his sons, he opened factories in

Liège for the construction of spinning and weaving machines, thus introducing an industry that previously had been an English monopoly. He retired in 1812.

Cockermouth, parish (town), Allerdale district, county of Cumbria, England. Situated where the River Derwent, emerging from the mountains of the scenic Lake District region, is joined by the River Cocker, the community grew under the protection of a Norman castle, now modernized as a private residence. The 19th-century English Romantic poet William Wordsworth was born in Cockermouth, and his house in the main street is preserved by the National Trust, a British conservation body. In addition to acting as the service centre for an extensive farming district, the town benefits from tourist traffic attracted to the Lake District. Pop. (1981 prelim.) 7,149.

cockfighting, the sport of pitting gamecocks to fight and the breeding and training of them for that purpose. The game fowl is probably the nearest to the Indian red jungle fowl (*Gallus gallus),* from which all domestic chickens are believed to be descended.

The sport was popular in ancient times in India, China, Persia, and other Eastern countries and was introduced into Greece in the time of Themistocles (*c.* 524–460 BC). The sport spread throughout Asia Minor and Sicily. For a long time the Romans affected to despise this "Greek diversion" but ended by adopting it so enthusiastically that the agricultural writer Columella (1st century AD) complained that its devotees often spent their whole patrimony in betting at the side of the pit.

From Rome the sport spread northward. Although opposed by the Christian clergy, it nevertheless became popular in the Low Countries, Italy, Germany, Spain and its colonies, and throughout England, Wales, and Scotland. Occasionally, authorities tried to repress it, but cockfighting remained a favourite pastime of the English royalty and gentry from the early 16th century to the 19th century.

Cockfighting pits were circular with a matted stage about 20 feet (6 metres) in diameter and surrounded by a barrier to keep the birds from falling off. The mains (matches) usually consisted of fights between an agreed number of pairs of birds, the majority of victories deciding the main, but there were two other varieties that aroused the particular ire of moralists. These were the battle royal—in which a number of birds were "set" (*i.e.,* placed in the pit at the same time) and allowed to remain until all but one, the victor, were killed or disabled—and the Welsh main—in which eight pairs were matched, the eight victors being again paired, then four, and finally the last surviving pair.

Cockfighting was introduced into the North American colonies at an early date, but it was soon forbidden by some of the older states; Massachusetts passed laws against cruelty in 1836. Cockfighting was prohibited by law in Great Britain in 1849. The sport is expressly prohibited in Canada, and in most states of the U.S. it is specifically forbidden or is repressed by general laws for the prevention of cruelty to animals. Although cockfighting ceased as a public sport in the U.S., Canada, and the British Isles, it continued to exist privately in those countries. In the United States the sport was extremely popular along the Atlantic seaboard and in the South.

Cockfighting is not recognized as a form of sport by the Latin-American countries in general, although it persists in several areas. Paraguay prohibited it by law. In Cuba, however, cockfighting continued to be regulated by the government until curtailed by the Castro regime in 1959. The sport became popular in Haiti, Mexico, and Puerto Rico, an important cockfighting centre.

Those who enjoy cockfighting insist that theirs is an amateur—not a professional—sport and that the greatest zest to be obtained from it lies in the many chances to gamble before and throughout a fight. Odds against one bird or the other fluctuate constantly, and it is not uncommon for a great deal of money to be wagered. Cocks usually are put to the main when between one and two years of age. Before their entrance into the fighting pit, they are given intensive training.

Before a fight, spurs of metal or bone are slipped over the natural spurs of the gamecocks. The modern short spur is $1\frac{1}{2}$ inches (4 centimetres) or less in length; the longer spur scales from 2 to $2\frac{1}{2}$ inches (5 to 6 centimetres). In ancient times, cocks were permitted to fight until one or the other was killed. Later, although some fights still are to an absolute finish, rules have sometimes permitted the withdrawal at any time of a badly damaged cock. Other rules fix a time limit for each fight. On rare occasions when a gamecock refuses to fight longer, his handler puts him breast to breast with the other bird. If he still refuses, it is ruled that he has quit and the fight ends. At all mains, the judge's word is absolute law, even as to gambling. There is no appeal from his decisions.

cockfighting chair, chair with broad armrests that form a yoke with the back rail, to which a reading desk is attached. Broad in front but curving inward toward the back, the seat was shaped so that a reader could easily sit astride, facing the desk at the back of the chair and resting his arms on the ends of the yoke.



Mahogany cockfighting chair with leather upholstery, English, *c.* 1720; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Because such chairs were shown in illustrations of cockfights, it was thought for a time that they were made for this purpose. More correctly called reading chairs, they were first made in England for libraries in the early 18th century.

cockle, also called HEART CLAM, any of the approximately 250 species of marine bivalve mollusks, or clams, of the family Cardiidae. Distributed worldwide, they range from about one centimetre (0.4 inch) in diameter to about 15 centimetres (about 6 inches)—the size of the smooth giant cockle (*Laevicardium elatum*) of California.



Great heart cockle (*Dinocardium robustum*)

Harry Rogers

The two valves of the shell are equal in size and shape, and range in colour from brown to red or yellow. Those of many species are quite smooth; others have ribs radiating from the hinge area between the shells.

Most species live just below the low-tide line; some have been obtained from depths of more than 500 metres (1,500 feet), and a few live in the intertidal zone. All are found in sandy or muddy areas shallowly buried to a depth of not more than three centimetres (about one inch).

The breeding season of most species lasts several months. Eggs and sperm are shed into the sea, where fertilization occurs. The young larvae swim freely for a time before settling on the bottom. Cockles feed on microscopic organisms that they filter from the water.

The average marketable cockle is about 2.5 centimetres (one inch) long and two or three years old. The meat, which is usually sold fresh or preserved in salt or vinegar, is sometimes eaten raw; when canned, the meat is commonly eaten as hors d'oeuvres. Cockles are also eaten by shore birds, bottom-feeding fishes, and starfishes.

Cerastoderma (Cardium) edulis, an important food in Britain and western Europe, is gathered by hand or with rakes or scrapers. Other edible cockles include the large basket cockle (*Clinocardium nuttalli*), which is taken in Puget Sound and Washington state; and the torgai (*Papyridea [Fulvia] mutica*) of Japan.

Common species on the Atlantic coast of North America include the prickly cockle (*Trachycardium egmontianum*), which grows to a width of 6 centimetres; the yellow cockle (*T. muricatum*), 5 centimetres; the Atlantic strawberry cockle (*Americardia media*), 2.5 centimetres; and the great heart cockle (*Dinocardium robustum*), 15 centimetres.

Common species on the Pacific coast of North America include the giant Pacific cockle (*Trachycardium quadragenarium*), which attains a diameter of 15 centimetres; the common Pacific egg cockle (*Laevicardium substriatum*), 2 centimetres; the giant Pacific egg cockle (*L. elatum*), 15 centimetres; and the fucan cockle (*Clinocardium fucanum*), 2.5 centimetres. Members of the genus *Clinocardium* have beaks that point sharply forward; those of *Trachycardium* have spined ribs; and those of *Laevicardium* have valves with smooth margins.

About 10 cockle species occur in the coastal waters of Britain. The spiny, or red-nose, cockle (*Acanthocardium aculeata*) is found on the south Devon coast and attains diameters of up to 10 centimetres. The prickly cockle (*A. echinata*) is smaller and more widely distributed.

Consult the INDEX *first*

cocklebur, also called CLOTBUR, weedy annual plant of the genus *Xanthium* of the family Asteraceae, distributed throughout much of Europe and parts of North America. Some authorities consider that the genus contains about 15 species, others say from 2 to 4.

All species have round, short clusters of male flowers, above the female flowers, which are enclosed in oval green, yellow, or brown burs that have many hooked spines and two large hornlike spines. The ripe burs adhere to the hair of animals, which widely disseminate the plant. Cocklebur (*X. strumarium*) is poisonous



Cocklebur (*Xanthium*)
John H. Gerard

to grazing animals and was formerly used in herbal remedies.

Cockpit Country, an approximately 500-square-mile (1,300-square-kilometre) region in the interior of Jamaica, southeast of Montego Bay. It is part of the great White Limestone plateau and has typical karst topography, with innumerable conical and hemispherical hills covered with dense scrubby trees, rising hundreds of feet above depressions and sinkholes with sharp, precipitous sides—the cockpits. This difficult and inhospitable terrain provided refuge for *cimarrones* (Spanish: "runaway slaves"), called Maroons by the English, who bolted when the English conquered Jamaica in 1665 and waged relentless guerrilla warfare. The descendants of these unsubdued slaves, who intermarried with freed slaves and Arawak Indians in the area, today number about 5,000 and still inhabit the Cockpit Country, where they maintain a large measure of freedom from government interference. Social organization is based on the whole community, not the family, and all land belongs to the community. They pay no taxes, and the central government may interfere only in the rare case of a capital crime.

cockroach, also called ROACH, any insect of the suborder Blattaria (order Dictyoptera) of more than 3,500 species. The word cockroach is a corruption of the Spanish *cucaracha.* Cockroaches are among the most primitive living, winged insects (almost unchanged for more than 320 million years) and are among



Female cockroach (*Periplaneta*)
Colin Butler—Bruce Coleman Ltd.

the oldest fossil insects. The cockroach is characterized by a flattened, oval body; long, threadlike antennae; and a shining, black or brown, leathery integument. The head is bent downward, and the mouthparts point backward instead of forward or downward as is the case in most other insects. The male usually has two pairs of wings; the female, often wingless or with vestigial wings, carries eggs in egg cases (called ootheca) that protrude from her body. After the female deposits an egg case, soft white nymphs emerge, hardening and turning brown in colour upon exposure to air. The structure and large size (certain species have a wingspread of more than 12 cm [4.7 inches]) of cockroaches have made them objects of interest in the biological laboratory.

The cockroach prefers a warm, humid, dark environment and is usually found in tropical or other mild climates. Only a few species have become pests. The insect damages more material than it consumes and emits a disagreeable odour. The diet of the roach, which includes both plant and animal products, ranges from food, paper, clothing, and books to dead insects, especially bedbugs. Insecticides are used in roach control.

The American cockroach (species *Periplaneta americana*) is 30 to 50 mm long (up to about 2 inches), reddish brown, and lives outdoors or in dark, heated indoor areas (*e.g.,* basements and furnace rooms). During adult life, a period of about 1.5 years, the female deposits 50 or more oothecae, each containing about 16 eggs that hatch after 45 days. Nymphal life lasts from 11 to 14 months. The American cockroach, a native of tropical and subtropical America, has well-developed wings and can fly long distances.

The German cockroach (*Blattella germanica*), a common household pest sometimes erroneously called a waterbug, is light-brown with two dark stripes on the prothoracic region. The female produces the ootheca three days after mating and carries it for about 20 days. Because it is small (about 12 mm [less than 0.5 inch] long), this cockroach often is carried into homes in grocery bags and boxes; it has spread throughout the world by ship. Three or more generations may occur yearly. This cockroach, abundant around the water pipes of the Croton Aqueduct in New York City, became known as the Croton bug.

The brown-banded cockroach (*Supella supellectilium*) resembles the German cockroach but is slightly smaller. The male has fully developed wings and is lighter in colour than the female, whose wings are short and nonfunctional. Both sexes have two light-coloured bands across the back. The adult life span is about 200 days, and there may be two generations annually. Eggs may be deposited in clothes, wood molding, or cracks in the floor. With the advent of heated buildings this cockroach became established in cooler climates.

The Oriental cockroach (*Blatta orientalis*) is considered one of the filthiest of household pests. It is oval, shiny black or dark brown, 25 to 30 mm long, with a life cycle similar to that of tne American cockroach. The male has short, fully developed wings, and the female has vestigial wings. This cockroach has been distributed by vehicles of commerce from its Asiatic origins to all the temperate regions.

Wood roaches are not domestic pests. *Parcoblatta pennsylvanica,* the common wood cockroach, is found under logs and stones in northern latitudes. The male and female are so different in appearance that they were once considered separate species. The male, 15 to 25 mm long, has wings that extend past the abdomen; the female is smaller and has much shorter wings. *Cryptocercus punctulatus* digests wood with the aid of certain protozoans in its digestive tract.

cockscomb, common garden plant of the genus *Celosia* (*q.v.*).

Cockscomb Range, mountain chain in central Belize (formerly British Honduras), a spur of the Maya Mountains, extending east–west for about 10 miles (16 km). The highest elevation is Victoria Peak (3,681 feet [1,122 m]), near Dangriga (formerly Stann Creek). The mountains have stands of timber that, despite depletion, still constitute an economic asset.

cocksfoot grass: *see* orchard grass.

Cockspur Island, also called LONG ISLAND, island, Chatham county, southeastern Georgia, U.S., in the mouth of the Savannah River. Known during colonial times as Peeper Island, it was given the name Cockspur for the shape of its reef. Its strategic advantages were early recognized; the island held Fort George (dismantled), used mainly for defense against privateers, and, later, Fort Greene (destroyed by hurricane), which was used for quarantine and for customs and inspection of slave-trading ships. When the War of 1812 once again made clear the need for coastal defense, Fort Pulaski was built (1829–47). Upon its completion, the fort remained unoccupied until it was seized by Confederate troops in 1861. It was captured by Union troops in 1862. Fort Pulaski National Monument was established in 1924.

Coco, Vincenzo: *see* Cuoco, Vincenzo.

coco de mer, also called DOUBLE COCONUT (species *Lodoicea maldivica*), native palm of the Seychelles Islands in the Indian Ocean. The flowers are borne in enormous fleshy spadices (spikes), the male and female on distinct plants. Coco de mer fruits, among the largest known, take about 10 years to ripen; they have a fleshy and fibrous envelope surrounding a hard, nutlike portion that is generally two-lobed, suggesting a double coconut. The contents of the nut are edible but are not commercially valuable. Water vessels and platters are made from the shells. The empty fruits (after germination of the seed) are found floating in the Indian Ocean and were known long before the palm was discovered.

coco plum, also called ICACO (species *Chrysobalanus icaco*), evergreen tree, in the family Chrysobalanaceae, native to tropical



Coco plum (*Chrysobalanus icaco*)
Walter Dawn

America and Africa. The tree, up to 9 m (30 feet) tall, has roundish shiny green leaves and clusters of white flowers. The fruit, up to 4 cm (1.5 inches) long, is a pulpy drupe, sweet but rather tasteless, sometimes used in preserves. Coco plum is planted occasionally in the subtropical United States as an ornamental.

Coco River, Spanish RÍO COCO, river in southern Honduras and northern Nicaragua, rising west of the town of San Marcos de Colón, in southern Honduras, near the Honduras-Nicaragua border. The Coco flows generally eastward into Nicaragua, then turns northward near Mount Kilambé. For much of its middle and lower course the river flows generally northeastward, forming a delta and emptying into the Caribbean Sea at Cape Gracias a Dios through three main channels. After much litigation, in 1961 its middle and

lower course was declared the international boundary between Honduras and Nicaragua. Although its total length is 485 miles (780 km), only the lower 140 miles (225 km) are navigable. Formerly known as the Segovia and the Wanks, it is not of great economic significance, although there is some placer gold mining along its course, and it is used for floating timber cut from the densely forested Caribbean lowlands.

cocoa, highly concentrated powder made from chocolate liquor—a paste prepared from cocoa beans, the fruit of the cacao (*q.v.*)—and used in beverages and as a flavouring ingredient.

Cocoa Beach, city, Brevard county, east-central Florida, U.S., on a beach ridge between the Banana River (lagoon) and the Atlantic Ocean, just south of Cape Canaveral, and near Patrick Air Force Base. Originally a small resort linked to Cocoa on the mainland across Merritt Island by a bridge (1923) and later by a causeway, Cocoa Beach developed rapidly after 1950 with the emergence of the programs centred on Cape Canaveral and the John F. Kennedy Space Center. A city charter was adopted in 1957. Because of its beach and favourable climate and proximity to the cape, an active tourist trade has developed. Pop. (1990) 12,123.

cocoa butter, also called THEOBROMA OIL, pale-yellow, edible vegetable fat obtained from cocoa beans, having a mild chocolate flavour and aroma, and used in the manufacture of chocolate confections, pharmaceutical ointments, and toiletries. It is valued for its melting characteristics, remaining brittle at room temperature or lower but melting just below body temperature. One of the most stable fats known, cocoa butter contains antioxidants that discourage rancidity and allow storage life of two to five years. Its use with other fats improves their stability. Treatment of cocoa butter to remove aroma and colour also removes antioxidants, increasing susceptibility to rancidity.

Cocoa butter is an important component of eating chocolate. Although the chocolate liquor used in manufacturing eating chocolate already contains cocoa butter, an additional amount is required to produce a molded product that remains firm until dissolved in the mouth. The amount of fat obtained from hydraulic pressing of chocolate liquor in cocoa manufacture has become insufficient for the demands of chocolate production, and whole cocoa beans or nibs may be processed mainly for their cocoa butter content. Because of the high cost of cocoa butter, substitutes have been developed, including a type suitable for warm weather because of its higher melting point; such fats, which many countries prohibit in products sold as pure chocolate, impart waxy texture and taste similar to that of cocoa butter. *See also* chocolate.

Cocoa-Rockledge, twin cities, Brevard county, central Florida, U.S., on the Atlantic coast. They are linked to Merritt Island, Cape Canaveral, and the city of Cocoa Beach by causeway across the Indian River (part of the Atlantic Intracoastal Waterway).

Rockledge, established about 1875 and incorporated as a city in 1925, was named for the formation of coquina rock that appears as ledges along the shore. Cocoa, named for the local coco plum, was incorporated as a town in 1895 and as a city in 1911. Early development was based on fishing, livestock raising, and citrus cultivation, but the two communities, which are mainly residential, now largely depend on tourism, a large fruit market, and the aerospace industries of the John F. Kennedy Space Center. Brevard Community College, at Cocoa, was founded in 1959. Pop. (1990) Cocoa city, 17,722; Rockledge city, 16,023.

Coconuco, Indian people of what is now the southern Colombian highlands at the time of the Spanish conquest, related to the modern Páez Indians. The Coconuco language is now extinct; the culture and tribal structure have also disappeared, although some Coconuco place-names and family names remain. The language was most closely related to Moguex and belonged to the Chibchan family. Little is known of the Coconuco culture, but it is considered to have been similar to that of the Páez (*q.v.*).

coconut crab: *see* robber crab.

coconut palm (species *Cocos nucifera*), tree of the palm family (Arecaceae). It is one of the most important crops of the tropics. The slender, leaning, ringed trunk of the tree rises



Coconut palm (*Cocos nucifera*)
Russ Kinne—Photo Researchers/EB Inc

to a height of up to 25 m (80 feet) from a swollen base and is surmounted by a graceful crown of giant, featherlike leaves. Mature fruits, ovoid or ellipsoid in shape, 300–450 mm (12–18 inches) in length, and 150–200 mm in diameter, have a thick, fibrous husk surrounding the familiar single-seeded nut of commerce. A hard shell encloses the insignificant embryo with its abundant endosperm, composed of both meat and liquid.

Coconut fruits float readily and have been dispersed widely by ocean currents and by humans throughout the tropics; they probably originated somewhere in Indo-Malaya. Marco Polo was among the first Europeans to describe coconuts.

Coconut palms flourish best close to the sea on low-lying areas a few feet above high water where there is circulating groundwater and an ample rainfall. Most of the world's coconuts are produced on small native plantations. Propagation is by unhusked ripe nuts. These are laid on their sides close together in nursery beds and almost covered with soil. After 4 to 10 months the seedlings are transplanted to the field, where they are spaced at distances of 8–10 m. Palms usually start bearing after 5 to 6 years. Full bearing is obtained in 15 years. Fruits require a year to ripen; the annual yield per tree may reach 100, but 50 is considered good. Yields continue profitably until trees are about 50 years old.

The harvested coconut yields copra (*q.v.*), the dried extracted kernel, or meat, from which coconut oil, the world's ranking vegetable oil, is expressed. The Philippines and Indonesia lead in copra production, and throughout the South Pacific copra is one of the most important export products.

Although the coconut finds its greatest commercial utilization in the industrial countries of the Western world, its usefulness in its native areas of culture is even greater. Indonesians claim that coconuts have as many uses as there are days in a year. Besides the edible kernels and the drink obtained from green nuts, the husk yields coir (*q.v.*), a fibre highly resistant to salt water and used in the manufacture of ropes, mats, baskets, brushes, and brooms.

Other useful products derived from the coconut palm include toddy, palm cabbage, and construction materials. Toddy, a beverage drunk fresh, fermented, or distilled, is produced from the sweetish sap yielded by the young flower stalks when wounded or cut; toddy is also a source of sugar and alcohol. Palm cabbage, the delicate young bud cut from the top of the tree, is, like the buds from other palms, eaten as a salad vegetable. Mature palm leaves are used in thatching and weaving baskets. The fibrous, decay-resistant tree trunk is incorporated into the construction of huts; it is also exported as a cabinet wood called porcupine wood.

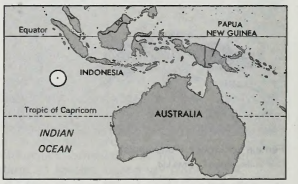
cocoon, a case produced in the larval stage of certain animals (*e.g.*, butterflies, moths, leeches, earthworms, Turbellaria) for the resting pupal stage (*see* pupa) in the life cycle. Certain spiders spin a fibrous mass, or cocoon, to cover their eggs.

Cocos Island, Spanish ISLA DEL COCO, island lying in the Pacific Ocean, about 300 miles (480 km) south of the Osa Peninsula, Costa Rica. It rises to an elevation of about 2,800 feet (850 m) above sea level, is about 5 miles (8 km) long and 3 miles (5 km) wide, and has a total area of 9 square miles (24 square km). Geologically, it is part of the Cocos Ridge and is related to the Galápagos Islands to the south.

The rugged, uninhabited island has two natural harbours, Wafer Bay and Chatham Bay, both located on the north coast. It gained notoriety during the colonial era as a haven for pirates and as an alleged site of their buried treasures, which have never been found despite the attempts of 500 expeditions. It is of strategic importance because of its proximity to the Panama Canal.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Cocos Islands, also called KEELING ISLANDS, external territory of Australia in the eastern Indian Ocean, 2,290 miles (3,685 km) west of Darwin, Australia, and about 800 miles (1,300 km) south-southwest of Singapore. The isolated territory, with a total land area of 5.6 square miles (14.4 square km), consists of two coral atolls, of which the southern has 26 islets and the northern only North Keeling Is-



Cocos Islands

land. The territory's administrative headquarters are on West Island in the southern atoll. The population in 1990 was estimated at 700.

The land. North Keeling Island is located about 15 miles (24 km) north of the main lagoon, which is surrounded by the numerous

exposures of the South Keeling Islands. The principal islands of the South Keelings include West Island (the largest in the territory, with a length of 6 miles [10 km]), South, Home, Direction, and Horsburgh. The highest point in the territory rises only about 20 feet (6 m) above sea level. Temperatures range from 72° to 90° F (22° to 32° C), and annual rainfall averages 91 inches (2,300 mm). There may be destructive cyclones early in the year, and earthquakes occur periodically. The vegetation is chiefly coconut palms; on North Keeling and Horsburgh islands, coarse grass serves as a ground cover. There are no indigenous mammals, but seabirds abound.

The people. The inhabitants are predominantly the descendants of the original workers and their dependents, mostly of Malay origin, who were brought to the islands by John Clunies-Ross, a Scotsman, in 1827–31. The Cocos Islanders, or Cocos Malays, as they are often called, live on Home Island together with the descendants of the Clunies-Ross family, and most are now Australian citizens. Most speak a dialect of Malay and are Muslim by tradition. Numerous Cocos Islanders, because of overcrowded conditions on the islands, settled in Australia in the mid-1950s, mainly in Western Australia.

The remainder of the population of the Cocos are mainland-recruited employees of the territory administration, together with their families, living on West Island. The majority of the population is engaged in maintaining the coconut plantations on Home and other islands in the group.

The economy. The production and export of copra is the territory's economic mainstay. The Cocos Islands Co-operative Society, established in 1979, supervises copra production, undertakes building maintenance and construction, and provides stevedoring and lighterage services. Although fishing is good and the islanders have gardens, much of the food must be imported, as must fuels and consumer goods.

An airstrip, built on West Island in 1945, was used until 1967 as a stopping place on flights between Perth, Australia, and Johannesburg, S.Af. An air charter service now connects the islands with Perth and with Christmas Island. Meteorological reports from the Cocos are important in forecasting weather for a large area of the Indian Ocean.

Administrative and social conditions. The islands became an Australian territory in 1955 and a part of Australia in 1984. An administrator, appointed by the Australian governor-general, is the senior governmental official in the Cocos. In 1979 the residents of Home Island established the Cocos Islands Council, an elected local government body that advises the administrator of the views of the Home islanders on local affairs. The territory has its own postal service. Education and medical and dental services are provided by the Australian government.

History. The islands, previously uninhabited, were discovered in 1609 by William Keeling (a mariner of the English East India Company) and were first settled (1826) by an English adventurer named Alexander Hare, who brought his Malay harem and slaves. In 1827 John Clunies-Ross settled with his family, improved the natural coconut groves, and brought in additional numbers of Malays to assist in harvesting the coconuts for copra. The British naturalist Charles Darwin made coral-reef observations there in 1836.

Declared a British possession in 1857, the Cocos were placed under the governor of Ceylon in 1878. The islands were attached to the Straits Settlements in 1886 and were granted in perpetuity to the Clunies-Ross family. In 1903 the Cocos were attached to the British crown colony of Singapore. During World War I the German cruiser *Emden* was destroyed (1914) by the Australian cruiser *Sydney* on the shore of North Keeling. The islands passed from British Singapore to Australia in 1955. In September 1978 the owner, John Cluniess-Ross, sold his plantations and relinquished his authority over the islands to Australia, which introduced Australian currency and took steps toward establishing Cocos Malay self-government. In April 1984 the residents voted to merge with Australia.

Cocteau, Jean (b. July 5, 1889, Maisons-Laffitte, near Paris, Fr.—d. Oct. 11, 1963, Milly-la-Forêt, near Paris), French poet, librettist, novelist, actor, film director, and painter. Some of his most important works include the poem *L'Ange Heurtebise* (1925; "The



Cocteau, 1939
Gisele Freund

Angel Heurtebise"); the play *Orphée* (1926; "Orpheus"); the novels *Les Enfants terribles* (1929; "The Incorrigible Children"; Eng. trans. *Children of the Game*) and *La Machine infernale* (1934; *The Infernal Machine*); and his surrealistic motion pictures *Le Sang d'un poète* (1930; *The Blood of a Poet*) and *La Belle et la bête* (1946; *Beauty and the Beast*).

Heritage and youth. Cocteau grew up in Paris and always considered himself Parisian by speech, education, ideas, and habits. His family was of the solid Parisian bourgeoisie—cultivated, wealthy, and interested in music, painting, and literature.

Cocteau's earliest memories had to do with the theatre, in popular forms, such as the circus and the ice palace, as well as serious theatre, such as the tragedies performed at the Comédie-Française. At 19 he published his first volume of poems, *La Lampe d'Aladin.* ("Aladdin's Lamp").

Cocteau was the product of the years immediately preceding World War I, years of refined artistic taste that were devoid of political turmoil. His real exploration of the world of the theatre began when he encountered the Ballets Russes, then under the direction of Sergey Diaghilev. When Cocteau expressed a desire to create ballets, Diaghilev challenged him to "Étonne-moi" ("Surprise me"). This famous remark seems to have guided the poet not only in his ballets, such as *Parade* (1917), with music by Erik Satie, and *Le Boeuf sur le toit* (1920; "The Ox on the Roof"), with music by Darius Milhaud, but also in his other works; and it is sometimes quoted in his plays and films.

During World War I, Cocteau served as an ambulance driver on the Belgian front. The landscape he observed there was later used in his novel *Thomas l'imposteur* (1923; "Thomas the Imposter"). He became a friend of the aviator Roland Garros and dedicated to him the early poems inspired by aviation, *Le Cap de Bonne-Espérance* (1919; "The Cape of Good Hope"). At intervals during the years 1916 and 1917, Cocteau entered the world of modern art, then being born in Paris; in the bohemian Montparnasse section of the city, he met painters such as Pablo Picasso and Amadeo Modigliani and writers such as Max Jacob and Guillaume Apollinaire.

Influence of Radiguet. Soon after the war, Max Jacob introduced Cocteau to the future poet and novelist Raymond Radiguet. The 16-year-old Radiguet, who appeared to be a prodigy, advocated an aesthetic of simplicity and of classical clarity, qualities that would become characteristic of Cocteau's own work. The example of Radiguet counted tremendously for Cocteau; and when Radiguet died in 1923, at the age of 21, the older man felt bereft of a friendship that had been based upon a constant interchange of ideas, encouragement, and enthusiasms.

An addiction to opium, brought on by Cocteau's grief over his lover's death, necessitated a period of cure. Jacques Maritain, a French Thomist philosopher, paid his first visit to Cocteau in the sanatorium. Through Maritain, Cocteau returned briefly to religious practice. These complex experiences initiated a new period in his life, during which he produced some of his most important works. In the long poem *L'Ange Heurtebise* the poet engages in a violent combat with an angel that was to reappear continually in his works. His play *Orphée,* first performed in 1926, was destined to play a part in the resurrection of tragedy in contemporary theatre; in it, Cocteau deepened his interpretation of the nature of the poet. The novel *Les Enfants terribles,* written in the space of three weeks in March 1929, is the study of the inviolability of the character of two adolescents, a brother and sister Paul and Elisabeth. In 1950 Cocteau prepared the screenplay for a film of this work, and he spoke the commentary.

Cocteau had enlarged the scope of his work by the creation of his first film, *Le Sang d'un poète,* a commentary on his own private mythology; the themes that then seemed obscure or shocking today seem less private and more universal because they have appeared in other works. Also in the early 1930s, Cocteau wrote what is usually thought to be his greatest play, *La Machine infernale,* a treatment of the Oedipus theme that is very much his own. In these two works he moved into closer contact with the great myths of humanity.

Filmmaking in the 1940s. In the 1940s, Cocteau returned to filmmaking, first as a screenwriter and then also as a director in *La Belle et la bête,* a fantasy based on the children's tale, and *Orphée* (1950), a re-creation of the themes of poetry and death that he had dealt with in his play.

Also a visual artist of significance, Cocteau in 1950 decorated the Villa Santo Sospir in Saint-Jean-Cap-Ferrat and began a series of important graphic works: frescoes on the City Hall in Menton, the Chapel of Saint-Pierre in Villefranche-sur-Mer, and the Church of Saint-Blaise-des-Simples in Milly-la-Forêt. His adopted son, the painter Édouard Dermit, who also appears in his later films, continued the decoration of a chapel at Fréjus, a work Cocteau had not completed at his death at the age of 74. (W.F.)

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cod (species *Gadus morhua*), large and economically important marine fish of the family Gadidae, found on both sides of the North Atlantic. The cod, a cold-water fish, generally remains near the bottom, ranging from inshore regions to deep waters. It is valued for its edible flesh, the oil of its liver, and other products. A dark-spotted fish, with three dorsal fins, two anal fins, and a chin barbel, it varies in colour from greenish or grayish to brown or blackish, though it may also be dull to bright red. It is usually caught at weights of up to about 11.5 kg (25 pounds) but can reach a maximum length and weight of more than 1.8 m (6 feet) and 91 kg (201 pounds). It is a voracious migratory fish, feeding largely on other fishes and various invertebrates.

A North Pacific species of cod, *G. macrocephalus,* is very similar in appearance to the



Atlantic cod (*Gadus morhua*)
Painted especially for *Encyclopaedia Britannica* by Tom Dolan, under the supervision of Loren P. Woods, Chicago Natural History Museum

Atlantic form. In Japan this fish, which is found in both the eastern and western Pacific, is called tara; it is fished both for food and for liver oil. Smaller than the Atlantic cod, it grows to a maximum of about 75 cm (30 inches) long and is mottled brownish with a white lateral line.

Cod, Cape, hooked peninsula in Barnstable county, southeastern Massachusetts, U.S. Sandy and of glacial origin, it extends 65 miles (105 km) into the Atlantic Ocean, has a breadth of 1–20 miles (1.6–32 km), and is bounded by Cape Cod Bay (north and west), Buzzards Bay (west), and Vineyard and Nantucket sounds (south). The Cape Cod Canal, 17.5 miles (28 km) long, cuts across the base of the peninsula, separating it from the mainland; it shortens the shipping distance between New York City and Boston by more than 75 miles (120 km) and forms part of the Atlantic Intracoastal Waterway.

Cape Cod was named by Bartholomew Gosnold, an English explorer who visited its shores in 1602 and took aboard a "great store of codfish." In 1620 the Pilgrims landed at the site of Provincetown, on the hooked tip of Cape Cod, before proceeding to Plymouth.

Because the cape extends into the warm Gulf Stream, its climate is moderate compared with that of the mainland; it has warmer winters and cooler summers. During the summer, coastal towns and villages such as Barnstable, Bourne, Chatham, Dennis, Eastham, Falmouth, Harwich, Hyannis, Provincetown, Sandwich, Truro, Wellfleet, and Woods Hole (*qq.v.*) become densely populated resorts and busy fishing ports.

The economy of Cape Cod is boosted by Otis Air Force Base (in Bourne and Sandwich). Limited farming produces cranberries and asparagus. The northern hook of the cape (embracing a recreation area of dunes, marshes, lakes, and pinewoods) was designated the Cape Cod National Seashore (area 68 square miles [176 square km]) in 1961.

cod-liver oil, pale yellow oil obtained from the liver of the cod and related fish, particularly the Atlantic cod, *Gadus morhua,* and other species of the family Gadidae. Cod-liver oil is a source of vitamins A and D. It is used in medicine to correct abnormal calcium and phosphorous metabolism resulting from a lack of vitamin D as in rickets, infantile tetany, and osteomalacia. It is also used in feeds for poultry and other animals.

In the 19th century cod-liver oil was a folk remedy for several wasting diseases. By 1922 its medicinal value was established and related to the presence of vitamins A and D. Vitamin potency varies with the age and species of fish; the older and the less fatty the liver, the more potent are the vitamins.

The chief countries producing cod-liver oil are Norway, Japan, Iceland, and Poland. Fresh cod livers are digested by steam, water, acid, or alkali to produce the oil. Medicinal grades are chilled, and congealed stearic acid and other fatty acids are filtered off.

Chemically, cod-liver oil is a typical marine-animal oil. It is high in polyunsaturated fatty acids, a valuable aspect in nutrition but one that makes it subject to oxidation, rancidification, and destruction of vitamin A when it is exposed to air. Cod-liver oil is a mixture of glycerides of many fatty acids, predominantly oleic acid, gadoleic acid, and palmitoleic acid. *See also* fish oil.

coda (Italian: "tail"), in musical composition, a concluding passage based, as a general rule, on extensions or reelaborations of a work's or a particular movement's motivic substances; it may also introduce new materials. The origins of the coda go back at least as far as the later European Middle Ages, when special ornamental *caudae* served to enhance the ends of otherwise relatively simple polyphonic pieces of music.

Subsequent instrumental composer-performers tended to embellish final cadences, and soon this practice became conventionalized in the compositional process itself. By the time that W.A. Mozart composed his last symphony (*Jupiter,* 1788), and in the sonatas, symphonies, and similar works of Ludwig van Beethoven, the coda embodied a second, curtailed development of a movement's principal themes. This marked shift of emphasis to the end of a movement was paralleled by the growing importance attached to the last movement of multimovement instrumental works from Beethoven through Gustav Mahler.

Consult the INDEX *first*

Coddington, William (b. 1601, Boston, Lincolnshire, Eng.—d. Nov. 1, 1678, Rhode Island [U.S.]), colonial governor and religious dissident who founded Newport, Rhode Island, in 1639.

Coddington, an assistant in the Massachusetts Bay Company, migrated to the New England colony in 1630. He settled in Boston, where he became the company treasurer from 1634 to 1636 and, in the latter year, was a deputy in the colony legislature. In 1637 he supported the controversial antinomian religious tenets of Anne Hutchinson, and as a result he and his followers were obliged to leave Massachusetts for the island of Aquidneck (Rhode Island) in Narragansett Bay.

Coddington established a government based on Old Testament precepts in a settlement that he led at Pocasset (Portsmouth) on the northern part of Aquidneck. Anne Hutchinson had also settled in Portsmouth after she was banished from Massachusetts, but Coddington became embroiled in a dispute with her and moved his settlement to Newport in 1639. Although Portsmouth and Newport were united the next year, with Coddington elected governor, his hopes to maintain the island of Aquidneck as a separate colony were thwarted in 1644, when the English colonist Roger Williams obtained a patent uniting his Providence plantations with Aquidneck.

In 1651 Coddington obtained a patent from Parliament establishing Aquidneck as a separate colony, but opposition from his own followers as well as from Roger Williams caused Parliament to annul the grant the next year. Coddington thereupon left for Boston, where in 1656 he acknowledged the unity of Rhode Island. A decade later he espoused Quakerism, and as a Quaker he served as Rhode Island's governor in 1674, 1675, and 1678.

code, in communications, an unvarying rule for replacing a piece of information such as a letter, word, or phrase with an arbitrarily selected equivalent. The term has been frequently misapplied and used as a synonym for cipher. In the past this blurring of the distinction between code and cipher was rather inconsequential; in fact, many historical ciphers would be more properly classified as codes according to present-day criteria.

In modern communications systems, information is often both encoded and encrypted (or enciphered), and so an understanding of the difference between the two is important. Both codes and certain kinds of ciphers—substitution ciphers—replace elements of a message with other symbols; however, unlike codes, ciphers do so in accordance with a rule defined by a secret key known only to the transmitter of the information and the intended receiver. Without this secret key, a third party cannot invert the replacement to unscramble the cipher.

During the early years of the 20th century, elaborate commercial codes were developed. One such system was the Baudot code, which encoded complete phrases into single words (five-letter groups) for use by telegraphers. This type of code proved inadequate for radio, however, and other, more advanced forms of communications subsequently developed. In recent years various codes have been introduced to accommodate computer data and satellite communications. *See also* cryptology; cipher.

code, law: *see* law code.

Code Civil Suisse: *see* Swiss Civil Code.

Code Napoléon (legal code): *see* Napoleonic Code.

Code of ——— : *see under* substantive word (*e.g.,* Hammurabi, Code of).

codeine, also called METHYLMORPHINE, a naturally occurring alkaloid of opium. It is used in medicine as a cough suppressant and narcotic analgesic drug. Its action is weaker than that of morphine. Codeine is given orally as an ingredient in syrups to relieve coughing; it has antispasmodic and sedative effects. It is also combined with nonnarcotic analgesics and is used orally to relieve pain. In addition, it is given by hypodermic syringe for analgesia and sedation.

Codeine may be extracted directly from opium, the dried milky exudate of the unripe seed capsule of the opium poppy (*Papaver somniferum*), but most of the codeine used in the drug industry is produced from morphine, an opium derivative.

Codeine was first isolated from opium by the French chemist Pierre-Jean Robiquet in 1832. The sulfate and phosphate salts are used most frequently in medicine.

Chemically, codeine is an alkaloid of the phenanthrene group, all members of which have similarities in structure and therapeutic action. Because of its narcotic effects, the dis-

tribution of the drug is controlled by various governmental agencies.

codex, earliest type of manuscript in modern book form (*i.e.*, the collection of written pages stitched together), which replaced the earlier rolls of papyrus and wax tablets. The codex had several advantages over the roll, or scroll. A compact pile of pages could be opened at once to any point in the text, eliminating cumbersome unrolling and rerolling. The codex also made it possible to write on both sides of the leaf. Because of its compactness, the codex could contain long texts. The difference can be illustrated with copies of the Bible. While the Gospel According to Matthew nearly reached the practical limit of a roll, a common codex included the four Gospels and the Book of Acts bound together, and complete Bibles were not uncommon.

Though the folded note tablets used by the Greeks and Romans may have suggested the codex form, its development to eventual supremacy was related to cultural and technological changes—*i.e.*, the rise of Christianity, with its demand for more and larger books, and the availability of first parchment and then paper. The oldest extant Greek codex, said to date from the 4th century, is the Codex Sinaiticus, a biblical manuscript written in Greek. Also important is the Codex Alexandrinus, a Greek text of the Bible that probably was produced in the 5th century and is now preserved in the British Library, London. The term codex aureus describes a volume with gold letters written on sheets that have been stained with a purple dye called murex. Existing examples of the codex aureus date from the 8th and 9th centuries.

In a completely separate development, codices also were made by the Aztecs of Mexico after about AD 1000. These books contained pictographs and ideograms rather than written script. They were used to make astrological predictions, to record royal history, and to serve administrative purposes, such as the collection of tribute. Among the Aztec codices are the Vienna Codex, the Codex Colombino, and the Codex Fejérváry-Mayer, all believed to have been produced before 1350. Certain collections of formulas or standards are also referred to as codices; for example, the Codex Alimentarius and the *British Pharmaceutical Codex.*

Codex Alimentarius Commission, joint commission of the United Nations Food and Agriculture Organization (FAO) and World Health Organization (WHO) established in 1963 to develop an international code of food quality standards. In its first 20 years of activity, the commission compiled hundreds of definitions of foodstuffs and additives, restrictions on food composition including limits on residual pesticides, and requirements for labeling; many of these provisions were adopted as legally binding by the more than 120 member nations. In the late 1970s committees were established under the auspices of the commission to coordinate food quality monitoring and control thoughout the less-developed nations.

Codex Dresdensis (ancient Maya writing): *see* Dresden Codex.

Codex Juris Canonici, English CODE OF CANON LAW, official compilation of ecclesiastical law promulgated in 1917 and again, in revised form, in 1983, for Roman Catholics of the Latin rite. The code obliges Roman Catholics of Eastern rites only when it specifically refers to them or clearly applies to all Roman Catholics.

For centuries following the Council of Trent (1545–63), the need for a codification of the disciplinary law of the church had been recognized; not until 1904 was a plan put forth. On March 19 of that year, Pope Pius X announced his plan of procedure and appointed a commission of cardinals under the presidency of Pietro (later Cardinal) Gasparri to supervise the work. All Roman Catholic bishops, superiors of religious orders, and faculties of Roman Catholic universities were invited to collaborate. Pope Benedict XV promulgated the first code on Pentecost Sunday, May 27, 1917.

It consisted of 2,414 canons, or norms, organized under topical headings in five books. Some 26,000 citations of prior church legislation were listed, including approximately 8,400 from the *Decretum Gratiani* ("Decree of Gratian"), a 12th-century collection; 1,200 from general councils of the church; 4,000 from papal legislation; 11,200 from the norms of Roman congregations (the administrative bodies of the Roman Curia); and 800 from liturgical books. Between 1923 and 1939 Cardinal Gasparri and Jusztinian Serédi, a Hungarian canonist and the archbishop of Esztergom, published nine volumes of the sources of the code under the title *Fontes Juris Canonici* ("Sources of the Code of Canon Law").

After the promulgation of the first code, a great mass of ecclesiastical legislation, published periodically in the *Acta Apostolicae Sedis* ("Acts of the Apostolic See"), began to accumulate, and the need for revision became clear. On Jan. 25, 1959, Pope John XXIII established a papal commission of cardinals and experts to undertake a new revision of the code. On Jan. 25, 1983, Pope John Paul II signed the second Codex Juris Canonici, to take effect on Nov. 27, 1983.

The second code, written in Latin, consists of 1,752 canons organized into 7 books. Books I and II define the positions and responsibilities of both the laity and the clergy; Book III deals with the promulgation of the church, including the subjects of teaching, preaching, and the church's relations with the media; Book IV contains guidelines for the administration of the sacraments, with the greatest emphasis on the sacrament of marriage; Book V concerns the church's handling of money, property, and other temporal goods; Book VI deals with sanctions, reducing the number of excommunicable actions from 37 to 7; and Book VII provides a structure for the establishment of church courts and the settlement of internal disputes.

A chief element of the second code is the definition of the church as "the people of God" rather than as an institution.

Codex Justinianeus (Roman law): *see* Justinian, Code of.

Codex Vercellensis: *see* Vercelli Book.

Codium, genus of marine green algae usually found in deep pools along rocky coasts. Essentially filamentous, the branches are often woven together to form a velvety pseudothallus. Its length can exceed 30 cm (11.8 inches). In sexual reproduction the male gametes are small, contain one or two chloroplasts, and have two flagella. The female gametes are larger and have many chloroplasts. *Codium* is the favourite food of some sea slugs.

Codommanus: *see* Darius III.

Codona FAMILY, a circus trapeze family that became famous in the Ringling Brothers Circus.

In the 1890s the Codona family owned and operated a small circus in southern Mexico. Alfredo Codona (1893–1937), who would become the most noted member of the family, began appearing in the circus at 7½ months when his father, Edward, a flyer, balanced him on his hand for the opening act. In 1917, after four years with the Wirth Brothers Circus in Australia, the Codonas joined the Siegrist-Silbon Troupe of flyers, performing in the Ringling Brothers Circus. After Edward retired, the Three Codonas act began with Alfredo and his sister, Victoria, as flyers and their brother, Lalo, as the catcher. After Victoria quit, she was replaced by Vera Bruce.

Because of his exceptional grace and daring, Alfredo soon became a Ringling star. He was the first performer to master the triple aerial



Alfredo Codona
By courtesy of the Circus World Museum, Baraboo, Wis.

somersault and the first to discover that the slope of the ground altered the arc of trapeze swings and thus affected the timing of the act. In 1928 Alfredo married Lillian Leitzel (1893–1931), an aerialist whose act involved performing as many as 249, but usually 150, swing overs while suspended by a rope looped around her right wrist. Leitzel fell when part of her rigging broke, and she died of injuries two days later. After a time, Alfredo returned to flying and married Vera Bruce; however, he had become reckless and tore his shoulder ligaments in a fall that ended his career. In 1937, when Vera Bruce sued for divorce, Alfredo shot and killed her and himself. His brother, Lalo, had continued the act with flyers Clayton Behee and Rose Sullivan until torn muscles forced his retirement.

codpiece, pouchlike addition to men's long hose, located at the crotch, worn first in the 15th century. It came into fashion with hose



Man wearing a codpiece, "Antonio Navagero," oil portrait by Giovanni Battista Moroni, 1565; in the Brera, Milan
By courtesy of Pinacoteca di Brera, Milan; photograph, Angelo Coi

that were like tights and continued to be worn with breeches, or trousers. An earlier, narrower form of codpiece, worn with a belt or loincloth instead of hose or tights, was the basic fashion for men in the Aegean area during the Bronze Age.

In the 16th century the codpiece was padded, prominent, and decorated, even with jewels; but by 1580 it was mocked and thought indecent. After the pouch had disappeared, the name continued to be used into the 18th century for the front fastening of breeches.

Codreanu, Corneliu (Zelea) (b. Sept. 13, 1899, Iaşi, Rom.—d. Nov. 30, 1938, near Bucharest), Romanian political agitator, founder and leader of the country's principal national fascist movement, the Iron Guard.

Early exposed to anti-Semitism, Codreanu participated widely in anticommunist and anti-Semitic activities during his university years at Iaşi (1919–22). In 1922 he helped found the Association of Christian Students, which, from 1923 to 1927, he affiliated with the League of National Christian Defense (LANC), headed by the anti-Semitic university professor A.C. Cuza. Codreanu was arrested and imprisoned in 1923 for threatening to kill "traitors"; arrested again on a murder charge in 1925, he was acquitted. In 1927 he broke with LANC to form his Legion of the Archangel Michael, which later called itself the Legion or Legionary Movement. He also established a militant subdivision within this group called the Iron Guard (1930), the name which outsiders would eventually apply to the movement at large. Codreanu built in this movement against communism and Jewry a mystical religious fervour. Despite official persecution and its own terror tactics, the Guard—now renamed the All for the Fatherland Party—had by 1937 become the third largest party in the state; but its electoral successes moved the dictatorial king Carol II to dissolve it (January 1938) and imprison Codreanu (April 1938). On Nov. 30, 1938, while in transit between prisons, he and 13 of his associates were first garroted and then shot, supposedly while trying to escape.

Codrington, R(obert) H(enry) (b. Sept. 15, 1830, Wroughton, Wiltshire, Eng.—d. Sept. 11, 1922, Chichester, Sussex), Anglican priest and anthropologist who made the first systematic study of Melanesian society and culture and whose reports of his observations remain ethnographic classics.

Codrington became a fellow of Wadham College, Oxford (1855), and took holy orders in 1857. He emigrated to Nelson, N.Z., in 1860 and joined the Melanesian Mission, which he headed from 1871 to 1877. He traveled throughout Melanesia, making his principal observations in the New Hebrides, the Solomons, and the smaller islands lying between them. He gathered a great body of data on all major aspects of Melanesian life and society, including kinship, marriage, property, secret societies, folklore, ritual, and especially religion.

Returning to England, Codrington served as vicar of Wadhurst, Sussex (1888–93), and examining chaplain to the bishop of Chichester (1894–1901). During those years he devoted himself to the scholarly preparation of his writings and to enjoying the companionship of such figures as Lewis Carroll, William Ewart Gladstone, and Cardinal John Henry Newman.

In his writings Codrington attempted to give a representative picture of island life before contact with European culture. *Melanesian Languages* (1885), which dealt with the phonology, grammar, and vocabulary of the languages of the New Hebrides and the Solomon, Torres Straits, Loyalty, and other islands, is still considered relevant for the study of the Austronesian (Malayo-Polynesian) languages. Codrington's other linguistic work, *A Dictionary of the Language of Mota, Sugarloaf Islands, Banks' Islands* (1896), was written jointly with J. Palmer. His ethnographic work, *The Melanesians: Studies in Their Anthropology and Folklore* (1891), deals at length with the concepts of mana, magic, and related phenomena; and with social structure and secret clubs and societies.

Codrus, traditionally the last king of Athens, but there is some doubt as to whether he was a historical personage. According to the legend, Codrus was the son of Melanthus of Pylos, who went to Attica as a refugee from the Dorian invaders (11th century BC). By defeating the Athenians' enemies, the Boeotians, Melanthus won acceptance as king of Athens. After Codrus succeeded to his father's throne, Attica was invaded by the Dorians. The oracle of Delphi prophesied that only the death of the Athenian king at the hands of the Dorians could ensure victory for the Athenians. Codrus, therefore, went disguised into the enemy's camp and provoked a quarrel, in which he was killed. On discovering his identity, the Dorians retreated. Believing that no one was worthy to succeed Codrus, the Athenians abolished the title of king, substituting that of archon. Another version of the legend, however, claims that his son Medon was the last king of Athens. The royal families of Ionia (Greek area on the west coast of Asia Minor), as well as the Medontidae, a leading family of Athens, claimed descent from Codrus.

Cody, city, seat (1909) of Park county, northwestern Wyoming, U.S. It lies along the Shoshone River east of the Absaroka Range, at an altitude of 5,096 feet (1,553 m). Laid out in 1895 and developed by Colonel William F. "Buffalo Bill" Cody, it is a popular tourist resort in an area of dude and working livestock ranches, and farms irrigated by water from the Buffalo Bill Dam and Reservoir. Prime attractions are Cody's boyhood home (moved from LeClaire, Iowa), the Buffalo Bill Historical Center, and the Whitney Gallery of Western Art. Rodeos are held from mid-June through August, including a three-day Cody Stampede in early July. The city is headquarters of the Shoshone National Forest, and Yellowstone National Park is 55 miles (90 km) west. Oil production and gypsum-board manufacturing supplement Cody's tourist and agricultural economy. Inc. 1901. Pop. (1990) 7,897.

Cody, William F(rederick), byname BUFFALO BILL (b. Feb. 26, 1846, Scott county, Iowa, U.S.—d. Jan. 10, 1917, Denver, Colo.), buffalo hunter, U.S. Army scout, and Indian fighter who dramatized the facts and flavour of the American West through fiction and melodrama. His colourful Wild West exhibition (later known as Buffalo Bill's Wild West and Congress of Rough Riders of the World) became an international institution.

Cody's father died in 1857, and at the age of 11 the boy went to work as a mounted messenger in Kansas for the wagon-freight firm that later became Russell, Majors, and Waddell, backers of the Pony Express. Before the end of his teens, Cody had become an accomplished horse wrangler, hunter, and Indian fighter.



Cody, 1916

By courtesy of the Library of Congress, Washington, D.C.

After serving in the American Civil War (1861–65), he worked for the U.S. Army as a civilian scout and dispatch bearer out of Fort Ellsworth in Kansas (1866–67). In 1867–68 he hunted buffalo to feed construction crews on the Union Pacific Railroad. In eight months he slaughtered 4,280 head of buffalo, and he soon became known as the champion buffalo killer of the Great Plains.

Cody acquired a reputation not only for accurate marksmanship but also for total recall of the vast terrain he had traversed, knowledge of Indian ways, courage, and endurance. He was in demand as a scout and guide, mostly for the U.S. 5th Cavalry, throughout much of the government's attempt to wipe out Indian resistance to the white man west of the Mississippi River (1868–76). He was awarded the Medal of Honor in 1872, but the award was revoked in 1916 on the ground that he was not an officer or an enlisted man in the army (scouts were classified as civilians). The U.S. Army restored the Medal of Honor to Cody posthumously in 1989.

In all, Cody engaged in 16 Indian fights, including the much-publicized scalping (July 17, 1876) of the Cheyenne warrior Yellow Hair (erroneously translated Yellow Hand) in Sioux county, Neb. Such exploits provided choice material not only for newspaper reporters but also for dime novelists, who transformed the hard-riding, fast-shooting Cody into a Western folk hero. Among these early authors were Ned Buntline (pen name of E.Z.C. Judson) and Prentiss Ingraham. Recognizing the financial possibilities inherent in dramatizing the West, Cody was easily persuaded in 1872 to star in Buntline's drama *The Scouts of the Prairie.* Though his acting was far from polished, he became a superb showman, and his audiences greeted him with overwhelming enthusiasm. Between seasons, he frequently escorted hunting parties of wealthy Easterners and European nobility to the West.

In 1883 Cody organized his first Wild West exhibition—a spectacular featuring fancy shooting, a buffalo hunt, capture of the Deadwood (S.D.) stagecoach, a Pony Express ride, hard-riding cowboys, and yelling Indians. His stars included Annie Oakley, the famous rifle shot, and, in 1885, Chief Sitting Bull.

While Cody's exhibition remained extremely popular in the United States and abroad, in the end, through mismanagement, he lost the fortune he had made in show business. His last public appearance was at Portsmouth, Va., just two months before his death.

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Coeberger, Wensel: *see* Cobergher, Wenceslas.

coeducation, education of males and females in the same schools. A modern phenomenon, it was adopted earlier and more widely in the United States than in Europe, where tradition proved a greater obstacle.

Coeducation was first introduced in western Europe after the Reformation, when certain Protestant groups urged that girls as well as boys should be taught to read the Bible. The practice became especially marked in Scotland, the northern parts of England, and colonial New England, where young children of both sexes attended dame schools (*q.v.*). In the latter half of the 18th century, girls were gradually admitted to town schools. The Society of Friends in England as well as in the United States were pioneers in coeducation as they were in universal education, and, in Quaker

settlements in the British colonies, boys and girls generally attended school together. The new free public elementary, or common, schools, which after the American Revolution supplanted church institutions, were almost always coeducational, and by 1900 most public high schools were coeducational as well. Many private colleges from their inception admitted women (the first was Oberlin College in Oberlin, Ohio), and many state universities followed their example. By the end of the 19th century, 70 percent of American colleges were coeducational. In the second half of the 20th century, many institutions of higher learning that had been exclusively for persons of one sex became coeducational.

In western Europe the main exponents of primary and secondary coeducation were the Scandinavian countries. In Denmark coeducation extends back to the 18th century, and in Norway coeducation was adopted by law in 1896. In Germany, on the other hand, until the closing decades of the 19th century it was practically impossible for a girl to get a secondary education, and, when girls' secondary schools were introduced, their status was inferior to that of schools for boys. At present in many large municipalities, such as Bremen, Hamburg, and Berlin, coeducation at the primary level is the rule; at the secondary level there has been little change.

Antagonism to coeducation in England and on the European continent diminished more rapidly in higher education than in secondary. In England, Girton College at Cambridge was established for women in 1869, and the London School of Economics was opened to women in 1874. Germany permitted women to matriculate in 1901, and by 1910 women had been admitted to universities in The Netherlands, Belgium, Denmark, Sweden, Switzerland, Norway, Austria-Hungary, France, and Turkey.

Since World War II, coeducation has been adopted in many developing countries; China and Cuba are outstanding examples. There are many other countries, however, where social conditioning and religious sanctions have limited its success. In most Arab countries, for example, girls tend to drop out of coeducational schools at the age of puberty.

Coehoorn, Menno, baron van (b. March 1641, Lettinga-State, Dutch Republic [now The Netherlands]—d. March 17, 1704, The Hague), Dutch soldier and military engineer, a leading officer in the forces of William III, prince of Orange (William III, king of England, after 1689), and his allies in the War



Coehoorn, engraving by Pieter Schienk I
By courtesy of the Iconographisch Bureau, The Hague

of the Grand Alliance (1689–97), who made a number of innovations in weaponry and siege-warfare techniques.

The son of an infantry officer, Coehoorn became a captain in 1667 and served in the Dutch War (1672–78) against Louis XIV of France. He attained prominence at the siege of Grave (1674), in which he introduced a highly effective bronze mortar, which subsequently was known as the Coehoorn mortar. His first book on siege techniques appeared in 1682 and was followed by his most important and most widely translated work, *Nieuwe vestingbouw* (1685; "New Fortress Construction"). He perfected a system of fortification suited to level terrain, such as that of the Netherlands, and he advocated a new strategy for citadel defense that involved the active deployment of troops instead of relying only on moats and ramparts.

After greatly assisting in the capture of Bonn (1689) at the outset of the War of the Grand Alliance, Coehoorn fought in the Battle of Fleurus (1690). He improved the fortifications of Namur but lost the city to a French siege in 1692 and did not regain it until 1695. In 1695 he was promoted to master general of the artillery, and in that post he oversaw fortification of several Dutch cities.

coelacanth, any of the lobe-finned bony fishes of the order Crossopterygii. Members of the related but extinct suborder Rhipidistia are



Coelacanth (*Latimeria chalumnae*)
Peter Green—Ardea Photographics

considered to have been the ancestors of land vertebrates. In some systems of classification, the coelacanths and rhipidistians are considered separate orders, members of the subclass Crossopterygii.

Modern coelacanths are deep-sea fishes of the family Latimeriidae. The name refers to their hollow fin spines (Greek: *koilos,* "hollow"; *akantha,* "spine"). The modern coelacanths are bigger than most fossil coelacanths and are powerful predators with heavy, muscular bodies and highly mobile, limblike fins. They average 5 feet (1.5 m) in length and weigh about 100 pounds (45 kg).

Coelacanths appeared about 350 million years ago and were abundant over much of the world; the genus *Coelacanthus* has been found as fossils in rocks from the end of the Permian, 245 million years ago, to the end of the Jurassic, 144 million years ago. *Coelacanthus,* like other coelacanths, showed a reduction in bone ossification and a general trend toward a marine mode of life away from the earlier freshwater environment.

It was long supposed that coelacanths became extinct about 60 million years ago, but in 1938 a living member (*Latimeria chalumnae*) was netted in the Indian Ocean near the southern coast of Africa. Rewards were offered for more specimens, and in 1952 a second (named *Malania anjouanae* but probably not separable from *Latimeria*) was obtained from near the Comoros Islands. Several others have been caught in that area. It was later discovered that these fishes were well known to the islanders, who considered the flesh edible when dried and salted; the rough scales were used as an abrasive.

Coele Syria (Lebanon): *see* Biqāʿ, al-.

coelenterate: *see* cnidarian.

Coello, Alonso Sánchez: *see* Sánchez Coello, Alonso.

Coello, Claudio (b. *c.* 1642, Madrid—d. April 20, 1693, Madrid), Spanish painter who is considered the last important master of the great Madrid school of the 17th century. Influenced both by Velázquez and by Juan Carreño de Miranda, he attempted to halt the decline of Spanish art, and his work was greatly admired at the time.

The son of a famous Portuguese sculptor, Faustino Coello, he studied under Francisco Rizi and was dominated at first by a newly popular exaggerated style. Through the friendship of Carreño, he secured access to the royal collections, in which he studied the works of Titian, Rubens, and other masters. Josef Donoso probably taught him fresco painting, and they collaborated in the painting of churches and palaces in Madrid. In 1671 Coello decorated the ceiling of the vestry in Toledo cathedral; in 1683 he painted frescoes in the Augustinian church at Saragossa; and in 1684 he became painter to King Charles II. In 1691 he was appointed painter to the cathedral of Toledo, but his success was counterbalanced by the preference shown by the court to the Italian painter Luca Giordano, who arrived in Spain in 1692 to decorate El Escorial. Coello died a disappointed and disheartened man.

Coello's masterwork is the altarpiece for the sacristy in El Escorial, "Adoration of the Holy Eucharist" (1685–90). A fine arrangement of



"Adoration of the Holy Eucharist," oil on canvas by Claudio Coello; in the sacristy, El Escorial, Madrid
Archivo Mas, Barcelona

space in the Baroque style, it contains about 50 portraits, including that of Charles II. A remarkable mixture of profound religious feeling and realistic portraiture, closely allied to the work of Velázquez and Carreño, it shows strong colour and fine draftsmanship. This last great work of the school of Madrid has been called a devotional picture, a historical scene, and a marvelous portrait gallery.

Coelogyne, genus of as many as 200 species of orchids, family Orchidaceae, that are found on rocks, soil, or dead trees throughout Asia and some Pacific islands. All members of the genus have pseudobulbs (bulblike stems) with one or two leaves and a spike of flowers.

Coelogyne cristata, native to the Himalayas, has a beautiful white flower with golden hairs on its crested lip. *Coelogyne pandurata,* known as the black orchid because of the black, vel-



Black orchid (*Coelogyne pandurata*)
Joyce R. Wilson

vety markings on its fiddle-shaped lip, has from 5 to 15 greenish yellow flowers.

Coelophysis, genus of small carnivorous dinosaurs found as fossils in Late Triassic rocks (230 to 208 million years ago) of North America. *Coelophysis* which was representative of the coelurosaurs, was about 2.5 m (8 feet) long and was very light, weighing only about 18 to 23 kg (40 to 50 pounds), owing to its hollow bones. It had a long, slender neck, tail, and hind legs, and a long, narrow head equipped with many sharp teeth. In general the coelurosaurs were primitive bipeds capable of rapid movement. *Coelophysis* and the other coelurosaurs were agile, lightly built predators who possibly fed on other small reptiles and the very early mammals. This group is representative of the basal stock from which the sauropod dinosaurs developed; clear relationships are evident in the structure of the pelvis. The coelurosaur known as *Podokesaurus* was related to or congeneric with *Coelophysis*, though smaller in size (about 1.5 m [5 feet] long).

coelostat, device consisting of a flat mirror that is turned slowly by a motor to reflect the Sun continuously into a fixed telescope. The mirror is mounted to rotate about an axis through its front surface that points to a celestial pole and is driven at the rate of one revolution in 48 hours. The telescope image is then stationary and nonrotating. The coelostat is particularly useful in eclipse expeditions when elaborate equatorial mounting of telescopes is impossible. Other instruments applying the principle of the coelostat for similar observations are the heliostat and siderostat.

Coelurus, genus of small, lightly built dinosaurs (family Coeluridae) that some authorities equate with Ornitholestes (*q.v.*).

Coemgenus, SAINT: *see* Kevin, Saint.

Coen, Jan Pieterszoon (b. Jan. 8, 1587, Hoorn, Holland [now in The Netherlands]—d. Sept. 21, 1629, Batavia, Dutch East Indies [now Jakarta, Indon.]), chief founder of the Dutch commercial empire in the East Indies. As the fourth governor-general of the Dutch East Indies, he established a chain of fortified posts in the Indonesian Archipelago, displacing the Portuguese and preventing penetration by the English. His dream of a vast maritime empire stretching from Japan to India never came to fruition, but his energetic administration established Dutch rule in Indonesia, where it remained for four centuries.

Career as merchant. Coen was raised in a strict Calvinist atmosphere. He received his merchant's training from a Flemish company in Rome, and in 1607 he sailed to Indonesia with the fleet of Pieter Verhoeff as assistant merchant of the United East India Company (informally called the Dutch East India Company), which had received from the Dutch government exclusive shipping and trading rights in the area from the Cape of Good Hope east to South America. While on this journey, Verhoeff and 50 of his men were killed during negotiations with the chiefs of the Banda Islands. Upon his return to Holland in 1610, Coen submitted to the company's directors an important report on trade possibilities in Southeast Asia. As a result of this report, he was again sent overseas, in 1612, with the rank of chief merchant. In August of 1613, after a trip to the Spice Islands (*i.e.*, the Moluccas), he was appointed head of the company's post at Bantam, in Java, and, in November of 1614, he also became director general of the company's commerce in Asia.

As a merchant and Calvinist, Coen was convinced of the necessity of strict enforcement of contracts entered into with Asian rulers. He often aided Indonesian princes against their indigenous rivals or against other European powers and was given commercial monopolies for the company in return. In this way the Dutch, at the cost of heavy military and naval investment, gradually gained control of the area's rich spice trade. Between 1614 and 1618, Coen secured a clove monopoly in the Moluccas and a nutmeg monopoly in the Banda Islands. When the sultan of Bantam resisted his attempts to control the pepper trade, Coen transferred his headquarters to Jacatra (present Jakarta), so as to be freer to pursue his aims. In October 1617 he received news of his appointment as governor-general of the Dutch East Indies.



Coen, detail of an oil painting by an anonymous artist, first half of the 17th century; in the Rijksmuseum, Amsterdam
By courtesy of the Rijksmuseum, Amsterdam

In the meantime, relations had deteriorated with the English, who threatened the Dutch monopoly in the Indies. At the end of 1618 an English force, with a fleet commanded by Sir Thomas Dale, arrived at Jacatra and tried to establish a fort there. An inconclusive naval battle followed in which Coen had only a few ships at his disposal, and these loaded with precious merchandise. He gave orders to defend the Dutch fort as well as possible against the English and the Jacatrans and left for Amboina (Ambon, in the Moluccas) to reorganize his fleet.

Founding of Batavia. Returning to Jacatra at the end of May, he found the situation completely changed: in February, the sultan of Bantam had suddenly overpowered his Jacatran vassal, had forced the English to withdraw, and had placed the Dutch fort under siege. Coen forced the Bantams out of Jacatra on May 30, burned the city, and on its ruins founded the Dutch city of Batavia. He later gave orders to pursue the English fleet, which had scattered over the archipelago. Coen now had available to him a fortified city in the western part of the archipelago, which soon became the centre of Dutch power in Asia.

Word came to him, however, in March 1620 that the Dutch and English trading companies had reached an agreement in London: each would let the other engage in trading activities in the existing settlements, without interference, and a joint fleet would be outfitted against common enemies. Coen, seeing part of his work destroyed, reacted by defining the company's "Jacatra Kingdom" as far as the sea south of Java, making it impossible for the English to claim jurisdiction over any Javanese territory whatsoever.

In January 1621, after inviting the English to participate, Coen headed an all-Dutch fleet to the Banda Islands on a campaign of conquest, on the pretext of punishing the Bandanese for disregarding previous commercial agreements. His wholesale slaughter and enslavement of the natives shocked contemporaries as unusually severe and even drew a reprimand from the company's directors. In 1622 he sent a large expedition to the coast of China but overestimated his strength; from this, however, a Dutch settlement was established on Formosa, resulting in the foundation of a firmer base for profitable trade with Japan and China.

The Dutch East India Company now maintained settlements—mostly outside their own territory—from Japan to Surat on the west coast of India and, in addition, enjoyed trade relations with Arabia and Persia. Coen thought that the time had come to attract Dutch settlers. Batavia, he hoped, would become an eastern replica of Amsterdam, with colonists handling the inter-Asian trade along the coasts of southern and eastern Asia, while the company took care of the long-haul traffic with Europe. In order to urge his plans on the directors, he left for the Netherlands in February of 1623; at first he appeared to be successful, but his plans were cut short by the so-called Amboina massacre. Shortly after his departure from Batavia, a few Englishmen in Amboina, suspected of complicity in a plot to take over the Dutch settlement, were questioned, tortured, and sentenced to death by the Dutch factors. This was considered murder in England, and Coen was held morally responsible. Since, in Europe, the English and the Dutch were on friendly terms, Coen was temporarily forbidden to return to the Indies. He went back for the last time in 1627, traveling incognito and accompanied by his wife and a party of other women of good social standing, in an effort to attract Dutch settlers. But Coen's third visit to Asia had less significance than his previous ones; after many years in the tropics he had apparently lost his old energy. Moreover, his hopes for attracting free Dutch settlers were undermined by the directors' decision not to grant the colonists free-trade privileges. And, in addition, in Batavia Coen had his hands full with the attacks by the sultan of Mataram, the most powerful ruler on Java. In August 1628 and again in August 1629 a Javanese army besieged the city. During this last siege Coen died suddenly, probably of dysentery. (W.Ph.C.)

Coenwulf (Anglo-Saxon king): *see* Cenwulf.

coenzyme Q: *see* ubiquinone.

Coercive Acts: *see* Intolerable Acts.

coercive persuasion: *see* brainwashing.

coesite, a high-pressure polymorph (crystal form) of silica, silicon dioxide (SiO_2). It has essentially the same composition as the minerals cristobalite, keatite, lechatelierite, quartz, and tridymite but a different crystal structure. Because of the very high pressure necessary for its formation, it does not occur naturally in the Earth's crust. Artificially produced in 1953 by the American chemist Loring Coes,

Jr., it was discovered in nature in 1960 in the sandstone on the floor of Meteor Crater, near Winslow, Ariz. There coesite was formed from quartz under the high temperature and pressure generated by the large meteorite's impact. It has since been found in the craters of other large meteorites. On theoretical grounds, quartz should change to coesite at depths of 60 to 100 km (40 to 60 miles) below the Earth's surface. For detailed physical properties, *see* silica mineral (table).

Coeur, Jacques (b. *c.* 1395, Bourges, Fr.—d. Nov. 25, 1456, probably Chios in the Aegean Sea), wealthy and powerful French merchant, who served as a councillor to King Charles VII of France. His career remains a significant example of the spirit of enterprise and the social progress among the merchant classes in the beginning of the period of the rise of France after the Hundred Years' War.

Coeur's father was a furrier in the cloth-producing commercial town of Bourges. Coeur acquired his own training through experience in financial operations and on a commercial trip to the Middle East. After Paris was recovered from the English by Charles VII, Coeur won the confidence of the king and became an *argentier* (steward of the royal expenditure and banker of the court) and then a member of the king's council. He was put in charge of the collection of taxes, as *commissaire* in the estates' assemblies of the Languedoc region and as inspector general of the salt tax. He also was sent on diplomatic missions to Spain and Italy. Ennobled in 1441, he arranged the marriage of his daughter to a nobleman and obtained the archbishopric of Bourges for his son Jean and the bishopric of Luçon for his brother. He acquired about 40 seugneuries, or manors, and built a palace in Bourges, a structure that remains one of the finest lay monuments of Gothic architecture from the end of the European Middle Ages.

Because of his flair for business opportunities, Jacques Coeur was able to make use of every occasion and every means to increase his wealth. Without being a real statesman, he was able to serve the state as much as he served his own interest. His position as *argentier* was the basis for all his activity. It gave him not only access to the king and to the clientele of the court but also access to merchandise from every source; his stores, located in Tours, stocked cloth, silks, jewels, armour, and spices. Coeur also augmented his fortune by dealing in salt on the Loire and the Rhône rivers, in wheat in Aquitaine, and in wool in Scotland. Montpellier, where he built a *loge*, a kind of stock exchange for the merchants, was the first centre of his Mediterranean trade. In Florence, where he was registered in the Arte della Seta (Silk Makers' Guild), he owned a workshop for the manufacture of silks. A staff of traveling salesmen, drivers, and especially ship owners supplied his communications and transportation needs, and he himself owned at least seven ships in the Mediterranean. Like the Italians, Coeur set up individual companies for each branch of trade. He financed his businesses with credit (bills of exchange) that he obtained at fairs in Geneva, Avignon, Florence, and Rome, and by using *recettes fiscales* (fiscal receipts) from the king. He had the political support of Alfonso V, king of Aragon, and the cities of Genoa, Florence, and Barcelona, as well as the popes, who authorized his trade with the Muslims in Alexandria.

While his wealth in real estate and personal property, his luxurious style of life, and his titles, influence, and personal dynamism were impressive, his prosperity was in fact fragile. He had few efficient associates, the risks of maritime commerce were great, and his competitors, especially in Montpellier, were ruthless. Though he always appeared to be short of money, he was rich enough to be able to lend the king funds necessary for the reconquest of Normandy in 1450 and to become creditor for a large part of the aristocracy. Coeur thus became to many an object of envy and jealousy.

Falsely accused of having arranged the poisoning of Agnès Sorel, mistress of Charles VII, and of having engaged in dishonest speculation, he was arrested in 1451 and condemned to remain in prison until an enormous fine was paid. With the help of friends, he escaped from prison and took refuge, first in Florence and in 1455 in Rome. In November of the following year he died, probably on the Aegean island of Chios, where he had gone in command of a naval expedition organized by Pope Calixtus III against the Turks. After his death Louis XI made amends for Coeur's treatment by his father, Charles VII, by returning some of Coeur's property to his sons and by reviving enterprises that the former *argentier* had initiated: the silk workshop in Lyon and the first attempts to set up a company in the Middle East.

Jacques Coeur was representative of his generation; his ambitions were traditional: honours, noble rank, land. He differed from his more mediocre contemporaries by the sheer volume and extent of his trade, his audaciousness and tenacity, his self-confidence, his talent for making himself loved or hated, and especially by his flair for seizing opportunities. He understood business opportunities for his generation but was not prophetic. He was the incarnation of the rise of the merchant middle class, imitated in succeeding generations in Lyon and Tours with the same success.

The legend of Jacques Coeur remains many-faceted, and history has preserved conflicting images of him. For a long time he was seen as an adventurer, exploiting for his own profit the revenue of the kingdom and deceiving his master. The crowd, hostile to a nouveau riche, brought him down; he was accused of magic. The 18th century, the century of the Enlightenment, took pity on him as a victim of despotism. An eminent 19th-century historian, Jules Michelet, however, was the first to look upon Coeur as the model for a whole generation and a precursor of the powerful bourgeois class of succeeding centuries.

(M.J.Mo.)

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Coeur d'Alene, city, seat (1908) of Kootenai county, northwestern Idaho, U.S. It lies near the Washington border at the northern end of Coeur d'Alene Lake. Founded in 1879 as a trading post serving Fort Coeur d'Alene (later Fort Sherman), it developed after the discovery of lead and silver (1883) and the arrival of the railroad (1886). The local mines were the scene of bitter industrial strife between mine owners and unionized miners in the 1890s. The city is now headquarters for the Idaho Panhandle National Forest, which includes Kaniksu (in Montana), Coeur d'Alene, and St. Joe national forests. Lumbering is the economic mainstay, supplemented by tourism. North Idaho (junior) College (1939) is near the fort's chapel and a replica of its gate. Inc. village, 1887; city, 1906. Pop. (1990) 24,563.

Coeur d'Alene Lake, lake in Kootenai county, northern Idaho, U.S. It lies 25 miles (45 km) east of Spokane, Wash. Impounded by Coeur d'Alene Lake Dam on the Spokane River, it is fed by the Coeur d'Alene and St. Joe rivers. The lake is 30 miles (48 km) long and 1–3 miles (1.6–5 km) wide, with a 109-mile (175-kilometre) shoreline. The lake is noted for its scenic mountainous beauty and is the centre of a resort area. Recreational facilities are widely available, and an amusement park is located nearby. The Kootenai County Fair and County Rodeo are both annual events. Coeur d'Alene Indian Reservation borders the southern half of the lake. Coeur d'Alene city lies at the north end of the lake and marks the western end of an area important for its forests and mineral deposits. The origin of the name, given by the French to an Indian tribe of that area, is uncertain.

Coeur d'Alene Mountains, division of the Northern Rocky Mountains, in northern Idaho, U.S., extending in roughly triangular form south for about 60 miles (100 km) along the Montana border from Lake Pend Oreille to St. Joe River. The highest peaks (6,000–7,000 feet [1,800–2,100 m]) are in the east. Mines in this region produce most of Idaho's silver, lead, and zinc. Coeur d'Alene National Forest spreads across most of the range.

cofactor, a component, other than the protein portion, of many enzymes. If the cofactor is removed from a complete enzyme (holoenzyme), the protein component (apoenzyme) no longer has catalytic activity. A cofactor that is firmly bound to the apoenzyme and cannot be removed without denaturing the latter is termed a prosthetic group; most such groups contain an atom of metal such as copper or iron. A cofactor that is bound loosely to the apoenzyme and can be readily separated from it is called a coenzyme. Coenzymes take part in the catalyzed reaction, are modified during the reaction, and may require another enzyme-catalyzed reaction for restoration to their original state.

To make the best use of the Britannica, consult the INDEX *first*

coffee, tropical evergreen shrub belonging to the genus *Coffea* of the Rubiaceae, or madder, family; or its seeds, called beans; or the beverage made by brewing the roasted and ground beans with water.

A brief treatment of coffee follows. For a full treatment, *see*, MACROPAEDIA: Beverage Production; Farming and Agricultural Technology.

Coffee may derive its name from the Arabic *qahwah,* but some etymologists connect it with the name Kaffa, a province in southwestern Ethiopia, reputedly its birthplace. Most of the 25 or more species of the coffee plant grow wild in the tropics of the Eastern Hemisphere.



Coffee (*Coffea arabica*)
Donald P. Watson—EB Inc.

The earliest known and cultivated species is *Coffea arabica,* the coffee shrub of Arabia; it is now cultivated mostly in Latin America. *Coffea robusta,* which originated in East Africa and the Congo River basin, is now widely cultivated in Africa and Madagascar. Both species are cultivated in Asia.

In its wild state the coffee shrub is an evergreen bush 8 to 10 metres (26 to 33 feet) high. Its branches carry bouquets of small white flowers with a jasmine-like fragrance. The fruit, 15 to 18 millimetres (½–¾ inch) long and red when mature, is called a cherry; it

consists of a fleshy pulp and two seeds joined with even planes side by side. Each seed is protected by two coverings: a thin, hard endocarp and a fine membranous pellicle. The species *C. arabica* has given rise to a number of varieties, among which are *maragogype,* with bulky seeds; *bourbon,* appreciated for quality; and *caturra,* of exceptional quality and cultivated in Brazil and Colombia. The species *C. robusta* possesses greater strength and resistance to disease than *C. arabica,* yields more fruit, and adapts to warm, humid climates to which the *C. arabica* is not suited.

The coffee beverage is consumed hot or cold by about one-third of the world's population, and its total consumption is larger than that of any other beverage except tea. A coffee beverage may be prepared from the roasted and ground coffee beans in various ways and using diverse apparatus, sometimes with filtration: grounds may be steeped in water in a pot or leached with water in a percolator; espresso coffee is made by forcing steam through powdered coffee in a special machine; a decoction may be made by boiling the grounds in water in a pot.

Mild coffees are exclusively high-quality varieties of *C. arabica,* principally from Central and South America, excluding Brazil. The varieties obtained from Kenya, Tanzania, Ethiopia, and Cameroon are related to this group. Brazilian coffees, known for their diversity, are also varieties of *C. arabica,* but they are characterized by less refined flavour and aroma than those of the mild group. Coffees of the *C. robusta* species are more neutral in taste and less aromatic than the *C. arabica* varieties, but are becoming more appreciated, particularly in the form of soluble coffee. Most coffee products are mixtures that combine the characteristics of different species and varieties, professionally blended to satisfy consumers' tastes.

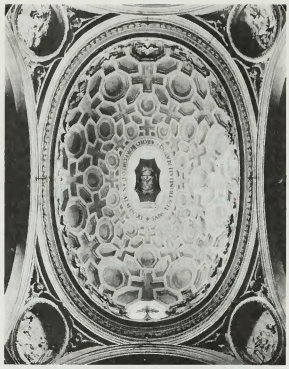
coffee rust, the most devastating disease of coffee plants, caused by the fungus *Hemileia vastatrix.* Long known in coffee-growing areas of Africa, the Near East, India, Asia, and Australasia, rust was discovered in 1970 to be widespread in Brazil, the first known infected area in the Western Hemisphere. Rust destroyed the once-flourishing coffee plantations of Sri Lanka and Java.

The symptoms of coffee rust include small, yellowish, oily spots on the upper leaf surface that expand into larger round spots that turn bright orange to red and finally brown with a yellow border. The rust pustules are powdery and orange-yellow on the underleaf surface. Later the pustules turn black. Rusted leaves drop so that affected trees are virtually denuded. Such trees usually die within a few years.

Coffee rust is controlled by the timely application of fungicide sprays during wet seasons. Plantations in some areas have been moved to higher and cooler altitudes, 1,800 to 2,100 m (6,000 to 7,000 feet), at which the rust fungus has difficulty reproducing. Quarantine has reduced the chances of coffee rust's long-distance spread.

coffer, in architecture, a square or polygonal ornamental sunken panel used in a series as decoration for a ceiling or vault. The sunken panels were sometimes also called caissons, or lacunaria, and a coffered ceiling might be referred to as lacunar.

Coffers were probably originally formed by the wooden beams of a ceiling crossing one another, as in the smaller halls of the great Loire valley châteaus of the early Renaissance. The earliest surviving examples, however, are of stone coffering, done by the ancient Greeks and Romans; the Propylaea in Athens, for example, has a stone-coffered ceiling that still



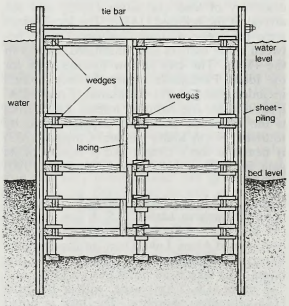
Baroque coffered ceiling of the cupola of S. Carlo alle Quattro Fontane, Rome, designed by Francesco Borromini, 1638–41

SCALA—Art Reference/EB Inc.

shows traces of painted decoration. The vogue was revived during the Renaissance and was common in Baroque and Neoclassical architecture, both religious and secular. Sir Christopher Wren used coffering generously in his London churches, notably in St. Paul's Cathedral.

coffer, in furniture, most commonly a portable container for valuables, clothes, and other goods, used from the Middle Ages onward. It was normally a wooden box covered in leather, studded with nails, and fitted with carrying handles. The top was commonly rounded so that rain would run off (the leather covering often increased protection). Sometimes the leather was decorated with incised patterns, painting, or gilding, but more often the closely studded brass-headed nails formed the only ornament, sometimes outlining the owner's initials or monogram. About the beginning of the 18th century, japanning (oriental-style lacquerwork) was applied to examples with curved tops.

cofferdam, watertight enclosure from which water is pumped to expose the bed of a body of water in order to permit the construction of a pier or other hydraulic work. Cofferdams are made by driving sheetpiling, usually steel in modern works, into the bed to form a watertight fence. The vertical piles are held in



Cofferdam made of steel sheetpiling, showing internal wooden bracing

From *Kempe's Engineers Year-Book* (1988), C. Sharpe (ed.)

place by horizontal framing members that are constructed of heavy timber, steel, or a combination of the two.

The sides of a cofferdam must be sturdy and well-braced to withstand the shock of being hit by a heavy dredging bucket; they must also be able to withstand the horizontal forces from the surrounding body of water when the water inside is pumped from the cofferdam. The cofferdam goes back at least to Roman engineers, who built a number of these enclosures to found the piers of their stone-arch bridges and aqueducts. *Compare* caisson.

Coffeyville, city, Montgomery county, southeastern Kansas, U.S., on the Verdigris River. Founded in 1869, it was named for James A. Coffey, a pioneer settler. During the early 1870s, following the completion of a railroad, Coffeyville became a major shipping point for Texas cattle and later developed into an important trading and industrial centre. It is located in the mid-continent gas and oil field (natural gas was discovered there in 1892) and is the seat of Coffeyville Community Junior College (1923). The Dalton Museum in Coffeyville commemorates a family of local desperadoes, the Dalton brothers, who lost several of their members in a running gunfight there in October 1892. Inc. 1872. Pop. (1990) 12,917.

Consult the INDEX *first*

coffin, the receptacle in which a corpse is confined. The Greeks and Romans disposed of their dead both by burial and by cremation. Greek coffins were urn-shaped, hexagonal, or triangular, with the body arranged in a sitting posture. The material used was generally burnt clay and in some cases had obviously been molded around the body and baked. In the Christian era stone coffins came into use. Romans who were rich enough had their coffins made of a limestone brought from Assus, in Asia Minor, which was commonly believed to "eat" the body.

Chaldean coffins were generally clay urns with the top left open; from the size of the mouth it is apparent that these coffins were molded and baked around the body. The Egyptian coffins, or sarcophagi, were the largest stone coffins known and were generally highly polished and covered with hieroglyphics that usually told a history of the deceased. Mummy chests shaped to the form of the body were also used, being made of hardwood or painted papier-mâché; these also bore hieroglyphics.

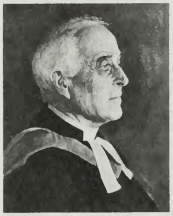
Primitive wooden coffins, formed of a tree trunk split down the centre and hollowed out, are still in use among some aboriginal peoples. This type of coffin, modified by planing, was used in medieval Europe by those who could not afford stone, while the poor were buried without coffins, wrapped simply in cloth or covered with hay and flowers. Lead coffins were also used in Europe during the Middle Ages; these were shaped like the mummy chests of Egypt. Iron coffins were used in England and Scotland as late as the 17th century, when coffins became usual for all classes, including the poor.

Among the American Indians some tribes used roughhewn wooden coffins; others sometimes enclosed the corpse between the upper and lower shells of a turtle. In their tree and scaffold burial the Indians sometimes used wooden coffins or travois baskets or simply wrapped the body in blankets. Canoes, mounted on a scaffold near a river, were used as coffins by some tribes, while others placed the corpse in a canoe or wicker basket and floated it out into the stream or lake. The Aborigines of Australia generally used coffins

of bark, but some tribes employed baskets of wickerwork.

In the United States glass is sometimes used for the lids, and the inside is lined with copper or zinc. Coffins used in cremation throughout the civilized world are of some light material easily consumed and yielding little ash.

Coffin, Henry Sloane (b. Jan. 5, 1877, New York City—d. Nov. 25, 1954, Lakeville, Conn., U.S.), American clergyman, author, and educator who led in the movement for liberal evangelicalism in Protestant churches.



Henry Sloane Coffin, detail from an oil painting by an unknown artist

By courtesy of the Union Theological Seminary, New York

After serving as minister of two Presbyterian churches in New York City (1900–26), he became president (1926–45) of Union Theological Seminary, also in New York City. Preaching throughout the United States, Coffin emphasized the application of Christianity to social problems.

Coffin also sought to improve the quality of theological education. He served as a fellow (1922–45) of the Corporation of Yale University, and during 1943–44 he was moderator of the general assembly of the Presbyterian Church in the U.S.A. Among his more than 20 books in the field of religion, his *Meaning of the Cross* (1931) is considered an excellent guide to Christian theology.

Coffin, Levi (b. Oct. 28, 1789, New Garden, N.C., U.S.—d. Sept. 16, 1877, Cincinnati, Ohio), American Abolitionist, called the "President of the Underground Railroad," who assisted thousands of runaway slaves on their flight to freedom.

Coffin was raised on a farm, an upbringing that provided little opportunity for formal education. He nonetheless became a teacher, and in 1821 he opened a Sunday school for slaves in New Garden. His school was soon closed, however, when fearful masters forbade their slaves' attendance.

A devout Quaker, Coffin opposed slavery despite his Southern birth and upbringing. When he moved to Newport (now Fountain City), Indiana, in 1826, he discovered he was on a route of the Underground Railroad, by which fugitive slaves made their way from the South to Canada. Coffin then made his home into a depot, and he funneled much of the wealth that he was acquiring as a prosperous merchant into hiding and then conveying "passengers" on their northern journey. Coffin's example induced his neighbours to contribute clothing and supplies to the more than 3,000 fugitive slaves who passed through his home.

In 1847 Coffin moved to Cincinnati, where he opened a store selling goods made exclusively by free labour. He continued his affiliation with the Underground Railroad until the outbreak of the American Civil War, then worked to aid the liberated slaves. In 1864 he went to England to raise funds for the freedmen, and in 1867 he was a delegate to the International Anti-Slavery Conference in Paris. His autobiography, *Reminiscences of Levi Coffin* (1876), contains much valuable information about American Abolitionism.

Coffin, Robert P(eter) Tristram (b. March 18, 1892, Brunswick, Maine, U.S.—d. Jan. 20, 1955, Portland, Maine), American poet whose works, based on New England farm and seafaring life, were committed to cheerful depiction of the good in the world.

Coffin regarded poetry as a public function that should speak well of life so that people might find inspiration. In vigorous, fresh colloquial verse, he expanded the particulars of his youth in Maine in order to describe experiences that would be universal to Americans. *Strange Holiness* (1935) won the Pulitzer Prize for poetry in 1936; *Saltwater Farm* (1937) is a collection of poems about Maine.

Coffin also lectured widely and took part in numerous poetry workshops. He taught at Wells College in Aurora, N.Y., (1921–34) and at Bowdoin College in Brunswick, Maine (1934–55); from 1937 to 1939 he was book and poetry editor for *Yankee.* Coffin explored other modes of writing in such works as *Red Sky in the Morning* (1935), a novel about the Maine coast; *Kennebec* (1937), part of a historical series on American rivers; and *Maine Doings* (1950), informal essays on New England life.

coffin fly (insect): *see* humpbacked fly.

Coffin Texts, collection of ancient Egyptian funerary texts consisting of spells or magic formulas, painted on the burial coffins of the First Intermediate period (*c.* 2130–1939 BC) and the Middle Kingdom (1938–*c.* 1600? BC). The Coffin Texts, combined with the Pyramid Texts from which they were derived, were the primary sources of the Book of the Dead, which was in prominent use during the New Kingdom and Late period. These three collections represent the most extensive body of Egyptian religious literature available to modern scholars.

Coffs Harbour, town and port, northeastern New South Wales, Australia. Founded in 1847 to serve a cedar-lumbering district, it was known as Brelsford until 1861, when it was gazetted as a village and adopted its present name, corrupted from that of a shipbuilder, John Korff. In 1906 it was incorporated into Dorrigo Shire, which became Coffs Harbour Shire in 1957. Before the advent of the railway in 1915, Coffs Harbour was an important coastal shipping outlet for the Bellingen, Dorrigo, and Orara districts. The town comprises Coffs Harbour Jetty (at the artificial harbour) and Coffs Harbour (2 miles [3 km] west on the Pacific Highway). With air and rail connections to Sydney (274 miles [441 km] southwest), it has become a seaside resort and commercial centre for an area of banana, vegetable, and dairy farming and fishing. Pop. (1981) 16,020.

cogeneration, in power systems, use of steam for both power generation and heating. High-temperature, high-pressure steam from a boiler and superheater first passes through a turbine to produce power (*see* steam engine). It then exhausts at a temperature and pressure suitable for heating purposes, instead of being expanded in the turbine to the lowest possible pressure and then discharged to the condenser, which would result in losing the remaining energy in the steam. Steam discharged from the turbine at the higher pressure in cogeneration can provide large amounts of lower-temperature energy for such applications as heating buildings or evaporating brine in a chemical plant. Considerable overall energy savings can be obtained by cogeneration.

Coggan, (Frederick) Donald, Baron (b. Oct. 9, 1909, London), Anglican archbishop of Canterbury from 1974 to 1980, theologian, educator, and the first Evangelical Anglican to become spiritual leader of the church in more than a century.

Educated at Merchant Taylors' School, London, and St. John's College, Cambridge (B.A. 1931), and ordained priest in 1935, he taught at the University of Manchester (1931–34) and Wycliffe College, Toronto, Ont. (1937–44), and was principal of the London College of Divinity (1944–56). Coggan was consecrated bishop of Bradford in 1956, elevated to archbishop of York in 1961, and succeeded Michael Ramsey as archbishop of Canterbury. He was elevated to a life peerage in 1980 as Baron Coggan of Canterbury and of Sissinghurst in the County of Kent. Among Coggan's writings are *The Ministry of the Word* (1945), *The Glory of God* (1950), *Stewards of Grace* (1958), *Christian Priorities* (1963), *Convictions* (1975), *The Name above All Names* (1981), and *Mission to the World* (1982). He also served on the panel of scholars who produced the New English Bible.

Coggeshall, Ralph of (English chronicler): *see* Ralph of Coggeshall.

cogito, ergo sum (Latin: "I think, therefore I am"), dictum coined in 1637 by René Descartes as a first step in demonstrating the attainability of certain knowledge. It is the only statement to survive the test of his methodic doubt (*q.v.*). The statement is indubitable, Descartes argued, because even if an all-powerful demon were to try to deceive me into thinking that I exist when I do not, I would have to exist for the demon to deceive me. Therefore, whenever I think, I exist. Furthermore, he argued, the statement "I am" (*sum*) expresses an immediate intuition, not the conclusion of dubious reasoning, and is thus indubitable. Whatever I know, I know intuitively that I am.

Cognac, town, Charente *département,* Poitou-Charentes *région,* western France. It lies 20 miles (30 km) west-northwest of Angoulême. The town gives its name to the brandy distilled there and exported all over the world. The distilling of cognac is its main industry. Casks and bottles are manufactured locally. Cognac was the birthplace of King Francis I (reigned 1515–47). Its possession was contested during the Wars of Religion. An air force pilot's school is located there. Pop. (1982) 20,247.

cognac, a brandy produced in the Charente and Charente-Maritime *départements* of France and named for the town of Cognac in the locality. French law limits the use of the name to brandy made from the wine of a specified grape variety, distilled twice in special alembics, or pot stills, and aged for a prescribed period in Limousin oak. Every step in the production of cognac, from the growing of grapes to the distillation of the new brandy, must take place within certain delimited areas of the Charente and Charente-Maritime *départements.* Cognac traces its origins to the 17th century, when wines of the Charente region were distilled to withstand shipment to distant European ports. In time, the brandy from the Cognac district in the centre of the Charente was recognized as superior and its production strictly regulated.

Cognac is produced in seven designated areas; the two most important are Grande Champagne and Petite Champagne (not to be confused with the province of Champagne; the term means simply "open field"), followed in descending order of quality by Borderies, Fins Bois, Bons Bois, Bois Ordinaires, and Bois Communs. "Fine Champagne" denotes cognac containing only brandies from Grande or Petite Champagne. Grande Fine Champagne cognacs must be exclusively from the Grande Champagne. The designated age of a cognac refers only to the time spent in wood (distilled spirits cease to age after they are bottled). The older the cognac, the smoother, more complex, and more refined it becomes,

though it is rare for cognac to remain in cask beyond 40 or 50 years. Most cognacs spend from one and one-half to five years in wood. The final product is a blend of cognacs from the various districts, aged for various periods of time.

Minimum age is indicated by certain words or symbols, as follows: Three Star, or V.S., two years; V.S.O.P. (very superior old pale, an English phrase), four years; Napoleon, five years. While these are the minimum age requirements set by law, many cognacs of these levels contain older brandies. Many firms bottle older cognacs under such designations as XO, Extra, and Réserve or under proprietary names such as Anniversaire, Triomphe, or Cordon Bleu.

cognition, the process involved in knowing, or the act of knowing, which in its completeness includes perception and judgment. Cognition includes every mental process that can be described as an experience of knowing as distinguished from an experience of feeling or of willing. It includes, in short, all processes of consciousness by which knowledge is built up, including perceiving, recognizing, conceiving, and reasoning. The essence of cognition is judgment, in which a certain object is distinguished from other objects and is characterized by some concept or concepts.

A brief treatment of cognition follows. For full treatment, *see* MACROPAEDIA: Learning and Cognition, Human.

The nature of cognition and the relationship between the knowing mind and external reality have been exhaustively discussed by philosophers since antiquity. Cognition and its development have been subjected to many viewpoints and interpretations. The psychologist is concerned with the cognitive process as it affects learning and behaviour.

There are two broad approaches to contemporary cognitive theory. The information-processing approach attempts to understand human thought and reasoning processes by comparing the mind to a sophisticated computer system that is designed to acquire, process, store, and use information according to various programs.

The second approach is based on the work of Swiss psychologist Jean Piaget (*q.v.*; 1896–1980), who viewed cognitive adaptation in terms of two basic processes: assimilation and accommodation. Assimilation is the process whereby an individual interprets reality in terms of his own internal model of the world based on previous experience; whereas, accommodation is the process of changing that model by developing the mechanisms to adjust to reality. Piaget believed that representational thought does not originate in a social language but rather in unique symbols that serve as a foundation for a later, acquired language.

The American psychologist Jerome S. Bruner (b. 1915) broadened Piaget's concept by suggesting that the cognitive process is effected by the three modes we use to represent our world: the enactive mode involves representation through action; the iconic mode uses visual and mental images; and the symbolic mode uses language.

cognitive dissonance, the mental conflict that occurs when beliefs or assumptions are contradicted by new information. The unease or tension that the conflict arouses in a person is relieved by one of several defensive maneuvers: the person rejects, explains away, or avoids the new information, persuades himself that no conflict really exists, reconciles the differences, or resorts to any other defensive means of preserving stability or order in his conception of the world and of himself. The concept, first introduced in the 1950s, has become a major point of discussion and research.

cogon grass, also called ALANG-ALANG, or BLADY GRASS (*Imperata cylindrica*), one of about seven species of perennials constituting the genus *Imperata* (family Poaceae), native to temperate and tropical regions of the Old World. Cogon grass is a serious weed in cultivated areas of South Africa and Australia. Satintail (*I. brevifolia*), a tall grass native to western North America, has a thin, silvery flower cluster. Each spikelet bears many long, silky hairs.

Cohan, George M., in full GEORGE MICHAEL COHAN (b. July 3, 1878, Providence, R.I., U.S.—d. Nov. 5, 1942, New York, N.Y.), American actor, popular songwriter, playwright, and producer especially of musical comedies, who became famous as the "Yankee Doodle Dandy."

At an early age he performed with his parents and sister, subsequently taking comedy roles in vaudeville and on the legitimate stage. By 1893 he was writing vaudeville skits



Cohan
Pictorial Parade

and popular songs. His first full-length play opened in New York in 1901. A description of his early experiments and the stage career of the "Four Cohans" is in his autobiography, *Twenty Years on Broadway and the Years It Took to Get There* (1925).

Among Cohan's productions were *The Governor's Son* (1901), *Forty-five Minutes from Broadway* (1906), *The Talk of New York* (1907), *Get-Rich-Quick Wallingford* (1910), *Broadway Jones* (1912), *Seven Keys to Baldpate* (1913), *The Tavern* (1921), *The Song and Dance Man* (1923), and *American Born* (1925). Among his best-known appearances were those in *Ah, Wilderness!* (1933) and *I'd Rather Be Right* (1937). He composed numerous songs, including "You're a Grand Old Flag," "Mary's a Grand Old Name," "Give My Regards to Broadway," "I'm a Yankee Doodle Dandy," and the famous "Over There" of World War I, for which Congress authorized him a special medal in 1940.

His career was the subject of a motion picture, *Yankee Doodle Dandy* (1942), and a Broadway musical, *George M!* (1968).

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Cohasset, town (township), Norfolk county, eastern Massachusetts, U.S. It lies along Massachusetts Bay, within the southeastern Boston metropolitan area. Captain John Smith supposedly landed there in 1614, and the site, settled about 1647, was a part of Hingham until its incorporation in 1770. The name is a contraction of the Indian Quonohassit, probably meaning "high-place-at." Now a popular resort and yachting centre, its early economic mainstays were cod and mackerel fishing and farming. The town is the home of the South Shore Music Circus, featuring Broadway players. Numerous shipwrecks on the coast resulted in construction of the first U.S. lifeboat station (1807) on Pleasant Beach; the offshore Minot's Ledge Lighthouse has been maintained since 1850. **Pop.** (1990) 7,075.

cohen, also spelled KOHEN (Hebrew: "priest"), plural COHANIM, or COHENS, Jewish priest, one who is a descendant of Zadok, founder of the priesthood of Jerusalem when the First Temple was built by Solomon (10th century BC) and through Zadok related to Aaron, the first Jewish priest, who was appointed to that office by his younger brother, Moses. Though laymen such as Gideon, David, and Solomon offered sacrifice as God commanded, the Hebrew priesthood was hereditary in biblical times and was transmitted exclusively to male descendants of Aaron of the tribe of Levi.

In Old Testament times the Hebrew high priest (*kohen gadol*) headed a priestly hierarchy in Jerusalem. He had many privileges but was also bound by numerous restrictions. Until the time of King Josiah (7th century BC), the high priest was anointed with oil before assuming office, and he alone could enter the Holy of Holies once a year to offer sacrifice on Yom Kippur (Day of Atonement).

Of lesser rank were his deputy and the military chaplain, who accompanied troops into battle. Other priests had charge of Temple finances or assumed administrative functions connected with the Temple, such as assigning duties to the lowest rank of priests (the cohanim), who, divided into 24 groups, took turns serving in the Temple. The Jewish priesthood reached its apogee during the period of the Second Temple.

During the post-Temple era, all priestly functions were necessarily curtailed, and priests lost most of their prerogatives. In the Diaspora, rabbis replaced the cohanim as teachers and authorities on the Law, but the priesthood does not pertain to them. It belongs by right of blood to cohanim, who trace their lineage back to Aaron. The surnames of many cohanim (*e.g.,* Cohen, Cowen, Kahn, etc.) indicate their status. Cohanim are granted first preference in the synagogue in the reading of the Torah and pronounce the priestly blessing over the congregation on festivals. They also officiate at the ritual whereby a father redeems his firstborn son with an offering of five silver coins (usually returned as a gift to the child). A cohen must also preserve his ritual purity by avoiding contact with the dead and hence may not attend funerals, except those of close relatives. There are also certain restrictions regarding marriage. Rules and privileges pertaining to cohanim are disregarded by Reform Judaism.

Cohen, Ernst Julius (b. March 7, 1869, Amsterdam, Neth.—d. *c.* March 5, 1944, Auschwitz [now Oświęcim], Pol.), Dutch chemist noted for his extensive work on the allotropy of metals, particularly tin, and for his research in piezochemistry and electrochemical thermodynamics.

Cohen was educated under J.H. van't Hoff at the University of Amsterdam (Ph.D., 1893) and worked in Paris with Henri Moissan before returning to teach chemistry in Amsterdam. In 1902 he moved to the University of Utrecht as director of a chemical laboratory. Cohen helped discover the two allotropes of tin (white tin and gray tin) and determined their differing properties. He lectured throughout Europe and the United States and published numerous works on his experimental research as well as medical textbooks and historical articles on the lives of influential research chemists. Cohen retired from teaching in 1939 but continued his studies until his arrest by the Nazi occupation forces in 1944. He died in the Auschwitz death camp.

Cohen, Hermann (b. July 4, 1842, Coswig, Anhalt—d. April 4, 1918, Berlin), German-Jewish philosopher and founder of the Marburg school of neo-Kantian philoso-

phy, which emphasized "pure" thought and ethics rather than metaphysics.

Cohen was the son of a cantor, and he studied at the Jewish Theological Seminary of Breslau and at the University of Berlin before receiving his Ph.D. at the University of Halle in 1865. In 1873 he was appointed a *Privatdozent* (lecturer) at the University of Marburg, where he found favour and was made professor within three years. There he taught until 1912, developing the principles of his Marburg, or logistic, neo-Kantian philosophy.

Upon his retirement from Marburg at the age of 70, Cohen went to Berlin, where he taught Jewish philosophy in the liberal environment of the Institute for the Science of Judaism. At Berlin he went through a substantial change in his thinking about the relationship between God and man and came to believe that reality is rooted in God rather than in human reason. This worked a radical effect on Cohen, and he turned to religion and to his ancestral Jewish faith.

Between 1902 and 1912 he published the three parts of his Marburg philosophical system: *Logik der reinen Erkenntnis* (1902; "The Logic of Pure Intelligence"), *Die Ethik des reinen Willens* (1904; "The Ethics of Pure Will"), and *Asthetik des reinen Gefühls* (1912; "The Aesthetics of Pure Feeling"). A work that expresses the shift in his thinking from man-centred to God-centred is *Die Religion der Vernunft aus den Quellen des Judentums* (1919; *Religion of Reason: Out of the Sources of Judaism*).

Cohen, Stanley (b. Nov. 17, 1922, Brooklyn, New York City), American biochemist who, with Rita Levi-Montalcini, shared the 1986 Nobel Prize for Physiology or Medicine for his researches on substances produced in the body that influence the development of nerve and skin tissues.

Cohen was educated at Brooklyn College (B.A., 1943), Oberlin College (M.A., 1945), and at the University of Michigan, where he received a Ph.D. in biochemistry in 1948. He joined Levi-Montalcini at Washington University, St. Louis, Mo., as a researcher in 1952. His training as a biochemist enabled him to help isolate nerve growth factor, a natural substance that Levi-Montalcini had found stimulated the growth of nerve cells and fibres. Cohen found another cell growth factor in the chemical extracts that contained the nerve growth factor. He discovered that this substance caused the eyes of newborn mice to open and their teeth to erupt several days sooner than normal. Cohen termed this substance epidermal growth factor (EGF), and he went on to purify it and completely analyze its chemistry. He and his coworkers found that EGF influences a great range of developmental events in the body. He also discovered the mechanisms by which EGF is taken into and acts upon individual cells.

Cohen conducted his research at Washington University until 1959, upon which he moved to Vanderbilt University, Nashville, Tenn., becoming professor of biochemistry there in 1967.

cohenite, the mineral iron and nickel carbide $[(Fe,Ni)_3C]$ that occurs as an accessory constituent of several iron meteorites, of all coarse octahedrites containing 7 percent or less nickel, and of at least one stony meteorite, an enstatite chondrite. Cohenite closely resembles the meteoritic mineral schreibersite, and it may be more common in meteorites than is supposed. When man-made, as in steel, it is called cementite. For detailed physical properties, *see* native element (table).

Cohens v. Virginia (1821), U.S. Supreme Court case in which the court reaffirmed its right to review all state court judgments in cases arising under the federal Constitution or a law of the United States. The Judiciary Act of 1789 provided for mandatory Supreme Court review of the final judgments of the highest court of any state in cases "where is drawn in question the validity of a treaty or statute of the United States and the decision is against its validity" or "where is drawn in question the validity of a statute of any state on the ground of its being repugnant to the Constitution, treaties or laws of the United States, and the decision is in favor of its validity."

In a case involving a dispute over extensive lands, *Fairfax's Devisee* v. *Hunter's Lessee* (1813), the Supreme Court had reversed Virginia's highest court and commanded it to enter a judgment in favour of the party originally ruled against. The Virginia court refused to obey the Supreme Court's mandate, declaring that "the appellate power of the Supreme Court of the United States does not extend to this court." As a result, the Supreme Court in *Martin* v. *Hunter's Lessee* (1816) affirmed the constitutionality of the Judiciary Act, thus asserting its right to appellate jurisdiction.

Chief Justice John Marshall did not participate in either decision because he and his brother had contracted to purchase part of the land. Thus, the Cohens case presented him with his first opportunity to express himself on appellate jurisdiction. Two brothers named Cohen had been convicted in a Norfolk, Vir., court for selling District of Columbia lottery tickets in violation of Virginia law. The Cohens claimed they were immune from state laws because the lottery tickets had been authorized by Congress. Although the U.S. Supreme Court decided against them on the merits of the case, an opinion by Marshall reasserted the Supreme Court's jurisdiction over state courts and took a harsh view of the reliability of state courts. Marshall wrote, "In many states, the judges are dependent for office and for salary on the will of the legislature. [When] we observe the importance which [the Constitution] attaches to the independence of judges, we are the less inclined to suppose that it can have intended to leave these constitutional questions to tribunals where this independence may not exist, in all cases where a state shall prosecute an individual who claims the protection of an act of Congress."

coherence, a fixed relationship between the phase of waves in a beam of radiation of a single frequency. Two beams of light are coherent when the phase difference between their waves is constant; they are noncoherent if there is a random or changing phase relationship. Stable interference patterns are formed only by radiation emitted by coherent sources, ordinarily produced by splitting a single beam into two or more beams. A laser, unlike an incandescent source, produces a beam in which all the components bear a fixed relationship to each other.

cohesion, in physics, the intermolecular attractive force acting between two adjacent portions of a substance, particularly of a solid or liquid. It is this force that holds a piece of matter together. Intermolecular forces act also between two dissimilar substances in contact, a phenomenon called adhesion. These forces originate principally because of coulomb (electrical) forces. When two molecules are close together, they are repelled; when farther apart, they are attracted; and when they are at an intermediate distance, their potential energy is at a minimum, requiring the expenditure of work to either approximate or separate them. Thus, work is required to pull apart two objects in intimate contact, whether they be of the same or different material.

The attractive forces of cohesion and adhesion act over a short range and vary in magnitude, depending on the substances concerned. If a piece of glass is submerged in water and then withdrawn, it will be wet—*i.e.,* water will cling to it, showing that the force of adhesion between water and glass molecules is greater than the force of cohesion between water molecules.

cohesion hypothesis, in botany, a generally accepted explanation of the rise of sap in plants by means of intermolecular attractions. Calculation and experiment indicate that the forces of cohesion between water molecules and the forces of adhesion between water molecules and the walls of the vessel cells are sufficient to confer on thin columns of water a tensile strength of at least 30 atmospheres (440 pounds per square inch). This is high enough to permit a thin column of water to be lifted to the top of any tree without breaking the column. The cohesion of water explains only maintenance of the sap column; the explanation for the upward movement of the water is accounted for by a mechanism, called transpiration pull, that involves the evaporation of water from leaves. Thus, the explanation for the upward movement of sap in trees is also called the transpiration–cohesion hypothesis. It accounts for the observed rise of sap and agrees with observed tensions (pressures below zero, negative pressures) in plant stems and gradients of tension between upper and lower parts of the same plant. The stability of water columns in wind-tossed trees is more difficult to understand. It is possible only because the water is enclosed in millions of small compartments (tracheids and vessels).

Cohn, Edwin Joseph (b. Dec. 17, 1892, New York City—d. Oct. 1, 1953, Boston), American biochemist who helped develop the methods of blood fractionation (the separation of plasma proteins into fractions). During World War II he headed a team of chemists, physicians, and medical scientists who made possible the large-scale production of human plasma fractions for treatment of the wounded.

Cohn received his Ph.D. from the University of Chicago in 1917 and began what was to be his lifelong study of proteins with Thomas B. Osborne at the Connecticut Agricultural Experimental Station. From 1922 to 1949 Cohn was a member of the department of physical chemistry at Harvard Medical School, serving as department head from 1935 to 1949.

In about 1930 Cohn began to study the components of protein molecules—amino acids and peptides. He and other investigators correlated the structures of the molecules with their physical properties, determining basic principles that became the foundation for the further study of proteins.

During World War II, with the support of the U.S. Office of Scientific Research and Development, Cohn and his colleagues devised methods to produce vitally needed human plasma fractions—serum albumin, gamma globulin, fibrinogen, and fibrin—for use by the military. Cohn himself oversaw the Navy's serum albumin program, supervising the training of technologists and establishing and monitoring processing standards. The methods pioneered by Cohn and his associates were adopted by industry, and the products were distributed for treatment of the armed forces and later for use in civilian medicine.

Cohn, Ferdinand (Julius) (b. Jan. 24, 1828, Breslau, Silesia, Prussia—d. June 25, 1898, Breslau), German naturalist and botanist known for his studies of algae, bacteria, and fungi. He is considered one of the founders of bacteriology.

Cohn was born in the ghetto of Breslau, the first of three sons of a Jewish merchant. His father spared no effort in the education of his precocious oldest child, and Ferdinand retained a melancholy recollection of his overly studious childhood. Cohn started his higher studies at the University of Breslau where,

as a Jew, he could not be admitted to the candidacy for the doctor's degree. So instead he received his Ph.D. from the more liberal University of Berlin, at the young age of 19.

In 1850 Cohn was named lecturer at the University of Breslau. He became extraordinary professor there in 1859 and finally became ordinary professor of botany at the university in 1871. In 1866 he founded and in 1872 became the director of the Institute of Plant Physiology at the University of Breslau; this was the first institute of plant physiology in the world.

Cohn's early research centred on the unicellular algae, the lowest forms of plant life. He applied to these organisms the principle that



Ferdinand Cohn

By courtesy of the Johns Hopkins Institute of the History of Medicine, Baltimore, Maryland

the phases of growth of microscopic plants could be learned only by observing every stage of their development under the microscope, just as differences in the youthful and adult appearance of an oak or a fern are traced by direct observation. His accounts of the life histories of a number of algae species were of permanent value, and in 1855 he helped to establish the existence of sexual processes in algae, specifically in *Sphaeroplea*. He also instituted marked reforms in the classification of algae.

Around 1868 Cohn started to study bacteria. From his accurate studies of their morphology, or bodily form, he was among the first to attempt to arrange the different varieties of bacteria into genera and species on a systematic basis. Up to that time, Louis Pasteur and others had been content with a rather arbitrary and confusing system of nomenclature. Cohn based the four groups and six genera of bacteria within his system on basic morphological differences, although he pointed out that morphology alone was an insufficient basis for classification and that differences in biochemical characteristics could also be important.

In 1870 Cohn founded a new journal entitled *Beiträge zur Biologie der Pflanzen* ("Contributions to the Biology of Plants"), in which he played such a large part that it came to be known as "Cohn's *Beiträge*." Many of the founding papers of bacteriology were to be published in this journal.

Among Cohn's most striking contributions was his discovery of the formation and germination of spores (called endospores) in certain bacteria, particularly in *Bacillus subtilis*. He was also the first to note endospores' resistance to high temperatures, and by his observations he was able to refute contemporary experiments that seemed to lend support to the theory of spontaneous generation. Cohn explained the quick reappearance of bacteria in thoroughly boiled flasks of hay and turnip–cheese infusions by speculating that the bacteria within them had formed thermoresistant spores and were thus able to survive the boiling intact, after which they reverted to their normal reproductive stages. He was thus able to refute other bacteriologists' assumptions that all the bacteria in the boiled infusions had been killed by the heat, and he showed the fallacy of their reliance on spontaneous generation as the only remaining explanation.

In 1876 Robert Koch, who was then unknown but was later to become the founder of medical bacteriology, turned to Cohn for a prepublication appraisal of his work on the cause of anthrax, a disease of cattle, sheep, and, sometimes, of man. Cohn agreed to see the unknown country physician and quickly recognized Koch as "an unsurpassed master of scientific research." It was in Cohn's *Beiträge* that Koch published his paper demonstrating that *Bacillus anthracis* was the causative agent of anthrax, and it was through Cohn's support that Koch was appointed to the Imperial Health Office in Berlin, where he continued his brilliant work.

During his lifetime Cohn was recognized as the foremost bacteriologist of his day. He is noted for his formulation of the concept that bacteria can be classified into species on the basis of their morphology and physiological characteristics, and for his discovery of the bacterial endospore, an advance that played an important part in the development of techniques of sterilization and in the rejection of the doctrine of spontaneous generation. But perhaps his greatest achievement was his introduction of the strict and systematic observation of the life histories of bacteria, algae, and other microorganisms.

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Cohn, Harry (b. July 23, 1891, New York City—d. Feb. 27, 1958, Phoenix, Ariz., U.S.), cofounder, with his brother Jack Cohn and Joe Brandt, of Columbia Pictures, of which he was president and head of production.

The son of an immigrant Polish Jewish tailor, Cohn quit school early and worked at sundry jobs before becoming a singer in vaudeville and at film shows. His motion-picture career began with a film distributor in New York City. In 1920 he, his brother Jack, and Brandt founded C.B.C. Film Sales Company, and he went to Hollywood to begin production. The company was reorganized and became Columbia Pictures Corporation in 1924.

During Cohn's regime, widely regarded as dictatorial, Columbia had the highest personnel turnover of any studio, but it was nonetheless a major force in the 1930s and 1940s. Cohn did have a flair for promoting new talent, and he was personally responsible for the success of many stars, including Rita Hayworth and Kim Novak. Director Frank Capra did his greatest work for Columbia, in such films as *It Happened One Night* (1934), *Mr. Deeds Goes to Town* (1936), *Lost Horizon* (1937), and *It's a Wonderful Life* (1946). Other classic Columbia films during Cohn's era included *All the King's Men* (1949), *Born Yesterday* (1950), *From Here to Eternity* (1953), *On the Waterfront* (1954), and *Bridge on the River Kwai* (1957).

Cohn is supposed to have inspired the characterizations of the junk tycoon in *Born Yesterday* and the tyrannical movie mogul in *The Big Knife*. A biography, *King Cohn*, by Bob Thomas, was published in 1967.

Cohnheim, Julius Friedrich (b. July 20, 1839, Demmin, Prussia—d. Aug. 15, 1884, Leipzig), pioneer of experimental pathology who helped determine the morbid changes that occur in animal tissue affected by inflammation, tuberculosis, and other disease states.



Cohnheim

The Bettmann Archive

At the Pathological Institute, Berlin (1865–68), Cohnheim was an outstanding pupil of Rudolf Virchow, founder of the science of pathology. While assisting him, Cohnheim also conducted extensive research into the causes of inflammation. By 1867, he confirmed earlier suspicions that the condition results from the passage of leukocytes (white blood corpuscles) through capillary walls and into tissues, and that pus consists mainly of the debris formed by disintegration of these leukocytes. He summarized his findings in *Neue Untersuchungen über die Entzündung* (1873; "Recent Researches on Inflammation").

Cohnheim served as professor of pathology at the universities of Kiel (1868–72) and Breslau (1872–78), where in 1876 he witnessed Robert Koch's historic demonstration of the infectivity of anthrax bacilli. Cohnheim's induction of tuberculosis in the anterior chamber of a rabbit's eye one year later led to Koch's discovery of the tuberculosis bacillus.

Cohnheim's *Vorlesungen über allgemeine Pathologie*, 2 vol. (1877–80; *Lectures on General Pathology*), far outlasted contemporary texts on the subject, and his method of freezing tissue before slicing it into thin sections for microscopic examination is now a standard clinical procedure.

coho, also called SILVER SALMON (*Oncorhynchus kisutch*), species of salmon, family Salmonidae, prized for food and sport. The coho weighs about 4.5 kg (10 pounds) and is recognized by the small spots on the back and upper tail-fin lobe. Young coho stay in fresh water for about one year before entering North Pacific waters; they mature in about three years. Some populations, called landlocked, spend their entire lives in suitable bodies of fresh water. Cohos were transplanted into Lake Michigan, U.S., and Canada, as a game fish in the 1970s, with conspicuous success.



Coho salmon (*Oncorhynchus kisutch*) in spawning phase

cohoba, also called YOPO, hallucinogenic snuff made from the seeds of a tropical American tree (*Piptadenia peregrina*) and used by Indians of the Caribbean and South America at the time of early Spanish explorations. DMT (*N,N*-dimethyltryptamine) and bufotenine (*qq.v.*) are thought to have been the active principles. Cohoba was inhaled deeply by means of special bilateral tubes.

Cohoes, city, Albany county, eastern New York, U.S., at the "Great Falls" (70 ft [21 m] high) of the Mohawk River, where it tumbles into the Hudson. Settled in 1665 by the Dutch Van Schaick family on the colonial military road between Albany (10 mi [16 km] south) and Lake George, its name is of Algonkian Indian origin meaning "pine tree." Growth was influenced by the completion of the Erie Canal in 1825 and the construction of a dam at the falls, which provided abundant waterpower. An early textile centre, it has developed other manufactures including paper products, alarm systems, and small boats. The Van Schaick Mansion (1735) was the headquarters of Gen. Horatio Gates during the American Revolution and is maintained as a museum. Inc. 1869. Pop. (1990) 16,825.

cohong, Wade–Giles romanization KUNG-HUNG, also called HONG, or CONG-HONG, the guild of Chinese merchants authorized by the central government to trade with Western merchants at Canton prior to the first Opium War (1839–42). Such firms often were called "foreign-trade firms" (*yang-hang*) and the merchants who directed them "hong merchants" (*hang-shang*). In existence by the mid-17th century, these merchants theoretically numbered 13 but frequently totalled no more than 4. A system was established in the 1740s that required each foreign ship arriving at Canton to be supervised by a hong merchant, who would guarantee to the Chinese government the payment of all duties and the proper behaviour of the foreign traders. When Canton became the only Chinese port open to foreign trade (1760), the hong merchants were the only merchants in Canton who were permitted to sell tea and silk to the Westerners. Although the hong merchants were subject to heavy exactions from officials, a few, such as Howqua (also called Wu Ping-chien), accumulated great wealth.

From 1720 to 1722 the hong merchants established a system of collective price-fixing, which required the taking of a blood oath, as practiced by the Chinese merchant guilds. Under the leadership of the Hoppo, the director of the Canton maritime customs, the hong merchants formed the *kung-hang* (1760). Although the term *kung-hang* connoted a price-fixing association, its pidgin English corruption, cohong, applied to the merchants in a general sense. Though the hong merchants collectively enjoyed their monopoly of the foreign trade at Canton, they were actually quite independent in their dealings.

Cohors Praetoria: *see* Praetorian Guard.

cohort analysis, method used in studies to describe an aggregate of individuals having in common a significant event in their life histories, such as year of birth (birth cohort) or year of marriage (marriage cohort). The concept of cohort is useful because occurrence rates of various forms of behaviour are often influenced by the length of time elapsed since the event defining the cohort—*e.g.,* the rate of fertility is influenced by the event of marriage. The idea of cohorts is similar to that of generations, although some writers avoid the latter term because it also has other connotations.

Cohort analysis has been used most extensively in demography, especially in studies of fertility. When statistics show a rise in the total fertility rate over a given period, for example, cohort analysis may reveal that this results from a lowering of the cohort mean age of fertility rather than simply a rise in the cohort total fertility rate.

cohune oil, also called COHUNE-NUT OIL, cohune also spelled COHOUN, oil obtained from the kernels of the fruits, or nuts, of the cohune palm tree, *Attalea cohune.* The tree grows in western Central America from the Yucatán Peninsula to Honduras. The oil's properties, similar to those of coconut oil, have given it increasing importance. Because the nuts are unusually hard and difficult to crack and their collection and transportation present problems, commercial oil recovery has been relatively undeveloped.

The kernels are 65 to 70 percent oil, but they amount to only about 10 percent of the weight of the nut.

Coiba Island, also spelled QUIBO ISLAND, Spanish ISLA DE COIBA or QUIBO, Central American island in the Pacific Ocean, administered by Veraguas province, Panama. Lying 15 mi (24 km) offshore and separated from the mainland by the Gulf of Montijo on the east and the Gulf of Chiriquí on the northwest, the island measures about 20 mi from north to south and 10 mi from east to west. It has an area of 191 sq mi (494 sq km) and rises to a maximum elevation of 1,400 ft (425 m). Coiba is the site of a penitentiary and an observatory. Pop. (1980) 809.

coif, close-fitting cap of white linen that covered the ears and was tied with strings under the chin, like a baby's bonnet. It appeared at the end of the 12th century as an additional head protection worn under the hood by men, and it persisted into the 16th century as ecclesiastic or legal headgear, sometimes worn alone, sometimes as an undercap.

The coif could also be an indoor skullcap of black cloth or silk. As worn by women from the 16th to the 18th century, it was sometimes



Woman wearing a coif, detail of "Portrait of Catherine Howard," oil on wood panel by Hans Holbein, the Younger, 1540–41; in the Toledo Museum of Art, Toledo, Ohio, gift of Edward Drummond Libbey

By courtesy of the Toledo Museum of Art, Toledo, Ohio

embroidered in coloured silks and made to curve out over the ears or was simple and kept under a hat.

Coihaique, city, capital of Aisén Region in southern archipelagic Chile, 50 mi (80 km) inland of Puerto Aisén and 25 mi (40 km) west of the Argentine border. Founded in 1912 by a small group of German colonists, it is situated among grassy steppes between the Coihaique and Simpson rivers, in a densely forested and extremely wet coastal region of Patagonian Chile (rainfall reaches 58 in. [1,485 mm] annually). Although some wheat, barley, oats, potatoes, and fruit are produced in the immediate area, the city's recent growth is attributable to a flourishing pastoral industry, primarily cattle and sheep. Established as the regional capital in 1974, the city was in the early 1980s the largest of the region and the economic centre, providing commercial and financial services, and supporting light industry. It is linked by road to Puerto Montt, Quellón, and Puerto Chacabuco. Pop. (1982 prelim.) 31,167.

coil, in an electric circuit, one or more turns, usually roughly circular or cylindrical, of current-carrying wire designed to produce a magnetic field or to provide electrical resistance or inductance; in the latter case, a coil is also called a choke coil (*see also* inductance). A soft iron core placed within a coil produces an electromagnet. A cylindrical coil that moves a plunger within it by variations in the current through the coil is known as a solenoid (*q.v.*).

Coimbatore, town, administrative headquarters of Coimbatore district, Tamil Nādu state, southeastern India. Coimbatore is located on the Noyil River, 300 mi (480 km) south of Madras, on the Madras–Calicut (now Kozhikode) road. Long important as commanding the Pālghāt Gap to the west coast, it is a trade and processing centre for agricultural produce and a manufacturing centre for agricultural implements. Coimbatore houses agricultural and engineering schools, 16 colleges affiliated with the University of Madras, and an industrial and commercial museum and model centre.

Coimbatore district (2,900 sq mi [7,500 sq km]) comprises a fertile, undulating plateau 3,000 ft (900 m) above sea level. Surrounded by the Nīlgiri (northwest) and Anaimalai and Palni (south) ranges of the Western Ghāts, it has a warm, dry climate and has been subject to famines. The plateau is an important cotton-producing region, and coffee and tea are grown in the hills, in which timber such as teak and sandalwood is also produced. Deposits of limestone, mica, asbestos, and beryl are mined.

There is evidence of extensive prehistoric occupation in the Coimbatore region. Until the 9th century AD it was an autonomous territory known as Koṅgu Nād, but it was later conquered by Vijayanagar, Muslim, and British rulers. The Bhoodan (Gift of Land) movement for the redistribution of land to the landless peasants began in the district in the 1950s.

Coimbatore is the second most highly industrialized district in Tamil Nādu state after Madras city. Industries include cotton milling, food processing, and the manufacture of transport equipment. Pop. (1981) town, 704,514; metropolitan area, 920,355; district, 3,060,184.

Coimbra, city, capital, and *concelho* (municipality), Coimbra district, north central Portugal, on the northern bank of the Rio Mondego. A 4th-century Latin inscription identifies Coimbra with Aeminium, while Condeixa, 8 mi (13 km) southwest, was the ancient Conimbriga or Conimbrica. Aeminium was for more than a century a Moorish stronghold, but in 878 it was recaptured by Alfonso III of Asturias and Leon and peopled by Galicians from the north. When the see of Conimbriga was transferred there, the bishop kept the



Old section of the University of Coimbra, Portugal

C.I.R.I.—EDISTUDIO

old name and Aeminium became known as Coimbra. Captured by Ferdinand I of Castile in 1064, it was for more than a century a base for the reconquest of Portugal from the Moors.

From 1139 until 1260, when it was replaced by Lisbon, the city of Coimbra was the capital of Portugal. Six medieval kings—Sancho I and II, Afonso II and III, Pedro I, and Ferdinand I—were born there, as was the 16th-century poet Francisco de Sá de Miranda. Portugal's oldest university, founded in 1290 in Lisbon, finally settled at Coimbra as the Universidade de Coimbra in 1537. Its chapel has a magnificently carved door (1517–22) and a richly decorated Baroque library (1716–23), which has 1,000,000 volumes and 3,000 manuscripts, among them a first edition of Luís de Camões' epic *Os Lusíadas* (1572; "The Portuguese"). In the early 16th century the city was a centre for polyphonic music, which travelers carried to Ethiopia and to the Congo.

Other notable landmarks in Coimbra include the Romanesque old cathedral (1170); the church of São Salvador (12th century); the new cathedral, begun in 1598; the Machado de Castro Museum in the old episcopal palace, restored in 1592; Santa Cruz church, built in the reign of Afonso I and rebuilt in 1520; the Aqueduct de São Sebastião (1568–70), rebuilt on Roman foundations; and the 12th-century Monastery of Celas, built by Beata Sancha, daughter of Sancho I. On the north side of the Mondego, linked to Coimbra by a stone bridge, is the suburb of Santa Clara; within this suburb are the old 13th- and new 17th-century convents of Santa Clara, where Inez de Castro, mistress of King Pedro I, was supposedly murdered.

Coimbra's main industries are the making of pottery, fabrics, beer, wine, paper, and leather. A publishing house was established there in the 19th century. Coimbra lies along the electrified railroad and the highway between Porto and Lisbon. Another highway and railroad extend east from near Coimbra to Guarda and to Spain.

Coimbra district has an area of 1,524 square miles (3,947 square km). Agriculture (grain, olives, rice, fruits) and fishing are the main occupations. Small petroleum deposits have been found in the district, but they are not commercially exploited. Construction on the Agueira/Raiva hydroelectric project, about 35 miles (55 km) from Coimbra on the Rio Mondego, began in 1972. Pop. (1981) city, 79,799; *concelho,* 144,471; (1985 est.) district, 444,699.

Coimbra, Pedro, 1° duque de (1st duke of), byname DOM PEDRO (b. Dec. 9, 1392, Lisbon—d. May 20, 1449, Alfarrobeira, Port.), second son of King John I of Portugal, younger brother of King Edward, and uncle of Edward's son Afonso V, during whose minority he was regent.

The second of the "illustrious generation," comprising the sons of John I and Philippa of Lancaster, Pedro was present at the conquest of Ceuta from the Muslims in 1415 and later traveled abroad in Europe, encouraging his younger brother Henry the Navigator in his discoveries. King Edward died young, leaving his foreign wife as regent for their young son Afonso V. Pedro successfully challenged her, took over the regency, married his daughter to the young King, and ruled the country until his illegitimate half brother, the head of the powerful Bragança family, mobilized opposition to him, obtained the young King's care, and forced Pedro into rebellion. He was slain at the Battle of Alfarrobeira.

His son Pedro the Constable, after a long exile in Castile, returned and was offered the crown of Aragon by a party in Barcelona, where he shortly died.

Coín, city, Málaga province, in the autonomous community (region) of Andalusia, southern Spain. It is situated near the beach resort region of Costa del Sol. The site was first settled by the Turdetanos, an Iberian tribe, and was later occupied by the Romans, who established the town of Lacibis. In 713 the Arabs took the town, calling it Cohine (Pleasant Paradise), the basis of its present name; it also has been known as Dakuan or Castro-Dakwan. Coín was a Moorish stronghold until Ferdinand V of Castile (also Ferdinand II of Aragon) recaptured it from the Moors in 1485.

An agricultural trade centre, Coín deals in citrus fruits, grapes, wheat, olive oil, vermicelli, and sausages. Limestone and marble are quarried in the vicinity. Pop. (1981) 20,852.

coin, a piece of metal or, rarely, of some other material (such as leather or porcelain) certified by a mark or marks upon it as being of a specific intrinsic or exchange value.

A brief treatment of coins follows. For full treatment, *see* MACROPAEDIA: Coins and Coinage.

Coins or coinlike objects were first issued by the Lydians of Anatolia in the late 7th century BC and in the Far East somewhat later. Their use was quickly adopted around the Mediterranean and has since spread over the whole civilized world.

For many centuries in the West, few changes occurred in the hand-coining technique of the earliest producers, in which round cast-metal blanks were reheated and then imprinted by hammering with iron or bronze dies. Iron dies were sufficiently hard and durable to permit blanks to be coined while cold. Such dies continued to be used until the development of modern tool steels.

The major original objective in coinage—that it provide a known weight and composition, and therefore value, of a precious metal in convenient form—has proved extremely problematic throughout history. King Croesus of Lydia (reigned 560–546 BC) is generally credited with issuing the first official government coinage of certified purity and weight. Fluctuations in the availability of and demand for precious metals, coupled with the desire on the part of sovereigns to include in the face value of coins a surcharge for their production and warranty, led in the Middle Ages to the widespread debasement and counterfeiting of coinage. From the late 15th century, the development in Italy of equipment capable of providing coins of reliable weight and size fostered a resurgence of standardization throughout Europe. Developments during the Industrial Revolution led to further refinements in coinage techniques.

While coin design in the West has varied widely over the centuries in individual types, most of the basic motifs of modern coinage were introduced in antiquity. In the Greek world, relief imprinting gradually replaced the roughly impressed reverse punch of the Lydians. Early Greek coin types were simple in conception and generally employed animal motifs, often with cult associations. Alexander the Great introduced the coin-portrait, at first depicting gods or heroes and later living monarchs; this motif remains virtually ubiquitous.

During a span covering the Greek and Roman developments, the influence of which reached as far as India, it is notable that the Chinese never adopted any of the procedures involved in the striking of coins. Up until the end of the 19th century, Chinese coins were cast in much the same fashion as that used for casting round blanks by the early Greeks. The square-holed Chinese bronze coins were issued in essentially the same size and shape for almost 2,500 years.

coin collecting, also called NUMISMATICS, the systematic accumulation and study of coins, tokens, paper money, and objects of similar form and purpose.

The history of coin collecting begins with the Italian Renaissance, and the 14th-century poet Petrarch was characteristic of his time in forming a series of ancient classical coins. During the 15th and 16th centuries many collections were made by princely or noble persons for whom Greco-Roman coins possessed special appeal because these ancient cultures were so much admired. The systematic reproduction of the types of ancient coins, either by casting or from falsified dies, resulted in the inclusion in most collections of spurious and often imaginative pieces.

The 17th century initiated a period of more systematic analysis, as numismatic scholars set out to compare, catalog, and publish the existing great collections, both public and private. The advent of such compilations had important results. Distinction between the genuine and the spurious became surer, the recording of new material was all the more keenly undertaken, and the part played by numismatic evidence in historical reconstruction was increasingly understood.

The number of collectors grew in the 19th and 20th centuries, and the output of authoritative catalogs and handbooks (including the British Museum series from 1873) also increased. The growth of the avocation was reflected in the foundation in many countries of specialist societies responsible for scholarly publications (beginning in 1836 with the Numismatic Society of London, now the Royal Numismatic Society). The day of the great private collection was not yet done, but in general the small collections of the 20th century have had to specialize somewhat narrowly to achieve scientific value. The number of coin collectors increased greatly in the 20th century. Public museums have taken over the main task of forming large collections of great detail and range; those of London, Oxford, Cambridge, Glasgow, Paris, Berlin, Vienna, Munich, Boston, and New York City are among the richest. London (followed by Zürich) is the world's largest numismatic market, serving the interests of public collections and private collectors in many lands. Inasmuch as the interests of both are directed increasingly toward the systematic elucidation of historical and economic problems, international cooperation has become more important, being exercised chiefly through the International Numismatic Commission (formed in 1936), which is itself associated with the International Committee for Historical Sciences.

A frequent justification for collecting coins is their investment value. Since the number of a particular coin issue remains static or decreases as coins are worn, damaged, lost, or destroyed, its value generally increases over time, especially if demand by collectors for that issue increases. Coins are also usually worth at least face value for their metal alone. The physical condition (degree of wear) of a coin is an important determinant of its value and is often graded as follows:

Proof: specially struck and polished for sale to collectors (sets of proof coins are issued annually by the governments of the United States and many other countries)
Uncirculated: no marks of wear or damage
Extremely Fine: no clear signs of wear but finish dulled
Very Fine: minor wear
Fine: somewhat worn but with detail still sharp
Very Good: obvious signs of wear
Good: worn but with detail still clear
Fair: quite worn or damaged
Poor: badly worn but with design still discernible

Mint marks may also influence value, since fewer coins of a particular denomination may

be produced at a given mint, making them more rare and, thus, more valuable.

coin glass, glassware usually in the form of wineglasses, goblets, or tankards enclosing a coin either in the foot, or in the hollow knop of the stem, rarely in an interior bulb. A Venetian specimen of coin glass dated 1647 is known, but the principal occurrence is in English glass from about 1650 onward. It was a useful device for expressing Jacobite or anti-Jacobite sympathies with either a Stuart or a Hanover coin. Early 19th-century loving cups and similar pieces in Boston glass generally had hollow stems enclosing coins.

coincidence counting, in physics, the detection of two nuclear or cosmic ray events that occur almost simultaneously (*e.g.*, within a time of 10^{-5} second). Coincidence counting involves two or more particle counters exposed to the same source of cosmic rays or nuclear radiation and connected to an electronic coincidence circuit. One principal use of the coincidence technique is to detect particles emitted simultaneously from the same nucleus—*e.g.*, a beta particle and a gamma ray photon.

In anticoincidence counting, two counters are connected so that a pulse from a cosmic ray or nuclear particle is recorded by one of them only if there is no simultaneous pulse (for example, by a spurious event) in the other.

Coindre, André (b. Feb. 26, 1787, Lyon—d. May 30, 1826, Blois, Fr.), founder of the Fratres a Sacratissimo Corde Iesu (Brothers of the Sacred Heart), a Roman Catholic religious order primarily devoted to high school and elementary school education; the brotherhood is also a missionary society.

Coindre, in his formative years, witnessed the devastating aftermath of the persecution of the church conducted by French Revolutionary forces. That experience influenced his decisive role in France's ecclesiastical reconstruction. Educated at the French seminaries in Argentière and in Lyon (1809–12), where he was ordained priest, Coindre zealously began his ministry at Bourg, Fr. In 1813 Napoleon asked him to preach at the primal Cathedral of Saint-Jean, Lyon.

By 1815 Coindre's fame as a preacher caused the Charterhouse Missionaries, instituted by Cardinal Fesch in 1806, with their headquarters at Lyon, to engage his services. He preached, led missions, and headed diocesan conferences. In 1818 he helped Claudine Thévenet found the Ladies of the Sacred Hearts of Jesus and Mary (after 1891 known as Religious of Jesus–Mary) for the education of girls. By 1820 he had established, near Lyon, an orphanage and trade school (Pieux-Secours) for homeless boys, which became so successful that with 10 recruits he founded his religious congregation on Sept. 23, 1821. They dedicated themselves to the apostolate of Catholic education. In the next year, concurrent with founding a new seminary, he organized a group of diocesan missionaries at the monastery of Monistrol-sur-Loire, Fr., which became the Association of the Sacred Heart of Jesus. There he lived, transferring the novices at Pieux-Secours to Monistrol in the same year.

In 1824 and 1825 he opened six more schools; the congregation had grown to such an extent that on Oct. 14, 1824, the first general chapter of the institute was formulated with Coindre as superior general and later (November 1825) vicar general. He was invited to establish a seminary at Blois, where he died suddenly. Coindre's work was then carried on by his brother Vincent. The order received its final approbation from Pope Pius XI in 1927. Their motherhouse was transferred to Rome in 1950, and their missions have extended throughout the world. *The Brothers of the Sacred Heart* (1961) contains a life of Coindre and a history of the institute.

Coipasa, Salar de, salt flat, in the bleak Altiplano of Bolivia, about 100 air mi (160 air km) southwest of the city of Oruro, near the Chilean border. At an altitude of 12,073 ft (3,680 m), the flat, Bolivia's second largest (after Salar de Uyuni), occupies 856 sq mi (2,218 sq km). Lago (lake) de Coipasa directly to the north receives the intermittently flowing Río Lauca from the northwest and is connected to Lago de Poopó to the east by the Río Lacajahuira.

coir, seed-hair fibre obtained from the outer shell, or husk, of the coconut, the fruit of *Cocos nucifera*, a tropical plant of the Arecaceae (Palmae) family. The coarse, stiff, reddish brown fibre is made up of smaller threads, each about 0.01 to 0.04 inch (0.03 to 0.1 centimetre) long and 12 to 24 microns (a micron is about 0.00004 inch) in diameter, composed of lignin, a woody plant substance, and cellulose. Sri Lanka is the centre of coir preparation, with hand processing, believed to produce a superior fibre, concentrated in the southwestern part of the island.

The processed fibres, ranging from about 4 to 12 inches (10 to 30 centimetres) in length, are light in weight, brittle, strong, and elastic, with a tendency to curl. They are resistant to abrasion and can be dyed. They are used to make brushes, are woven into matting, and are spun into yarns for marine cordage and fishnets.

Coira, also spelled COIRE (Switzerland): *see* Chur.

Coiter, Volcher, Coiter also spelled COYTER, or KOYTER (b. 1534, Groningen, Neth.—d. 1590?), physician who established the study of comparative osteology and first described cerebrospinal meningitis. Through a grant from Groningen he studied in Italy and France and was a pupil of Fallopius, Eustachius, Arantius, and Rondelet. He became city physician of Nürnberg (1569) and later entered military service as field surgeon to Johann Casimir, the palatine prince.

Coiter's researches included postmortem studies. He described human embryology as well as the comparative osteology of animals and illustrated his own work. He also investigated the sense organs and the nervous system.

coitus: *see* sexual intercourse.

Čojbalsan: *see* Choybalsan.

Cojedes, inland state, northwestern Venezuela, surrounded by the states of Yaracuy and Carabobo on the north, Guárico on the east, Barinas on the south, and Portuguesa on the west. Since colonial days cattle raising has dominated the local economy. The state, which has an area of 5,714 sq mi (14,800 sq km), lies mainly in the Llanos (plains), with no elevation above 700 ft (210 m). Drained by secondary tributaries of the Orinoco River, Cojedes has a tropical climate with extremes of wetness and dryness, which brings hardship to the cattlemen, who must contend with hazards of flooding as well as drought. About 50 in. (1,000 mm) of rain fall during the rainy season (May to September or October). There is some agriculture: coffee is grown in the low northern hills, and corn (maize), cotton, sugarcane, and cassava are cultivated in irrigated lands in the south. San Carlos (*q.v.*), the state capital, and Tinaquillo are the principal market centres. Pop. (1983) 129,634.

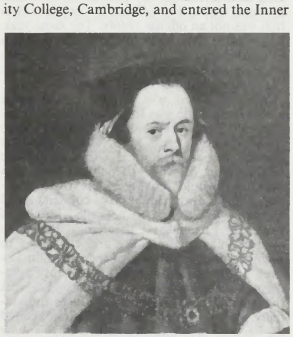
Cojutepeque, capital of Cuscatlán department, central El Salvador, located near Lake Ilopango on the Inter-American Highway, a section of the Pan-American Highway, at the northern foot of Cerro Las Pavas. Originally an Indian settlement, it was founded in 1571 and was declared a town in 1787 and a city in 1846. The economy is based on agriculture and associated industries (sugar milling, liquor distilling, and cotton milling). On August 29, Cojutepeque celebrates the feast of St. John, when thousands of people flock there to join the festivities and to trade their wares. Pop. (1980 est.) mun., 35,011.

coke, solid residue remaining after certain types of bituminous coals are heated to a high temperature out of contact with air until substantially all of the volatile constituents have been driven off. The residue is chiefly carbon, with minor amounts of hydrogen, nitrogen, sulfur, and oxygen. Also present in coke is the mineral matter in the original coal, chemically altered and decomposed during the coking process.

Oven coke (size: 40 to 100 millimetres, about 1½ to 4 inches) is used throughout the world in blast furnaces to make iron. Smaller quantities of coke are used in other metallurgical processes, such as the manufacture of ferroalloys, lead, and zinc, and in kilns to make lime and magnesia. Large, strong coke, known as foundry coke, is used in foundry cupolas to smelt iron ores. Smaller sizes of both oven and gas coke (15 to 50 millimetres) are used to heat houses and commercial buildings. Coke measuring 10 to 25 millimetres in size is employed in the manufacture of phosphorus and of calcium carbide, the raw material from which acetylene is made. Coke breeze (less than 12 millimetres) is applied to the sintering of small iron ore prior to use in blast furnaces. Any surplus breeze coke becomes industrial boiler fuel.

Coke, Sir Edward (b. Feb. 1, 1552, Mileham, Norfolk, Eng.—d. Sept. 3, 1634, Stoke Poges, Buckinghamshire), British jurist and politician whose defense of the supremacy of the common law against Stuart claims of the royal prerogative had a profound influence on the development of the English law and constitution.

Early life and public service. Coke was educated at Norwich Grammar School and Trinity College, Cambridge, and entered the Inner



Sir Edward Coke, detail of an oil painting by Paul van Somer; in the Inner Temple, London

By courtesy of the Inner Temple, London; photograph, Courtauld Institute of Art

Temple, one of the four inns of court that constituted "colleges in the university of law," in 1572. Called to the bar in 1578, he soon acquired a reputation; his early cases included the Cromwell libel case for words uttered by Edward Denny, a Norfolk vicar, imputing sedition to Henry, Lord Cromwell, and Shelley's case, a seminal decision in the history of English land law. Under the patronage of William Cecil, Lord Burghley, Elizabeth I's

first minister, Coke entered the public service and rose rapidly, becoming member of Parliament for Aldeburgh in 1589 and solicitor general and recorder of London in 1592. A year later he was elected speaker of the House of Commons, showing considerable skill in carrying out Queen Elizabeth's policy of curbing the Commons' passion for discussing ecclesiastical matters. In 1593 he first crossed Francis Bacon. The attorney generalship fell vacant, and Bacon, supported by the Earl of Essex, was Coke's rival for the post. Coke won the appointment in 1594 and then kept Bacon from becoming solicitor general as well, or so Bacon thought. Coke's first wife, Bridget Paston, died in 1598, and four months later Bacon was again his unsuccessful rival when Coke married Lady Elizabeth Hatton.

As attorney general, Coke was the champion of the crown and its prerogative powers. He started a series of state prosecutions for libel and conducted several great treason trials of the day, prosecuting the earls of Essex and Southampton (1600–01), Sir Walter Raleigh in 1603, and the Gunpowder Plot conspirators in 1605. His methods in these trials, especially in that of Raleigh, were brutal even by the standards of his age.

Career as a chief justice. In 1606 Coke was made chief justice of the Court of Common Pleas and there began the series of conflicts that eventually broke his judicial career. At the time of Coke's appointment, Archbishop Richard Bancroft had already started his attempt to shake off the control of the common-law courts over the jurisdiction of ecclesiastical courts. This matter came to a head in Fuller's case (1607–08) when Coke, summoned to a disputation on the king's power to withdraw a case from the courts, earned James I's fury by asserting that the common law was the supreme law and that "the king in his own person cannot adjudge any case." In 1610 Coke again crossed King James in a celebrated opinion on proclamations before the royal council, in which he stated that the king cannot change any part of the common law nor create any offense by proclamation that was not an offense before. The same year, he disputed the claim of the Court of High Commission to imprison for adultery, and, when in 1611 James attempted to put him on the commission, he refused.

Coke's position was strong. Incorruptible and respected, he was the embodiment of the common law. A last attempt was made to "buy" him in August 1613, when James, on Bacon's advice, appointed him chief justice of the Court of King's Bench, where it was hoped he would look after the royal interests. He was also made a privy councillor and as such was the first to be called lord chief justice of England. At the King's Bench he retained his predominance and continued to maintain the supremacy of the common law over all persons and institutions except Parliament. In Peacham's case he protested against the practice of consulting the judges individually and separately, which James, abetted by Bacon, was more or less driven to follow when the whole bench, if consulted together, merely echoed Coke. In 1615, however, he overreached himself when the Court of King's Bench started, and failed to win, a dispute with Lord Chancellor Ellesmere of the Court of Chancery over that court's right to interfere with, and indirectly nullify, a common-law decision. Coke was also believed to be at the bottom of the abortive attempt to make some suitors who had attempted to invoke the Court of Chancery's assistance in defiance of a King's Bench decree liable to the penalties of a praemunire (an offense against the king and his government). Meanwhile, he had further endangered his position by throwing out from the bench in the Overbury murder trials dark hints of scandal in high places ("God knows what became of that sweet babe, Prince Henry, but I know somewhat"). Finally he came into collision with James I over the king's right to grant permission to hold several ecclesiastical benefices at the same time. Coke and the other judges ignored a royal injunction that they should take no action on a case involving this right until the king's pleasure was known. They were called before the king and council and ordered to obey the injunction. The other judges submitted, but Coke merely said that he would do what an honest and just judge ought to do.

Dismissal from office. In June 1616 the Privy Council, with Bacon behind it, formulated three charges against him. One was a trivial matter, never proved, about a bond that had passed through his hands. The other two were charges of interference with the Court of Chancery and of disrespect to the king in the matter of plural benefices. Coke was forbidden to go on circuit, ordered to revise the "errors" in his *Reports*, and on Nov. 14, 1616, he was dismissed. Thereupon, presumably in search of an influential friend, he offered his daughter in marriage to Sir John Villiers, brother of the Duke of Buckingham. His wife, supported by Bacon, objected and hid the child, who was then only 14. Coke abducted her violently and had her married, strongly against her will, to Villiers. Coke then made a gradual return to public life and by 1617 was back in the Privy Council and in the Star Chamber.

In 1620 Coke entered Parliament again as member for a Cornish borough, in theory as a supporter of the king. Yet for the rest of his career he was a leading member of the popular party. He opposed Prince Charles's proposed Spanish marriage, took a part in drawing up the bribery charges against Bacon, and spoke in 1621 in major debates on the liberties of Parliament. He spent nine months in prison as a result, but nothing was found that could incriminate him. In 1628 it was his bill of liberties that ultimately took the form of the Petition of Right. This was his greatest parliamentary hour. Admitting his changed views, Coke, at the age of 76, molded the ancient precedents, including Magna Carta, into a charter of liberty limiting the royal prerogative. He retired at the end of the session. After Coke's death, his papers were instantly seized, and some, including his will, were never recovered.

Assessment. It is true that Coke was inclined to be overbearing and impatient both at the bar and on the bench, that he was undoubtedly rather narrow, and that he was not always logical. His knowledge of law, however, was unequaled, though he "read the *Year Books* [the old *Law Reports*] as a Tudor, not as a medieval lawyer." Coke manipulated medieval "precedents" and used them to support his 17th-century view of the common law. He successfully upheld this common law in the courts and in Parliament, against the church, the admiralty, and the dangerous claims of the royal prerogative. He only failed in trying to uphold it against the chancery (the High Court of Equity), which was too strong for him.

While he was issuing his *Reports*, in which he systematized the principles of English law as he related and commented on decisions, no other jurists published theirs. They are not so much reports in the modern sense as compendiums of the law bearing on a particular case, with personal comments on points raised or general remarks. A balanced estimate of his importance as a legal authority is that of Chief Justice William Best in 1824:

> The fact is, Lord Coke had [often] no authority for what he states, but I am afraid we should get rid of a great deal of what is considered law in Westminster hall, if what Lord Coke says without authority is not law. He was one of the most eminent lawyers that ever presided as a judge in any court of justice. (G.H.J.)

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Coke, Thomas (b. Sept. 9, 1747, Brecon, Brecknockshire, Wales—d. May 3, 1814, at sea en route from Liverpool to Ceylon), English clergyman, first bishop of the Methodist Church, founder of its missions, and friend of Methodism's founder, John Wesley, who called Coke his "right hand."

Coke was ordained an Anglican priest in 1772 and served as curate at South Petherton, Somerset, from 1772 to 1776. After meeting Wesley, however, he was dismissed from his curacy for conducting the open-air and cottage services Wesley recommended.

In 1777 Coke formally joined the Methodists. He became the first president of the Irish Conference of Methodists in 1782 and two years later was named by Wesley as superintendent of the new missions to North America.

In 1787, during one of Coke's nine visits to America, he was designated "bishop" despite Wesley's protest. As president of the English conference in 1797 and 1805, he sought to introduce the title among English Methodists. Rebuffed, he asked the prime minister, Lord Liverpool, to make him a bishop of the Anglican church in India. This request denied, Coke raised funds for his own Methodist mission and was en route to India when he died. A prolific writer, he was author of *Commentary on the Old and New Testaments*, 5 vol. (1801–03); *A History of the West Indies* (1808–11); several volumes of sermons; and a *Life of John Wesley* (with Henry Moore; 1792). Coke ardently opposed slavery.

Cokwe (people): *see* Chokwe.

Cola, genus of tropical trees of the chocolate family (Sterculiaceae, order Malvales) that bear fruits enclosing large kola, or cola, nuts containing caffeine, tannin, and theobromine. Though native to Africa, two species especially, *Cola acuminata* and *C. nitida,* are grown commercially in various tropical regions around the world, the dried kola nuts being used in manufacturing the popular soft drink called cola. The cola drink consists of flavouring extracts of kola nut, spice oils, and other aromatics (and sometimes of coca leaves); carmel colouring; sugar and other sweeteners, singly or in combination; phosphoric acid or citric acid; carbon dioxide for effervescence; and water (86 to 92 percent by volume). In diet cola drinks, artificial flavourings and sweeteners may predominate, and the water content may near 100 percent. In Africa kola nuts are chewed locally as a stimulant. In medicine the refined extract is used as a cardiac and central-nervous-system stimulant.

Mature kola trees may reach 12 to 20 m (40 to 65 feet) in height and grow best in sandy loams at low-lying elevations. These evergreen trees have oblong leathery leaves, yellow flowers, and star-shaped fruit. The podded seeds in the fruit are fleshy, about 2.5 to 4 cm (1 to 1.5 inches) long, and mottled white, brown, or reddish gray and have a bitter taste, though they become aromatic after aging.

Cola DI RIENZO, original name NICOLA DI LORENZO (b. 1313, Rome [Italy]—d. Oct. 8, 1354, Rome), Italian popular leader who tried to restore the greatness of ancient Rome. He later became the subject of literature and song, including a novel by the English novelist E.G.E. Bulwer-Lytton (1835) and an opera by Richard Wagner (1842), both entitled *Rienzi.*

He was the son of a Roman tavern keeper named Lorenzo Gabrini. His father's Christian name was shortened to Rienzo, and his own name, Nicola, to Cola; hence the Cola di Rienzo by which he is generally known.



Cola di Rienzo, detail of an engraving

Young Cola left Rome after his mother's death *c.* 1323 to live with an uncle at nearby Anagni. He returned to Rome as a student at the age of 20, and in 1343 he was sent by the city's government to Pope Clement VI in Avignon to plead the case of the Roman popular party, which had just gained ascendancy. The Pope appointed him notary of the Roman civic treasury, and Cola returned to Rome in 1344. He began to plot a revolution that would return the city to the glory of ancient Rome. On May 20, 1347, he summoned the people to a parliament on the Capitoline Hill. There he announced a series of edicts against the nobles, and to the acclaim of the multitude he assumed dictatorial powers. A few days later he took the ancient title of tribune.

After declaring reforms of the tax, judicial, and political structure of Rome, Cola conceived the grandiose idea of reestablishing Rome as the capital of a "sacred Italy," an Italian brotherhood whose mission would be to spread peace and justice to the world. At a conclave held on Aug. 1, 1347, he conferred Roman citizenship on all the cities of Italy and proceeded to prepare for the election of a Roman emperor of Italy the following year.

The Roman nobles, led by the Orsini and Colonna families, rose against Cola, who repelled their attack on Nov. 20, 1347. But his triumph was short-lived; the populace became disaffected, the aristocrats continued to organize against him, and the Pope issued a bull denouncing him as a criminal, a pagan, and a heretic. A fresh uprising forced his resignation on Dec. 15, 1347, but he took refuge for two years among hermits in the Maiella Mountains of the Abruzzi region.

In 1350 Cola went to Prague, where he attempted to enlist the aid of Emperor Charles IV with mystical prophecies. Charles, however, handed him over to the Archbishop of Prague, who yielded him to Pope Clement in July 1352. After being absolved of heresy by the Inquisition, he was freed and sent to Italy by the new pope, Innocent VI, to aid Cardinal Gil Albornoz in restoring papal authority to Rome. With the new title of senator, Cola made a triumphal return to Rome on Aug. 1, 1354.

His reinstatement was brief. Harassed by the Colonna family and driven by lack of money to desperate straits, he ruled arbitrarily. On Oct. 8, 1354, a riot broke out, and, when he attempted to address the mob, he was met with a shower of missiles. Disguising himself, he tried to mingle with the crowd but was seized and killed.

Cōḷa DYNASTY, also spelled CHOLA, South Indian Tamil rulers of unknown antiquity, antedating the early *caṅkam* poems (probably *c.* 200). The dynasty originated in the rich Cauvery Valley. Uraiyūr (now Tiruchchirāppalli [Trichinopoly]) was its oldest capital.

The legendary king Karikālaṉ was the common ancestor through whom small Deccan and Andhra families called Cōḷa or Cōḍa claimed a connection with the Uraiyūr family. The Cōḷa country (Coromandel) stretched from the Vaigai River in the south to Toṇḍaimaṇḍalam, the capital of which was Kāñcī (Kāñchipuram), in the north. Much of Tamil classical literature and the greater Tamil architectural monuments belong to the *śaṅgam* period, which also saw a revival of Śaivism (worship of Śiva) and the development of southern Vaiṣṇavism (worship of Vishnu). Revenue administration, village self-government, and irrigation were highly organized under the Cōḷas.

Cōḷa kings and emperors bore the titles Parakēśarivarman and Rājakēśarivarman, alternately. Their chronology is difficult. Vijayālaya (reigned *c.* 850–870) began the occupation of the territory of the Pallavas, which was extended under Āditya I (reigned *c.* 870–907). Parāntaka I (reigned 907–*c.* 953), known as the destroyer of Madurai (the capital city of the Pāṇḍyas), defeated Sinhalese invaders and united the lands of the Cōḷas and the Pāṇḍyas between 926 and 942. Coming to terms with the Rāṣṭrakūṭas, he took Nellore from them about 940, but their king, Kṛṣṇa III, seized Toṇḍaimaṇḍalam.

Rājarāja I (reigned 985–1014), an able administrator, protected Veṅgi (the Godāvari districts) and occupied the Gaṅgavāḍi territory (Karnātaka state), annihilating the western Gangas. By 996 he had conquered Kerala (the Cēra country) and acquired northern Ceylon (Sri Lanka). With the booty thus acquired he built the great Bṛhadīśvara temple at Tanjore (Thanjāvūr). By 1014 Rājarāja had acquired the Laccadive and Maldive Islands.

His son Rājendracōḷa Deva I (reigned 1014–44) outdid Rājarāja's achievements. He placed a son on the throne at Madurai, completed the conquest of Ceylon, overran the Deccan (*c.* 1021), and sent (1023) an expedition to the north that penetrated to the Ganges River and brought Ganges water to the new capital, Gaṅgaikoṇḍacōḷapuram. He conquered portions of the Malay Peninsula and Archipelago.

Rājādhirāja (reigned 1044–54) fought the Pāṇḍyas and Cēras and defeated the Western Cāḷukya ruler Someśvara I in 1046, but he was killed at the Battle of Koppam against the Cāḷukyas in 1054. The Cōḷa ruler Virarājendra (reigned 1063–69) attempted to render the Cāḷukya Empire in the Deccan harmless, but his death enabled Vikramāditya Cāḷukya to dabble in Cōḷa family quarrels.

Kulottunga I (reigned 1070–1122), who succeeded to both the Cōḷa and Eastern Cāḷukya crowns by right of inheritance, wisely abandoned the Deccan and concentrated on uniting the eastern coast. Intrigues concerning the right to the Pāṇḍya throne embroiled Cōḷas, Pāṇḍyas, and Ceylon (which by then had recovered its independence) from *c.* 1166.

From 1216 the Hoysaḷa kings obtained lands in the Cōḷa country, former Cōḷa feudatories threw off their allegiance, northern powers intervened, and the upheaval facilitated the Pāṇḍya conquest of the Cōḷa country in 1257. The Cōḷa dynasty end in 1279.

Colac, city, southern Victoria, Australia, on the southern shore of the shallow, 10½-sq-mi- (27-sq-km) Lake Colac. Founded in 1837 and proclaimed a town in 1859, it became a borough and shire in 1864 and a city in 1960. Colac serves as the market for a closely settled region that produces onions, grains, flax, livestock, dairy products, and poultry. Its manufactures include farm tools, bricks, and flax products. Timber comes from the Otway Ranges to the south. Connected to Melbourne, 85 mi (137 km) to the northeast, by rail and the Prince's Highway, the city draws visitors to its agricultural exhibitions, drama productions, and the Kanyana Athletics Festival (March). Pop. (1981) 10,587.

Colair Lake (India): *see* Kolleru Lake.

Colatina, city, central Espírito Santo state, eastern Brazil, on the Rio Doce, 60 mi (100 km) from its mouth on the Atlantic coast, at 131 ft (40 m) above sea level. Given city status in 1921, Colatina is a transportation, trade, and manufacturing centre. Its hinterland is the state's most important agricultural region and one of Brazil's largest coffee-producing areas. There is also lumbering. The bridge spanning the Rio Doce at Colatina has made the city, which is 60 mi northwest of Vitória, the state capital, an important point in the regional railroad network. Pop. (1980 prelim.) 61,057.

Colbath, Jeremiah Jones: *see* Wilson, Henry.

Colbert, Charles: *see* Croissy, Charles Colbert, marquis de.

Colbert, Jean-Baptiste (b. Aug. 29, 1619, Reims, Fr.—d. Sept. 6, 1683, Paris), controller general of finance (from 1665) and secretary of state for the navy (from 1668) under King Louis XIV of France. He carried out the program of economic reconstruction that helped make France the dominant power in Europe.

Early years. Colbert was born of a merchant family. After holding various administrative posts, his great opportunity came in



Jean-Baptiste Colbert, detail of a bust by A. Coysevox. 1677; in the Louvre, Paris
Giraudon—Art Resource/EB Inc.

1651, when Cardinal Mazarin, the dominant political figure in France, was forced to leave Paris and take refuge in a provincial city—an episode in the Fronde, a period (1648–53) of struggle between the crown and the French *parlement*. Colbert became Mazarin's agent in Paris, keeping him abreast of the news and looking after his personal affairs. When Mazarin returned to power, he made Colbert his personal assistant and helped him purchase profitable appointments for both himself and his family. Colbert became wealthy; he also acquired the barony of Seignelay. On his deathbed, Mazarin recommended him to Louis XIV, who soon gave Colbert his confidence. Thenceforth Colbert dedicated his enormous capacity for work to serving the King both in his private affairs and in the general administration of the kingdom.

The struggle with Fouquet. For 25 years Colbert was to be concerned with the economic reconstruction of France. The first necessity was to bring order into the chaotic methods of financial administration that were then under the direction of Nicolas Fouquet, the immensely powerful *surintendant des finances*. Colbert destroyed Fouquet's reputation with the King, revealing irregularities in his accounts and denouncing the financial operations by which Fouquet had enriched himself. The latter's fate was sealed when he made the mistake of receiving the King at his magnificent chateau at Vaux-le-Vicomte; the Lucullan festivities, displaying how much wealth Fouquet had amassed at the expense of the state, infuriated Louis. The King subse-

quently had him arrested. The criminal proceedings against him lasted three years and excited great public interest. Colbert, without any rightful standing in the case, interfered in the trial and made it his personal affair because he wanted to succeed Fouquet as finance minister. The trial itself was a parody of justice. Fouquet was sent to prison, where he spent the remaining 15 years of his life. The *surintendance* was replaced by a council of finance, of which Colbert became the dominant member with the title of intendant until, in 1665, he became controller general.

Financiers and tax farmers had made enormous profits from loans and advances to the state treasury, and Colbert established tribunals to make them give back some of their gains. This was well received by public opinion, which held the financiers responsible for all difficulties; it also lightened the public debt, which was further reduced by the repudiation of some government bonds and the repayment of others without interest. Private fortunes suffered, but no disturbances ensued, and the King's credit was restored.

Financial and economic affairs. Colbert's next efforts were directed to reforming the chaotic system of taxation, a heritage of medieval times. The King derived the major part of his revenue from a tax called the taille, levied in some districts on individuals and in other districts on land and businesses. In some districts the taille was apportioned and collected by royal officials; in others it was voted by the representatives of the province. Many persons, including clergy and nobles, were exempt from it altogether. Colbert undertook to levy the taille on all who were properly liable for it and so initiated a review of titles of nobility in order to expose those who were claiming exemption falsely; he also tried to make the tax less oppressive by a fairer distribution. He reduced the total amount of it but insisted on payment in full over a reasonable period of time. He took care to suppress many abuses of collection (confiscation of defaulters' property, seizure of peasants' livestock or bedding, imprisonment of collectors who had not been able to produce the due sums in time). These reforms and the close supervision of the officials concerned brought large sums into the treasury. Other taxes were increased, and the tariff system was revised in 1664 as part of a system of protection. The special dues that existed in the various provinces could not be swept away, but a measure of uniformity was obtained in central France.

Colbert devoted endless energy to the reorganization of industry and commerce. He believed that in order to increase French power it would be essential to increase France's share of international trade and in particular to reduce the commercial hegemony of the Dutch. This necessitated not only the production of high-quality goods that could compete with foreign products abroad but also the building up of a merchant fleet to carry them. Colbert encouraged foreign workers to bring their trade skills to France. He gave privileges to a number of private industries and founded state manufactures. To guarantee the standard of workmanship, he made regulations for every sort of manufacture and imposed severe punishments (fines and the pillory) for counterfeiting and shortcomings. He encouraged the formation of companies to build ships and tried to obtain monopolies for French commerce abroad through the formation of trading companies. The French East India and West India companies, founded in 1664, were followed by others for trade with the eastern Mediterranean and with northern Europe; but Colbert's propaganda for them, though cleverly conducted, failed to attract sufficient capital, and their existence was precarious. The protection of national industry demanded tariffs against foreign produce, and other countries replied with tariffs against French goods. This tariff warfare was one of the chief causes of the Dutch War of 1672–78.

Colbert's system of control was resented by traders and contractors, who wanted to preserve their freedom of action and to be responsible to themselves alone. Cautious and thrifty people, moreover, still preferred the old outlets for their money (land, annuities, moneylending) to investing in industry. The period, too, was one of generally falling prices throughout the world. Colbert's success, therefore, fell short of his expectation, but what he did achieve seems all the greater in view of the obstacles in his way: he raised the output of manufactures, expanded trade, set up new permanent industries, and developed communications by road and water across France (Canal du Midi, 1666–81).

Colbert and the navy. The controller general's sphere of activity continually expanded. He busied himself with everything, from questions of finance to the naming of Louis's illegitimate children. As secretary of state for the navy from 1668, he undertook to make France a great power at sea. This meant forming a fighting fleet, building and equipping the king's ships, fortifying ports, and encouraging the merchant navy. The Atlantic fleet was composed of sailing ships; the Mediterranean fleet, of galleys. To man the Atlantic fleet, professional sailors were required to sign on for the king's service. For the galleys, Colbert encouraged magistrates to sentence common criminals to serve in them and had no scruple about making use of other sources of manpower: political offenders, Protestants, and slaves seized from Africa and Canada.

Colbert reconstructed the works and arsenal of Toulon and founded the port and arsenal of Rochefort and naval schools at Rochefort, Dieppe, and St.-Malo. Calais, Dunkerque, Brest, and Le Havre were fortified. The need for naval construction goes far to explain Colbert's vigilance over the forests (*Ordonnance des eaux et forêts,* 1669), one of the most corruptly administered sectors of the royal domain. As he also wanted the French ships of the line to have a handsome appearance, in order to impress foreigners, he engaged excellent artists, such as Pierre Puget, to decorate them. Encouragement was given to the building of ships for the merchant navy by allowing a premium on those built at home and imposing a duty on those built abroad; and as French workmen were forbidden to emigrate, so French seamen were forbidden to serve foreigners on pain of death.

The arts. In 1669 the King added still further to Colbert's dignities by making him responsible for the intellectual and artistic life of the country, as secretary of state for the king's household. He applied to the arts the same principle that had guided him previously: the enhancement of the power and prestige of France.

Colbert, himself a member of the Académie Française, founded the Académie des Inscriptions et Belles-Lettres (1663) to choose inscriptions for medals and monuments celebrating the king's victories; the Académie des Sciences (1666) to study how the sciences could be exploited to the kingdom's advantage; and the Académie Royale d'Architecture (1671) to lay down rules and refine the taste of French work. He also founded schools, such as the Académie de France in Rome, in which artists could be trained under some of the great masters of the time; and schools for practical purposes, such as the École des Jeunes de Langues, for the study of Oriental languages. The Observatoire de Paris, of which the Italian astronomer Giovanni Cassini was put in charge, was founded by Louis XIV at Colbert's instigation. The Italian architect G.L. Bernini was invited to submit a design for the Louvre, but its execution proved too expensive, and plans by French architects eventually were adopted.

Other spheres of activity. Colbert encouraged emigration to Canada to form the colony of New France. He promoted legislation on many matters, such as the *Ordonnance criminelle* of 1670, commercial laws, and the so-called Code Noir on slave labour. In agriculture he tried to protect the peasants so far as was consistent with his general economic system, to improve the breed of horses and sheep, and to promote new crops. His concern for economic progress made him hostile to measures against the Protestants (many of whom were in business) and mistrustful of monks and even of the secular clergy (on the ground that too many men who should have been in commerce took holy orders). He himself remained a faithful Catholic.

Last years. At the end of his life, however, Colbert was a disappointed man. For the carrying out of his far-reaching reforms, the country needed peace; but Louis XIV had been drawn into a series of wars that imposed a heavy drain on the national revenues. Even so, by energetically applying the authoritarian methods of the times, without distinction of persons or heed to public opinion, Colbert had made the monarchy stronger and the nation better equipped. The order that he had introduced into public administration was to have a lasting effect.

Colbert's eldest son, Jean-Baptiste, marquis de Seignelay, had been granted the right to succeed his father as secretary of state for the navy; the second son, Jacques-Nicholas, was archbishop of Rouen; the fourth son, Jules-Armand, marquis d'Ormoy, was *surintendant des bâtiments* (minister of construction); and three of his daughters were married to dukes.

(V.L.T.)

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Colbert, Jean-Baptiste, MARQUIS DE SEIGNELAY (b. Nov. 1, 1651, Paris—d. Nov. 3, 1690, Versailles, Fr.), French secretary of state under Louis XIV.

As the eldest son of the famous secretary of state of that name, Colbert was given the best possible tutors, who found him bright but lazy. In 1683 Colbert became head of the navy and performed brilliantly at the post. He showed an excellent knowledge of naval affairs and personally supervised innovations in armaments and military construction. He displayed great personal courage, taking part in several maritime battles, such as the bombardment of Algiers (1683), Genoa (1684)—where he personally led the flotilla—Tripoli (1685), and the victory at Sainte-Hélène (1690). For at least a few years, Colbert raised the French Navy to world supremacy. Louis XIV, granting him the right to succeed to his father's position, made him minister of state in 1689. Professionally, Colbert displayed spirit, courage, and intelligence, but in his private life he did not inherit his father's sense of economy. His lifestyle was opulent and characterized by an excessive devotion to pleasure.

Colburn, Irving Wightman (b. May 16, 1861, Fitchburg, Mass., U.S.—d. Sept. 4, 1917), American inventor and manufacturer whose process for fabricating continuous sheets of flat glass formed the basis of the Libbey-Owens Sheet Glass Company. After an unsuccessful manufacturing venture, Colburn sold his patents to financial interests in Toledo, Ohio, in 1912. He continued to work under their auspices, finally perfecting his process the year before his death.

Colby, Frank Moore (b. Feb. 10, 1865, Washington, D.C., U.S.—d. March 3, 1925, New York, N.Y.), American encyclopaedia editor and essayist.

Early in his career Colby taught history and economics at Columbia University, Amherst College (Amherst, Mass.), and New York University (New York City). To supplement his income, he began writing for encyclopaedias, and so began his lifelong career. In 1898 he became editor of the *International Year Book* (later the *New International Year Book*), a position he was to hold until his death. He was editor, with Daniel Colt Gilman and Harry Thurston Peck, of the *New International Encyclopedia* (1900–03). From 1913 to 1915, with Talcott Williams, he supervised publication of the second edition.

Colby contributed to many magazines, including *Bookman, The New Republic,* and *Vanity Fair,* and his witty essays were widely read. After his death, his popularity rose with the publication of *The Colby Essays* (1926), edited by Clarence Day, Jr.

Colchester, district and borough, county of Essex, England. It is situated on the River Colne and has an area of 129 square miles (334 square km).

As Camulodunum, the town of Colchester was the capital of the pre-Roman Belgic ruler Cunobelinus and is so named on his coins. Although burnt in AD 60 during the rising of the British queen Boudicca, Colchester soon became one of the chief towns in Roman Britain, and surviving relics of this period include walls and gateways. The Saxons called the town Colneceaste; and Domesday Book (1086) mentions it as Colcestra. The town's first charter was given in 1189. Colchester's castle keep (built about 1080) is the largest of its kind in England and now houses a museum of Romano-British antiquities. Holy Trinity Church (1050) has a late Saxon tower, and the Augustinian St. Botolph's Priory retains part of the Norman west front, nave, and arcades. The 13th-century town was a major port. Both Elizabeth I and James I encouraged Flemish weavers to settle there and to manufacture baize fabric, and cloth making still flourishes. The trade in oysters from the River Colne also has a long history.

The borough has picturesque scenery, ranging from the beaches and estuaries on the east coast to the Dedham vicinity, which was often the subject of John Constable's landscapes. Colchester town's industries include printing and the manufacture of electrical equipment, diesel engines, lathes, and bearings. The University of Essex, founded in 1961, is in Colchester. Pop. (1981) town, 88,847; (1991 prelim.) district, 141,100.



St. Botolph's Priory in Colchester, Essex

Margaret Collier/Robert Harding Picture Library

colchicine, drug used to treat the pain, swelling, and inflammation caused by acute gout. It is also used as a preventative against such attacks and against acute attacks of familial Mediterranean fever. The drug is obtained from the autumn crocus (*Colchicum autumnale*) and other plants. The mechanism by which colchicine relieves the pain of gout remains unknown.

Because it disrupts normal cell division (mitosis) in plants and animals, colchicine is also used in botanical, cellular, and genetic research. Colchicine is capable of stopping mitotic cell division at the stage when the chromosomes have divided and are fully formed but have not yet pulled apart to form two separate nuclei. The cell's chromosomes thus remain double in number, a phenomenon that has been used by plant breeders to create new varieties of fruits, vegetables, and flowers.

Colchicum, genus of flowering plants in the family Liliaceae, consisting of about 30 species of herbs native to Eurasia. The stemless, crocuslike flowers bloom in autumn, and



Colchicum autumnale

A to Z Botanical Collection

some are variously called autumn crocus and meadow saffron. The fruit is a three-valved capsule that ripens in the spring when the leaves appear. In some species the leaves arise from the ground, with the flowers, in autumn. Several species are cultivated as ornamentals for their pink, white, or bluish purple tubelike flowers, especially *C. autumnale, C. bornmuelleri,* and *C. speciosum.* The swollen underground stem of *C. autumnale* contains colchicine, a substance used to relieve the pain of gout.

Colchis, ancient region at the eastern end of the Black Sea south of the Caucasus, in the western part of modern Georgia. It consisted of the valley of the Phasis (modern Riuni) River. In Greek mythology Colchis was the home of Medea and the destination of the Argonauts, a land of fabulous wealth and the domain of sorcery. Historically, Colchis was colonized by Milesian Greeks to whom the native Colchians supplied gold, slaves, hides, linen cloth, agricultural produce, and such shipbuilding materials as timber, flax, pitch, and wax. The ethnic composition of the Colchians, who were described by Herodotus as black Egyptians, is unclear. After the 6th century BC they lived under the nominal suzerainty of Achaemenidian Persia and passed into the kingdom of Mithradates VI (1st century BC) and, then, under the rule of Rome.

United with Lazica in the 4th century AD, Colchis constituted an important buffer state between the Sāsānian and Byzantine empires. In the late 8th century Colchis was attached to Abasgia, which in turn was incorporated into Russian Georgia.

Colchis Lowland (Georgia): *see* Kolkhida.

cold, common (medicine): *see* common cold.

cold-bloodedness, also called POIKILOTHERMY, ECTOTHERMY, or HETEROTHERMY, the state of having a variable body temperature that is usually only slightly higher than the environmental temperature. This state distinguishes fishes, amphibians, reptiles, and invertebrate animals from warm-blooded, or homoiothermic, animals (birds and mammals). Because of their dependence upon environmental warmth for metabolic functioning, the distribution of terrestrial cold-blooded animals is limited, with only a few exceptions, to areas with a temperature range of 5–10° to 35–40° C (41–50° to 95–104° F). For cold-blooded animals living in the arctic seas, temperatures may range from below 0° C to 10–15° C (below 32° F to 50–59° F). Poikilotherms do maintain a limited control over internal temperature by behavioral means, such as basking in sunlight to warm their bodies.

cold emission (physics): *see* field emission.

Cold Harbor, battles of, two engagements of the American Civil War at Cold Harbor, 10 miles (16 km) northeast of Richmond, Va., the Confederate capital.

The first battle (June 27, 1862), sometimes called the Battle of Gaines's Mill, was part of the Seven Days' Battles (June 25–July 1) which ended the Peninsular Campaign (April 4–July 1), the large-scale Union effort to take Richmond. After fighting at Mechanicsville and Beaver Dam Creek, General George B. McClellan ordered Union troops to high ground between Gaines's Mill and Cold Harbor. When Confederate General Robert E. Lee attacked on June 27, the Union troops were driven back in disorder and withdrew to the south side of the Chickahominy River.

The second Battle of Cold Harbor (June 3–12, 1864) is considered one of the worst Northern defeats in the Civil War, though its subsequent effect was negligible. Following the Battle of Spotsylvania Court House (May 8–19), Union General Ulysses S. Grant advanced southward toward Richmond in a series of flanking movements. Confederate troops under General Robert E. Lee at Cold Harbor entrenched themselves in defensive positions behind earthworks. From these, Union assaults were repulsed with heavy losses. Because of Grant's vast numbers (more than 100,000 men), his losses of about 7,000 (compared with fewer than 1,500 for Lee) did not deter him from continuing to Petersburg later that month in his drive toward Richmond.

Cold War, the open yet restricted rivalry that developed after World War II between the United States and the Soviet Union and their respective allies. The Cold War was waged on political, economic, and propaganda fronts and had only limited recourse to weapons. The term was first used by the American financier and presidential adviser Bernard Baruch during a congressional debate in 1947.

A brief treatment of the Cold War follows. For full treatment, *see* MACROPAEDIA: International Relations, 20th Century.

Following the surrender of Nazi Germany in May 1945 near the close of World War II, the uneasy wartime alliance between the United States and Great Britain on the one hand and the Soviet Union on the other began to unravel. By 1948 the Soviets had installed left-wing governments in the countries of eastern Europe that had been liberated by the Red Army. The Americans and the British feared the permanent Soviet domination of eastern Europe and the threat of Soviet-influenced communist parties coming to power in the democracies of western Europe. The Soviets, on the other hand, were determined to maintain control of eastern Europe in order to safeguard against any possible renewed threat from Germany, and they were intent on spreading communism worldwide, largely for ideological reasons. The Cold War had solidified by 1947–48, when U.S. aid provided under the Marshall Plan to western Europe had brought those countries under American influence and the Soviets had installed openly communist regimes in eastern Europe.

The Cold War reached its peak in 1948–53. In this period the Soviets unsuccessfully blockaded the Western-held sectors of West Berlin (1948–49); the United States and its European allies formed the North Atlantic Treaty Organization (NATO), a unified military command to resist the Soviet presence in Europe (1949); the Soviets exploded their first atomic warhead (1949), thus ending the American monopoly on the atomic bomb; the Chinese communists came to power in mainland China (1949); and the Soviet-supported communist government of North Korea invaded U.S.-supported South Korea in 1950, setting off an indecisive Korean War that lasted until 1953.

From 1953 to 1957 Cold War tensions relaxed somewhat, largely owing to the death of the longtime Soviet dictator Joseph Stalin in 1953; nevertheless, the standoff remained. A unified military organization among the Soviet-bloc countries, the Warsaw Pact, was formed in 1955; and West Germany was admitted into NATO that same year. Another intense stage of the Cold War was in 1958–62. The United States and the Soviet Union began developing intercontinental ballistic missiles, and in 1962 the Soviets began secretly installing missiles in Cuba that could be used to launch nuclear attacks on U.S. cities. This sparked the Cuban missile crisis (1962), a confrontation that brought the two superpowers to the brink of war before an agreement was reached to withdraw the missiles.

The Cuban missile crisis showed that neither the United States nor the Soviet Union were ready to use nuclear weapons for fear of the other's retaliation (and thus of mutual atomic annihilation). The two superpowers soon signed the Nuclear Test-Ban Treaty of 1963, which banned aboveground nuclear weapons testing. But the crisis also hardened the Soviets' determination never again to be humiliated by their military inferiority, and they began a buildup of both conventional and strategic forces that the United States was forced to match for the next 25 years.

Throughout the Cold War the United States and the Soviet Union avoided direct military confrontation in Europe and engaged in actual combat operations only to keep allies from defecting to the other side or to overthrow them after they had done so. Thus the Soviet Union sent troops to preserve communist rule in East Germany (1953), Hungary (1956), Czechoslovakia (1968), and Afghanistan (1979). For its part, the United States helped overthrow a left-wing government in Guatemala (1954), supported an unsuccessful invasion of Cuba (1961), invaded the Dominican Republic (1965) and Grenada (1983), and undertook a long (1964–75) and unsuccessful effort to prevent communist North Vietnam from bringing South Vietnam under its rule.

In the course of the 1960s and '70s, however, the bipolar struggle between the Soviet and American blocs gave way to a more complicated pattern of international relationships in which the world was no longer split into two clearly opposed blocs. A major split had occurred between the Soviet Union and China in 1960 and widened over the years, shattering the unity of the communist bloc. In the meantime, western Europe and Japan achieved dynamic economic growth in the 1950s and '60s, reducing their relative inferiority to the United States. Less-powerful countries had more room to assert their independence and often showed themselves resistant to superpower coercion or cajoling.

The 1970s saw an easing of Cold War tensions as evinced in the SALT I and II agreements of 1972 and 1979 respectively, in which the two superpowers set limits on their antiballistic missiles and on their strategic missiles capable of carrying nuclear weapons. This was followed by a period of renewed Cold War tensions in the early 1980s as the two superpowers continued their massive arms buildup and competed for influence in the Third World. But the Cold War began to break down in the late 1980s during the administration of Soviet leader Mikhail S. Gorbachev. He dismantled the totalitarian aspects of the Soviet system and began efforts to democratize the Soviet political system. When communist regimes in the Soviet-bloc countries of eastern Europe collapsed in 1989–90, Gorbachev acquiesced in their fall. The rise to power of democratic governments in East Germany, Poland, Hungary, and Czechoslovakia was quickly followed by the unification of West and East Germany under NATO auspices, again with Soviet approval.

Gorbachev's internal reforms had meanwhile weakened his own Communist Party and allowed power to shift to Russia and the other constituent republics of the Soviet Union. In late 1991 the Soviet Union collapsed and 15 newly independent nations were born from its corpse, including a Russia with a democratically elected, anticommunist leader. The Cold War had come to an end.

Colditz Castle, German SCHLOSS COLDITZ, German prisoner-of-war camp in World War II, the site of many daring escape attempts by Allied officers. The castle sits on a steep hill overlooking the Mulde River as it flows through the small Saxon town of Colditz, about 30 miles (48 km) southeast of Leipzig. A former residence of the kings of Saxony, the castle was used in 1939 as a prisoner-of-war camp, and in 1940 it became a maximum security prison for escape-prone Allied officers.

The internal buildings and courtyards were perched 250 feet (76 m) above the surrounding terrain and were enclosed by steep stone walls 7 feet (2 m) thick at their base. Staffed by numerous armed guards and located some 400 miles (640 km) from friendly territory, Colditz seemed to offer no hope for escape. Yet, through ingenious tunneling and various ruses, prisoners on some 130 occasions managed to clear the fortress grounds. A total of 32 prisoners managed to reach the frontier without recapture. Colditz fell to the U.S. Army in April 1945.

Coldstream, small burgh in the district of Berwickshire, Borders region, Scotland. It is situated at a fording place on the River Tweed on the border with England. Flodden, a battlefield (1513) where the Scots were badly defeated by the English, lies 6 miles (10 km) southeast, in England. Coldstream is associated with the famous British Coldstream Guards regiment (first raised there *c.* 1650), which marched to London in 1660 and played a significant part in the restoration of Charles II. Pop. (1981) 1,645.

Cole, Nat King, byname of NATHANIEL ADAMS COLE, family name originally COLES (b. March 17, 1919, Montgomery, Ala., U.S.—d. Feb. 15, 1965, Santa Monica, Calif.), American musician who first came to prominence as a jazz pianist but who reached enormous popularity with his warm, relaxed, somewhat breathy-voiced ballad singing.

Cole grew up in Chicago. In 1937, after touring with a black musical revue, he began playing in jazz clubs in Los Angeles. There he formed the King Cole Trio, with guitarist Oscar Moore and bassist Wesley Prince, in 1939. With his compact, syncopated backup chords and clean, spare, melodic phrases, Cole emphasized the piano as a solo, rather than a rhythm, instrument in his jazz arrangements. Commercial success, however, came with his singing. After "Straighten Up and Fly Right" (1943), Cole gradually abandoned jazz piano for popular vocals. Among his other hits were "Nature Boy," "Mona Lisa," "Too Young," and "Unforgettable." Cole toured internationally and appeared in motion pictures.

Cole, Thomas (b. Feb. 1, 1801, Bolton-le-Moors, Lancashire, Eng.—d. Feb. 11, 1848, Catskill, N.Y., U.S.), American Romantic



"The Architect's Dream," oil painting by Thomas Cole, 1840; in the Toledo Museum of Art, Ohio

By courtesy of the Toledo Museum of Art, gift of Florene Scott Libbey

landscape painter who was a founder of the Hudson River school.

Cole's family immigrated first to Philadelphia and then settled in Steubenville, Ohio. He was trained by an itinerant portrait painter named Stein and then spent two years at the Pennsylvania Academy of the Fine Arts. In 1825 some of Cole's landscapes in a New York shop window attracted the attention of Colonel John Trumbull and the painter Asher B. Durand. They bought his works and found him patrons, assuring his future success.

In 1826 Cole made his home in the village of Catskill, N.Y., on the western bank of the Hudson River. From there he frequently journeyed through the Northeast, primarily on foot, making pencil studies of the landscape. He used these sketches to compose pictures in his studio during the winter. One of Cole's most effective landscape paintings, "The Oxbow" (1846; Metropolitan Museum of Art, New York City), was the result of pencil studies that he made in Massachusetts. Cole's scenes of the Hudson River valley, reverently recorded, echoed the loneliness and mystery of the North American forests. Cole could paint direct and factual landscapes recorded in minute detail, but he was also capable of producing grandiose and dramatic imaginary vistas using bold effects of light and chiaroscuro. When the human figure appears in his works, it is always subordinate to the majesty of the surrounding landscape.

Cole spent the years 1829–32 and 1841–42 abroad, mainly in Italy. He lived in Florence with the American sculptor Horatio Greenough. When he returned to the United States, he painted five huge canvases for a series entitled "The Course of Empire" (1836). These paintings are allegories on the progress of mankind based on the Count de Volney's *Ruines, ou méditations sur les révolutions des empires* (1791). A second series, called "The Voyage of Life" (begun 1839), depicts a symbolic journey from infancy to old age in four scenes. Shortly before he died Cole began still another series, "The Cross of the World," which was of a religious nature.

Durand's well-known painting "Kindred Spirits" (1849; New York Public Library), painted in Cole's memory the year after his death, paid tribute to Cole's close friendship with the poet William Cullen Bryant.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Colebrook, Leonard (b. March 2, 1883, Guildford, Surrey, Eng.—d. Sept. 29, 1967, Farnham Common, Buckinghamshire), English medical researcher who introduced the use of Prontosil, the first sulfonamide drug, as a cure for puerperal, or childbed, fever, a condition resulting from infection after childbirth or abortion.

Colebrook joined researcher Almroth Wright in 1907 at St. Mary's Hospital. In 1926 Colebrook became interested in the incidence of puerperal fever in women who had just undergone childbirth. Nine years later, he obtained the newly discovered antibacterial drug Prontosil and used it to treat a woman who was dying of puerperal fever. The patient recovered, and the drug was next used successfully on a woman dying of septicemia (blood poisoning). By 1945, as a result of the widespread use of the drug, puerperal fever was no longer a common problem. Prontosil was also used to treat other diseases, including lobar pneumonia.

At the outbreak of World War II, Colebrook went to France to investigate the treatment of burns. He established the efficacy of the sulfonamides and then of penicillin in controlling the infection of burns, urged the wider application of skin-grafting techniques to heal burns, and brought the problem of tissue rejection to the attention of Peter B. Medawar. Colebrook served as director of the Burns Investigation Unit of the Medical Research Council from 1942 to 1948.

Colebrook-Cameron Commission, committee sent by the British government in 1829–32 to investigate its colonial government in Ceylon (now Sri Lanka) and to make recommendations for administrative, financial, economic, and judicial reform. Most of the recommendations were accepted; they signified for Ceylon the first manifestation of constitutional government, the first steps toward modernizing the traditional economic system, and the beginnings of a uniform system of justice, education, and civil administration.

The recommendations of the commission were as follows: (1) that the formerly absolute power of the governor of Ceylon be limited by a separation of the executive, legislative, and judicial authorities, a step that would entail the creation of an Executive Council, which was to act jointly with the governor in decision making, and a Legislative Council, which was to include some native Ceylonese members; (2) that all of Ceylon be united under one administrative system; (3) that more civil service posts be opened to natives; (4) that a uniform judicial system be created to promote greater efficiency and equal treatment before the law of Ceylonese and Europeans; (5) that *rājākariya*, the traditional system of land tenure, be abolished, along with government trade monopolies; and (6) that a uniform system of education be developed, with English as the medium of instruction.

Coleman, Ornette, in full RANDOLPH DENARD ORNETTE COLEMAN (b. March 19, 1930, Fort Worth, Texas, U.S.), American jazz saxophonist, composer, and bandleader who was the principal initiator and leading exponent of "free jazz" in the late 1950s.

Coleman began playing alto, then tenor saxophone as a teenager and soon became a working musician in dance bands and rhythm-and-blues groups. Early in his career, his approach to harmony was already unorthodox and led to his rejection by established musicians in Los Angeles, where he lived for most of the 1950s. While working as an elevator operator, he studied harmony and played an inexpensive plastic alto saxophone at obscure nightclubs. Until then, all jazz improvisation had been based on fixed harmonic patterns. In the "harmolodic theory" that Coleman developed in the 1950s, however, improvisers abandoned harmonic patterns ("chord changes") in order to improvise more extensively and directly upon melodic and expressive elements. Because the tonal centres of such music changed at the improvisers' will, it became known as "free jazz."

In the late 1950s Coleman formed a group with trumpeter Don Cherry, drummer Billy Higgins, and bassist Charlie Haden, with whom he recorded his first album, *Something Else* (1958). His classic recordings *The Shape of Jazz to Come* and *Change of the Century* in 1959 preceded his move that year to New York City, where his radical conception of structure and the urgent emotionality of his improvisations aroused widespread controversy. His recordings *Free Jazz* (1960), which used two simultaneously improvising jazz quartets, and "Beauty Is a Rare Thing," in which he successfully experimented with free metres and tempos, also proved influential.

In the 1960s Coleman taught himself to play the violin and trumpet, using unorthodox techniques. By the 1970s he was performing only irregularly, preferring instead to compose. His most notable extended composition is the suite *Skies of America,* which was recorded in 1972 by the London Symphony Orchestra joined by Coleman on alto saxophone. Influenced by his experience of improvising with native musicians in the Rif Mountains of Morocco in 1973, Coleman formed an electric band called Prime Time, whose music was a fusion of rock rhythms with harmonically free collective improvisations; this band remained his primary performance vehicle until the 1990s. Coleman's early style influenced not only fellow saxophonists but also players of all other instruments in jazz.

BIBLIOGRAPHY. John Litweiler, *Ornette Coleman: A Harmolodic Life* (1993), is a full-length biography.

colemanite, borate mineral, hydrated calcium borate ($Ca_2B_6O_{11} \cdot 5H_2O$) that was the principal source of borax until the 1930s. It

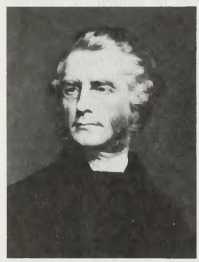


Colemanite from Boron, Calif.
By courtesy of the Field Museum of Natural History, Chicago, photograph: John H. Gerard

typically occurs as colourless, brilliant crystals and masses in Tertiary sediments (those formed 66.4 to 1.6 million years ago), where it has been derived from ulexite and borax. The chief localities are the Kramer district, Death Valley, and Daggett, Calif. Colemanite is an important source of commercial borates and boric acid. For detailed physical properties, *see* borate mineral (table). *See also* borax.

Çölemerik (Turkey): *see* Hakkâri.

Colenso, John (b. Jan. 24, 1814, St. Austell, Cornwall, Eng.—d. June 20, 1883, Durban, Natal [now in South Africa]), controversial liberal Anglican bishop of Natal. He made numerous converts among the Zulus, who caused him to abandon certain religious tenets and thus be subjected to trial for heresy.



Colenso, detail of an oil painting by Samuel Sidley, 1866; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Colenso became rector of Forncett St. Mary's Church, Norfolk, in 1846 and in 1853 bishop of Natal, where he served until his death. A strict logician, he was led by questions asked by Zulu converts to doubt the historical accuracy of the Pentateuch, the first five books of the Old Testament. Arguing that the Pentateuch must have been a postexilic forgery rather than a faithful contemporary account of

Jewish life, he also maintained that the numerical discrepancies found in Genesis warranted doubts concerning the historical accuracy of the Bible. For this position, presented in his *Pentateuch and Book of Joshua Critically Examined* (1862–79), for his opposition to the doctrine of eternal punishment for sinners, and for his toleration of polygamy among the Zulus, Colenso was summoned in 1863 by his superior, Bishop Robert Gray of Cape Town, to appear before him on a charge of heresy. Colenso was convicted the next year, but in 1865 he was acquitted on appeal by the judicial committee of the church Privy Council in England, which held that because the crown was powerless to appoint a bishop in a colony possessing its own independent legislature, the royal courts could not uphold the legality of Gray's authority.

In 1866 Colenso's right to his episcopal income was confirmed. Nevertheless, his victories were purely technical, for royal supremacy was subsequently declared invalid in South Africa. Gray's religious authority increased despite his loss of legal authority, and after the church in South Africa was recognized as autonomous, the English bishops deposed Colenso in 1869. Colenso remained at his post, beside the new bishop, ministering to a dwindling band of supporters. He also composed a grammar, a dictionary, and a New Testament translation in Zulu.

coleopteran, a member of the insect order Coleoptera, which contains the beetles and the weevils and is the largest of the insect orders. The 250,000 known coleopteran species include some of the smallest and largest of the insects: the smallest coleopterans are less than one millimetre (0.04 inch) in length, while the largest (*e.g.*, the rhinoceros beetle *Xyloryctes satyrus*) can exceed 20 centimetres (8 inches). Beetles can be found in almost all environments except Antarctica and the peaks of the highest mountains. The tropics contain the most diverse beetle fauna, while in temperate zones, the fewer species are represented in greater numbers.

A brief treatment of coleopterans follows. For full treatment, *see* MACROPAEDIA: Insects.

The major diagnostic characteristic of the order is a modification of the forewings, or elytra. These may be either rigid or thickened and leathery; they lie protectively over the back and hindwings and meet in a line down the centre of the back. The hindwings are used for flying in most species. This protective modification perhaps allowed early beetles to exploit niches underneath bark, where unprotected wings would be damaged. The body is built on the general insect plan of head, thorax, and abdomen; in coleopterans, however, the last two thoracic segments are joined to the abdomen, and the prothorax stands alone under a protective plate called the pronotum. The legs may be adapted for running, digging, swimming, or jumping. The antennae are normally composed of 11 segments, but their form may vary widely. Depending on the diet, the mandibles may be quite large or nearly absent. Most coleopterans possess a pair of prominent compound eyes.

With so many species in the order, it is not surprising that there is a great diversity of forms and adaptations. In many beetles the elytra are brightly coloured or patterned. The rather generalized Carabidae (ground beetles) have an oval, flattened body with medium-length appendages; in water beetles (Hydrophilidae) the underside is very smooth and there are long hairs on the hindlegs that give greater surface area when paddling; ladybugs (Coccinellidae) are very round in contour and flat below; stag beetles (Lucanidae) have enormously enlarged mandibles; the long-horned wood-boring beetles (Cerambycidae) have exceptionally long antennae and are frequently very slender of body; the fireflies (Lampyridae) have soft elytra and can produce light; and the weevils (Curculionidae) have their mouths at the tip of an extended snout.

Beetles live on plants, underground, in the water, as commensals in the nests of various social insects, in rotten logs, and in myriad other habitats. Many beetles are predaceous. Adult ground beetles are nocturnal and feed on various insects and snails. Both larval and adult diving beetles (Dytiscidae) eat insects and small fish and frogs. Ladybugs eat large numbers of aphids and scale insects, while soldier beetles (Cantharidae) prefer worms and various insect larvae, and fireflies take mostly snails. Another large group of coleopterans eats plants. In this group are the June beetles (Melolonthinae), seed beetles (Bruchidae), handsome fungus beetles (Endomychidae), and leaf beetles (Chrysomelidae). False darkling beetles (Melandryidae) feed on rotting wood, while the skin beetles (Dermestidae) and spider beetles (Ptinidae) are scavengers on dead animal skins and the like. Several members of the Scarabaeidae, as well as other groups, feed on dung.

Among the insects, beetles are moderately well armoured, but they are still subject to a fair amount of predation. Bats, swifts, frogs, and certain other insects, including other beetles, will attack them. Tachinid flies parasitize adult beetles and various wasps parasitize beetle larvae.

Certain species are involved in complex relationships with other living things. Some beetles dwell in nests of ants or termites. Many of these forms have lost their wings, as flight is unnecessary, and some have glands that secrete substances attractive to the host species. Certain ambrosia beetles (Scolytidae) share their arboreal habitat with particular fungi. They have evolved structures on which to transport this fungus when moving to a new tree.

Most beetles are bisexual and lay eggs, although there are a few parthenogenetic species in which fertilization is not necessary. Coleopterans undergo a complete metamorphosis composed of four developmental stages: egg, larva, pupa, and adult. After copulation the female beetle stores sperm in a saclike spermatheca until the eggs are ready for fertilization. Once fertilized the eggs may be laid singly or in small clutches. They are usually placed near a source of food for the larvae; wood-boring species lay their eggs in tree trunks, while foliage eaters leave them on a leaf.

Larvae may be long and tapered (Staphylinidae and Silphidae, the rove and carrion beetles), cylindrical and hard-surfaced (Elateridae, the click beetles), tapered with a bristly covering (dermestids), or soft-bodied and C-shaped (scarabaeids). The larvae may be predatory or phytophagous and do not necessarily feed on the same diet as the adults. Larvae go through three to five molts before they pupate. The pupa resembles the adult except that it is soft and its wings are encased. When the thin pupal skin is shed the adult emerges.

Because of their abundance many species of Coleoptera are considered pests in their impact on man. The leaf beetles and weevils have serious adverse effects on many crops. Carpet beetles (Dermestidae) can ruin various fabrics and clothing. Lumber is frequently damaged by powder-post beetles (Lyctidae) and deathwatch beetles (Anobiidae). Certain beetles also transmit diseases from plant to plant; Dutch elm disease, for instance, is carried by the bark beetle *Scolytus multistriatus.*

Colepeper (of Thoresway), John Colepeper, 1st Baron, Colepeper also spelled CULPEPPER (d. June 11, 1660), English statesman who was an influential counsellor of Charles I during the Civil War and of Charles II in exile.

Elected member for Kent in the Long Parliament, he took the popular side, supporting the Earl of Strafford's attainder and receiving an appointment to the Parliamentary committee of defense in 1641. He separated, however, from the popular party on the church question, opposing the proposals to abolish episcopacy and for religious union with the Scots. In 1642 he joined the King's supporters, taking office as chancellor of the exchequer, but he disapproved of Charles's attempted arrest of five members of the Commons. In the Oxford Parliament he advised concessions to secure peace. He received a peerage in 1644.

Colepeper was sent with Edward Hyde (afterward earl of Clarendon) in charge of the Prince of Wales, after Charles's final defeat in 1645, to the Scilly Isles and thence to France (1646). In 1648 he accompanied the Prince on his unsuccessful naval expedition and returned with him to The Hague. After Charles I's execution he pressed upon Charles II the acceptance of the Scots' proposals. The treaty between Oliver Cromwell and Cardinal Mazarin in 1654 compelled Colepeper to leave France for Flanders. At the Restoration he returned to England but lived only a few weeks.

Coleraine, Irish CÚIL RAITHIN, town, seat, and district (established 1973; formerly astride Counties Antrim and Londonderry), Northern Ireland. Coleraine town is located near the mouth of the River Bann. Flint implements dating back to nearly 7000 BC have been found in the vicinity; they provide the earliest evidence of human occupation in Ireland. The main town on the east bank radiates from a central square, The Diamond. Modern Coleraine (from the Irish, meaning "ferry corner") owes its foundation to the companies of the City of London who undertook the colonization of County Londonderry in the 17th century under the scheme for the Plantation of Ulster. A road and rail junction and the seat of the New University of Ulster (founded 1965), the town manufactures Acrilan synthetic fibre and has agricultural processing, a salmon fishery, and light engineering industries. Its harbour accommodates small vessels.

Coleraine district covers an area of 189 sq mi (490 sq km) and is bordered by the districts of Limavady to the west, Magherafelt to the south, Ballymoney and Moyle to the east, and by the Atlantic Ocean to the north. Western Coleraine is composed of wooded, hilly terrain that slopes eastward to the River Bann Valley. Eastern Coleraine is rich agricultural country, producing barley, poultry, and livestock (pigs and sheep). Portrush and Portstewart, located on the Atlantic coast northeast of the mouth of the River Bann, are popular resort towns with a line of reefs known as The Skerries directly offshore. Pop. (1971) town, 14,903; (1981 prelim.) district, 47,524.

Coleridge, (David) Hartley (b. Sept. 19, 1796, Kingsdown, Bristol, Gloucestershire, Eng.—d. Jan. 6, 1849, Grasmere, Cumberland), English poet whose wayward talent found expression in his skillful and sensitive sonnets.

The eldest son of the poet Samuel Taylor Coleridge, he spent his childhood alarming and delighting his family and the Southeys and Wordsworths by his mental agility and the "exquisite wildness" that caused his father and Wordsworth to address poems to him prophetic in their forebodings. He entered Oxford in 1815 and in 1819 gained an Oriel Fellowship but forfeited it after a year by uncontrolled drinking and lack of application.

In 1820 he began literary work in London and contributed to the *London Magazine*, but again instability cut short a promising career. By 1833 Coleridge returned to the Lake District at Grasmere, where, with two short inter-

vals of teaching at Sedbergh, he lived until his death.

Coleridge, Samuel Taylor (b. Oct. 21, 1772, Ottery St. Mary, Devonshire, Eng.—d. July 25, 1834, Highgate, near London), English lyrical poet, critic, and philosopher. His *Lyrical Ballads,* written with William Wordsworth, heralded the English Romantic movement, and his *Biographia Literaria* (1817) is the most



Samuel Taylor Coleridge, detail of an oil painting by Washington Allston, 1814; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

significant work of general literary criticism produced in the English Romantic period.

Early life and works. Coleridge's father was vicar of Ottery and headmaster of the local grammar school. As a child Coleridge was already a prodigious reader, and he immersed himself to the point of morbid fascination in romances and Eastern tales such as *The Arabian Nights' Entertainments.* In 1781 his father died suddenly, and in the following year Coleridge entered Christ's Hospital in London, where he completed his secondary education. In 1791 he entered Jesus College, Cambridge. At both school and university he continued to read voraciously, particularly in works of imagination and visionary philosophy, and he was remembered by his schoolmates for his eloquence and prodigious memory. In his third year at Cambridge, oppressed by financial difficulties, he went to London and enlisted as a dragoon under the assumed name of Silas Tomkyn Comberbache. Despite his unfitness for the life, he remained until discovered by his friends; he was then bought out by his brothers and restored to Cambridge.

On his return, he was restless. The intellectual and political turmoil surrounding the French Revolution had set in motion intense and urgent discussion concerning the nature of society. Coleridge now conceived the design of circumventing the disastrous violence that had destroyed the idealism of the French Revolution by establishing a small society that should organize itself and educate its children according to better principles than those obtaining in the society around them. A chance meeting with the poet Robert Southey led the two men to plan such a "pantisocracy" and to set up a community by the Susquehanna River in Pennsylvania. To this end Coleridge left Cambridge for good and set up with Southey as a public lecturer in Bristol. In October 1795 he married Sara Fricker, daughter of a local schoolmistress, swayed partly by Southey's suggestion that he was under an obligation to her since she had been refusing the advances of other men.

Shortly afterward, Southey defected from the pantisocratic scheme, leaving Coleridge married to a woman whom he did not really love. In a sense his career never fully recovered from this blow: if there is a makeshift quality about many of its later events, one explanation can be found in his constant need to reconcile his intellectual aspirations with the financial needs of his family. During this period, however, Coleridge's intellect flowered in an extraordinary manner, as he embarked on an investigation of the nature of the human mind, joined by William Wordsworth, with whom he had become acquainted in 1795. Together they entered upon one of the most influential creative periods of English literature. Coleridge's intellectual ebullience and his belief in the existence of a powerful "life consciousness" in all individuals rescued Wordsworth from the depression into which recent events had cast him and made possible the new approach to nature that characterized his contributions to *Lyrical Ballads* (which was to be published in 1798).

Coleridge, meanwhile, was developing a new, informal mode of poetry in which he could use a conversational tone and rhythm to give unity to a poem. Of these poems, the most successful is "Frost at Midnight," which begins with the description of a silent frosty night in Somerset and proceeds through a meditation on the relationship between the quiet work of frost and the quiet breathing of the sleeping baby at the poet's side, to conclude in a resolve that his child shall be brought up as a "child of nature," so that the sympathies that the poet has come to detect may be reinforced throughout the child's education.

At the climax of the poem, he touches another theme, which lies at the root of his philosophical attitude:

> . . . so shalt thou see and hear
> The lovely shapes and sounds intelligible
> Of that eternal language, which thy God
> Utters, who from eternity doth teach
> Himself in all, and all things in himself.

Coleridge's attempts to learn this "language" and trace it through the ancient traditions of mankind also led him during this period to return to the visionary interests of his schooldays: as he ransacked works of comparative religion and mythology, he was exploring the possibility that all religions and mythical traditions, with their general agreement on the unity of God and the immortality of the soul, sprang from a universal life consciousness, which was expressed particularly through the phenomena of human genius.

While these speculations were at their most intense, he retired to a lonely farmhouse near Culbone, Somersetshire, and, according to his own account, composed under the influence of laudanum the mysterious poetic fragment known as "Kubla Khan." The exotic imagery and rhythmic chant of this poem have led many critics to conclude that it should be read as a "meaningless reverie" and enjoyed merely for its vivid and sensuous qualities. An examination of the poem in the light of Coleridge's psychological and mythological interests, however, suggests that it has, after all, a complex structure of meaning and is basically a poem about the nature of human genius. The first two stanzas show the two sides of what Coleridge elsewhere calls "commanding genius": its creative aspirations in time of peace as symbolized in the projected pleasure dome and gardens of the first stanza; and its destructive power in time of turbulence as symbolized in the wailing woman, the destructive fountain, and the voices prophesying war of the second stanza. In the final stanza the poet writes of a state of "absolute genius" in which, if inspired by a visionary "Abyssinian maid," he would become endowed with the creative, divine power of a sun god—an Apollo or Osiris subduing all around him to harmony by the fascination of his spell.

Coleridge was enabled to explore the same range of themes less egotistically in "The Rime of the Ancient Mariner," composed during the autumn and winter of 1797–98. For this, his most famous poem, he drew upon the ballad form. The main narrative tells how a sailor who has committed a crime against the life principle by slaying an albatross suffers from torments, physical and mental, in which the nature of his crime is made known to him. The underlying life power against which he has transgressed is envisaged as a power corresponding to the influx of the sun's energy into all living creatures, thereby binding them together in a joyful communion. By killing the bird that hovered near the ship, the mariner has destroyed one of the links in this process. His own consciousness is consequently affected: the sun, previously glorious, is seen as a bloody sun, and the energies of the deep are seen as corrupt.

> All in a hot and copper sky,
> The bloody Sun, at noon,
> Right up above the mast did stand,
> No bigger than the Moon.
> . . . . . .
> The very deep did rot; O Christ!
> That ever this should be!
> Yea, slimy things did crawl with legs
> Upon the slimy sea.

Only at night do these energies display a sinister beauty.

> About, about, in reel and rout
> The death-fires danced at night;
> The water, like a witch's oils,
> Burnt green, and blue and white.

After the death of his shipmates, alone and becalmed, devoid of a sense of movement or even of time passing, the mariner is in a hell created by the absence of any link with life. Eventually, however, a chance sight of water snakes flashing like golden fire in the darkness, answered by an outpouring of love from his heart, reinitiates the creative process: he is given a brief vision of the inner unity of the universe, in which all living things hymn their source in an interchange of harmonies. Restored to his native land, he remains haunted by what he has experienced but is at least delivered from nightmare, able to see the ordinary processes of human life with a new sense of their wonder and mercifulness. These last qualities are reflected in the poem's attractive combination of vividness and sensitivity. The placing of it at the beginning of *Lyrical Ballads* was evidently intended to provide a context for the sense of wonder in common life that marks many of Wordsworth's contributions. While this volume was going through the press, Coleridge began a complementary poem, a Gothic ballad entitled "Christabel," in which he aimed to show how naked energy might be redeemed through contact with a spirit of innocent love.

Troubled years. Early in 1798 Coleridge had again found himself preoccupied with political issues. The French Revolutionary government had suppressed the states of the Swiss Confederation, and Coleridge expressed his bitterness at this betrayal of the principles of the Revolution in a poem entitled "France: An Ode."

At this time the brothers Josiah and Thomas Wedgwood, who were impressed by Coleridge's intelligence and promise, offered him in 1798 an annuity of £150 as a means of subsistence while he pursued his intellectual concerns. He used his new independence to visit Germany with Wordsworth and Wordsworth's sister, Dorothy. While there Coleridge attended lectures on physiology and biblical criticism at Göttingen. He thus became aware of developments in German scholarship that were little-known in England until many years later.

On his return to England, the tensions of his marriage were exacerbated when he fell

in love with Sara Hutchinson, the sister of Wordsworth's future wife, at the end of 1799. His devotion to the Wordsworths in general did little to help matters, and for some years afterward Coleridge was troubled by domestic strife, accompanied by the worsening of his health and by his increasing dependence on opium. His main literary achievements during the period included another section of "Christabel." In 1802 Coleridge's domestic unhappiness gave rise to "Dejection: An Ode," originally a longer verse letter sent to Sara Hutchinson in which he lamented the corrosive effect of his intellectual activities when undertaken as a refuge from the lovelessness of his family life. The poem employs the technique of his conversational poems; the sensitive rhythms and phrasing that he had learned to use in them are here masterfully deployed to represent his own depressed state of mind.

Although Coleridge hoped to combine a platonic love for Sara with fidelity to his wife and children and to draw sustenance from the Wordsworth household, his hopes were not realized, and his health deteriorated further. He therefore resolved to spend some time in a warmer climate and, late in 1804, accepted a post in Malta as secretary to the acting governor. Later he spent a long time journeying across Italy, but, despite his hopes, his health did not improve during his time abroad. The time spent in Malta had been a time of personal reappraisal, however. Brought into direct contact with men accustomed to handling affairs of state, he had found himself lacking an equal forcefulness and felt that in consequence he often forfeited the respect of others. On his return to England he resolved to become more manly and decisive. Within a few months he had finally decided to separate from his wife and to live for the time being with the Wordsworths. Southey atoned for his disastrous youthful advice by exercising a general oversight of Coleridge's family for the rest of his days.

Coleridge published a periodical, *The Friend,* from June 1809 to March 1810 and ceased only when Sara Hutchinson, who had been acting as amanuensis, found the strain of the relationship too much for her and retired to her brother's farm in Wales. Coleridge, resentful that Wordsworth should apparently have encouraged his sister-in-law's withdrawal, resolved shortly afterward to terminate his working relationship with William and Dorothy Wordsworth and to settle in London again.

The period immediately following was the darkest of his life. His disappointment with Wordsworth was followed by anguish when a wounding remark of Wordsworth's was carelessly reported to him. For some time he remained in London, nursing his grievances and producing little. Opium retained its powerful hold on him, and the writings that survive from this period are redolent of unhappiness, with self-dramatization veering toward self-pity.

In spite of this, however, there also appear signs of a slow revival, principally because for the first time Coleridge knew what it was to be a fashionable figure. A course of lectures he delivered during the winter of 1811–12 attracted a large audience; for many years Coleridge had been fascinated by William Shakespeare's achievement, and his psychological interpretations of the chief characters were new and exciting to his contemporaries. During this period, Coleridge's play *Osorio,* written many years before, was produced at Drury Lane with the title *Remorse* in January 1813.

Late life and works. In the end, consolation came from an unexpected source. In dejection, unable to produce extended work or break the opium habit, he spent a long period with friends in Wiltshire, where he was introduced to Archbishop Robert Leighton's commentary on the First Letter of Peter. In the writings of this 17th-century divine, he found a combination of tenderness and sanctity that appealed deeply to him and seemed to offer an attitude to life that he himself could fall back on. The discovery marks an important shift of balance in his intellectual attitudes. Christianity, hitherto one point of reference for him, now became his "official" creed. By aligning himself with the Anglican church of the 17th century at its best, he hoped to find a firm point of reference that would both keep him in communication with orthodox Christians of his time (thus giving him the social approval he always needed, even if only from a small group of friends) and enable him to pursue his former intellectual explorations in the hope of reaching a Christian synthesis that might help to revitalize the English church both intellectually and emotionally.

One effect of the adoption of this basis for his intellectual and emotional life was a sense of liberation and an ability to produce large works again. He drew together a collection of his poems (published in 1817 as *Sibylline Leaves*) and wrote *Biographia Literaria* (1817), a rambling and discursive but highly stimulating and influential work in which he outlined the evolution of his thought and developed an extended critique of Wordsworth's poems.

For the general reader *Biographia Literaria* is a misleading volume, since it moves bewilderingly between autobiography, abstruse philosophical discussion, and literary criticism. It has, however, an internal coherence of its own. The book's individual components—first an entertaining account of Coleridge's early life, then an account of the ways in which he became dissatisfied with the associationist theories of David Hartley and other 18th-century philosophers, then a reasoned critique of Wordsworth's poems—are fascinating. Over the whole work hovers Coleridge's veneration for the power of imagination: once this key is grasped, the unity of the work becomes evident.

A new dramatic piece, *Zapolya,* was also published in 1817. In the same year, Coleridge became associated for a time with the new *Encyclopaedia Metropolitana,* for which he planned a novel system of organization, outlined in his *Prospectus.* These were more settled years for Coleridge. Since 1816 he had lived in the house of James Gillman, a surgeon at Highgate, north of London. His election as a fellow of the Royal Society of Literature in 1824 brought him an annuity of £105 and a sense of recognition. In 1830 he joined the controversy that had arisen around the issue of Catholic Emancipation by writing his last prose work, *On the Constitution of the Church and State.* The third edition of Coleridge's *Poetical Works* appeared in time for him to see it before his final illness and death in 1834.

Evaluation. Coleridge's achievement has been given more widely varying assessments than that of any other English literary artist, though there is broad agreement that his enormous potential was never fully realized in his works. His stature as a poet has never been in doubt; in "Kubla Khan" and "The Rime of the Ancient Mariner" he wrote two of the greatest poems in English literature and perfected a mode of sensuous lyricism that is often echoed by later poets. But he also has a reputation as one of the most important of all English literary critics, largely on the basis of his *Biographia Literaria.* In Coleridge's view, the essential element of literature was a union of emotion and thought that he described as imagination. He especially stressed poetry's capacity for integrating the universal and the particular, the objective and the subjective, the generic and the individual. The function of criticism for Coleridge was to discern these elements and to lift them into conscious awareness, rather than merely to prescribe or to describe rules or forms.

In all his roles, as poet, social critic, literary critic, theologian, and psychologist, Coleridge expressed a profound concern with elucidating an underlying creative principle that is fundamental to both human beings and the universe as a whole. To Coleridge, imagination is the archetype of this unifying force because it represents the means by which the twin human capacities for intuitive, nonrational understanding and for organizing and discriminating thought concerning the material world are reconciled. It was by means of this sort of reconciliation of opposites that Coleridge attempted, with considerable success, to combine a sense of the universal and ideal with an acute observation of the particular and sensory in his own poetry and in his criticism. (J.B.B./Ed.)

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A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Coleridge, Sara (b. Dec. 22, 1802, Keswick, Cumberland, Eng.—d. May 3, 1852, London), English translator and author of children's verse, known primarily as the editor of the works of her father, Samuel Taylor Coleridge.

During her childhood, her father was seldom at home, and his brother-in-law Robert Southey chiefly influenced Sara's early years. She did not see her father from 1812 to 1822, when she visited him at Highgate with her mother. Thereafter his influence was strikingly manifest.

In 1829 she married her cousin, Henry Nelson Coleridge. For her children she wrote *Pretty Lessons in Verse for Good Children* (1834) and *Phantasmion* (1837), a fairy story with some delightful lyrics. When her husband died in 1843, she took up his unfinished task of editing her father's works and also made several contributions to Coleridgean studies. Notable among these were an "Essay on Rationalism," appended to the 5th edition of *Aids to Reflection* (1843), and a supplement and exhaustive notes to the 2nd edition of *Biographia Literaria* (1847).

Coleridge-Taylor, Samuel (b. Aug. 15, 1875, London, Eng.—d. Sept. 1, 1912, Croydon, Surrey), English composer who enjoyed considerable acclaim in the early years of the 20th century.

Coleridge-Taylor's father, thwarted in his attempts to progress as a physician—through apparent racial prejudice—deserted his son and English wife and returned to his native West Africa. At the age of five Samuel began



Coleridge-Taylor
By courtesy of the Royal College of Music, London

playing the violin and joined the choir of a Presbyterian church in Croydon, where H.A. Walters guided his progress and arranged his admittance to the Royal College of Music in 1890.

While still a student he published some anthems, but his creative gifts were more apparent in various colourful instrumental works. In 1896 he became conductor of an amateur orchestra in Croydon and began teaching, guest-conducting, recital work, and judging at music festivals to support his wife and two children. He also continued to compose and was an early success at the Gloucester Festival with an orchestral *Ballade in A Minor* (1898), which was followed by his outstanding achievement, the Longfellow trilogy for solo voices, chorus, and orchestra of *Hiawatha's Wedding Feast* (1898), *The Death of Minnehaha* (1899), and *Hiawatha's Departure* (1900). In these and numerous other works, including incidental music, choral works, and a violin concerto (1911), influences from Dvořák, Tchaikovsky, and Grieg appear along with a spontaneity derived from appreciation of Negro folk music, in which Coleridge-Taylor was a pioneer. He was well received in the United States, where he toured in 1904, 1906, and 1910.

Coleroon River, river in Tiruchchirāppalli and Thanjāvūr districts, Tamil Nādu state, southeastern India, formed by the northern bifurcation of the Cauvery River at Śrīrangam. The river flows between South Arcot and Thanjāvūr districts for 36 mi (58 km) and empties through several mouths into the Bay of Bengal, 3 mi south of Porto Novo. The Coleroon is part of the Cauvery Delta, the most fertile and densely populated region of southern India, noted for its rice production. The town Chidambaram lies on its banks in Thanjāvūr district.

Colet, John (b. 1466/67, London—d. Sept. 16, 1519, Sheen, Surrey, Eng.), theologian and founder of St. Paul's School, London, who, as one of the chief Tudor Humanists, promoted Renaissance culture in England.

The son of a prosperous merchant who had been Lord Mayor of London, Colet studied mathematics and philosophy at Oxford and then travelled and studied for three years in France and Italy. He returned to England *c.* 1496 and was ordained sometime before 1499. He lectured at Oxford University, to which he invited Desiderius Erasmus, the brilliant Humanist of the northern Renaissance. In addition to Erasmus, Colet collaborated with and influenced such prime Humanists as Sir Thomas More and Thomas Linacre, prototype of the scholar-physicians of the Renaissance. Colet was appointed dean of St. Paul's Cathedral in 1504 and founded St. Paul's School *c.* 1509.

Colet's devotion to Humanism was diversely expressed. His insistence that the classics be taught diffused a sounder knowledge of Greek and Latin and of ancient life and thought. He revered the 3rd-century philosopher Plotinus, founder of the Neoplatonist school; Marsilio Ficino, one of the leaders of Renaissance Platonism; and Dionysius the Areopagite, allegedly an early Christian convert regarded as the author of *The Mystical Theology of the Celestial Hierarchies*, on which Colet wrote a treatise. His contempt for contemporary ecclesiastical abuses was so intense that his denunciation of the sins of the clergy caused him to be suspected of heresy.

Colet's works, mainly unpublished until the 19th-century editions of J.H. Lupton (1867–76), include commentaries on Romans and Corinthians and treatises on the sacraments and the church. With Erasmus and John Lily, he wrote a Latin grammar that was widely used for many years. Works on Colet include Lupton's *Life of John Colet* (1887), E.W. Hunt's *Dean Colet and His Theology* (1956), and L. Miles's *John Colet and the Platonic Tradition* (1961).

Colet, Louise, *née* REVOIL (b. Aug. 15, 1810, Aix-en-Provence, Fr.—d. March 9, 1876, Paris), French poet and novelist, as noted for her friendships with leading men of letters as for her own work.

Daughter of a businessman, she married a musician, Hippolyte Colet, in 1834, and published her first poetry, "Fleurs du Midi," in 1836. Her Paris salon became a meeting place for literary lights, notably Gustave Flaubert, with whom she had a stormy eight-year liaison, during which he composed his *Lettres* addressed to Mme Colet under the guise of "The Muse." Their estrangement was followed by her bitter novel *Lui* (1859; "Him"), which caused a sensation. Among her other intimates were the poets Alfred de Musset and Alfred de Vigny and the philosopher Victor Cousin, who through his official connections helped her to gain prizes and a pension. Her other novels include *La Jeunesse de Mirabeau* (1841; "Mirabeau's Youth") and *Les Coeurs brisés* (1843; "Broken Hearts"). Among her better known works in verse are *Penserosa* (1840); *Ce qui est dans le coeur des femmes* (1852; "In



Louise Colet, lithograph by Grégoire et Deneux
J.P. Ziolo

Women's Hearts"); *Ce qu'on rêve en aimant* (1854; "What One Dreams in Love"); and *Le Poème de la femme* ("The Woman's Poem").

Colette, (Sidonie-Gabrielle) (b. Jan. 28, 1873, Saint-Sauveur-en-Puisaye, Fr.—d. Aug. 3, 1954, Paris), the outstanding French woman writer of the first half of the 20th century, whose novels, largely concerned with the pleasures and pains of love, are remarkable for their exact sensory evocation of sounds, smells, tastes, textures, and colours. Reared in a village in Burgundy, where a kind and wise mother awakened her to the wonders of everything that "germinates, blossoms, or flies," she accepted the world as it was and wrote of love and nature with a mixture of innocence and guile and an acute observation that endeared her to five decades of readers, who, despite the scandals of her life, eventually made her a member of the Belgian Royal Academy (1935), the French Académie Goncourt (1945), and a grand officer of the Légion d'Honneur—honours rarely granted to women.

At 20, Colette married a writer and critic, Henri Gauthier-Villars, who introduced her to the improprieties of the Parisian demi-monde. He discovered her talent for writing and published the four "Claudine" novels (1900–



Colette, 1937
Charles Leirens—Black Star/EB Inc

03), reminiscences of an uninhibited young heroine, under his pen name, Willy. Turning from the semi-autobiographical adventures of a libertine ingénue, Colette wrote sensitively of animals, with whom she maintained a mischievous alliance against the disappointing world of men. At the same time, her senses were enlivened by an almost animistic affection for plant life.

After her divorce in 1906, she became a music-hall performer. During these vagrant years, her attempts to achieve an independent womanhood inspired *La Vagabonde* (1910) and *L'Envers du music-hall* (1913). In 1912, she married Henry de Jouvenel, editor in chief of the paper *Le Matin,* to which she contributed theatre chronicles and short stories. Their daughter (b. 1913) is the Bel-Gazou of the delightful animal story *La Paix chez les bêtes* (1916).

All these works belong to what Colette called her years of apprenticeship (*Mes Apprentissages,* 1936). After 1920 came the decade of her masterpieces. A first group revolves around slightly depraved youth of post-World War I, such as the tainted hero of *Chéri* (1920) and *La Fin de Chéri* (1926), dealing with a liaison between a young man (Chéri) and an older woman, and the adolescents of *Le Blé en herbe* (1923), which concerns a tender and acid initiation to love. In a second group, she looked back to the countryside of her enchanted childhood and away from the pleasures and disillusions of shallow love affairs. *La Maison de Claudine* (1922) and *Sido* (1930) are the poetic meditations of these years.

After 1930 she enjoyed 25 productive and serene years. In 1935, following her divorce from de Jouvenal the previous year, she married Maurice Goudeket, a writer. The marriage brought much happiness, interrupted, however, by her husband's imprisonment by the Gestapo in World War II. Goudeket left his memoirs on their life together (*Près de Colette,* 1955). Colette's later works were diverse in theme: *La Chatte* (1933) and *Duo* (1934) are treatments of jealousy. *Gigi* (1944), the story of a girl reared by two elderly sisters to become a courtesan, was adapted for both stage and screen. A charming musical film version (1958) enjoyed great popularity.

A delicate and humorous realist, Colette was the annalist of female existence, accepting with uncritical realism the traditional female roles of the husband hunter or the discarded, aging, or déclassé mistress. Her format was the novella; her style, a blend of the sophisticated and the natural, laced with all the subtle

cadences of sensuous pleasures and intuitive acumen. From 1949 she was increasingly crippled by arthritis. She ended her days, a legendary figure, surrounded by her beloved cats, confined to her beautiful Palais-Royal apartment overlooking Paris.

Colette, SAINT (b. Jan. 13, 1381, Corbie, Fr.—d. March 6, 1447, Ghent; canonized 1807; feast day March 6), abbess, reformer of the Poor Clares and founder of the Colettine Poor Clares.

The daughter of a carpenter at the monastery of Corbie, she was orphaned at 17 and entered the third order of St. Francis, living in a hermitage given her by the abbot of Corbie. In a vision, St. Francis directed Colette to restore the Poor Clares to the original severity of their rule, which she undertook to do, in 1406, after visiting Antipope Benedict XIII and receiving his support. Despite initial opposition, her reform spread through Savoy, Burgundy, France, Flanders, and Spain, increasing notably after her death.

Coleus, Old World tropical plant genus of about 150 species, of the mint family (Lamiaceae), order Lamiales, best known for members with colourful foliage. Varieties of *C. blumei*, from Java, are well-known house and garden plants up to one metre (three feet) tall. They have square stems and two-lipped flowers, which in *C. blumei* are small, blue, and in spikes.



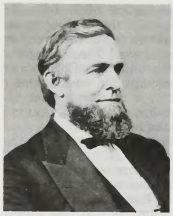
Coleus blumei
Sven Samelius

Bush coleus (*C. thrysoideus*), from Central Africa, reaches one metre and produces seven-centimetre (about three-inch) sprays of bright blue flowers. Others are variously known as flame nettle, painted leaves, painted nettle, Spanish thyme, Indian borage, country borage, and flowering bush.

Colfax, Schuyler (b. March 23, 1823, New York City—d. Jan. 13, 1885, Mankato, Minn., U.S.), Republican vice president of the United States (1869–73) under Pres. Ulysses S. Grant.

After moving to Indiana in his youth, Colfax founded the *St. Joseph Valley Register* (1845), which became one of the most influential papers in the state during his 18 years of editorship. In the fluctuating political situation preceding the U.S. Civil War (1861–65), he shifted from the Whig Party to the Know-Nothings to the Republicans, who elected him to Congress in 1854. He served until 1869, the last six years as speaker of the House.

During Reconstruction (1865–77), Colfax was a leader of the Radical Republicans who favoured extending suffrage to Negro freedmen and disenfranchising those who had served prominently in the Confederacy. Elected to the vice presidency in 1868, he failed to win renomination in 1872. Later that year a congressional investigation implicated him—along with other politicians—in corrupt transactions with the Crédit Mobilier of America. It was also revealed that in 1868 he had accepted a $4,000 campaign contribution from a contractor who had supplied the government with envelopes while Colfax was chairman of the Committee on Post Offices and Post Roads in Congress.



Colfax
By courtesy of the Library of Congress, Washington, D.C.

At the end of his term, Colfax returned to private life under a cloud but managed to make a living by delivering popular lectures. A biography is Willard H. Smith's *Schuyler Colfax: The Changing Fortunes of a Political Idol* (1952).

Colgate-Palmolive Company, U.S. diversified company that produces and distributes household, health care, and personal products. Headquarters are in New York City.

Colgate-Palmolive's history traces back to the early 19th century, when William Colgate, a soap and candle maker, began selling his wares in New York City. His company sold the first toothpaste in a tube, Colgate Ribbon Dental Cream, in 1908.

In 1928 Colgate & Company was bought by Palmolive-Peet Company. Palmolive-Peet's founder, B.J. Johnson, had developed the formula for Palmolive soap in 1898. At the turn of the century Palmolive, which contained both palm and olive oils, was the world's best-selling soap. The current name was adopted in 1953.

Colgate-Palmolive has long been in fierce competition with Procter & Gamble, the country's largest soap and detergent maker. P&G introduced its Tide laundry detergent shortly after World War II and thousands of consumers turned from Colgate's soaps to the new product. Colgate lost its number one place in the toothpaste market when P&G started putting fluoride in its toothpaste.

Colgate now markets a broadly diversified mix of products in the United States and other countries. Major product areas include household and personal care products, food products, health care and industrial supplies, and sports and leisure time equipment.

colic, in medicine, any paroxysmal pain; the term is usually restricted to a pain produced by the contraction of the muscular walls of any hollow organ, such as the renal pelvis or the biliary tract, of which the aperture has become more or less blocked, temporarily or otherwise. In infants, usually those who are bottle-fed, intestinal colic is common and is shown by the drawing up of the infant's legs, restlessness, and continuous crying. Colic may accompany any form of enteritis or an intestinal malignant growth, as well as certain forms of influenza. Colic caused by spastic contractions of the bowel is a common symptom of lead poisoning. Treatment for colic is aimed at relief of symptoms and often includes the administration of a muscle relaxant such as atropine and, occasionally, meperidine hydrochloride (marketed as Demerol).

coliform bacteria, microorganisms that usually occur in the intestinal tract of animals, including man, and are the most widely accepted indicators of water quality in the United States. More precisely they are evidence of recent human fecal contamination of water supplies.

The coliforms are facultative anaerobic (not requiring oxygen), nonsporulating, rod-shaped bacteria that produce acid and gas from the fermentation of lactose sugar: *e.g., Escherichia coli, Enterobacter aerogenes,* and *Klebsiella pneumoniae.*

Coligny, Gaspard II de, SEIGNEUR (lord) DE CHÂTILLON (b. Feb. 16, 1519, Châtillon-sur-Loing, Fr.—d. Aug. 24, 1572, Paris), admiral of France and leader of the Huguenots during the early years of the Wars of Religion (1562–98).

Coligny was the son of Gaspard I de Coligny, the marshal of Châtillon, and Louise de Montmorency, sister of Anne de Montmorency, constable of France. At 22 Coligny came to court and became friendly with François de Lorraine, 2nd duc de Guise. He served in the Italian campaign in 1544 and later was appointed colonel general of the infantry. Made admiral of France in 1552, he later fought against the Spanish and was imprisoned by them for two years.

Although in 1555 Coligny had favoured a plan for sending Huguenots to Brazil to establish a colony in safety, he did not officially announce his support for the Reformation until 1560. At that time, protected by his uncle Montmorency, he became the protector of his coreligionists in France. He demanded religious toleration, gaining the support of the chancellor, Michel de L'Hospital, and, for a time, of Catherine de Médicis but arousing the enmity of the powerful Guise family. Coligny's conversion was more political than religious. Although attracted to Calvinist philosophy, he saw the reformed religion as a system for the maintenance of order, discipline, and justice.

When the civil wars began in 1562, Coligny hesitantly joined the fight. He was not one of the best generals; he simply did not like war. Upon the death of the first Prince de Condé in 1569, Coligny became the sole leader of the Huguenots. Although severely defeated at Moncontour (October 1569), he rallied an army in southern France and advanced as far as the upper Seine valley, forcing the Peace of Saint-Germain (August 1570), which was very advantageous to the Huguenot cause.



Coligny, detail of a portrait by an unknown artist, 16th century; in the Musée Condé, Chantilly, Fr.
By courtesy of the Musee Conde, Chantilly, France; photograph, Giraudon—Art Resource

Returning to the court in 1571, Coligny rose rapidly in favour with Charles IX and began to exert considerable influence over the King's policies. He proposed that a combined army of French Catholics and Huguenots fight against the Spanish in the Netherlands. Driving the Spanish from Flanders was only a secondary objective: by having the Huguenots serve France abroad successfully, Coligny hoped to

secure their position within the realm. At the same time, he hoped to win favour with the king for himself.

Catherine and Guise did not want war with Spain, their ally, and feared for their own influence over the king. At the instigation of Catherine an unsuccessful assassination attempt was made against Coligny on Aug. 22, 1572, in Paris. Charles visited him, promising a full investigation. Catherine, knowing that she would be discovered, played on her son's fears and instabilities by telling him that the Huguenots were plotting to retaliate against him. In an outburst of rage, Charles ordered the deaths of the Huguenot leaders, including Coligny, and the massacre of St. Bartholomew's Day began.

At dawn on the 24th, mercenaries of Henri de Guise attacked Coligny at his house, struck blow after blow, and finally threw him, still living, from the window; his head was then cut off by one of Guise's henchmen.

Colijn, Hendrikus (b. June 22, 1869, Haarlemmermeer, Neth.—d. Sept. 18, 1944, Ilmenau, Ger.), Dutch statesman who as prime minister (1933–39) gained widespread popular



Colijn, drawing by Willy Sluiter, 1925
By courtesy of the Iconographisch Bureau, The Hague

support through his conservative antidepression economic policies.

A soldier (1895–1904) in the colonial army during the Achinese War in northern Sumatra, Colijn later served there as a civil administrator, organizing government services and rubber plantations. He entered the Dutch Parliament in 1909 as a member for the orthodox Calvinist Anti-Revolutionary Party and became war minister (1911–13). After serving as director (1914–22) of the company that later became the Royal Dutch Petroleum Company (Shell), he succeeded Abraham Kuyper in 1922 as leader of the Anti-Revolutionary Party and editor of its newspaper, *De Standaard*.

He served as finance minister from 1923 to 1925. After a brief ministry in 1925–26, he became prime minister again in 1933 and pursued a policy of "adaptation" (reducing the general standard of living) and of postponing devaluation of the currency. He was forced to resign from office in July 1939 after dropping the Catholic bloc from his coalition Cabinet. Having remained in The Netherlands as editor of *De Standaard* after the German occupation in 1940, he was arrested in July 1941 and spent his remaining years under Nazi supervision.

Colima, small *estado* ("state") on the Pacific coast of west-central Mexico, bounded by the Pacific Ocean (south and west) and by the states of Jalisco (northwest and north) and Michoacán (east). Its area of 2,004 square miles (5,191 square km) includes the Revillagigedo Islands (*q.v.*), 500 miles (800 km) off the coast. Most of Colima is within the narrow coastal plain, beyond which it rises toward the northeast into the Sierra Madre foothills. It is drained by the Armería and Coahuayana rivers, which are used for irrigation. The soil is generally fertile and productive, but lack of transportation has impeded development. The climate is hot and humid, becoming drier and more healthful on the higher mountain slopes. Livestock raising is an important industry in the more elevated regions. Agriculture is the principal occupation, the most important crops being sugarcane, rice, corn (maize), palm oil, and mountain-grown coffee. Mineral deposits include iron, copper, and lead. Salt is produced at Cuyutlán, on the coast. A railroad and a highway traverse the state, leading from Guadalajara and Mexico City through Colima, the state capital, to the port city of Manzanillo, a Pacific-coast resort offering bathing beaches and fishing. Pop. (1986 est.) 405,480.

Colima, city, capital of Colima *estado* ("state"), west-central Mexico. It lies along the Colima River in the Sierra Madre foothills, 1,667 feet (508 m) above sea level. Although it was founded in 1522, Colima has played a minor role in Mexican history because of its inaccessibility. It is now connected by rail and paved highway to the port of Manzanillo, as well as to interior points. Its industries centre upon the processing of local agricultural products (including cotton, rice, and corn [maize]), together with salt refining, alcohol distilling, and the manufacture of shoes and leather goods. It is the site of the University of Colima (1867; reorganized 1962). Pop. (1980) 86,044.

Colin MUSET (fl. 13th century), French trouvère, a professional vielle player and jongleur, who performed in châteaus of the Upper Marne Valley between Langres and Joinville. Colin was a native of Lorraine; his poetry, skillfully written, praised the pleasures of wine and good living. He also wrote and sometimes parodied courtly poetry.

Colines, Simon de (b. 1480—d. 1546), French printer who pioneered the use of italic types in France. He worked as a partner of Henri Estienne, the founder of an important printing house in Paris.

Estienne died in 1520, and Colines married his widow and was in charge of the press until Estienne's son Robert I entered the business in 1526, by which time Colines had set up his own shop nearby. In 1528 he began to use italic type. Colines published many Greek and Latin classics. Although he was not a scholar himself, he extended the range of the Estienne firm's learned and scientific works to include the natural sciences, cosmology, and astrology. He is credited with the design of italic and Greek fonts and of a roman face for St. Augustine's *Sylvius* (1531), from which the Garamond types were derived. In 1525 he published the notable *Grandes Heures de Simon de Colines,* with decorations by Geoffroy Tory.

colitis, inflammation of the large intestine (colon), especially of its mucous membranes. Spastic colitis is commonly "nervous," or psychosomatic, in origin and is usually a temporary upset rather than a chronic inflammation; this disorder may account for 50 percent of all digestive-tract illnesses. Its symptoms are abdominal pain, diarrhea (sometimes alternating with constipation), and erratic frequency of bowel movements. Treatment of this disorder is basically supportive and psychological in approach.

In the more severe disorder known as ulcerative colitis, patches of tiny holes (ulcers) develop in the inflamed membranes, and there is diarrhea with blood and mucus. The condition tends to become chronic, with sustained fever and weight loss; complications and death may result. Specific causes, such as amebic or bacillary dysentery, are rarer than unknown or multiple causes. The condition is treated with sulfasalazine or steroids or, in severe cases that cannot be controlled with medication, by surgical removal of part or all of the colon.

A mild form of colitis in which the stool contains mucus is known as mucous colitis. Still another type of colitis arises when antibiotic use causes the abnormal proliferation of certain types of bacteria in the colon, leading to inflammation and the typical symptoms of colitis. This disorder is treated by stopping the use of the causal antibiotic.

collage (French: "pasting"), artistic technique of applying manufactured, printed, or "found" materials, such as bits of newspaper, fabric, wallpaper, etc., to a panel or canvas, frequently in combination with painting. In the 19th century, papiers collés were created from papers cut out and put together to form decorative compositions. In about 1912–13 Pablo Picasso and Georges Braque extended this technique, combining fragments of paper, wood, linoleum, and newspapers with oil paint on canvas to form subtle and interesting abstract or semiabstract compositions. The development of the collage by Picasso and Braque contributed largely to the transition from Analytical to Synthetic Cubism.

The word *collage* was first used to refer to works by Dada and Surrealist artists, especially Max Ernst. His collages were composed of old engravings and prints that had been skillfully cut and pasted together to form disquietingly irrational images. Kurt Schwitters' collages utilized pieces of string, rags, wood, wire, nails, and papers. Henri Matisse's imaginative *papiers découpés,* the works of his last years, were an adaptation of the collage technique. The American artist Joseph Cornell expanded upon the collage technique in his intimate, mysterious shadow boxes. In the 1960s collage was employed as a major form of Pop art. The Pop-art collage was brought to its high point in the 1960s by Robert Rauschenberg, who combined newspaper and magazine photographs with silk-screen printing to produce images that are amalgams of American history and popular culture.

collagen, any of a group of proteins that are components of whitish, rather inelastic fibres of great tensile strength present in tendon and ligament and in the connective tissue layer of the skin—dermis—and in dentin and cartilage. Collagenous fibres occur in bundles up to several hundred microns wide, and the individual fibres can be separated into fine fibrils; the fibrils, furthermore, consist of even finer filaments with a periodic banded structure.

Collagen is a scleroprotein (*q.v.*), being one of a family of proteins marked by low solubility in water. Collagen is especially rich in the amino acid glycine, and it is the only protein known to contain a substantial proportion of hydroxyproline. Upon exposure to boiling water, collagen is converted to gelatin.

collarbone (anatomy): *see* clavicle.

collard, original name COLEWORT (*Brassica oleracea,* Acephala group), headless form of cabbage (*q.v.*) of the mustard family (Brassicaceae). It bears the same botanical name as kale, from which it differs only in leaf characters; collard leaves are much broader, are not frilled, and resemble the rosette leaves of head cabbage. The main stem reaches a height of 60–120 cm (24–48 inches) with a rosette of leaves at the top. Lower leaves commonly are harvested progressively; the entire young rosette is sometimes harvested. The plant is a source of nutritionally important minerals and of vitamins A and C. It is commonly raised as a source of winter greens in the southern United States, where it is customarily boiled with a seasoning of pork fat.

collared hemipode (bird): *see* plains wanderer.

collared lizard (*Crotaphytus*), any of four species belonging to the lizard family

Iguanidae. The coloration of the collared lizards changes depending on temperature and light.

The common collared lizard, *Crotaphytus collaris*, ranges in length up to 35 centimetres (14 inches), including a long slender tail, and it can run on its hind legs. Though often referred to as a "mountain boomer," it has no voice. Collared lizards are nimble, active, aggressive reptiles with relatively massive heads.

collecting tubule: *see* renal collecting tubule.

collective bargaining, process of negotiation between representatives of workers and management to determine the conditions of employment. The collectively determined agreement may cover not only wages but hiring practices, layoffs, promotions, working conditions and hours, worker discipline, and benefit programs.

Collective bargaining existed as early as the end of the 18th century in England; its development on the European continent and in the United States occurred later. Collective agreements are probably most significant in the United States and the United Kingdom and least significant in developing countries with large pools of surplus labour.

The degree of centralization in the bargaining process and the functions performed by collective agreements vary. Contract negotiation may occur at the national, regional, or local level, depending on the structure of industry within a country. National agreements, which are more common in smaller countries, usually settle general matters, leaving more detailed issues for local consideration. Collective agreements may set actual wage rates or may be limited to minimum wage rates. In Germany, for example, considerable differences between the contract wage rate and the actual prevailing rates are common. Collective agreements are not legally binding in all countries; in England, for example, their application depends on the goodwill of the signatories. In some countries, including Germany, France, and Australia, the terms of negotiated settlements may be extended by the government to apply to all firms in an industry. Similar results are sometimes accomplished informally in the United States under the tradition of allowing certain bargaining agreements to set the pattern for other settlements in an industry.

collective behaviour, the kinds of activities engaged in by sizable but loosely organized groups of people. Episodes of collective behaviour tend to be quite spontaneous, resulting from an experience shared by the members of the group that engenders a sense of common interest and identity. The informality of the group's structure is the main source of the frequent unpredictability of collective behaviour.

A brief treatment of collective behaviour follows. For full treatment, *see* MACROPAEDIA: Collective Behaviour.

Despite the uncertainties in specific courses of action, certain patterns in collective behaviour can be noted. In particular, there is typically a preliminary phase, during which people prepare themselves to act together. This phase is said to contain elementary collective behaviour, which is of three basic types. The first is milling. Milling consists of the restless movements of a group of people who are aroused in some way but who are still responding to their situation primarily as individuals. Milling serves to make members of the group aware of each other and helps spread a mutual sense of the situation and its meaning.

The second type of elementary collective behaviour is rumour. Rumour can be seen as a process by which a group of people arrive at a consensus on the nature and significance of events. Rumours can be defined as bits of information that are transmitted via channels that lack official sanction. Thus, rumours flourish when these channels provide insufficient information or perhaps are not trusted.

A prolonged combination of milling and rumour can produce the third type of elementary collective behaviour, social unrest. A community in which people are sensitive to each others' moods is prone to generalized discontent that can spread rapidly and bring ordinary affairs to a halt. Because the discontent is unfocussed, a period of social unrest is marked only by sporadic individual actions; it sets the stage, however, for more fully developed collective behaviour.

A central example of full-blown collective behaviour is the phenomenon of crowds. A crowd is a group of people who occupy a fairly limited space over a relatively brief span of time but who share a mutually defined purpose. An "active" crowd directs its energies toward some external object that it desires to transform, often to deface or destroy. Thus, the period of elementary collective behaviour that forges the crowd must effectively diminish its members' normal reluctance to engage in violence. An "expressive" crowd is not concerned with anything outside itself. Rather, its members direct their energies toward a certain shared experience, often of a fervent nature.

Crowd behaviour must be distinguished from related varieties of collective behaviour. First, crowds differ from so-called publics, which are relatively dispersed groups of people who have not settled their views on a given issue. Second, crowds differ from so-called masses, which are groups of people who all perform the same action, perhaps in the same place, but without the sense of acting in concert. Finally, crowds differ from so-called social movements, which have longer term goals and which can be manifested repeatedly over time.

Other familiar cases of collective behaviour fall under the rubric of collective obsessions. The central example is the fad, in which large numbers of people occupy themselves with an unusual activity almost to the exclusion of anything else, primarily because the activity has become intensely popular. Those who do not participate in the fad usually regard it as silly, if not indeed dangerous. The phenomenon is roughly similar to speculative "crazes" in the world of business, and it has, in a sense, been institutionalized by the fashion industry. A fascinating example of a collective obsession is a so-called hysterical contagion, wherein a group of people all manifest symptoms of a mysterious disease. Investigation into these cases shows that the disease is nonexistent and that the symptoms are the result of shared (though perhaps unstated) anxiety.

Efforts to explain collective behaviour have pointed to three sorts of causes. Some theorists have emphasized the motivations that lead an individual to engage in it. In this view, people who ordinarily feel cut off from social groups develop a deep sense of frustration. To alleviate this unpleasant feeling, such people seize on the opportunity to act together with others, almost without regard to the activity itself. Other theorists have emphasized the influence that people in a group exercise over one another. Thus, a bit of behaviour can be repeated and intensified by successive members of a group. In this way, a group can generate a pattern of behaviour forceful enough to overcome the resistance of people who would ordinarily not engage in the activity in question. Finally, certain theorists have emphasized the importance of social conditions, arguing that collective behaviour can express various kinds of social change. Groups that hold a new set of values or are exercising newly acquired power often engage in collective behaviour in order both to consolidate their membership and to manifest themselves to the rest of society.

The effects of collective behaviour will differ, depending on such factors as social reactions. Immediately, an episode of collective behaviour can enliven society to a given issue, forcing people to take sides. But it should be observed that the way in which the behaviour is handled by social authorities—*e.g.*, whether it is officially sanctioned or ruthlessly repressed—will help shape the way that people respond to it. Taking a broader view, it is sometimes suggested that collective behaviour provides an avenue for social experimentation—a procedure by which new social forms and values can be put to the test in full public view. As such, social leaders are deeply concerned to try to control collective behaviour—either to put it to their own uses or to prevent its use by someone else. The explosive character of collective behaviour makes it virtually impossible to master, however.

collective farm: *see* kolkhoz.

collective model, also called UNIFIED MODEL, description of atomic nuclei that incorporates aspects of both the shell model and the liquid-drop model to explain certain magnetic and electric properties that neither of the two separately can explain. In the shell model, nuclear structure and behaviour are explained on the basis of unpaired nucleons (protons and neutrons) beyond the passive nuclear core composed of closed shells of paired protons and paired neutrons; in the liquid-drop model, nuclear structure and behaviour are explained on the basis of statistical contributions of all the nucleons (much as the molecules of a spherical drop of water contribute to the overall energy and surface tension). In the collective model, high-energy states of the nucleus and certain magnetic and electric properties (magnetic and quadrupole moments) are explained by the motion of the nucleons outside the closed shells combined with the motion of the paired nucleons in the core. Roughly, the nuclear core may be thought of as a liquid drop on whose surface circulates a stable tidal bulge directed toward the rotating unpaired nucleons outside the bulge. The tide of protons (positively charged particles) constitutes a current that in turn contributes to the magnetic properties of the nucleus, and the greater deformation of the nucleus as the number of unpaired nucleons increases accounts for the measured electric quadrupole moment (which may be considered an index of nuclear shape or a measure of how much the distribution of electric charge in space departs from spherical symmetry).

collective security, system by which states have attempted to prevent or stop wars. Under a collective security arrangement, an aggressor against any one state is considered an aggressor against all other states, which act together to repel the aggressor.

Collective security arrangements have always been conceived as being global in scope; this is in fact a defining characteristic, distinguishing them from regional alliances such as the North Atlantic Treaty Organization. Both the League of Nations and the United Nations were founded on the principle of collective security.

Neither the League nor the United Nations were able to operate the principle successfully to prevent aggression because of the conflicts of interest among states, especially among the major powers. The existence of such conflicts has in fact been recognized in the institutionalized arrangements of the two world bodies themselves: under the Covenant of the League of Nations the response to aggression was left to the member states to decide (article 16, paragraph 3, as amended by interpretive resolutions adopted in 1921); and under the UN Charter any permanent member of the Secu-

rity Council may veto collective action (article 27, paragraph 3).

collective unconscious, term introduced by psychiatrist Carl Jung to represent a form of the unconscious (that part of the mind containing memories and impulses of which the individual is not aware) common to mankind as a whole and originating in the inherited structure of the brain. It is distinct from the personal unconscious, which arises from the experience of the individual. According to Jung, the collective unconscious contains archetypes, or universal primordial images and ideas.

collectivism, any of several types of social organization in which the individual is seen as being subordinate to a social collectivity such as a state, a nation, a race, or a social class. Collectivism may be contrasted with individualism (*q.v.*), in which the rights and interests of the individual are emphasized.

The earliest modern, influential expression of collectivist ideas in the West is in Jean-Jacques Rousseau's *Du contrat social,* of 1762 (*see* social contract), in which it is argued that the individual finds his true being and freedom only in submission to the "general will" of the community. In the early 19th century the German philosopher G.W.F. Hegel argued that the individual realizes his true being and freedom only in unqualified submission to the laws and institutions of the nation-state, which to Hegel was the highest embodiment of social morality. Karl Marx later provided the most succinct statement of the collectivist view of the primacy of social interaction in the preface to his *Contribution to the Critique of Political Economy:* "It is not men's consciousness," he wrote, "which determines their being, but their social being which determines their consciousness."

Collectivism has found varying degrees of expression in the 20th century in such movements as socialism, communism, and fascism. The least collectivist of these is social democracy, which seeks to reduce the inequities of unrestrained capitalism by government regulation, redistribution of income, and varying degrees of planning and public ownership. In communist systems collectivism is carried to its furthest extreme, with a minimum of private ownership and a maximum of planned economy.

collectivization, policy adopted by the Soviet government, pursued most intensively between 1929 and 1933, to transform traditional agriculture in the Soviet Union and to reduce the economic power of the kulaks (prosperous peasants). Under collectivization the peasantry were forced to give up their individual farms and join large collective farms (kolkhozy). The process was ultimately undertaken in conjunction with the campaign to industrialize the Soviet Union rapidly. But before the drive began, long and bitter debates over the nature and pace of collectivization went on among the Soviet leaders (especially between Stalin and Trotsky, 1925–27, and between Stalin and Nikolay Bukharin, 1927–29).

Some Soviet leaders considered collective farms a socialist form of land tenure and therefore desirable; but they advocated a gradual transition to them in order to avoid disrupting the agricultural productivity necessary to stimulate industrial growth. Other leaders favoured rapid industrialization and, consequently, wanted immediate, forced collectivization; they argued not only that the large kolkhozy could use heavy machinery more efficiently and produce larger crops than could numerous small, individual farms but that they could be controlled more effectively by the state. As a result, they could be forced to sell a large proportion of their output to the state at low government prices, thereby enabling the state to acquire the capital necessary for the development of heavy industry.

A decision was made by the 15th Congress of the Communist Party (December 1927) to undertake collectivization at a gradual pace, allowing the peasantry to join kolkhozy voluntarily. But in November 1928 the Central Committee (and in April 1929 the 16th Party Conference) approved plans that increased the goals and called for 20 percent of the nation's farmland to be collectivized by 1933. Between October 1929 and January 1930 the proportion of peasant households forced into kolkhozy rose from about 4 percent to 21 percent, although the government's main efforts in the countryside were concentrated on extracting grain from the kulaks.

Intensive collectivization began during the winter of 1929–30. Stalin called upon the party to "liquidate the kulaks as a class" (Dec. 27, 1929), and the Central Committee resolved that an "enormous majority" of the peasant households should be collectivized by 1933. Harsh measures—including land confiscations, arrests, and deportations to prison camps—were inflicted upon all peasants who resisted collectivization. By March 1930 more than one-half of the peasantry (a larger proportion in the agriculturally rich southwestern region of the Soviet Union) had been forced to join collective farms.

But the peasants objected violently to abandoning their private farms. In many cases, before joining the kolkhozy they slaughtered their livestock and destroyed their equipment. The losses, as well as the animosity toward the Soviet regime, became so great that Stalin decided to slow down the collectivization process. On March 2, 1930, he published an article, "Dizzy from Success," in which he shifted the blame to local officials, whom he characterized as overzealous in their duties. Immediately, many peasants left the kolkhozy. In March 1930 approximately 58 percent of the peasant households had been enrolled in kolkhozy; by June only about 24 percent remained. In the southwestern "black earth" region the figure dropped from 82 percent in March to 18 percent in May.

In the fall of 1930 the drive was renewed at a slower pace, but with equal determination. The application of various administrative pressures—including punitive measures—resulted in the recollectivization of one-half of the peasants by 1931. By 1936 the government had collectivized almost all the peasantry. But in the process millions of those who had offered resistance had been deported to prison camps and removed from productive activity in agriculture. Furthermore, the absence of heavy agricultural machinery and of the horses and cattle that the peasants had killed seriously handicapped the new collective farms.

Output fell, but the government, nevertheless, extracted the large amounts of agricultural products it needed to acquire the capital for industrial investment; this caused a major famine in the countryside (1932–33) and the deaths of millions of peasants. Despite these great costs, the forced collectivization achieved the final establishment of Soviet power in the countryside. Through collectivization agriculture was integrated with the rest of the state-controlled economy, and the state was supplied with the capital it required to transform the Soviet Union into a major industrial power. *See also* kolkhoz.

college, an institution that offers post-secondary education. The term is used without uniformity of meaning.

In Roman law a collegium was a body of persons associated for a common function. The name was used by many medieval institutions—from guilds to the body that elected the Holy Roman emperor.

Secondary schools are sometimes called colleges. England's Winchester and Eton colleges—which date from the 14th century—are examples. From 1539 to 1773 the Jesuits built collegia in Catholic countries and colonies. In post-Napoleonic France municipalities founded *collèges* where the central government's *lycées* were not available.

In medieval Bologna the body of instructors was called the collegium and the student body the *universitas.* But some students lived in collegia. In most universities of the later Middle Ages, collegium meant an endowed residence hall for students, usually candidates for both bachelor and advanced degrees. The colleges grew strongest at the University of Paris and at the universities of Oxford and Cambridge. Each had colleges in the 13th century, notably Paris' Sorbonne, Oxford's Merton, and Cambridge's Peterhouse. By 1500 few students lived outside colleges. The colleges kept libraries and scientific instruments and offered regular salaries—occasionally chairs—to doctors and tutors who could prepare students to be examined for degrees. College teaching eclipsed university teaching. Eventually, the holder of a university chair had little to do besides examining students who had been prepared in the various colleges.

Colleges disappeared from Paris and the rest of continental Europe during the French Revolutionary and Napoleonic periods. But colleges have retained their function at Oxford and Cambridge, although the trend has been to share instructors and resources among themselves and with the universities. The Swedish *nation* and the Spanish *colegio* are contemporary continental efforts to gain some of the advantages of the older system.

Dublin University and its first college—Trinity—were both founded in 1591; the college and the university became almost one because no other colleges were founded, although distant Magee College later affiliated.

The idea that a college trains for a degree and a university grants it was strong in the 19th-century British system. Two colleges were founded in London in the 1820s, but in 1836 the University of London was founded to grant degrees to their students. Many other colleges—most of them physically remote from each other—have affiliated with that university. The University of Durham was founded in 1837 as an Oxford-model campus with several colleges for residence and teaching; it later acquired affiliate colleges elsewhere—some in British colonies. University colleges were founded by Roman Catholics in Ireland in the 1850s; their students were usually examined for degrees at established universities until the National University of Ireland was founded in 1908. Other universities with colleges were founded. But English universities founded after 1879—commonly called "red brick" universities—have no colleges. The University of St. Andrews in Scotland is composed of two colleges.

The Maritime Provinces and Ontario in Canada have had colleges since the late 18th century, but most colleges in English-speaking Canada are affiliated with universities. Colleges were founded in the Cape Province in South Africa in the 19th century; most later became universities. In Australia universities without colleges were founded in the 19th century. But teachers' colleges and "colleges of advanced education" exist—and grant bachelor's degrees. New Zealand's only college other than a teachers' college is a campus affiliated with a university. British Africa had mostly colleges until independence, when national universities—often on the London model—were founded.

In the United States college may refer to a four-year institution of higher education offering only the bachelor's degree, or it may refer to a junior or community college with a

two-year program that leads to the associate degree. A four-year college usually emphasizes a liberal-arts or general education rather than specialized technical or vocational preparation. The four-year college may be an independent privately controlled liberal-arts college, or it may be the undergraduate division of a private or state university. A university division that offers a graduate or professional degree is usually called either a "college" or a "school" or "graduate school." The term "college" also refers to separate degree-granting professional institutions such as state teachers' colleges and agricultural colleges. "College" is also used in the names of institutions that teach office skills, automotive repair, hairdressing, and other trades.

In 1783 the United States had nine colleges that had earlier been chartered to grant bachelor's degrees and were sometimes informally called universities. After independence, states established universities similar to those colleges, and teachers' colleges and agricultural colleges were also founded. Cornell University, in Ithaca, N.Y., opened in 1868 and was the first American university to be divided into colleges offering different degrees. When Johns Hopkins University opened in 1876, it was divided administratively into an undergraduate college and a graduate school. Many state universities quickly imitated this plan, and in the 1890s Yale, Harvard, and other private universities did likewise.

The Collège de France—with antecedents in France dating to 1518—offers postsecondary study but no degrees. In Quebec, *collèges classiques* offer secondary and baccalaureate studies and are affiliated with universities. In Germany *Kollegien* appears in the name of some institutions offering technical courses. *See also* higher education.

College Park, city, Prince Georges county, Maryland, U.S. It lies 8 miles (13 km) northeast of Washington, D.C. It developed around Maryland Agricultural College (established 1856), which became Maryland State College (1916) and merged with the University of Maryland (1807) when its main campus was established at College Park in 1920. The Maryland Agricultural Experimental Station (1887) is in College Park. Surrounding institutions include the U.S. Naval Ordnance Station (northwest), the National Agricultural Research Center and Fort Meade (northeast), and Goddard Space Flight Center (east). The Army Aviation School commenced at the College Park airfield in 1909 with Wilbur Wright as an instructor. Inc. town, 1945; city, 1955. Pop. (1990) 21,927.

College Station, city, Brazos county, southeastern Texas, U.S. It is adjacent to the city of Bryan and lies 96 miles (154 km) northwest of Houston. Having grown up around the Texas Agricultural and Mechanical University (inaugurated 1876 as a college, university status attained 1963), the city is essentially residential with its economy geared to that of the university. The college was located on the Houston and Texas Central Railroad (now the Southern Pacific) and was known as a "flag station." When a post office was established in the locality in 1877, the words *college* and *station* were combined to form the name of the town. Texas A & M University remains the principal source of employment in College Station. Inc. 1938. Pop. (1991 est.) city, 53,575; Bryan–College Station MSA, 124,461.

collegia pietatis (Latin: "schools of piety"), conventicles of Christians meeting to study the Scriptures and devotional literature; the concept was first advanced by the German Protestant reformer Martin Bucer, an early associate of John Calvin in Strasbourg. Philipp Jakob Spener adopted the idea a century later in an effort to counteract the corruptions of the church and to implement a program of reform that revolved around Bible study, spiritual exercises, and personal piety. This led to a religious revival in many German states and influenced not only the church but also society in general. Because of their emphasis on the practice of a pious life, Spener and his followers were called Pietists.

collegiality, in various Christian denominations, especially Roman Catholicism, Anglicanism, and Eastern Orthodoxy, the view that bishops, in addition to their role as individuals presiding over local churches (in most cases, dioceses), are members of a body that has the same teaching and ruling functions in the universal church that the Apostles had in the early church. Based on the concept in Roman law of "college," a body of persons, not fewer than three, associated together by the possession of common function, the collegiality of bishops is reflected in the ancient tradition that at least three bishops should participate in the consecration of a priest to the episcopate. Historically, the collegiate function of bishops has been manifested in regional or national synods or conferences and in the less frequent meetings of all bishops (ecumenical councils). The second Vatican Council (1962–65) clarified the Roman Catholic position on the relationship of the bishops to the pope, who is considered by Catholics to be head of the episcopal college. The concept should not be confused with collegiate episcopacy (the government of a local church by a body of presbyters as found in the 1st century).

Collett, Camilla, in full JACOBINE CAMILLA COLLETT, *née* WERGELAND (b. Jan. 23, 1813, Kristiansand, Nor.—d. March 6, 1895, Kristiania [now Oslo]), novelist and passionate advocate of women's rights; she wrote the first Norwegian novel dealing critically with the position of women. Its immense influence on later writers—especially Henrik Ibsen, Bjørnstjerne Bjørnson, Jonas Lie, and Alexander Kielland—is reflected in the late 19th century, when women's emancipation became a burning topic of the day.

The sister of Norway's beloved national poet Henrik Wergeland, she was in love as a young woman with his greatest rival, J.S. Welhaven, but the love affair ended unhappily, and she later married Peter Jonas Collett, who strongly encouraged her writing. Not until after his death and the death of her parents and brother did she write the novel for which she is most famous, *Amtmandens døttre* (1854–55; "The Governor's Daughter"). In it she attacked the existing inequality of the sexes and the conventional marriage and home based on patriarchal dominion. Her second novel, *I de lange nætter* (1862; "In the Long Nights"), was less aggressive, dealing with reminiscences of her childhood and youth. The rest of her works were dedicated to the social and emotional emancipation of women.

Collett, Glenna: *see* Vare, Glenna Collett.

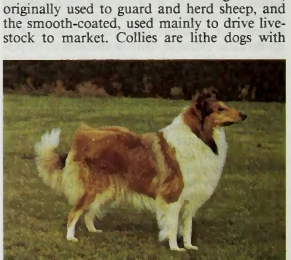
colliding-beam storage ring, also called COLLIDER, type of particle accelerator (*q.v.*) that stores and then accelerates counterrotating beams of subatomic particles before bringing them into head-on collision. Because the net momentum of the oppositely directed beams is zero, all the energy of the beams can go into particle interactions. This is in contrast to interactions between particles in a single beam and a stationary target, in which some of the beam energy is used to conserve momentum by giving kinetic energy to the products of the collision. In a collider, the product can be at rest, with all the energy of the collision converted into the mass of the product.

The basic element of most colliders is a synchrotron (accelerator) ring (*see also* synchrotron). A single ring can accommodate two beams of particles traveling in opposite directions, provided one beam contains particles with the same mass as those in the other but opposite electric charge. This is possible with electrons and their antiparticles, positrons, or with protons and antiprotons. Bunches of each type of particle are fed into the synchrotron ring until a sufficiently large number has accumulated in each beam, and then the two beams are accelerated simultaneously. Once they have reached the desired energy, the beams are brought into collision at predetermined points surrounded by particle detectors. Actual interactions between particles are relatively rare (one of the drawbacks of colliding-beam systems), and the beams can typically circulate, colliding on each circuit, for several hours before the beams are "dumped" and the machine "filled" once again.

The Large Electron-Positron collider at CERN (European Organization for Nuclear Research), Geneva, is the world's largest collider, achieving collisions between electrons and positrons in a ring 27 km (17 miles) in circumference. The machine generally operates at 45.5 gigaelectron volts (GeV) per beam in order to produce the Z^0 particle, which has a mass of 91 GeV. There were plans to upgrade collision energies to about 90 GeV per beam. The highest-energy proton-antiproton collisions occur at the Fermi National Accelerator Laboratory, Batavia, Ill., U.S., at energies of close to 1,000 GeV per beam.

With beams of identical particles or of particles of different mass, a collider must contain two synchrotron rings, interlaced to bring the beams into collision at two or more points. The first colliders, electron-electron machines built in the early 1960s, were of this type, as was the Intersecting Storage Rings, a proton-proton collider that operated at CERN during the 1970s. In 1992 the first electron-proton collider, with two rings, came into operation at DESY (German Electronic Synchrotron), Hamburg, Ger. (Ch.Su.)

collie, working-dog breed developed in Great Britain, probably by the 18th century. There are two varieties of collie: the rough-coated, originally used to guard and herd sheep, and the smooth-coated, used mainly to drive livestock to market. Collies are lithe dogs with



Collie
Sally Anne Thompson

tapering heads, almond-shaped eyes, and erect ears that tip forward at the ends. Both varieties are identical in form, although some authorities believe they were once distinct breeds. The rough-coated collie, a popular companion and watchdog, has a thick, straight coat that forms a heavy ruff about its neck and throat; the smooth-coated collie has a dense, smooth coat. Both varieties stand 56 to 66 cm (22 to 26 inches) and weigh 23 to 34 kg (50 to 75 pounds), and both are famed for their loyalty. They are brown and white, black with tan and white, blue-gray with black mottling and white markings, or white, usually with darker markings.

The border collie, typically an outstanding sheep dog, is a breed that has been used

along the English-Scottish border for about 300 years. A long-haired dog, usually black and white in colour, it stands about 51 cm and weighs 14 to 23 kg. The border collie is purebred but is not recognized by the American Kennel Club.

Collier, Arthur (b. Oct. 12, 1680, Langford Magna, Wiltshire, Eng.—d. September 1732), idealist philosopher and theologian remembered for his concept of human knowledge.

Collier was born at the rectory of Langford Magna. Educated at Pembroke and Balliol colleges, Oxford, he became rector at Langford Magna in 1704.

Like the idealist thinker George Berkeley, Collier denied that an external world exists independent of that conceptualized by a mind. In his major work, *Clavis Universalis* (1713; "Universal Key"), he argued that men dare not conclude that what seems to perception to be external is actually external, for such objects as hallucinations, which seem external, are admitted to be internal. The difference between a seen and an imagined object, Collier asserted, is not that the seen object possesses a quality of externality but that it is more vividly experienced than the imagined—a difference that he held to be insufficient proof that the seen object exists independently of the perceiver.

Extending his argument, Collier insisted that the very idea of an external world is self-contradictory. What men perceive, he said, exists only in relation to their minds. He did not claim that the mind is the cause of the ideas that it contains but rather that the existence of objects in the external world is dependent upon the mental state of the perceiver. Thus, he did not deny that external objects exist; he denied only that they exist independently of the mind. Such an attitude, according to Collier, is necessary in order to understand that everything exists only by way of its dependence on the one supreme substance, God. Outlined in his unpublished "Confession" of 1709, Collier's metaphysics is interpreted theologically in his works *A Specimen of True Philosophy* (1730) and *Logology* (1732).

Collier, Jeremy (b. Sept. 23, 1650, Stow by Quy, Cambridgeshire, Eng.—d. April 26, 1726, London), English bishop of the nonjurors (clergy who refused to take the oaths of allegiance to William III and Mary II in 1689) and the author of a celebrated attack on the immorality of the stage.

Collier attended Caius College, Cambridge, in 1669 and was ordained priest in 1677. He became chaplain to the countess dowager of Dorset and in 1679 rector of Ampton, near Bury St. Edmunds. He was made lecturer of Gray's Inn in 1685 but resigned at the Revolution of 1688 and was sent to Newgate for writing a pamphlet supporting James II. Released without trial after several months, he was again imprisoned in November 1692 on suspicion of treasonable correspondence with James but was freed within 10 days. In 1696 he daringly gave absolution on the scaffold to Sir John Friend and Sir William Parkyns, who had been condemned for attempting to assassinate William III. His confederates in this act were imprisoned, but Collier absconded and lived under sentence of outlawry. When the storm subsided, he returned to London.

In his notorious *A Short View of the Immorality and Profaneness of the English Stage* (1698), Collier attacks William Wycherley, John Dryden, William Congreve, John Vanbrugh, and Thomas D'Urfey, censuring them for indecency, for profane language, for abusing the clergy, and for undermining public morality by sympathetic presentation of vice. An ensuing pamphlet war lasted spasmodically until 1726.

Consecrated in 1713 by George Hickes, the sole survivor of the nonjuring bishops, Collier was created, on July 23, 1716, primus of the church of the nonjurors. His *Reasons for Restoring Some Prayers* (1717) recommended the reintroduction of certain usages into the Anglican communion service. The consequent "usages" controversy split the nonjuring community and ultimately extinguished the party. A new *Communion Office* (1718) embodied the changes required by Collier and was probably chiefly compiled by him.

Collier's Encyclopedia, general encyclopaedia first published in 1950–51 in the United States and continuously revised. Originally in 20 volumes, *Collier's* was expanded to 24 volumes for a major revision in 1962. It is a well-reputed work with coverage reflecting secondary-school and college curricula. Its style is concise and readable. Most of the articles are signed, many by world-renowned scholars.

Collier's is strongest in its treatment of the arts and humanities, social sciences, and botany. Major biographies receive lengthy treatment; geography articles are attractively presented and receive a high percentage of the set's space. Accompanying illustrations, well-reproduced, include effective graphics, photographs, diagrams, and drawings.

Volume 24 contains bibliographies arranged under broad subject headings with various subdivisions; a study guide, which lists the articles in the encyclopaedia that the editors consider fundamental to a thorough understanding of a given subject; and an exhaustive, consolidated index to text, illustrations, maps, and bibliographies.

colligative property, in chemistry, any property of a substance that depends on, or varies according to, the number of particles (molecules or atoms) present but does not depend on the nature of the particles. Examples include the pressure of an ideal gas and the depression of the freezing point of a solvent caused by dissolved particles.

Consult the INDEX *first*

collimator, device for changing the diverging light or other radiation from a point source to a parallel beam. This collimation of the light is required to make specialized measurements in spectroscopy and in geometric and physical optics.

An optical collimator consists of a tube containing a convex lens at one end and an adjustable slit at the other, the slit being in the focal plane of the lens. Radiation entering the slit leaves the collimator as a parallel beam, so that the image can be viewed without parallax.

The collimator may be a telescope with a slit at the principal focal length of the lens. Light from the luminous source is focused on this slit by a lens of similar focal length, and the slit then serves as the luminous object of the optical system.

In radiology, a collimator is an arrangement of absorbers for limiting a beam of X rays, gamma rays, or nuclear particles to the dimensions and angular spread required for the specific application.

Colling, Robert; and Colling, Charles (respectively b. 1749, Ketton, Durham, Eng.—d. March 7, 1820, Brampton, Durham; b. 1751, Ketton—d. Jan. 16, 1836), stock raisers, first scientific breeders of Shorthorn, or Durham, beef cattle.

After visiting Robert Bakewell, the outstanding livestock breeder, at Dishley, Leicestershire, Charles began in 1782 a program of improving the quality of cattle in the Tees River valley. His brother, who occupied another farm in the district, later turned to cattle breeding. Charles's wife, the former Mary Colpitts (1763–1850), also is credited with valuable work in cattle breeding.

Collings, Jesse (b. Jan. 9, 1831, Littleham-cum-Exmouth, Devon, Eng.—d. Nov. 20, 1920, Edgbaston, Birmingham, Warwickshire), British politician, educational and agrarian reformer whose land policy was summarized in the slogan "three acres and a cow."



Collings
BBC Hulton Picture Library

A partner in a Birmingham mercantile firm (1864–79), Collings served as mayor of the city (1878–80), succeeding Joseph Chamberlain, with whose municipal reform program he had been closely associated. Subsequently he was a member of the House of Commons (1880–1918), parliamentary secretary to the Local Government Board (1886), and under secretary to the Home Office (1895–1902).

In 1869 Collings became secretary of the National Education League, an influential body that advocated free, nondenominational elementary schools. Later he helped to found the Rural Labourers' League and was a trustee of Joseph Arch's National Agricultural Labourers' Union. Collings urged workers' participation in ownership of farmland and vocational education in agricultural areas. In 1884 he was appointed a member of the important Royal Commission on Housing. The Land Settlement Act of 1919 incorporated many of his ideas.

On Jan. 27, 1886, Collings caused the fall of the Conservative government of Lord Salisbury by introducing, as an amendment to an Irish coercion bill, a measure in favour of English rural smallholdings. The following March he resigned as Local Government Board secretary (along with Chamberlain, at that time board president) in protest against the Irish Home Rule proposal of Salisbury's Liberal successor, William Ewart Gladstone.

Collingwood, Cuthbert Collingwood, 1st Baron (b. Oct. 24, 1748, Newcastle upon Tyne, Northumberland, Eng.—d. March 7, 1810, at sea en route to England), British naval commander who was Horatio Nelson's second in command at the Battle of Trafalgar and held the Mediterranean command thereafter.

Collingwood was sent to sea at the age of 12 and served for several years on the home station. In 1774 he served on the North American station and saw service at the Battle of Bunker Hill, there winning his lieutenancy (June 17, 1775). In 1776 he was lieutenant of the sloop *Hornet* in the West Indies and thereafter began his close association with Nelson.

In 1786 Collingwood returned home and, with the exception of one brief command, remained there until 1792. On the outbreak of the French Revolutionary Wars, he was appointed flag captain and took part in Lord Howe's victory on the "glorious first of June," 1794. He later engaged in the blockade of Toulon and took a conspicuous part in Sir John Jervis' victory off St. Vincent (February 1797). In 1799 Collingwood became rear admiral, and he was at sea in the *Triumph* and other ships until the peace of Amiens in 1802.

On the renewal of war in 1803, Collingwood was at once employed, chiefly in blockading Brest. He remained there until May 1805 (having in the meantime been promoted to vice admiral in May 1804), when he was given command of a small squadron which was intended to reinforce the Mediterranean fleet under Nelson. He placed himself off Cádiz, and there he was joined by Nelson, so becoming second in command at Trafalgar. In this battle he carried out brilliantly the part assigned to him by the commander in chief. With 15 ships he was to attack the rear of the enemy to prevent their escape. On Nelson's death in the battle, command passed to Collingwood, and he had the difficult task of conserving the fleet and its prizes during the storm that followed. For his services he was created Baron Collingwood and granted a pension of £2,000 a year.

The completeness of victory at Trafalgar prevented Nelson's immediate successors from achieving any comparable triumph, but Collingwood held the Mediterranean command with distinction until his death. He died at sea and was buried near Nelson in St. Paul's Cathedral.

Collingwood, R(obin) G(eorge) (b. Feb. 22, 1889, Cartmel Fell, Lancashire, Eng.—d. Jan. 9, 1943, Coniston, Lancashire), English historian and philosopher whose work provided a major 20th-century attempt to reconcile philosophy and history.

Deeply influenced by his father, a painter and archaeologist who was a friend and biographer of John Ruskin, Collingwood was educated at home until he was 13. Throughout his life he painted and composed music. After five years at Rugby, he entered Oxford in 1908, was elected tutor in philosophy in 1912, and remained there until his retirement in 1941. Between 1911 and around 1934, Collingwood concentrated on archaeological studies that made him the leading authority on Roman Britain in his day. The best known of these works are *The Archaeology of Roman Britain* (1930) and *Roman Britain and the English Settlements* in the *Oxford History of England* (1936). The same period saw the development of Collingwood's philosophical thought.

An early book entitled *Religion and Philosophy* (1916), a critique of empirical psychology and an analysis of religion as a form of knowledge, was followed by a major work, *Speculum Mentis* (1924), which proposed a philosophy of culture stressing the unity of the mind. Structured around five forms of experience—art, religion, science, history, and philosophy—the work sought a synthesis of levels of knowledge.

During later years, Collingwood enriched his conception of philosophy and history and increasingly proposed a notion of philosophical inquiry that is dependent on the study of history. In two works, *Essay on Philosophical Method* (1933) and *An Essay on Metaphysics* (1940), he proposed the historical nature of civilization's presuppositions and urged that metaphysical study evaluate these presuppositions as historically defined conceptions rather than as eternal verities. His last book, *The Idea of History* (1946), proposed history as a discipline in which one relives the past in one's own mind. Only by immersing oneself in the mental actions behind events, by rethinking the past within the context of one's own experience, can the historian discover the significant patterns and dynamics of cultures and civilizations. Collingwood has been criticized for an overly intellectualist analysis of the motivating forces in history, but his attempt to integrate history and philosophy is recognized as a significant scholarly contribution. He published *An Autobiography* in 1939.

Collins, Anthony (b. June 21, 1676, Heston, Middlesex, Eng.—d. Dec. 13, 1729, London), prolific and provocative English Deist and freethinker and friend of the philosopher John Locke.

In Collins' first noteworthy work, *Essay concerning the use of Reason in propositions the evidence whereof depends on Human Testimony* (1707), he demanded that revelation should conform to man's ideas of God drawn from nature. Neither an atheist nor an agnostic, Collins wrote in *A Discourse of Free-thinking* (1713), his major work, "Ignorance is the foundation of Atheism and Free-Thinking the Cure of it." Like all of his other works, this essay was published anonymously. It immediately caused a sensation, eliciting numerous replies. Similarly, no fewer than 35 answers were directed against his *Discourse of the Grounds and Reasons of the Christian Religion,* prefixed by *An Apology for Free Debate and Liberty of Writing* (1724). Written in opposition to the effort of William Whiston, an English theologian, to show that the Old Testament prophesied New Testament events, the work asserts that such fulfillment by Christ of Old Testament prophecies is all "secondary, secret, allegorical, and mystical." To his opponents, who included Anglican bishops and the philosopher Samuel Clarke, Collins replied with his *Scheme of Literal Prophecy considered* (1726). An appendix to the work, directed at Whiston, maintains that the Old Testament Book of Daniel was a forgery. Collins thus helped prepare the way for modern biblical criticism by raising the issue of the validity of the scriptural canon.

Although most Deists defended the doctrine of individual freedom of the will, Collins advocated necessitarianism, referring to an inevitable cause-and-effect relationship between events. His brief *Inquiry concerning Human Liberty and Necessity* (1715) was attacked by Samuel Clarke, and *Liberty and Necessity* (1729) was Collins' rejoinder. Against Clarke he also argued, in *A Letter to Mr. Dodwell* (1707), that, even if an immaterial soul be admitted, it does not follow automatically that such a soul is immortal. Collins' other writings include *Vindication of the Divine Attributes* (1710), *Priestcraft in Perfection* (1709), and two tributes to John Locke published in 1708 and 1720.

Collins, Michael (b. Oct. 16, 1890, Clonakilty, County Cork, Ire.—d. Aug. 22, 1922, Beal-na-Blath, Cork), hero of the Irish struggle for independence, best remembered for his daring strategy in directing the campaign of guerrilla warfare during the intensification of the Anglo-Irish War (1919–21).

He was employed as a British civil servant in London from 1906 until he returned to Ireland in 1916. He fought in the Easter Rising, was arrested and held in detention at Frongoch, Merioneth, but was released in December 1916. In December 1918 he was one of 27 out of 73 elected Sinn Féin members (most of whom were in jail) to be present when the Dáil Éireann (Irish Assembly) convened in Dublin and declared for the republic. Their elected president, Eamon De Valera, and vice president, Arthur Griffith, were both in prison. Hence, much responsibility fell on Collins, who became first Sinn Féin minister of home affairs and, after arranging for De Valera's escape from Lincoln jail (February 1919), minister of finance. It was as general of the volunteers and as director of intelligence of the Irish Republican Army (IRA), however, that he became famous. As chief planner and coordinator of the revolutionary movement, he headed the list of men wanted by the British, who placed a price of £10,000 on his head.

After the truce of July 1921, Griffith and Collins were sent to London by De Valera as the principal negotiators for peace (October–December 1921). The treaty of Dec. 6, 1921, was signed by Collins in the belief that it was the best that could be obtained for Ireland at the time and in the full awareness that he was signing his own death warrant. It gave Ireland dominion status, but its provisions for partition and for an oath of allegiance to the crown were unacceptable to De Valera and other republican leaders. Collins' persuasiveness won acceptance for the treaty by a small majority in the Dáil, and a provisional government was formed with Griffith as president and Collins as chairman; but effective administration was obstructed by the mutinous activities of the anti-treaty republicans. Collins refrained from taking action against his former comrades until IRA insurgents seized the Four Courts in Dublin and civil war became inevitable. Collins assumed command of the army and on Griffith's death (August 12) became head of the government. Ten days later, on a tour of military inspection, he was shot to death in an ambush in west Cork.

Collins, Michael (b. Oct. 31, 1930, Rome), U.S. astronaut, co-pilot of the Gemini 10 flight and Command Module pilot of Apollo 11, the first manned lunar landing mission.

A graduate of the U.S. Military Academy at West Point, N.Y., Collins transferred to the



Michael Collins, 1966

By courtesy of the National Aeronautics and Space Administration

Air Force, becoming a test pilot at Edwards Air Force Base in California. He joined the space program in 1963.

Gemini 10, manned by Collins and John W. Young, was launched on July 18, 1966. After a rendezvous with an Agena target vehicle, the two men used the Agena's engines to propel them to a record altitude of 475 miles (764 kilometres), where Collins left the spacecraft to remove equipment needed for a micrometeorite experiment from the aft end of the Gemini and attempted unsuccessfully to attach similar equipment to the Agena. He succeeded in retrieving an instrument from the Agena, but his activity was cut short because the Gemini craft was low on fuel. Gemini 10 returned to Earth on July 21.

Collins participated in the Apollo 11 mission with Neil A. Armstrong and Edwin E. Aldrin, Jr. On July 20, 1969, Armstrong and Aldrin landed on the Moon. Collins remained in the Command Module, circling the Moon at an altitude of 60 to 75 miles (97 to 121 kilometres). On July 21 Armstrong and Aldrin rejoined him, and the following day the astronauts left lunar orbit, landing in the Pacific Ocean on July 24. (His account of the landing, *Carrying the Fire,* was published in 1974.) Apollo 11 was his last space mission; later in 1969 he was appointed assistant secretary of state for public affairs. In 1971 he joined the administrative staff of the Smithsonian Institution, Washington, D.C.

Collins, Tom: *see* Furphy, Joseph.

Collins, (William) Wilkie (b. Jan. 8, 1824, London—d. Sept. 23, 1889, London), early master of the mystery story and the first English novelist to write in this genre.

The son of William Collins (1788–1847), the landscape painter, he developed a gift for inventing tales while still a schoolboy at a private



Wilkie Collins, detail of an oil painting by J. Millais, 1850; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

boarding school. At an early age he was placed in the tea trade, where his performance was undistinguished. After studying law at Lincoln's Inn, he was admitted to the bar in 1851 but proved to have as little aptitude for law as for commerce. He worked, instead, on an historical novel, painted well enough to have a picture hung at the Royal Academy, engaged in theatricals, and visited Paris. His first published work was a memoir to his father, who died in 1847, *Memoirs of the Life of William Collins, Esq., R.A.* (1848). His fiction followed shortly after: *Antonina; or, the Fall of Rome* (1850) and *Basil* (1852), a highly coloured tale of seduction and vengeance with a contemporary middle-class setting and passages of uncompromising realism. In 1851 he began an association with Dickens that exerted a formative influence on his career. Their admiration was mutual. Under Dickens' influence, Collins developed a talent for characterization, humour, and popular success, while the older writer's debt to Collins is evident in the more skillful and suspenseful plot structures of such novels as *A Tale of Two Cities* (1859) and *Great Expectations* (1860–61). Collins began contributing serials to Dickens' periodical *Household Words*, and his first major work, *The Woman in White* (1860), appeared in Dickens' *All the Year Round*. Among his most successful subsequent books were *No Name* (1862), *Armadale* (1866), and *The Moonstone* (1868).

One of the first and greatest masters of the mystery story, he was a much-imitated writer. The motif of *The Moonstone*, concerning a cursed jewel that was originally stolen from an idol's eye, has been repeated countless times, and his Count Fosco in *The Woman in White* is the illustrious original of innumerable bravura villains.

Collins, William (b. Dec. 25, 1721, Chichester, Sussex, Eng.—d. June 12, 1759, Chichester), pre-Romantic English poet whose lyrical odes adhered to Neoclassical forms but were Romantic in theme and feeling. Though his literary career was brief and his output slender, he is considered one of the finest English lyric poets of the 18th century.

He was educated at Winchester College, where he formed one of the most stable and fruitful relationships of his unstable life: his friendship with the poet Joseph Warton. When only 17, under the influence of Pope's *Pastorals*, he composed his four *Persian Eclogues* (1742; 2nd ed., *Oriental Eclogues*, 1757), the only one of his works to be esteemed in his lifetime. In 1744 he published his verse *Epistle: Addrest to Sir Thomas Hanmer on his Edition of Shakespeare's Works*, containing his exquisite "Dirge from Cymbeline."

Collins was graduated from Magdalen College, Oxford (1743), and went to London in 1744. An inheritance, supplemented by an allowance from his uncle, enabled him to live as a man-about-town. He made friends with Dr. Johnson, who expressed respect for his talents and, later, concern for his fate. By 1746 extravagance and dissipation put Collins deeply in debt. He agreed to collaborate with Warton on a volume of odes, which appeared separately that December (the title page of Collins' *Odes* being dated 1747). Warton's collection was well received, but Collins' *Odes on Several Descriptive and Allegorical Subjects* was barely noticed. Though disappointed, Collins continued to perfect the style exemplified in his "Ode to Simplicity."

In 1749 Collins' uncle died, leaving him enough money to extricate himself from debt. In the next few months he wrote his "Ode on the Popular Superstitions of the Highlands of Scotland," which anticipates many of the attitudes and interests of the Romantic poets. Threatened after 1751 by mental illness and physical debility, which he tried to cure by travel, Collins was confined in a mental asylum in 1754. Released to the care of his sister, he survived wretchedly in Chichester for five more years, neglected and forgotten by his literary friends, who believed him dead.

Collinsville, city, on the Madison–St. Clair county line, southwestern Illinois, U.S. Laid out in 1837 and named for an early pioneer family, it has evolved as part of the St. Louis, Mo., urban industrial complex. Once a bituminous coal-mining centre (the first of a score of mines was sunk in 1859), it now depends on food processing and clothing manufacturing. Fairmont Race Track and the Cahokia Mounds State Historic Site (Indian prehistoric burial grounds) are a few miles west. Inc. village, 1856; city, 1872. Pop. (1990) 22,446.

collision, also called IMPACT, in physics, the sudden, forceful coming together in direct contact of two bodies, such as, for example, two billiard balls, a golf club and a ball, a hammer and a nail head, two railroad cars when being coupled together, or a falling object and a floor. Apart from the properties of the materials of the two objects, two factors affect the result of impact: the force and the time during which the objects are in contact. It is a matter of common experience that a hard steel ball dropped on a steel plate will



Golf ball being struck by the club; photograph taken with an exposure of 10^{-6} second

Harold Edgerton, Massachusetts Institute of Technology

rebound to almost the position from which it was dropped, whereas with a ball of putty or lead there is no rebound. The impact between the steel ball and plate is said to be elastic, and that between the putty or lead balls and plate is inelastic, or plastic; between these extremes there are varying degrees of elasticity and corresponding responses to impact. In a perfectly elastic impact (attained only at the atomic level), none of the kinetic energy of the coacting bodies is lost; in a perfectly plastic impact, the loss of kinetic energy is at a maximum.

In all of the examples of colliding bodies here referred to, the time of contact is extremely short and the force of contact extremely large. In the Figure, the flattening of the golf ball is indicative of an enormous force over a contact time of about one-thousandth of a second. It can be shown that, in the limiting case of an "infinite" force acting for an "infinitesimal" time, there is an instantaneous change in the velocity of a body but no change in its position during the period of contact. Forces of this nature are known as impulsive forces and, being difficult to measure or estimate, their effects are measured by the change in the momentum (mass times velocity) of the body. The ballistic pendulum is a device based on this principle.

When two bodies collide, the equal and opposite impulsive forces are internal forces in what is called a two-body system and consequently have no effect on the total momentum of the system. This phenomenon means that the sum of the momenta of the bodies before impact is equal to the sum of the momenta after impact. The relation between the kinetic energies before and after impact depends, as previously noted, on the elasticity of the bodies. Knowing the initial velocities, the final velocities can be obtained by the simultaneous solution of the momentum and energy equations.

collision theory, theory used to predict the rates of chemical reactions, particularly for gases. The collision theory is based on the assumption that for a reaction to occur it is necessary for the reacting species (atoms or molecules) to come together or collide with one another. Not all collisions, however, bring about chemical change. A collision will be effective in producing chemical change only if the species brought together possess a certain minimum value of internal energy, equal to the activation energy of the reaction. Furthermore, the colliding species must be oriented in a manner favourable to the necessary rearrangement of atoms and electrons. Thus, according to the collision theory, the rate at which a chemical reaction proceeds is equal to the frequency of effective collisions. Because atomic or molecular frequencies of collisions can be calculated with some degree of accuracy only for gases (by application of the kinetic theory), the application of the collision theory is limited to gas-phase reactions.

Collitz, Hermann (b. Feb. 4, 1855, Bleckede, near Lüneburg, Hanover—d. May 13, 1935, Baltimore), German-born U.S. linguist noted for his work on the Indo-European languages; he contributed to the study of Sanskrit consonants, sound changes in the Germanic languages, and Greek dialectology.

His doctoral dissertation at the University of Göttingen (1878) dealt with the origin of the Indo-Iranian palatal series of consonants and helped to explain an early, obscure, and unsuspected sound change in Sanskrit. While teaching Sanskrit and comparative linguistics at the University of Halle (1885–86), he began publishing, in collaboration with a number of other scholars, *Sammlung der griechischen Dialektinschriften*, 4 vol. (1884–1915; "Collection of Greek Dialect Inscriptions"). This work, which included vocabulary lists and grammatical studies, proved to be a major contribution to Greek comparative linguistics.

In 1886 he published *Die neueste Sprachforschung* ("The Newest Linguistics") and settled in the United States as associate professor of German at Bryn Mawr (Pennsylvania) College, where he concentrated on the historical and comparative study of the Germanic languages. While professor of Germanic philology at Johns Hopkins University, Baltimore (1907–27), he wrote *Das schwache Präteritum und seine Vorgeschichte* (1912; "The Weak Past Tense and Its Antecedents").

Collodi, C., pseudonym of CARLO LORENZINI (b. Nov. 24, 1826, Florence, Tuscany [Italy]—d. Oct. 26, 1890, Florence), Italian author and journalist, best known as the creator of Pinocchio, the childlike puppet whose adventures delight children around the world.

As a young man Collodi joined the seminary. The cause of Italian national unification usurped his calling, however, as he took to journalism as a means of supporting the Risorgimento in its struggle with Austria. In 1848 Collodi started publishing *Il Lampione*, a newspaper of political satire. With the founding of the Kingdom of Italy in 1861, Collodi ceased his journalistic and militaristic activities and began writing for children.

Giannettino was published in 1876 and *Minuzzolo* in 1878. The first chapter of *Pinocchio* appeared in the *Giornale dei bambini* ("Children's Magazine") in 1880 and was an immediate success. All of Collodi's works portray children in a realistic light, imbuing them with mischievous behaviour with which youngsters easily identify.

collodion process: *see* wet collodion process.

colloid, any substance consisting of particles substantially larger than atoms or ordinary molecules but much too small to be visible to the unaided eye. Such particles range in size from about 10^{-7} to 10^{-3} centimetres and are linked or bonded together in various ways. Colloidal systems may exist as dispersions of one substance in another, as, for example, smoke particles in air, or as single substances, such as rubber.

Colloids are generally classified into two systems, reversible and irreversible. In a reversible system the products of a physical or chemical reaction may be induced to interact so as to reproduce the original components. In a system of this kind, the colloidal material may have a high molecular weight, with single molecules of colloidal size, as in polymers, polyelectrolytes, and proteins, or substances with small molecular weights may associate spontaneously to form particles (called micelles) of colloidal size, as in soaps, detergents, and some dyes. An irreversible system is one in which the products of a reaction are so stable or are removed so effectively from the system that its original components cannot be reproduced. Examples of irreversible systems include sols (dilute suspensions), pastes (concentrated suspensions), emulsions, foams, and certain varieties of gels. The size of the particles of these colloids is greatly dependent on the method of preparation employed.

All colloidal systems can be either generated or eliminated by nature as well as by industrial and technological processes. The colloids prepared in living organisms by biological processes are vital to the existence of the organism. Those produced with inorganic compounds in the Earth and its waters and atmosphere are also of crucial importance to the well-being of life forms.

The scientific study of colloids dates from the early 19th century. Among the first notable investigations was that of the British botanist Robert Brown. During the late 1820s Brown discovered, with the aid of a microscope, that minute particles suspended in a liquid are in continual, random motion. This phenomenon, which was later designated Brownian movement (*q.v.*), was found to result from the irregular bombardment of colloidal particles by the molecules of the surrounding fluid. Francesco Selmi, an Italian chemist, published the first systematic study of inorganic colloids. Selmi demonstrated that salts would coagulate such colloidal materials as silver chloride and Prussian blue and that they differed in their precipitating power. The Scottish chemist Thomas Graham, who is generally regarded as the founder of modern colloid science, delineated the colloidal state and its distinguishing properties. In several works published during the 1860s, Graham observed that low diffusivity, the absence of crystallinity, and the lack of ordinary chemical relations were some of the most salient characteristics of colloids and that they resulted from the large size of the constituent particles.

The early years of the 20th century witnessed various key developments in physics and chemistry, a number of which bore directly on colloids. These included advances in the knowledge of the electronic structure of atoms, in the concepts of molecular size and shape, and in insights into the nature of solutions. Moreover, efficient methods for studying the size and configuration of colloidal particles were soon developed—for example, ultracentrifugal analysis, electrophoresis, diffusion, and the scattering of visible light and X-rays. More recently, biological and industrial research on colloidal systems has yielded much information on dyes, detergents, polymers, proteins, and other substances important to everyday life.

Colloquy of the Ancients: *see* Interrogation of the Old Men, The.

Collot d'Herbois, Jean-Marie (b. June 19, 1749, Paris, France—d. Jan. 8, 1796, Sinnamary, French Guiana), radical democrat and member of the Committee of Public Safety that ruled revolutionary France during the period of the Jacobin dictatorship (1793–94).

The son of a Parisian goldsmith, Collot d'Herbois became a professional actor and a writer of comedies. In 1787 he was manager of a theatre in Lyon, and by 1789—the year the Revolution broke out—he was staging his plays in Paris. He joined the Jacobin Club and, in 1791, gained fame with his *Almanach*



Collot d'Herbois, engraving by C. Minatelli, 18th century

By courtesy of the Bibliotheque Nationale, Paris

du Père Gérard ("Almanac of Old Gerard"), which set forth principles of constitutional monarchy.

Collot d'Herbois' acting talents made him an effective agitator among the Parisian lower classes. As a member of a newly formed "revolutionary Commune," he helped organize the popular insurrection that overthrew the monarchy on Aug. 10, 1792. The following month he became a deputy to the National Convention, in which capacity he voted for Louis XVI's death without reprieve. Collot d'Herbois and his friend Jean-Nicolas Billaud-Varenne soon became identified with the extreme democrats led by Jacques Hébert. Taking advantage of popular unrest in Paris, the Hébertists forced the Convention to appoint Collot d'Herbois and Billaud-Varenne to the Committee of Public Safety in early September.

On Oct. 30, 1793, Collot d'Herbois and Joseph Fouché were sent to pacify Lyon, where a counterrevolutionary uprising had just been crushed. By organizing mass executions of the Lyonese bourgeoisie, Collot d'Herbois earned a reputation for pitiless bloodshed. Returning to Paris in December, he came into conflict with Robespierre by supporting the Hébertist-inspired "dechristianizers" who were destroying Roman Catholic institutions. Robespierre had the leading Hébertists guillotined in March 1794, but pressure from Collot d'Herbois and Billaud-Varenne also forced him to eliminate Georges Danton, the leader of the Jacobins' right wing, in April. An attempt on Collot d'Herbois's life (May 23, 1794) enhanced his popularity, while his energetic advocacy of radical democratic measures within the Jacobin Club led to his emergence as a possible rival to Robespierre and increased the tensions between the two men. As president of the National Convention at the time, Collot d'Herbois declared himself violently opposed to Robespierre and helped bring about the latter's downfall on 9 Thermidor (July 27, 1794). After the abortive Jacobin uprising of 12 Germinal (April 1, 1795), however, Collot d'Herbois was deported to Guiana, where he died of yellow fever.

collotype, also called PHOTOCOLLOGRAPHY, photomechanical printing process that gives accurate reproduction because no halftone screen is employed to break the images into dots. In the process, a plate (aluminum, glass, cellophane, etc.) is coated with a light-sensitive gelatin solution and exposed to light through a photographic negative. The gelatin is hardened in exposed areas and is then soaked in glycerin, which is absorbed most in the nonhardened areas. When exposed to high humidity, these areas absorb moisture and repel the greasy ink. The hardened areas accept the ink, and the plate can be used to print a few thousand copies of the positive image.

Colman OF LINDISFARNE, SAINT (b. *c.* 605, Ireland—d. Aug. 8, 676, Inishbofin Island; feast day, Scottish diocese of Argyll and the Isles February 18, elsewhere August 8), important prelate of the early Irish church and monastic founder who led the Celtic party at the crucial Synod of Whitby (663/664), held by the church of the Anglo-Saxon kingdom of Northumbria to decide whether to follow Celtic or Roman usages.

Colman was a monk at the celebrated monastery of Iona—an island of the Inner Hebrides, Argyll—before succeeding St. Finan in 661 to become the third bishop-abbot of the great Northumbrian diocese of Lindisfarne, or Holy Island. His episcopacy witnessed a vital turning point in the development of the Christian church in England.

Though Northumbria had been mainly converted by Celtic missionaries, there was by 662 an influential party that subscribed to Roman church customs, particularly in determining the date of Easter. The Synod of Whitby decided in favour of Rome. Colman objected to the synod's decisions that brought the English church into closer contact with the European continent. He resigned his see and, with all the Irish and about 30 of the English monks of Lindisfarne, returned to Iona. Between 665 and 667 he founded several Scottish churches, afterward sailing to Ireland with his disciples. They settled on Inishbofin, off the west coast of Ireland, where in 668 Colman built a monastery. He later founded a separate abbey at Mayo for the English monks. He was abbot of both until his death.

Although the Venerable Bede disapproved of the Celtic customs, he had high praise for Colman in his *Ecclesiastical History of*

the English People, considered to be the best source for Colman's life at Lindisfarne. He is styled Colman of Lindisfarne to distinguish him from numerous other saints named Colman who are listed in the Irish martyrologies.

Colman, George, THE ELDER (b. April 1732, Florence—d. Aug. 14, 1794, London), a leading English comic dramatist of his day and an important theatre manager who sought to revive the vigour of Elizabethan drama



George Colman, the Elder, detail of an oil painting from the studio of Sir Joshua Reynolds, 1767; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

with adaptations of plays by Beaumont and Fletcher and Ben Jonson.

He was the son of Francis Colman, envoy to the Grand Duke of Tuscany. After his father's death in 1733, he became the ward of an uncle, William Pulteney (later 1st earl of Bath). Colman abandoned a legal career for literature and the theatre, and his first play, *Polly Honeycombe* (1760), satirized the current craze for romantic novels. It was presented as an afterpiece by the great actor-manager David Garrick at London's Drury Lane Theatre. His next play, *The Jealous Wife* (1761), an adaptation of Henry Fielding's novel *Tom Jones*, was one of the best comedies of the age and held its place in the stock theatrical repertoire for nearly a century. Colman collaborated with Garrick on *The Clandestine Marriage* (1766), a play blending sentiment with satire, which is still stageworthy. In 1767 Colman bought a quarter share in Covent Garden theatre, London, which he managed for seven years, during which time he appreciably raised the standard of acting and of drama. In 1776 he bought the Little Theatre in the Hay, Haymarket, London, a summer theatre that reached the peak of its fame under his management. In 1785 Colman suffered a stroke, from which he never fully recovered.

Colman, George, THE YOUNGER (b. Oct. 21, 1762, London—d. Oct. 17, 1836, London), English playwright, writer of scurrilous satiric verse, and theatre manager whose comic operas, farces, melodramas, and sentimental comedies were box-office successes in the late 18th and early 19th centuries.



George Colman, the Younger, engraving by T.G. Lupton after a painting by John Jackson

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Dr. Pangloss, the elderly pedant in *The Heir at Law* (first performed 1797), is his only outstanding comic creation. But the comic opera *Two to One* (1784), his first success; the melodramas *The Battle of Hexham* (1789) and *The Iron Chest* (1796), the latter based on William Godwin's novel *Caleb Williams* (1794); and *John Bull* (1803), his most popular comedy, long kept their place in the repertoire of the Little Theatre in the Hay, London, the management of which Colman took over from his father. When his father died in 1794, he bought the theatre, though large debts forced him to sell part of his share in 1805 and the rest in 1820. As examiner (or censor) of plays from 1824 until his death, Colman aroused resentment owing to his narrow severity and petty tyranny.

Colman, Ronald (b. Feb. 9, 1891, Richmond, Surrey, Eng.—d. May 19, 1958, Santa Barbara, Calif., U.S.), British-born U.S. motion-picture actor.

In 1920, after service in the British Army during World War I, Colman left a successful stage and film career in London to emigrate to the United States. He was chosen by silent-film star Lillian Gish, who noticed him in a stage production, to play opposite her in *The White Sister* (1923), and he quickly rose to stardom, making silent films throughout the 1920s, most notably *Beau Geste* in 1926. His distinguished good looks, gentlemanly air, and especially his cultivated, expressive voice assured his success when sound came to the movies in the late 1920s.

Beginning with *Bulldog Drummond* (1929), Colman's sound career included roles in such popular films as *Arrowsmith* (1932), *A Tale of Two Cities* (1935), *Lost Horizon* (1937), *The Prisoner of Zenda* (1937), *If I Were King* (1938), *The Light That Failed* (1939), *Random Harvest* (1942), and *The Late George Apley* (1947). For his portrayal of an actor possessed by the role of Othello in *A Double Life* (1947), Colman won an Oscar from the Academy of Motion Picture Arts and Sciences. He also starred in a television series, *The Halls of Ivy*, in 1954.

Colmar, town, northeastern France, capital of Haut-Rhin *département*, in the Alsace region. Colmar is located 42 mi (68 km) south-southwest of Strasbourg, 10 mi west of the Rhine River, bordering the German frontier and a few miles east of the foothills of the Vosges Mountains. It is on the main railway from Strasbourg to Mulhouse and Basel, Switz., and is linked with the three towns by canal.

The first mention of Colmar is in a chronicle of the Saxon wars of Charlemagne, emperor of the West (800–814). In 1226 Colmar was raised to the status of an imperial town by the Holy Roman emperor Frederick II and was surrounded by defensive walls. Civil rights were granted to it by Rudolf of Habsburg in 1278. In 1632, during the Thirty Years' War, it was occupied by Sweden. Louis XIII of France took the town under his protection in 1635; it was later gradually annexed by France during 1648–78. Colmar was twice annexed by Germany: from 1871 to 1919 and again during World War II.

Colmar's many fountains, ancient churches, and Alsatian Renaissance houses have made Colmar a centre of tourism. The Musée d'Unterlinden, formerly a convent, houses the 16th-century Isenheim Altarpiece, the master work of the German religious painter Matthias Grünewald. The home of the sculptor of New York City's Statue of Liberty, Frédéric-Auguste Bartholdi, who was born in Colmar in 1834, is a museum. Colmar is also a wine-trading centre and commands an industrial port zone on the Rhine. Metallurgical industries predominate, and there are textile industries as well. Pop. (1982) 61,560.

colobus, long-tailed, more or less thumbless African monkey of the genus *Colobus*, family Cercopithecidae. Colobus monkeys are placed in the subfamily Colobinae and, like others of this group, have complex stomachs adapted to accommodating a vegetarian diet. Colobus are diurnal, arboreal, and generally gregarious, and they are able to make long leaps from tree to tree. The 10 species may be divided into three groups: black and white, red, and olive colobus.



Male red colobus monkey (*Colobus badius temminckii*)

©STARIN

The four species of black and white colobus, which are sometimes called guerezas, are slender monkeys with long, silky, parti-coloured coats. Their pelts are valued ornaments of native populations, and at one time the European demand for the fur was so great that large numbers of these monkeys were slaughtered annually. Black and white colobus are about 55–60 centimetres (22–24 inches) long without the 77–82-cm tail and are found in lowland and mountain forests. Their young are white at birth. The five species of red colobus are brown or black with red markings and are about 46–60 cm long excluding the 40–80-cm tail. The olive colobus (*C. verus*) is a small monkey with short, olive-coloured fur. Red and olive colobus seldom survive for long when captured.

The *Red Data Book* lists several races of the red colobus as endangered, though nominally protected, species. The other colobus species are declining in population and are variously listed as vulnerable or rare.

colocynth, also called BITTER APPLE, or BITTER CUCUMBER (*Citrullus colocynthis*), hairy-



Colocynth (*Citrullus colocynthis*)

A.J. Huxley—EB Inc.

stemmed climbing vine, of the gourd family (Cucurbitaceae), native to the Mediterranean region. The colocynth has small, pale greenish yellow flowers, forked tendrils, hairy, deeply cut leaves, and rounded yellow or green fruits that have a bitter taste.

Cologne, German KÖLN, largest city of North Rhine–Westphalia *Land* (state), and a major river port of Germany. It is located on the left (west) bank of the Rhine River below Bonn. Cologne's historical importance is due to its location at the crossing of major European trade routes. Settled since Roman times, the city achieved renown as a medieval commercial and manufacturing centre; it is considered to be the cultural and economic capital of the Rhineland.

A brief treatment of Cologne follows. For full treatment, *see* MACROPAEDIA: Cologne.

Cologne is situated on a fertile lowland plain, about 21 miles (34 km) northwest of Bonn, and has a temperate but humid climate. The city's layout follows the semicircular pattern it assumed in 1180 when the city wall was built; the flat side of the semicircle is bounded by the Rhine. Administrative annexations of surrounding communities in 1975 significantly enlarged the city's area and population; heavily industrialized and rural residential districts surround the modern city on both banks of the river.

Banking and trade have been prominent in the economy of Cologne since the Middle Ages. Wine and textile production are other well-established activities. Insurance has become of great importance, as have engineering, metalworking, and petrochemical, pharmaceutical, and lignite-extraction industries. Other manufactures include engines, chocolate, and eau de cologne.

The perimeter of Cologne's inner semicircle is defined by ring roads, called the Ringstrassen, which in the 19th century replaced the medieval fortifications. Greenbelts stretch alongside the Ringstrassen. The main shopping and business streets, such as the north-south Hohe Strasse and the west-east Schildergasse, as well as the city's historic buildings, lie within the Ringstrassen.

Despite the destruction of about 90 percent of the central city during World War II, Cologne's appearance still reflects its history; religious and secular buildings and monuments of all periods remained standing or have been rebuilt. The most impressive architectural feature of the city is the Cologne Cathedral, which was built between the 13th and the 19th century. It is the largest Gothic church in northern Europe and houses a collection of relics and art treasures that span a millennium. Numerous Romanesque churches date from the 11th to the 13th century. Secular medieval buildings such as the Overstolzenhaus, the Gothic Town Hall, and the Gürzenich, or Festhaus (banquet hall), suffered damage in World War II but have undergone extensive reconstruction.

Institutions of higher learning in the city include the University of Cologne (founded in 1388, dissolved during the French Revolutionary occupation of the city, and refounded in 1919) and professional, trade, and art schools. Among the city's cultural institutions are the Wallraf-Richartz Museum (with a fine collection of Old Masters), the Ludwig Museum (with an excellent wide-ranging collection of modern art), and several other museums.

City mass transit consists of bus, streetcar, and subway service. Because of its favourable location, Cologne has become a major rail junction and an important inland port. Autobahns connect the city with other major German urban centres. The Cologne/Bonn Airport has a helicopter landing ground. Area city, 156 square miles (405 square km). Pop. (1992 est.) 956,690.

cologne, also called EAU DE COLOGNE, in perfumery, scented solution usually consisting of alcohol and about 2–6 percent perfume concentrate. Originally, eau de cologne was a mixture of citrus oils from such fruits as lemons and oranges, combined with such substances as lavender and neroli (orange-flower oil); toilet waters were less-concentrated forms of other types of perfume. The two terms, cologne and toilet water, however, have come to be used interchangeably.

Cologne, University of, German UNIVERSITÄT ZU KÖLN, autonomous, state-supported coeducational institution of higher learning in Cologne, Ger., founded in 1388 as a municipal university. In spite of Protestant influences, the university became a centre of German Roman Catholicism.

The University of Cologne was abolished by the French in 1798 after they had occupied Cologne. The university was refounded in 1919 as an autonomous, state-supported institution by Konrad Adenauer, who was then lord mayor of Cologne. It flourished until the loss of academic freedom under Adolf Hitler's Third Reich (1933–45). The university was closed again in 1945 until 1953, when it was reopened under the jurisdiction of the Ministry of Education of North Rhine–Westphalia state. It has faculties of economics and social sciences, law, medicine, philosophy, mathematics and natural sciences, education, and special education and therapies.

Cologne Zoological Garden, AG, German AKTIENGESELLSCHAFT ZOOLOGISCHER GARTEN KÖLN, one of the major zoological gardens in Germany. Opened in 1860, the zoo occupies 20 hectares (49 acres) along the Rhine River in Cologne. About 6,000 specimens of 650 species are exhibited on its attractively kept grounds. The zoo specializes in primates and has an excellent collection of lemurs. It also has an outstanding aquarium.

Coloman, also spelled KOLOMAN, byname COLOMAN THE POSSESSOR OF BOOKS, Hungarian KÖNYVES KÁLMÁN (b. *c.* 1070—d. Feb. 3, 1116), king of Hungary from 1095 who pursued expansionist policies and stabilized and improved the internal order of Hungary.

Coloman was the natural son of King Géza I by a Greek concubine. King Ladislas (László), his uncle, would have made him a monk, but Coloman refused and eventually escaped to Poland. On Ladislas' death (1095), Coloman returned to Hungary and seized the crown. His legitimately born half brother, Álmos, continued to plot against the usurpation until 1113, when Coloman imprisoned him and his infant son, Béla, and had them blinded.

Though his accession to the throne was irregular, Coloman was a wise and just ruler. He permitted the crusaders, under Godfrey of Bouillon, to cross his territory, and he won considerable fame throughout Europe for this diplomatic gesture. He continued his predecessor's policy of trying to secure a seaboard for Hungary. In 1097 he made good Hungary's claim to Croatia by overthrowing King Petar Svačić, the king of Croatia, and by 1102 Coloman controlled the greater part of Dalmatia, though this latter acquisition brought him into conflict with other major powers interested in the fate of that province.

It was as a legislator and administrator, however, that Coloman was greatest. He was not only one of the most learned sovereigns of the early Middle Ages (hence his byname) but was also one of the most statesmanlike. Under him the feudal system was consolidated in Hungary, and strict but just laws were passed to preserve the state, the church, the central government, and private property and to strengthen the economic and military position of Hungary. He is noted particularly for enacting a law forbidding trials of witches, whose existence he denied.

Colomb, Philip Howard (b. May 29, 1831, Scotland—d. Oct. 13, 1899, Botley, Hampshire, Eng.), British naval officer and historian, noted for his innovative theories about sea power.

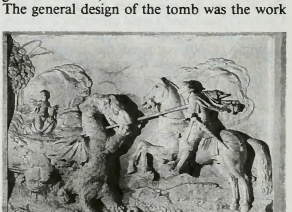
Colomb entered the Royal Navy in 1846 at age 15 and served successively in the Mediterranean, China, Myanmar (Burma), and other areas. He invented a new and more efficient way of signaling between ships at night, and his system was adopted throughout the Royal Navy in 1867. He was retired from active service in 1886 and reached the rank of vice admiral in 1892.

Colomb made a special study of naval tactics for steam-powered vessels, but his major work remains *Naval Warfare,* 8 vol. (1891). In this overly long historical study he stressed the importance of sea power in maintaining Britain's colonial empire and its geopolitical supremacy vis-à-vis the other European powers. Colomb thus came independently to many of the conclusions that were more ably publicized by Admiral Alfred Thayer Mahan.

Colomb-Béchar (Algeria): *see* Béchar.

Colombe, Michel (b. *c.* 1430, Brittany [France]—d. *c.* 1512, Tours, France), the last important Gothic sculptor in France. Little is known of his life, and none of his early works survives.

His masterpiece is the tomb (1502–07) of Francis II of Brittany and his consort, Marguerite of Foix, in the Cathedral of Nantes. The general design of the tomb was the work



"St. George and the Dragon," marble relief by Michel Colombe, 1508–09; in the Louvre, Paris
Giraudon/Art Resource, New York City

of the sculptor Jean Perréal, but Colombe executed the work. The reclining effigies and the figures of the four virtues on the corners of the tomb show little influence of the Burgundian Gothic style or of the art of the Italian Renaissance. Instead, they stem from the serene late Gothic art produced in the Loire River valley of France.

The only other work definitely attributable to Colombe is a marble relief, "St. George and the Dragon" (1508–09). This work exhibits the influence of the Italian Renaissance in its perspective and compositional organization, but the careful attention to minute detail and the imaginative treatment of the dragon are typical of the artist's own Gothic style.

Colombes, northwestern industrial suburb of Paris, Hauts-de-Seine *département,* Paris *région,* France. It is known particularly for the Yves-du-Manoir sports stadium, built for the 1924 Olympic Games, which has 65,000 seats. Henrietta Maria of England died in 1669 on her estate outside the original village of Colombes. Automobile tires are now manufactured in the suburb. Pop. (1990) 79,058.

Colombia, officially REPUBLIC OF COLOMBIA, Spanish REPÚBLICA DE COLOMBIA, country of northwestern South America, covering an area of 440,831 square miles (1,141,748 square km). The capital of Colombia is Bogotá (*q.v.*). The country is bounded



Colombia

roughly by latitudes 4° S and 13° N (about 1,100 miles [1,780 km] from north to south) and by longitudes 67° and 79° W (about 785 miles [1,263 km] from east to west). Colombia is bordered on the west by the Pacific Ocean, on the northwest by Panama and the Caribbean Sea, on the east by Venezuela and Brazil, and on the southwest by Peru and Ecuador. Population in 1986 was estimated at 28,831,000.

A brief treatment of Colombia follows. For full treatment, *see* MACROPAEDIA: Colombia.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Colombia's topography is dominated by its Andean highlands, which effectively separate the country's eastern lowland regions from the Pacific coastal lowlands in the west and the Caribbean littoral in the northwest. The Colombian Andes consist of three major ranges (cordilleras) extending like fingers from the Ecuadorian border northeast to the Caribbean Sea. In the south, a western Cordillera Occidental and a central Cordillera Central are separated by a rift valley enclosing the Cauca River. The Cordillera Occidental parallels the sparsely populated Pacific coast and recedes, as does the Cordillera Central, into the Caribbean lowlands in the northwest. At the Great Colombian Massif (about latitude 3° N), the Cordillera Oriental branches off to the northeast from the Cordillera Central. The Oriental and Central cordilleras are separated from each other by the Magdalena River valley, one of the major longitudinal basins of the Colombian Andes. The Cordillera Oriental is the longest of the three cordilleras and extends for some 750 miles (1,200 km).

To the southeast of the Cordillera Oriental lies the vast, barely populated lowland, which consists of the Llanos (Orinoquia) and Amazonia regions (together accounting for three-fifths of the country's land area) and which is drained by the Orinoco (northern half) and the Amazon rivers. The highest peak there, the Colón, rises to nearly 19,000 feet (5,800 m); it is not of Andean origin but rather is part of an isolated mountain formation in the extreme north.

The Colombian Andes are geologically active. A major earthquake on July 31, 1970, had its epicentre 400 miles (640 km) below the southeastern province of Amazonas; it sent shockwaves throughout an area estimated to be greater than 15,000,000 square miles (38,850,000 square km). On Nov. 13, 1985, the Mount Ruiz volcano in the Cordillera Central erupted; the melting of its icecap caused large mudflows, one of which inundated the nearby town of Armero and left as many as 25,000 dead.

The basin of the Magdalena River (including the Cauca River, the major tributary of the Magdalena) is wholly within Colombia. The Magdalena accounts for most of the flow from the Caribbean watershed. Almost all of the country's irrigation is supplied from this watershed. The much larger eastern lowlands region, with a 260,000-square-mile (673,400-square-kilometre) watershed, contains nearly six percent of the Amazon basin and almost a third of the Orinoco basin, but because of its relative isolation it has remained almost totally unutilized.

Colombia's climate is generally tropical. The north Pacific coast, the Amazonian half of the eastern lowlands, and the central Magdalena Valley experience annual rates of precipitation of more than 100 inches (2,500 mm); rain forests (selvas) abound in these areas. Tropical savanna conditions prevail in the northern stretches of the Magdalena Valley and through much of the Llanos, where almost none of the year's average rainfall (nearly 70 inches [1,778 mm]) occurs during the winter months. Dry savanna conditions requiring irrigated agriculture prevail for nearly the entire Caribbean lowland region, which generally receives no more than 30 inches (762 mm) of rain and has average temperatures of 81° F (27° C), whereas the general average is 74° F (23° C). The climate of the mountain regions is greatly affected by elevation: at 7,000 feet (2,135 m) precipitation varies between 70 and 110 inches (1,778 and 2,794 mm) and the temperature usually remains below 64° F (18° C); at 9,000 feet (2,745 m) high temperatures range from 52° to 57° F (11° to 14° C) and moisture comes as fog or drizzle. In the high mountain regions—the *páramos*—at 12,000 feet (3,660 m), the limit of human habitation, high temperatures remain below 50° F (10° C); above 15,000 feet (4,575 m) snow and ice are perpetual.

About five percent of Colombia's total land area is considered arable, much of it scattered throughout the Magdalena and Cauca and other fertile highland valleys. Nearly 30 percent of the country's area is considered permanent pastureland. Among Colombia's varied plant communities are the mangrove swamps of the maritime coasts, the forests and grasslands of the Llanos, the palm groves along the northern coast, the Andean forests, and the rain forests of the Amazon and northern Pacific coastal area. Wildlife, especially in the Amazon area, is abundant. There are more than 1,500 species of birds, including migratory species shared with North America; among mammals are spectacled bear and deer, sloths, rodents large and small, many kinds of monkeys, and such carnivores as jaguars and ocelots, both of which were considered endangered in the mid-1980s.

Colombia is rich in mineral resources; it has substantial reserves of bauxite, and large deposits of copper were discovered during the late 1970s in the western province of Antioquia. Fossil fuel reserves include moderate amounts of petroleum, coal, and natural gas. There are reserves of the precious metals, principally gold, platinum (nearly all of it panned from the country's western rivers), and silver, and also of iron ore, nickel, molybdenum, and uranium.

The people. In general, the Colombian population has its ethnic origins in the intermarriages of early groups of Indians, Spaniards, and Africans. It is estimated today that almost one-half of the population is mestizo (persons of mixed European and Amerindian descent); mulattoes number more than one-fifth of the population; Europeans number about one-fifth of the population; there are also blacks and Indians (some 400 tribes). The official language of the country is Castilian Spanish. The indigenous Amerindian languages and dialects, numbering more than 180, belong to five major linguistic groups and include the Aymara, Arawak, Chibcha, Carib, Quechua, Tupí-Guaraní, and Yurumanguí languages. Roman Catholicism is the official religion and is practiced by most Colombians. Some Indians continue to follow traditional religious beliefs, however.

Colombia's annual birth rate and its rate of natural increase are among the highest in Latin America and make its population growth rate one of the highest in South America. The infant mortality rate is also relatively high. Colombia has a young population: 40 percent is less than 15 years of age. In 1946–58 the national population was more than 60 percent rural; by the early 1980s this proportion was reversed, and the nation was 65 percent urban, reflecting large-scale migration from rural to urban areas.

The economy. Colombia has a developing private-enterprise economy, based primarily upon agriculture and manufacturing. The gross national product (GNP) is keeping even with population growth; the GNP per capita is about average for South America. The GNP originates primarily from manufacturing (one-fifth); agriculture (less than one-fifth); and trade, restaurants and hotels, and other services.

Coffee is the principal cash crop, occupying about one-sixth of the arable land; other important cash crops include bananas, fresh-cut flowers, and sugarcane. The principal food crops include corn (maize), rice, roots and tubers, beans, bananas, cassava, and potatoes; tobacco is also grown. Cannabis and coca are grown illicitly on a major scale in Colombia; the raising, marketing, distribution, and use of these drugs creates significant national and international problems of crime, law enforcement, and political corruption. The principal livestock raised are cattle, pigs, and sheep.

Forests cover about half of Colombia's total land area. Important forest products include broad-leaved roundwood, sawn wood, paper products, and wood-based panels. Colombia's principal mineral products are natural gas, petroleum, coal, iron ore, silver, platinum, limestone, kaolin clay, and gypsum. Its production of gold is South America's third largest, and its emeralds constitute most of the world's output.

Manufacturing is well diversified, the principal products including processed food, beverages, chemicals, textiles, nonmetal products, and transport equipment. Almost three-fourths of the annual electrical production is from hydroelectric power stations and the rest from thermal plants.

The government owns and controls mineral exploration and exploitation, fishing, railroads, telecommunications, and part of the shipping industry. About one-third of the labour force is employed in agriculture, hunting, forestry, and fishing, followed by social and community services and manufacturing.

Budgetary revenue is mainly generated from indirect taxes (about one-half of total), direct taxes, and credit resources. Government expenditures include education, finance (including debt repayment), defense, and public works.

Transport in Colombia is most frequently by bus or by air, although railways are also used. Only about 28 percent of the road network is paved. There are inland navigable waterways, principally on the Orinoco, Amazon, Magdalena, and Atrato rivers, as well as major ports on both the Atlantic (Caribbean) and Pacific coasts. Colombia has six international airports.

Exports, in value about one-seventh less than imports, are principally coffee (half of the total), crude petroleum and petroleum products, bananas, fresh-cut flowers, chemicals, and cotton. Contraband exports of cocaine and marijuana are estimated at twice the value of the leading legal export, coffee. The principal importers of Colombian products are the Euro-

pean Economic Community (EEC) countries, the United States, Venezuela, and Peru. Imports include machinery and transport equipment (about one-third of the total), chemicals, crude petroleum and petroleum products, and base metals and metal manufactures. The principal sources for exports to Colombia were the United States, the EEC countries, Japan, Venezuela, and Brazil.

Government and social conditions. Colombia is a republic with a multiparty political system. Its government is headed by an elected president, who is assisted by a cabinet and appoints the governors of the nation's departments. Legislative power is vested in the democratically elected Congress (Congreso), consisting of a Senate and a House of Representatives. The Supreme Court wields the highest judicial power in the country. Despite strong bipartisanship in its government, Colombia has suffered from serious civil unrest. Insurgent groups such as the April 19th Movement and the Colombian Revolutionary Armed Forces have committed terrorist acts in an effort to destabilize and overthrow the country's government.

Significant numbers of people suffer from malaria, dysentery, and other infectious diseases, and malnutrition is also a problem. There is a shortage of trained medical personnel. Colombia's life expectancy rates are 66 years for men and 72 for women. The country suffers from a severe housing shortage in its urban areas, where rural migration has created slums known as *barrios populares.*

Primary education is free and compulsory for five years. Despite the absence of schools in some rural areas, Colombia has a relatively high literacy rate of 87 percent for the population over age 15. There are several prestigious universities, including the publicly operated National University of Colombia (founded 1867).

The Colombian news media, including radio and television broadcasting, generally operate without government interference. The press, however, generally assumes the role of loyal opponent of the government.

Colombian art has been strongly influenced by European culture, particularly emanating from Spain. The country's most prominent cultural figure is Gabriel García Márquez, whose *One Hundred Years of Solitude* (1967) is considered to be among the finest novels written in Latin America. The most eminent figure in Colombian music has been Guillermo Uribe-Holguín, composer of more than 500 works.

History. There is little recorded history of pre-Spanish Colombia. When the Spaniards arrived, they found mostly Chibchan-speaking Indians, concentrated in the western mountainous regions and divided into several tribes.

The Spanish conquest of Colombia began effectively in 1525 with the founding of the city of Santa Marta by Rodrigo de Bastidas. In 1533 Pedro de Heredia founded Cartagena, which became one of the major naval and merchant marine bases of Spain's empire in the New World. In 1550 the *audiencia* of Santa Fé de Bogotá, part of the viceroyalty of Peru, was established and the colonial era had begun. The area's population declined after the Spanish conquest as a result of disease and the economic demands made upon the Indians. Acculturation and intermarriage destroyed most of the special cultural traits of the remaining Indians.

After 1740 the *audiencia* was transferred to the newly created viceroyalty of New Granada (comprising present-day Colombia, Venezuela, and Ecuador). The improved administration and increase in trade spurred a new prosperity for some, particularly the emerging Creole middle class.

Parts of Colombia threw off Spanish jurisdiction in 1810, and full independence came after Spain's defeat by Simón Bolívar at the Battle of Boyacá in 1819, when New Granada became the Republic of Gran Colombia in 1821. Under the leadership of Francisco de Santander, an orderly government was established, but civil war in 1840 checked development. Two major political parties were organized, the Liberals and the Conservatives. Governments alternated between the two parties, leading to continued violence that culminated in the War of a Thousand Days (1899–1903).

Subsequently, years of relative peace followed, but hostility between Liberals and Conservatives erupted again in 1948. In 1958 the Liberal and Conservative forces agreed on a scheme for alternating governments between the two parties. Beginning in 1974, under a constitutional amendment passed in 1968, the president and all legislative bodies at the national level were to be elected without regard to parity. The traditional parties maintained their hold on the government into the 1990s, but civil unrest and intermittent guerrilla warfare and drug wars continued throughout the country.

Colombia, Republic of (1822–30): *see* Gran Colombia.

Colombian Abyssal Plain, submarine plain forming part of the floor of the south-central Caribbean Sea, and the deepest and flattest portion of the Colombian Basin. It rises to the southeast to form the Caribbean coast of Colombia, joins the Clark Basin and Central America's part of the continental shelf to the west, and stretches northward toward the island of Jamaica. The plain is separated from the Venezuelan Basin to the east by the Beta Ridge projecting southwestward from the island of Hispaniola. The maximum depth of the Colombian Abyssal Plain is 14,261 feet (4,347 m). The evenly distributed sediments on the plain are transported downslope from the shallow continental shelf areas by turbidity currents. The very flat topography of the plain, which slopes less than 1 part in 1,000, is accounted for by the deposition of these turbidites in typical fashion.

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Colombo, city, administrative capital of Sri Lanka. (Sri Jayawardenepura Kotte is the legislative and judicial capital.) It is situated on the west coast of the island, just south of the Kelani River, and is a principal port of the Indian Ocean. Colombo has one of the largest artificial harbours in the world and handles the majority of Sri Lanka's foreign trade.

The earliest written mention of the port may be that of Fa-hsien, a Chinese traveler of the 5th century AD, who referred to the port as Kao-lan-pu. The Sinhalese called the port Kolamba, which the Portuguese thought was derived from the Sinhalese word for mango trees (*kola,* "leaves"; *amba,* "mango"). A more likely explanation is that *kolamba* was an old Sinhalese word meaning "port," or "ferry."

In the 8th century AD Arab traders settled near the site of the modern port. From the 16th century onward, the port was developed by the Portuguese, the Dutch, and the British, who each in turn established themselves on the island. In 1815, when the Sinhalese chiefs deposed the king of Kandy in the heart of Ceylon (now Sri Lanka) and ceded his territory to the British, Colombo became the capital of the island. Western influence in the city has diminished since Sri Lanka gained its independence in 1948.

The oldest districts of the city, which are nearest to the harbour and north of Beira Lake, are known as the Fort and the Pettah (a name deriving from the Tamil word *pettai,* meaning "the town outside the fort"). The Fort is still a focal point of government and commercial activity, although less so than in the past. The Pettah has become a district of small shops, markets, and sidewalk stalls, with all the characteristic features of an Oriental bazaar. The built-up area of Cinnamon Gardens, which is south of Beira Lake, was an important cinnamon-growing region during the Dutch period.

Colombo's important buildings include the Secretariat, the Town Hall, the Clock Tower, St. Lucia's Cathedral, and the Galle Face Hotel. Other distinctive buildings in the city are the Wolvendahl Church, built by the Dutch in 1749; a complex of hospitals; the University of Colombo (1921); several Buddhist and Hindu temples; and the residences of the head of state and of the prime minister.

The city's manufacturing industries are based on the processing of raw materials exported through the port. General engineering industries are connected with public utilities and with the sale, service, repair, and assembly of motor vehicles and other machinery; light manufacturing industries process food, drinks, and tobacco. Numerous factories are located on the city's periphery. Colombo also remains the commercial centre of the island; the head offices of local and foreign banks, the Insurance Corporation (which has a monopoly of insurance), brokerage houses, and government corporations are all located in the city.

Trains connect Colombo with other major cities on the island. There are also bus services within the city and with all parts of Sri Lanka. The international airport is located at Katunayake, and Ratmalana airport handles domestic flights.

Colombo has numerous parks and playing fields. Among them are the Galle Face Green by the sea, the Vihara Maha Devi Park, and the Ridgeway Golf Links. Cricket and football (soccer and rugby) grounds are located throughout the city; tennis and track events are also popular. Sea bathing and surfing can be enjoyed at Mount Lavinia Beach, which is about 7 miles (11 km) south of the city. The National Zoological Gardens of Sri Lanka is located at Dehiwala, south of Colombo. Pop. (1990 est.) 615,000.

Colombo, Bartolomeo: *see* Columbus, Bartholomew.

Colombo, Cristoforo: *see* Columbus, Christopher.

Colombo, Joseph A., Sr. (b. June 16, 1923, New York, N.Y., U.S.—d. May 22, 1978, Newburgh, N.Y.), major organized crime boss in Brooklyn who founded an Italian-American Civil Rights League to deflect government investigations of his activities.

Brooklyn-born, Colombo was still a teenager when his father, Anthony, was killed in 1938 in a gangland war. After service in the Coast Guard during World War II, he drifted into a life of petty crime. Gradually he rose in the ranks of organized crime to become head of one of New York's Five Families in 1964, inheriting the leadership once held by Joseph Profaci and temporarily quelling a gang war within the ranks. Colombo's activities included numbers and sports gambling, hijacking, fencing stolen goods, and loansharking and also included interests in at least 20 legitimate businesses in New York City.

Angered by the FBI's harassment of him and his family, he began protesting publicly and helped found the Italian-American Civil Rights League in 1970; his son Andrew was its vice president. On June 28, 1971, Colombo, speaking at an Italian-American rally in Columbus Circle, was shot by a young black man, who was himself immediately slain. Colombo was probably the target of the followers of Joseph Gallo, with whom Colombo had fought gang wars for a decade.

Colombo, almost totally paralyzed by the

gun wound, died seven years later, after declining into a coma.

Colombo, Matteo Realdo (b. 1516?, Cremona [Italy]—d. 1559, Rome), Italian anatomist and surgeon who anticipated the English anatomist William Harvey, the discoverer of general human blood circulation, in clearly describing the pulmonary circulation, or passage of blood between the heart and the lungs.

At the University of Padua (1540), Colombo studied medicine under the great Renaissance anatomist Andreas Vesalius, succeeding the master as professor of surgery in 1543. In 1546 Colombo became the first professor of anatomy at the University of Pisa and, in a similar position at the Sapienza, or Papal University, in Rome (1548–59), was surgeon to Pope Julius III.

De re anatomica (1559; "On Things Anatomical"), his only formal written work, includes several important original observations derived from his dissections on both living animals and human cadavers. His descriptions of the mediastinum (organs and tissues within the thoracic cavity, excluding the lungs), pleura (membrane surrounding the lungs), and peritoneum (membrane surrounding the abdominal organs) are the best made to that time.



Matteo Colombo, oil painting by an unknown artist

Alinari—Art Resource/EB Inc.

Most important, however, was his description of general heart action, which correctly stated that blood is received into the ventricles during diastole, or relaxation of the heart muscle, and expelled from them during systole, or contraction. He clearly outlined circulation of venous blood from the right ventricle, through the pulmonary artery to the lungs, whence it emerges bright red after mixture with a "spirit" in the air, and returns to the left ventricle through the pulmonary vein.

Although pulmonary circulation had been espoused clearly as early as the 13th century, accounts of it were unknown to contemporary science, and Colombo was recognized by his colleagues and by William Harvey as the discoverer of the phenomenon.

Colombo Plan, in full THE COLOMBO PLAN FOR CO-OPERATIVE ECONOMIC AND SOCIAL DEVELOPMENT IN ASIA AND THE PACIFIC, formerly (1951–77) COLOMBO PLAN FOR COOPERATIVE ECONOMIC DEVELOPMENT IN SOUTH AND SOUTH-EAST ASIA, arrangement for discussing economic development plans and facilitating technical and financial assistance for development projects in south and southeast Asia. It was established at Colombo, Ceylon (now Sri Lanka), in 1951 as a result of discussions by the governments of India, Pakistan, Ceylon, Australia, New Zealand, and Great Britain. The United States, Japan, and a number of Southeast Asian, East Asian, and Pacific countries also joined later. The plan's name was changed following the end of participation by several newly communist countries of Southeast Asia.

Development planning and problems are discussed at an annual meeting. Although there is a continuing body that deals with technical assistance, there is no central fund from which loans or grants are allocated. Instead, financing of development projects is arranged bilaterally between individual governments or with the International Bank for Reconstruction and Development.

Colón, city, eastern Matanzas province, west-central Cuba. The city is situated on an inland plain where sugarcane, fruits, and tobacco are grown and poultry and cattle are raised. The area also yields honey. Colón processes the farm products and has tobacco factories and a fruit-dehydration plant. The city lies on the central highway and a major railroad. Pop. (1989 est.) 66,900.

Colón, city, north-central Panama. Founded in 1850 at the Atlantic (northern) terminus of the original Panama railway, the settlement was first called Aspinwall after one of the builders of the railway. Colón is the Spanish form of Columbus; the name of the neighboring port of Cristóbal is Spanish for Christopher. After completion of the railway in 1855, Colón overshadowed the older Caribbean ports of Panama, and with the first plans for the isthmian canal it took on additional prestige. Built on swampy Manzanillo Island, the city was notoriously unhealthful until U.S. Colonel William C. Gorgas, in charge of sanitation during the canal construction, gave it a new system of waterworks and sewerage and drained the surrounding swamps.

The great portworks and docks built by the U.S. government in the former Canal Zone at Cristóbal, now virtually a suburb, make Colón one of the most important ports of the Caribbean Sea. The city's population is largely black, chiefly descendants of labourers imported from the British West Indies during construction of the canal. A busy tourist centre, Colón contains a customhouse, large public buildings, churches, and several modern hotels. It is on the Boyd-Roosevelt Highway, which runs to Panama City, and it has an airport. Pop. (1989 est.) 58,479.

colon, in physiology, that segment constituting most of the length of the large intestine in mammals. The term is often used synonymously with "large intestine" or in reference to a corresponding region of the vertebrate gut.

For a depiction of the colon in human anatomy, shown in relation to other parts of the body, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

The human colon extends from the end of the small intestine and cecum up the right side of the abdomen (ascending colon), across to the left side (transverse colon), down the left side (descending colon), and loops (sigmoid flexure, or sigmoid colon) to join the rectum. In humans, the colon has no digestive function. Its purpose is to lubricate waste products, absorb remaining fluids and salts, and store waste products until they are ready to be passed from the body. Most absorption occurs in the ascending and transverse regions, where the liquid material received from the small intestine is dehydrated to form a fecal mass.

The inner wall of the colon consists of a mucous membrane that absorbs the fluids and gives off mucus to lubricate the waste materials. The deeper muscle layer is composed of circular and longitudinal muscles. Circular muscles produce the mild churning and mixing motions of the intestine, while the longitudinal ones create the strong massive muscle contractions that actually move the feces.

Medical problems associated with the colon range from constipation, diarrhea, gas discomfort, and colitis (inflammation of the colon) to the more serious megacolon (enlarged colon) and cancer. *See also* large intestine.

Colón, Archipiélago de (Ecuador): *see* Galápagos Islands.

Colón, Bartolomé: *see* Columbus, Bartholomew.

Colón, Cristóbal: *see* Columbus, Christopher.

Colón, Diego, English DIEGO COLUMBUS (b. 1479/80, Porto Santo, Madeira Islands—d. Feb. 23, 1526, Montalbán, Spain), eldest son of Christopher Columbus and viceroy of the Indies for 15 years, who spent most of his life in legal battles to secure the Columbus claims.

When his father undertook the great voyage of discovery in 1492, Diego was made a page at the Spanish court. After his father's death in 1506, he began a long struggle to regain his father's former privileges in the Indies. Diego's marriage to María Alvarez de Toledo, niece of the Duke de Alba, the cousin of King Ferdinand, worked in his favour, and in 1508 he was accredited governor of the Indies. He arrived at Santo Domingo in July 1509 to take his post. Not satisfied with that assignment alone, he wanted all his father's privileges. In May 1511 he received the hereditary title of viceroy of the islands, but no mention was made of the mainland. Throughout his viceroyalty Columbus protested encroachments upon his authority, such as the formation of an *audiencia* (governing body) and the *residencia* (inspection). He made several voyages to Spain to defend his position in 1515 and 1523 but died without any final decision on his rights. In June 1536 a compromise settlement was made. His son Luis was to receive the title admiral of the Indies but would renounce all other rights in return for a perpetual annuity of 10,000 ducats, the island of Jamaica in fief, and an estate of 25 square leagues on the Isthmus of Panama with the titles of Duke de Veragua and Marquis de Jamaica.

Colon Classification, system of library organization developed by the Indian librarian S.R. Ranganathan in 1933. It is general rather than specific in nature, and it can create complex or new categories through the use of facets, or colons. The category of dental surgery, for example, symbolized as L 214:4:7, is created by combining the letter L for medicine, the number 214 for teeth, the number 4 for diseases, and the number 7 for surgery.

In Colon Classification, there are 108 main classes (previously there were 33) and 10 generalized classes (broadly divided between the humanities and sciences), which are represented by a mixed notation of Arabic numerals and roman and Greek letters. Each main class comprises five fundamental facets, or groups: personality, matter, energy, space, and time. Ranganathan's main contribution to classification was the notion of these fundamental facets, or categories.

Instead of schedules of numbers for each topic, Colon Classification uses series of short tables from which component numbers are chosen and linked by colons to form a whole. The book number is an integral part of the call number, a departure from Dewey or Library of Congress systems. Each main class has its appropriate facets and focuses; *e.g.*, literature has language and form. In addition, there are four floating tables that correspond to subdivisions—*e.g.*, form, geography, time, and language. Further expansion of the tables is allowed through colon addition or omission (if the subject cannot be expanded).

The collection of the University of Madras, India, was utilized in the creation of Colon Classification.

colonel, the highest field-grade officer, ranking just below the general officer grades in

most armies or below brigadier in the British services. A colonel was traditionally the commanding officer of a regiment. In air forces that use the same titles of rank as the army, such as the U.S. Air Force, a colonel's command is usually a group; the comparable grade in the Royal Air Force is group captain. When not exercising command of a regiment, group, or equivalent formation, a colonel is generally placed in a senior staff or administrative post.

coloni (Roman serfs): *see* colonus.

colonia (ancient Rome): *see* colony.

Colonial National Historical Park, historical reservation of approximately 9,300 acres (3,800 hectares) on a peninsula between the York and James rivers, in southeastern Virginia, U.S. Established in 1936, it embraces Yorktown (the final battleground of the American Revolution), Jamestown (site of the first permanent English settlement [1607] in America), Cape Henry (where the first English settlers landed on April 26, 1607), and the Colonial Parkway. The latter is a 23-mile (37-kilometre) link between Jamestown, Williamsburg (not strictly within the national park but a cradle of colonial culture and Revolutionary sentiment), and Yorktown, the main points around Virginia's historic triangle. The scenic route is dotted with historic spots and interpretive markers. *See also* Jamestown; Williamsburg; Yorktown; Henry, Cape.

colonial pine: *see* Moreton Bay pine.

colonialism, a political-economic phenomenon beginning about the year 1500 whereby various European nations discovered, conquered, settled, and exploited large areas of the world.

A brief treatment of colonialism follows. For full treatment, *see* MACROPAEDIA: European Overseas Exploration and Empires, History of.

Colonialism commenced with the emerging European nation-states: England, France, Portugal, Spain, and the Low Countries. After the opening of a sea route around southern Africa in 1488 and the discovery of America in 1492, voyages of colonization and conquest were sent out by most nations of Atlantic Europe. Portugal led the way in discovery. The Portuguese expanded westward to Brazil and eastward to the Indian Ocean, where they traded without competition until other nations began to move in on their monopoly.

After Christopher Columbus discovered Cuba, the Bahamas, and Hispaniola for Spain in 1492, other Spanish voyagers staked claims to Brazil and the Isthmus of Panama. Spanish conquest of the Americas began with the occupation of the larger West Indian islands. Later, encouraged by the occupation of Aztec Mexico by Hernán Cortés, which yielded much gold and silver, the Spanish established an American empire stretching from Chile in the south to Mexico and California in the north and including present-day Florida.

Early in the 16th century the Dutch became the leading European naval and commercial power, with an Oriental empire that developed rapidly after the chartering of the Dutch East India Company in 1602 and the company's founding of Batavia (now Jakarta), Java, as the centre of trade with China, Japan, India, Ceylon (now Sri Lanka), and Persia.

France, beset by problems on the European continent, was a weak administrator of its overseas empire. The French New World settlements began after Giovanni da Verrazano's trip in 1524 and the exploration of the St. Lawrence River. Samuel de Champlain went to New France (Canada) in 1603 and founded Quebec in 1608, but, despite the status of royal province granted in 1663, the colony grew slowly, numbering by 1754 only some 55,000.

England's East India Company (chartered in 1600) led the acquisition of India, an achievement largely due to Robert Clive. Significant British gains in North America resulted from the colonial wars of the 18th century. By Queen Anne's War with Spain, ending in 1713, England won Newfoundland, Nova Scotia, and part of northern Canada. The successful conclusion of the French and Indian War in 1763 gained for Britain all of North America east of the Mississippi River. The first great colonial era ended with the British Empire as the most wealthy of all European colonial systems. British sea power propelled the empire to the South Pacific, the Far East, the South Atlantic, and the African coast. The loss of the American colonies in 1783 was a blow, although offset by the consolidation of India after the defeat of the Marāthā opposition in 1803 and by settlement of Australia and the Caribbean.

In contrast, Spain's and Portugal's colonial growth suffered during the Napoleonic Wars. French occupation of the Iberian Peninsula in 1807 led to estrangement between South American colonies and their mother countries, both of which were too preoccupied to intervene effectively in nationalistic movements, civil wars, and revolutions. By 1825 Brazil had freed itself from Portugal, and Spain had lost all its colonies but Cuba and Puerto Rico.

The late 19th and early 20th centuries saw new expansionist powers emerge: Germany, the United States, Belgium, Italy, and Japan. Russia, another new colonial power, expanded overland (as did the United States), absorbing and displacing indigenous cultures. Russia penetrated Siberia, the Far East, the Caucasus, and Asia as far as the Korean coastline but was stopped by the Russo-Japanese War (1905). Western Europe began the partitioning of China with the Opium Wars, waged by Britain to protect British merchants who were exporting opium from India to China. After the Treaty of Nanking (1842), France, the United States, and Russia secured similar treaties of entry.

Africa was another stage for the new wave of imperialism. Before 1880 there were very few colonial possessions in Africa, but by 1900 the continent was almost wholly controlled by European powers. From a beginning in French Algeria and the French building of the Suez Canal and the subsequent British

Chronological List of New Independent Nations Since 1943

Year	Date	Nation
1943	Nov. 22	Lebanon
1944	Jan. 1	Syria
	June 17	Iceland
1945	Aug. 17	Indonesia
	Oct. 25	Taiwan
1946	May 25	Jordan
	July 4	Philippines
1947	Aug. 14	Pakistan
	Aug. 15	India
1948	Jan. 4	Myanmar (Burma)
	Feb. 4	Sri Lanka (Ceylon)
	May 14	Israel
	Aug. 15	Korea (South)
	Sept. 9	Korea (North)
1951	Dec. 20	Oman
	Dec. 24	Libya
1953	Oct. 23	Laos
	Nov. 9	Cambodia
1954	Sept. 2	Vietnam
1956	Jan. 1	The Sudan
	March 2	Morocco
	March 20	Tunisia
1957	March 6	Ghana
	Aug. 31	Malaysia
1958	Oct. 2	Guinea
1960	Jan. 1	Cameroon
	April 27	Togo
	June 26	Madagascar
	June 30	Zaire (Congo)
	July 1	Somalia
	Aug. 1	Benin (Dahomey)
	Aug. 3	Niger
	Aug. 5	Burkina Faso (Upper Volta)
	Aug. 7	Côte d'Ivoire (Ivory Coast)
	Aug. 11	Chad
	Aug. 13	Central African Republic
	Aug. 15	Congo
	Aug. 16	Cyprus
	Aug. 17	Gabon
	Aug. 20	Senegal
	Sept. 22	Mali
	Oct. 1	Nigeria
	Nov. 28	Mauritania
1961	April 27	Sierra Leone
	June 19	Kuwait
	Dec. 9	Tanzania (Tanganyika 1961 and Zanzibar Dec. 10, 1963)
1962	Jan. 1	Western Samoa
	July 1	Burundi
	July 1	Rwanda
	July 5	Algeria
	Aug. 6	Jamaica
	Aug. 31	Trinidad and Tobago
	Oct. 9	Uganda
1963	Dec. 12	Kenya
1964	July 6	Malawi
	Sept. 21	Malta
	Oct. 24	Zambia
1965	Feb. 18	The Gambia
	July 26	Maldives
	Aug. 9	Singapore
1966	May 26	Guyana
	Sept. 30	Botswana
	Oct. 4	Lesotho
	Nov. 30	Barbados
1967	Nov. 30	Yemen (South)
1968	Jan. 31	Nauru
	March 12	Mauritius
	Sept. 6	Swaziland
	Oct. 12	Equatorial Guinea
1970	June 4	Tonga
	Oct. 10	Fiji
1971	March 26	Bangladesh
	Aug. 15	Bahrain
	Sept. 3	Qatar
	Dec. 2	United Arab Emirates
1973	July 10	The Bahamas
1974	Feb. 7	Grenada
	Sept. 10	Guinea-Bissau
1975	June 25	Mozambique
	July 5	Cape Verde
	July 6	Comoros
	July 12	São Tomé and Principe
	Sept. 16	Papua New Guinea
	Nov. 11	Angola
	Nov. 25	Suriname
1976	June 29	Seychelles
1977	June 27	Djibouti
1978	July 7	Solomon Islands
	Oct. 1	Tuvalu
	Nov. 3	Dominica
1979	Feb. 22	Saint Lucia
	July 12	Kiribati
	Oct. 27	Saint Vincent and the Grenadines
1980	April 18	Zimbabwe
	July 30	Vanuatu
1981	Sept. 21	Belize
	Nov. 1	Antigua and Barbuda
1983	Sept. 19	Saint Kitts and Nevis (Saint Christopher and Nevis)
1984	Jan. 1	Brunei
1986	Oct. 21	Marshall Islands
	Nov. 3	Micronesia
1990	March 21	Namibia
	Aug. 23	Armenia
1991	April 9	Georgia
	June 25	Croatia
	June 25	Slovenia
	Aug. 20	Estonia
	Aug. 21	Latvia
	Aug. 24	Ukraine
	Aug. 25	Belarus
	Aug. 27	Moldova
	Aug. 30	Azerbaijan
	Aug. 31	Kyrgyzstan
	Aug. 31	Uzbekistan
	Sept. 6	Lithuania
	Sept. 9	Tajikistan
	Oct. 26	Turkmenistan
	Dec. 8	Russia
	Dec. 16	Kazakhstan
	Dec. 19	Macedonia
1992	March 3	Bosnia and Herzegovina
1993	Jan. 1	Czech Republic
	Jan. 1	Slovakia
	May 24	Eritrea

Note: The disintegration of the Soviet Union and of the former Yugoslavia of six republics extended over more than two years, and thus the dates of "independence" or "sovereignty" of the component republics are somewhat clouded. The dates shown in the table are considered official, but other dates could be adduced.

takeover of Egypt, the expansion into sub-Saharan Africa produced such colonial entities as the Belgian Congo, French Equatorial Africa, Tanganyika (German East Africa), and South Africa, where Britain gained sovereignty over the Transvaal and the Orange Free State after the Boer War (1899–1902). After World War I, Britain and France took control of Middle Eastern countries formerly held by the Ottoman Empire.

Between World War I and World War II, most colonial systems, while in geographic extent at their zenith, were politically strained or on the verge of revolt. The Russian Revolution and various nationalistic movements contributed to the political instability. In addition, the process of economic modernization helped to erode the old military and paternalistic dominance of the mother countries. By the end of the war with the Axis Powers, European colonial rule in Asia, sharply challenged by an expansionist Japan, had been fatally crippled.

From 1945 decolonization became a rapidly accelerating movement. Great Britain, in particular, set about disassembling its empire. India and Pakistan were granted independence in 1947 and were followed by Britain's black African colonies after 1956; Cyprus and Malta were freed in the 1960s. Britain pulled out of the Persian Gulf in 1971, and the Royal Navy left Singapore in the same year, ending British Far East presence. France's decolonization process was less peaceful, marked by wars in French Indochina, Morocco, Tunisia, and Algeria. Belgium, Portugal, and The Netherlands all divested themselves of most of their overseas possessions during the 1950s, '60s, and '70s.

Colonna FAMILY, noble Roman family of great antiquity and importance, descended from the 10th-century counts of Tusculum. The first to take the name Colonna ("de Columna") was Piero, the son of Gregorio, Count of Tusculum, who on Gregorio's death (*c.* 1064) received the castle of Colonna in the Alban Hills, together with Palestrina and other places, as his share of the inheritance. Like other Roman families, the Colonna gained power and wealth through papal favour and by the 13th century were already providing cardinals and senators of Rome. Thereafter, the Colonna are so consistently prominent in the politics of the church and the city of Rome that even the most distinguished are far too numerous to name; a detailed record of the family would almost amount to a history of Lazio and of Rome itself.

Throughout the European Middle Ages, they figure among the most unruly and potent of the Roman baronial dynasties; their feuds with the Caetani and Orsini dominate the local history of a region where feudal power long remained unsubdued. Of more than local importance, however, was their bitter quarrel with the Caetani pope, Boniface VIII, who tried to extirpate the family and drove them into alliance with his enemy, the French king Philip IV the Fair; Sciarra Colonna (d. 1329) led the armed attack on Boniface at Anagni on Sept. 7, 1303. On the pope's death the Colonna recovered their lands and influence, and for many years subsequently Rome was harassed by their struggle for power with the Orsini, which divided the nobility into two contending factions. These conditions gave rise to Cola di Rienzo's popular dictatorship, which was a check to all the Roman magnates and notably the Colonna, over whom the tribune won a bloody victory at Porta San Lorenzo in Rome on Nov. 20, 1347. The check, however, was temporary; Colonna power was undiminished and soon after was signally increased by the election at Constance of Cardinal Oddone Colonna as Pope Martin V. During his pontificate (1417–31), Martin obtained the grant of fiefs for his family in southern Italy and enriched them with vast estates in papal territory, including Frascati, Paliano, Genazzano, and many other places.

Their power was challenged by Martin's successor, Eugenius IV, and for well over a century the fortunes of the Colonna continued to be disturbed by conflict with the popes; but from the later years of the 16th century they lived in unbroken peace with the papacy, and many members of the family rose to eminence as prelates, soldiers, and statesmen in the service of the church as well as other powers, particularly Spain.

The surviving branches of the family comprise the Colonna di Paliano, the Colonna di Stigliano, and the Barberini-Colonna di Palestrina.

Colonna, Oddone (pope): *see* Martin V.

Colonna, Vittoria (b. 1492, Marino, near Rome [Italy]—d. Feb. 25, 1547, Rome), Italian poet, less important for her poetry than for her personality and her associations with famous contemporaries, particularly Michelangelo.

Of a noble family, Vittoria Colonna married Ferdinando Francesco d'Avalos, Marchese di Pescara, in 1509. Her husband seems to have spent most of their married life on military campaigns; nevertheless, when he died in 1525 she began a series of poems in his memory, the best modern edition of which is *Rime spirituali* (1882; Eng. trans. *The "In Memoriam" of Italy: A Century of Sonnets from the Poems of Vittoria Colonna*). She also wrote much religious poetry, but her life has drawn more interest than her work.

Learned and intelligent, of a religious and emotional nature, Vittoria was much respected by the poet Ludovico Ariosto and was a close friend of other literary figures, including the poet Jacopo Sannazzaro, the humanist Pietro Bembo, and the renowned author of the etiquette manual *Il cortegiano* ("The Courtier"), Baldassare Castiglione, as well as several contemporary religious reformers. Her most famous platonic association, however, was with Michelangelo, whom she met in Rome in 1538 and with whom she exchanged many letters and philosophical sonnets. Michelangelo was at her bedside when she died and, in his touching memorial sonnet, wrote that on her death "Nature, that never made so fair a face, / Remained ashamed, and tears were in all eyes."

colonnade, row of columns generally supporting an entablature (row of horizontal moldings), used either as an independent feature (*e.g.*, a covered walkway) or as part of a building (*e.g.*, a porch or portico). The earliest colonnades appear in the temple architecture of antiquity, numerous examples of which survive in Greece and Rome.



Colonnade, palace of Charles V, the Alhambra, Granada, Spain, designed by Pedro de Muchuca, begun 1527
Archivo Mas, Barcelona

The Greek market hall, or stoa, as seen in Athens is a particularly good illustration of a long colonnade serving a commercial purpose. Colonnades were much employed in the Baroque and Neoclassical periods, such as the notable colonnade of St. Peter's in Rome, designed by Gian Lorenzo Bernini and completed in 1667.

colonus, plural COLONI, tenant farmer of the late Roman Empire and the European Middle Ages. The coloni were drawn from impoverished small free farmers, partially emancipated slaves, and barbarians sent to work as agricultural labourers among landed proprietors. For the lands that they rented, they paid in money, produce, or service. Some may have become coloni in order to gain protection from the proprietor against the state tax collector or against invaders and aggressive neighbours. Although technically freemen, the coloni were bound to the soil by debts that were heritable and by laws limiting their freedom of movement. By AD 332 landlords were permitted to chain coloni suspected of planning to leave. Coloni were forbidden to transfer their property without consent of the landlord and to sue the landlord except for increasing their rent. The colonus could not lose his land as long as he paid the rent, but he was forbidden to leave or change his occupation. If the land was sold, he went with it; his children held it after him on the same terms.

The descendants of the coloni, along with other dependent peasants, became the serfs of the European Middle Ages.

colony, Latin COLONIA, plural COLONIAE, in Roman antiquity, a Roman settlement in conquered territory. The earliest colonies were coast-guard communities, each containing about 300 Roman citizens and their families. By 200 BC a system of such Roman maritime colonies maintained guard over the coasts throughout Italy. The Romans preferred this form of coastal defense to the use of a fleet. The colonists kept their Roman citizenship, with all the rights thereof.

The larger Latin colonies were established for defensive purposes outside Roman territory. In 218 BC, for example, about 6,000 colonists, Latin as well as Roman, were settled in Placentia and Cremona to guard the region of the Po River following the conquest of northern Italy. At first, the Romans who moved to such colonies exchanged their Roman citizenship for generous land grants, but after 177 BC Latin colonists were considered Roman citizens. The colonists could exercise full political rights in Rome and elect their own magistrates, who had limited judicial and financial power.

By the late 2nd century BC, colonies were established not only for defensive purposes but for offering work to landless freedmen and veterans. Julius Caesar and Augustus regularized the practice of founding colonies for veterans and proletarians in conquered territories outside Rome. The presence of colonists helped to Romanize the local inhabitants, some of whom assimilated and acquired Roman citizenship. This policy was maintained until the 2nd century AD. Thereafter, *colonia* became simply the highest rank that a community could attain. Colonies were often named for their founders and later benefactors, which often included the emperors.

colony, in zoology, a group of organisms of one species that live and interact closely with each other in an organized fashion. A

colony differs from an aggregation, which is also a group of conspecifics but has no cooperative or organized function. Small, functionally specialized, attached organisms called polyps in cnidarians and zooids in bryozoans form colonies and may be modified for capturing prey, feeding, or reproduction. Colonies of social insects (*e.g.,* ants, bees) usually include castes with different responsibilities.

Temporary breeding colonies are formed by many birds. Certain birds, among them the now-extinct passenger pigeon, require the presence of many of their kind to stimulate reproductive activities. Others (*e.g.,* gulls) breed in colonies because of a limited breeding habitat and to coordinate their efforts in protecting the nests from predators. Certain mammals that live in close groups are said to be colonial, although they lack cooperative activities and each maintains a territory.

Colophon, ancient Ionian Greek city, located about 15 miles (24 km) northwest of Ephesus, in modern Turkey. It was a flourishing commercial city in the 8th and 7th centuries BC with its harbour at Notium. Colophon was ruled by a timocracy (government based on wealth) and was famous for its cavalry and for its luxury. It was the birthplace of the philosopher Xenophanes and the poet Antimachus. Seized by Gyges of Lydia in 665 BC, it was later brought into the Delian League. During the Peloponnesian War it was controlled first by the Persians and then by Athens. Colophon was conquered in 302 BC by Lysimachus, one of Alexander the Great's generals, who transferred its population to his new city of Ephesus. The Colophonians returned to their old city after Lysimachus' death in 281, however. The old city subsequently declined in favour of Notium (New Colophon).

colophon, an inscription placed at the end of a book or manuscript and giving details of its publication, *e.g.,* the name of the printer and the date of printing. Colophons are sometimes found in manuscripts and books made from the 6th century AD on. In medieval and Renaissance manuscripts, a colophon was occasionally added by the scribe and provided his name and the date and place of his completion of the work, along with an expression of pious thanks for the end of his task.

With the invention of printing in the 15th century, printers gradually added a blank piece of paper at the front of a book to protect the first page from soiling, and they also added an identifying monogram, emblem, or a brief sentence at the rear of the book. At first, the latter inscription simply recorded that the printer had printed the work at hand in a given place. The first such printed colophon occurs in the Mainz Psalter produced by Johann Fust and Peter Schöffer in 1457, and is translated as follows:

> The present copy of the Psalms, adorned with beauty of capital letters and sufficiently picked out with rubrics, has thus been fashioned by an ingenious method of printing and stamping without any driving of the pen, and to the worship of God has been diligently completed by Johannes Fust, citizen of Mainz, and Peter Schoeffer of Gernsheym, in the year of the Lord 1457 on the Vigil of the Assumption [*i.e.,* August 14].

Such colophons are important sources of information for the origin of early printed books. Printed colophons soon became more elaborate, however, evolving into a means whereby the printer might praise the book at length and even insert a short essay upon its merits. Ultimately, by about 1480, part of the contents of the colophon was transferred to the blank cover page at the front of the book, thereby initiating the title page as it is now known today.

In most countries, the colophon now appears on the page opposite the title page and consists of a one-sentence statement that the book was printed by a given printer at a given location. Colophons stating the typeface, paper, and other production details of fine editions are sometimes still placed on the last page, however.

colophony (resin): *see* rosin.

color: *see under* colour.

Colorado, Indian people of the Pacific coast of Ecuador. They live in the tropical lowlands of the northwest, where they are one of the last remaining aboriginal groups. The Colorado



Colorado Indian
Carl Frank

are linguistically related to the neighbouring Cayapa, although their Chibchan languages are mutually unintelligible.

The Colorado are fishermen and slash-and-burn agriculturists. Their staple crop is plantain, but cassava, yams, cacao, peppers, corn (maize), rice, and other crops are also grown. They also hunt and keep some domestic animals. About 1,000 Colorado were left in the late 20th century. They live scattered through the forest in single-family houses, consisting usually of thatched roofs supported by posts and lacking walls. Clothing is traditional: men wear a knee-length wraparound kilt and a square of cotton cloth over the shoulders; women wear an ankle-length wraparound cotton skirt and a shawl tied at the neck. The Colorado were so named because of their use of red pigment. Men cover their entire bodies with red pigment, while women paint only their faces. Their hair is also treated with red dye and sculpted to look helmetlike.

Colorado, constituent state of the United States of America, lying in the west-central United States astride the Rocky Mountains. It is bounded on the north by Wyoming and Nebraska, on the east by Nebraska and Kansas, on the south by Oklahoma and New Mexico, and on the west by Utah. The capital is Denver.

A brief treatment of Colorado follows. For full treatment, *see* MACROPAEDIA: United States of America: *Colorado.*

The original inhabitants of Colorado were Plains and Great Basin Indians, particularly the Arapaho, Cheyenne, and Ute. The area was claimed by Spain in 1706 but passed to France when Napoleon exerted control over Spain in 1802. Eastern Colorado was part of the Louisiana Purchase from France in 1803. The remainder was in Spanish, then Mexican hands until 1848. Gold was discovered in 1859 and touched off a population boom, but by the 1890s much of the original mining area had been vacated. In the meantime U.S. statehood was achieved in 1876.

Colorado can be divided into three physiographic regions: the plains, a semiarid segment of eastern Colorado where water is scarce, the topography flat, and vegetation is mostly grass; the Colorado Piedmont, in central Colorado, where most of the state's population lives, works, and plays; and the southern Rocky Mountains and Colorado Plateau, in western Colorado, distinguished by mountain ranges and mesas that alternate with broad, intervening valleys and deep, narrow canyons. The central core of the Colorado Rockies is the Sawatch Range, which has a maximum elevation of 14,433 feet (4,399 m).

In eastern Colorado the plains receive only 15 to 20 inches (380 to 510 mm) of precipitation annually, while the Piedmont receives even less. Both the plains and the Piedmont have warm summers and cold, harsh winters. Both regions are subject to extreme variations in temperature.

The population of Colorado is relatively homogeneous. Persons of Spanish origin, mostly Mexicans, make up one-eighth of the population. About 80 percent of the population resides in the Piedmont region, leaving low population densities on the plains and in the mountains. The urban portion of the population is high, and, like other states in the West, Colorado is a fast-growing state. Its growth rate from 1970 to the mid-1980s was almost three times the national average.

Agriculture is heavily dependent on irrigation but remains a basic asset of the economy. Major crops include alfalfa (lucerne), wheat, corn (maize), and sorghum. Colorado is a national leader in cattle production and contributes large numbers of hogs and sheep. Important products of mining and quarrying include molybdenum, petroleum, and coal.

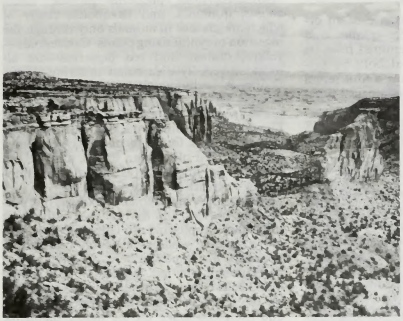
Industry is an important segment of the economy. Manufacturing employment increased much more rapidly during 1972–82, compared with the U.S. average during the same period. Major industries include military ordnance and machinery production and the processing of food and related products. Tourism is a major source of income for the state. Skiing is the principal winter sport that attracts visitors, and summer tourism is concentrated on national and state parks, including the renowned Rocky Mountain National Park.

Colorado ranks first among the Rocky Mountain states in road mileage. The highest of its numerous mountain passes is on Trail Ridge Road in Rocky Mountain National Park at 12,183 feet (3,713 m). Denver's Stapleton International Airport is a national air hub.

Colorado is the home of several universities and of the U.S. Air Force Academy, which is located near Colorado Springs. There are also several scientific research centres in the state. Area 104,091 square miles (269,596 square km). Pop. (1990) 3,294,394.

Colorado Desert, part of the Sonoran Desert, extending southeastward for 164 miles (264 km) from the San Gorgonio Pass in southeastern California, U.S., to the Colorado River delta in northern Mexico. A low-lying, arid region, it is bounded by the Pacific coastal ranges (west), the San Bernardino, Cottonwood, Chuckawalla, and Chocolate mountains and the Colorado River (north through east), and the head of the Gulf of California (south). The typical vegetation of the desert is the creosote-bush–desert-shrub association. Shifting sand dunes lie in the northwest and in the Algodones sand hills in the east. The Salton Sea, a brackish-water lake, occupies the Salton Sink depression near the middle of the Colorado Desert. The productive, irrigated Coachella and Imperial valleys stretch northwest and southeast from the Salton Sea. Water is supplied to these valleys through canals from the Colorado River, after which the desert was named. Within the desert are several Indian reservations, the Salton Sea National Wildlife Refuge, and popular resorts, such as Palm Springs.

Colorado National Monument, national monument in west-central Colorado, U.S., just west of the city of Grand Junction near the Colorado River. Established in 1911, it occupies an area of 32 square miles (83 square km). Part of the Uncompahgre Plateau, the monument is known for its colourful, wind-eroded sandstone formations, towering monoliths, and steep-walled canyons. Petrified logs and dinosaur fossils have been exposed in the locality. Rim Rock Drive skirts the walls of the Red, Ute, No Thoroughfare, and Monument canyons at elevations more than 6,500 feet (1,980 m) above sea level. The monument's more interesting rock formations include Balanced Rock, Coke Ovens, Sentinel Spire, Independence Monument, and Window Rock. Juniper, piñon pine, and wildflowers thrive in the canyons, and deer, foxes, and bobcats are plentiful.



Colorado National Monument, with the Colorado River valley in the distance
Paul Briol—Black Star

Colorado Plateau, also called COLORADO PLATEAUS, part of the Rocky Mountain system, extending across the southwestern United States, covering the southeastern half of Utah, extreme western and southwestern Colorado, northwestern New Mexico, and the northern half of Arizona. The region, which occupies about 130,000 square miles (337,000 square km), is bounded by the Rocky Mountains (north and east), the Great Basin (west), and the Sonoran Desert (south). The plateau is dominated by high mountains that are gashed by superb river canyons or scarred with dry gullies and washes and the beds of intermittent streams. Other topographic features of the plateau include great shallow basins, sunken deserts, dreary levels, bold buttes, picturesque mesas, forests, and rare verdant sections of valley. Elevations range from 2,000 feet (600 m) in the Grand Canyon, Arizona, to more than 12,700 feet (3,870 m) in the La Sal Mountains, Utah.

Erosion by the Colorado River system has carved deep, brilliantly coloured gorges, notably the Grand Canyon, which are geologic and scenic wonders. The plateau embraces numerous conservation areas—national parks, national forests, and national monuments—and also many Indian reservations.

Consult the INDEX *first*

Colorado potato beetle (species *Leptinotarsa decemlineata*), also called POTATO BUG, insect pest that attacks the leaves of potato plants. This leaf beetle belongs to the subfamily Chrysomelinae of the family Chrysomelidae (order Coleoptera). It is native to western North America and originally fed on buffalo bur, a wild plant of the potato family abundant in the Rocky Mountain region. It began feeding on cultivated potatoes when they were introduced into western North America. By 1874 the beetle had become an important potato pest, spreading wherever potatoes were cultivated. The Colorado potato beetle is hemispherical in shape, about 10 mm (0.4 inch) long, and orange-red or yellow in colour, with black stripes on its wing covers (elytra).



Colorado potato beetle (*Leptinotarsa decemlineata*)
D.M. Dennis

The female deposits between about 300 and 500 eggs on the underside of potato leaves. The red, plump, leaf-feeding larvae pupate underground and are usually not seen until they emerge as adults. Depending on the latitude, from one to three generations may occur each year.

Colorado River, major river of North America, rising in the Rocky Mountains of Colorado, U.S., and flowing generally west and south for 1,450 miles (2,330 km) into northwestern Mexico.

A brief treatment of the Colorado River follows. For full treatment, *see* MACROPAEDIA: North America.

The Colorado River's drainage basin comprises 246,000 square miles (637,000 square km) in seven states—Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, and California. For 17 miles (27 km) the river constitutes the international boundary between Arizona and Mexico, and, before the construction of a number of dams along its route, it flowed 80 miles (130 km) through Mexico to the Gulf of California. The Colorado River drains a very large, arid sector of the North American continent. No other river in the world has cut such a remarkable number of extremely deep trenches, of which the Grand Canyon (*q.v.*) is the largest and most spectacular. The Colorado is also remarkable in its value for hydroelectic power and irrigation. The river combines, in proper sequence for complete use, a large quantity of water, great concentrations of fall, reservoir sites for the control of flow, sites for hydroelectric-power plants, and several million acres of irrigable land below the stretch where power may be developed.

For more than 1,000 miles (1,600 km) of its course, the Colorado has cut a deep gorge, with an additional transverse system of narrow, deep, winding canyons where lateral streams join the river. The upper and middle parts of the Colorado River basin are thus traversed by a labyrinth of deep gorges. On the California (western) side of the lower course of the Colorado is the Salton Basin and a large desert extending northwestward from the head of the Gulf of California for a distance of 150 miles (240 km).

The Colorado River system was the first drainage basin in which the concept of multiple use of water was put into practice (*e.g.*, power development, irrigation, recreation, flood control, and navigation). The first major development of the Colorado began in 1928, when Congress passed an act authorizing the construction of Boulder (now Hoover) Dam; this multipurpose water-storage project was a major engineering feat of its time (*see* Hoover Dam). Since its completion in 1936, the Hoover Dam and Lake Mead (*q.v.*), which it created with its impounded waters, have become major tourist attractions. Many additional projects have since been completed on the river, notably Glen Canyon Dam, impounding Lake Powell, and Parker Dam, impounding Havasu Lake, which supplies water for southern California. Other projects divert water from the Colorado River through tunnels and aqueducts to irrigate cropland in northern Colorado and to supply the cities of Phoenix and Tucson in Arizona.

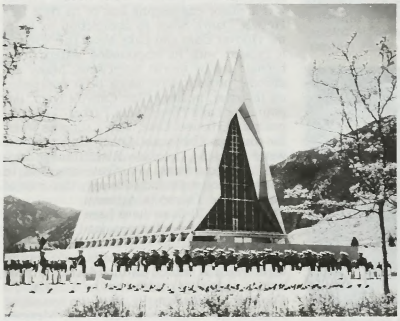
More than 20 dams have been built on the Colorado and its tributaries, and, as a result of this, the river no longer reaches the Gulf of California. Instead, the Morelos diversion dam, which is located on the Mexico-Arizona border and is the southernmost dam on the Colorado, sends virtually all of the remaining water to the irrigation canals of the Mexicali Valley and to the Mexican border towns of Mexicali and Tijuana.

Colorado River, river rising in western Texas, U.S., on the Llano Estacado ("Staked Plain") in Dawson county, north of Lamesa. It flows generally southeast past Colorado City, through rolling prairie and rugged hill and canyon country, via the Highland Lakes past Austin, and across the coastal plain to enter Matagorda Bay (an inlet of the Gulf of Mexico) after a course of 862 miles (1,387 km). The river, the largest entirely within Texas, drains an area of about 39,900 square miles (103,350 square km) and receives several prongs of the Concho River, the Pecan Bayou, and the San Saba, Llano, and Pedernales rivers. It is the site of several important flood-control, power, irrigation, and recreational projects.

Colorado River, Spanish RÍO COLORADO, river in south-central Argentina. Its major headstreams, the Grande and Barrancas rivers, flow southward from the eastern flanks of the Andes and meet north of Buta Ranquil to form the Colorado. The river flows generally east-southeastward across northern Patagonia and is a border for several provinces. Its lower course splits into two arms, which flow into the Atlantic Ocean south of Bahía Blanca. The total length of the Colorado is about 530 miles (850 km).

Colorado Springs, city, seat (1873) of El Paso county, central Colorado, U.S., at the confluence of Monument and Fountain creeks. It stands on a mesa (6,008 feet [1,831 m]) near the eastern base of Pikes Peak, east of Pike National Forest, for which it is headquarters. Founded in 1871 as Fountain Colony by General William J. Palmer, builder of the Denver and Rio Grande Western Railroad, it was renamed for the nearby Manitou mineral springs. Growth of the area followed the Cripple Creek gold strikes in the 1890s and the promotion of the tourist–health-resort trade in the area. In 1917 Colorado Springs consolidated with Colorado City (founded 1859 as El Dorado City). The establishment of military installations gave further impetus to development. The North American Air Defense and Aerospace Defense commands are headquartered at Ent Air Force Base (Peterson Field). Fort Carson (1942), on the city's southern edge, is the home of the Fourth U.S. Infantry Division. The U.S. Air Force Academy (1954), just to the north, is set against a backdrop of the Rampart Range. The Garden of the Gods, a natural park with red sandstone monoliths, is one of many scenic attractions in the area.

The city is the site of Colorado College (1965), the University of Colorado at Colorado Springs (founded in 1874 as Colorado College), Nazarene Bible College (1967), and Colorado Springs College of Business (1969). Inc. town, 1872; city, 1886. Pop. (1990) city, 281,140; Colorado Springs MSA, 397,014.



U.S. Air Force Academy chapel, Colorado Springs, Colo.
By courtesy of the U.S. Air Force Academy

Colorado tick fever, also called MOUNTAIN FEVER, acute, febrile viral infection usually transmitted to humans by the bite of the tick *Dermacentor andersoni*. The virus is classified as an orbivirus of the family Reoviridae, a grouping of viruses that is characterized by the lack of a lipid envelope and the presence of two protein coats. *D. andersoni* requires a vertebrate host for a part of its life cycle. The main mammalian reservoir of the virus is the golden-mantled ground squirrel, *Citellus lateralis*. The carrier tick is found chiefly in the western parts of the United States, notably in Colorado, and is most active in the late spring and summer.

A few days following tick exposure, the fever onset is abrupt, often with intolerance to light, headache, and prostrating weakness. Aching soon becomes generalized, especially in the muscles and joints. Abdominal pain and vomiting occur occasionally. The first attack lasts about two days. After a complete remission of all signs and symptoms lasting also about two days, there is in most cases a second attack that may be even more acute than the first. Except for the rare development of brain inflammation (encephalitis) in young children, however, recovery is usually uncomplicated, and there is lifelong immunity.

coloration, in biology, appearance of an organism as determined by the quality and quantity of light reflected or emitted from its surface. Coloration is achieved both by pigments and by structural features, and it serves a variety of ecological and physiological functions.

A brief treatment of coloration follows. For full treatment, *see* MACROPAEDIA: Coloration, Biological.

The pigments of biological tissues that reflect or transmit light are known as biochromes. Colours produced by the structural features of an organism, created by submicroscopic structures such as striations or facets, are called schemochromes. Biological coloration is genetically determined and functions largely to attract or repel other organisms or to conceal an organism from predators or prey. Coloration also plays a vital role in such biochemical reactions as photosynthesis, as well as contributing to an organism's thermal balance by absorbing or reflecting solar energy.

Schemochromes result from the reflection, fractionation, or scattering of incident light. Reflection of the entire light spectrum, which imparts whiteness to flower petals, feathers, fur, and hair, for example, is often produced by minute air spaces lying between finely divided materials. Interference, the fractionation of light into its constituent colours, is produced by repeated reflection through ultrathin films and results in striking iridescence, as seen in peacock feathers, some insect wings, and pearls. The scattering of light to produce blue colours of structural origin, such as those of eyes or of many feathers, occurs when small air vesicles or suspended particles scatter the shorter wavelengths of blue light while allowing the remaining colours to be absorbed by an underlying layer of dark pigments. The structural production of colours is often reinforced by pigments lying above or below the structures, and the two may act in combination; the greens of fishes, amphibians, and reptiles, for example, most often arise from blue scattered through a layer of yellow pigment.

Biochromes, organic compounds often classified according to the presence or absence of nitrogen, produce colour by the selective absorption of light. The molecules of pigment absorb a limited range of wavelengths; the light that is not absorbed is reflected, and its dominant wavelength determines the pigment's colour. Many biochromes also function as catalysts for biochemical reactions, and others play a pivotal role in such metabolic processes as photosynthesis and the production of vitamin A.

Nonnitrogenous pigments include carotenoids, quinones, and flavonoids, many of which are present in animals only through the ingestion of synthesizing plants. Carotenoids—yellow, orange, and red pigments—are almost universally distributed in living things. Quinones, including vitamin K, cause yellow, orange, red, purple, or green coloration in plants and the animals that feed on them. Flavonoids, including the pigments that impart the yellow found in many flower petals, the purple-red of autumn leaves, and the red of beets, are important as indicators of mineral deficiencies in various crops.

Nitrogen-bearing pigments include the porphyrins, indoles, and flavins. Two of the most important porphyrins are chlorophyll, a dark green pigment vital as the energy transformer necessary to photosynthesis in plants, and hemoglobin, the red pigment found in the blood cells of many animals that makes possible the transfer of oxygen to tissues. Melanins and indigoids make up the indole pigments. Melanin, a brownish or black pigment, is present in all human skin, most heavily in dark-skinned races, and in various tissues of many animals, and it helps protect underlying tissues from ultraviolet radiation. The indigoids include indigo, found in many plants and used to make a blue dye, and Tyrian purple, which is extracted from certain marine snails to produce a red-violet dye.

Adaptive mechanisms that involve coloration have developed in a variety of species. Concealing coloration can be imitative, as when an insect resembles a twig or a marine animal mimics a rock or coral, or cryptic (background resemblance), as seen in the chameleon's colour changes or the camouflaging coloration of the leopard and lion. In some cases, especially among fishes, the pattern of colour can disrupt the outline of an organism, either masking its true shape or making it difficult for a predator to visually resolve it from a colourful or disruptive background.

The use of coloration to make an organism highly visible, either to attract members of its own or another species or to warn or repel predators or challengers, is known as advertisement. Flowering plants that rely on animals, frequently insects, for the transmission of pollen necessary to sexual reproduction exhibit bright colours and intricate patterns, some visible only in ultraviolet light, to attract pollinators. Some fish and insects use bioluminescence to attract mates and differentiate species. Many vertebrates have developed spectacular courtship colorations to attract mates. Bright colours, frequently yellow, red, or black, often warn that an apparently defenseless organism is poisonous, equipped with spines, or in some other way dangerous.

Short-term coloration changes are often mediated by chromatophores, structures that act to control coloration by collecting and dispersing pigments. Chromatophores are found in many fishes, crustaceans, lizards, mollusks, amphibians, and insects. The octopus, squid, and cuttlefish are capable of the most rapid colour changes, and many marine animals can emit pigmented fluids (inks) as protection when excited or threatened.

Many organisms also undergo seasonal coloration changes. These may serve to ensure cryptic matching to a seasonally changing background, as in the varying hare, which goes from brown pelage in summer to white in winter. Or they may be tied to seasonal reproduction and the establishment of breeding territories, as in many species of fish and birds. Other animals undergo age-related changes in coloration. The juvenile plumage of birds, for example, gives way to adult coloration as the bird ages.

Biological coloration has had great importance to humans throughout history: commercial dyes have been manufactured from plants and animals since ancient times; many of the first clues to understanding genetics and evolution came from coloration and its properties; the diagnosis of crop disorders through coloration has increased agricultural yields; the development of military camouflage owes its roots to animal models. There also is evidence that human aesthetic and emotional responses to colour have broad biological bases, thus tying a large part of art and design to biological coloration.

colored: *see under* coloured, except as below.

colorimetry, measurement of the wavelength and the intensity of electromagnetic radiation in the visible region of the spectrum. It is used extensively for identification and determination of concentrations of substances that absorb light. Two fundamental laws are applied: that of a French scientist, Pierre Bouguer, which is also known as Lambert's law, relates the amount of light absorbed and the distance it travels through an absorbing medium; and Beer's law relates light absorption and the concentration of the absorbing substance. The two laws may be combined and expressed by the equation $\log I_0/I = kcd$, where I_0 = intensity of the incident beam of light, I = transmitted intensity, c = the concentration of absorbing substance, d = the distance through the absorbing solution, and k = a constant, dependent upon the absorbing substance, the wavelength of light used, and the units used to specify c and d.

A simple application of this expression is found in comparing intensities of radiation transmitted through layers of different thicknesses of two solutions of the same absorbing substance, one with a known concentration, the other unknown. If the same incident intensity is used and if the thicknesses of the two solutions are adjusted so that the transmitted intensities are equal, then the concentration of the unknown (c_2) can be expressed by the ratio of the thicknesses of the two solutions, d_1/d_2, times the known concentration (c_1). If a photoelectric cell instead of the eye is used to compare intensities, the instrument is called a photoelectric colorimeter.

In colorimetry, frequently the entire visible spectrum (white light) is used, and consequently the complementary colour of the one absorbed is observed as transmitted light. If monochromatic light or a narrow band of radiation is used, the instrument is called a spectrophotometer. It is not limited to the visible spectrum and is often employed to make measurements in the ultraviolet and infrared regions. The spectrophotometer has largely replaced the colorimeter.

Most of the chemical elements and a large number of compounds may be determined colorimetrically or spectrophotometrically, frequently at concentrations smaller than one part of the constituent in several hundred million parts of solution.

colorpoint (breed of cat): *see* Himalayan.

Colosimo, James, byname BIG JIM (b. 1877, Cosenza, Italy—d. May 11, 1920, Chicago, Ill., U.S.), crime czar in Chicago from about 1902 until his death, owner of plush brothels, saloons, and a nightclub. Immigrating from Italy in 1895, he rose from poverty through petty crime and pimping to head a chain of brothels. In 1909 he imported Johnny Torrio from New York to head his gang of enforcers. In 1920 Torrio seized control by having Colosimo murdered (allegedly by Al Capone, then Torrio's henchman).

colossal order, also called GIANT ORDER, architectural order extending beyond one interior story, often extending through several stories. Though giant columns were used in antiquity, they were first applied to building facades in Renaissance Italy. Any of the orders (the major types being Tuscan, Doric, Ionic, Corinthian, and Composite) could be treated in this manner. The colossal order was revived



Colossal order, court facade of Blenheim Palace, Oxfordshire, England, by Sir John Vanbrugh, begun 1705

A.F. Kersting

in 18th-century Europe, notably in England in the grandly theatrical classicism of Sir John Vanbrugh and Nicholas Hawksmoor. *See also* order.

Colosseum, giant amphitheatre built in Rome under the Flavian emperors and originally called the Flavian Amphitheatre. Construction of the Colosseum was begun sometime between AD 70 and 72 during the reign of Vespasian; the structure was officially dedicated in AD 80 by Titus in a ceremony that included 100 days of games. Later, in AD 82, Domitian completed the work by adding the uppermost story. Unlike earlier amphitheatres, which were nearly all dug into convenient



Colosseum, Rome, completed AD 82

Artephot/Pubbli Aer Foto

hillsides for extra support, the Colosseum is a freestanding structure of stone and concrete, measuring 620 by 513 feet (190 by 155 m) overall and seating 50,000 spectators. It was the scene of thousands of hand-to-hand combats between gladiators, of contests between men and animals, and of many larger combats, including mock naval engagements.

It was damaged by lightning and earthquakes in medieval times and, even more severely, by vandalism; all the marble seats and decorative materials have disappeared.

Colossians, The Letter of Paul to the, also called THE EPISTLE OF ST. PAUL THE APOSTLE TO THE COLOSSIANS, New Testament writing addressed to Christians at Colossae, Asia Minor, whose congregation was founded by Paul's colleague Epaphras. The developed theology of the letter, many believe, indicates that it was composed by Paul in Rome about AD 62 rather than during an earlier imprisonment. Some question Pauline authorship on the basis of vocabulary.

The Colossians were apparently adopting views and practices that were incompatible with "the knowledge of God's mystery, of Christ, in whom are hid all the treasures of wisdom and knowledge" (2:2–3). Though there are references to such things as philosophy and empty deceit (2:8), Jewish-like practices (2:16), visions (2:18), and "rigour of devotion and self-abasement and severity to the body" (2:23), the source of these teachings is not quite clear. The author strives to curb such tendencies by recalling the preeminence of Christ in everything (1:18), because he is "the image of the invisible God" (1:15), who reconciled man to God "by the blood of his cross" (1:20). Paul then exhorts the Christian community to put away anger, malice, and foul talk and to show kindness, meekness, patience, forgiveness, and love in imitation of Christ. Every Christian, according to his state in life, should fulfill his duties.

colossus, statue that is considerably larger than life-size. They are known from ancient Egypt, Mesopotamia, India, China, and Japan. The Egyptian sphinx (*c.* 2550 BC) that survives at al-Jizah, for example, is 240 feet (73 m) long; and the "Daibutsu" (Great Buddha; AD 1252) at Kamakura, Japan, is 37 feet (11.4 m) high.

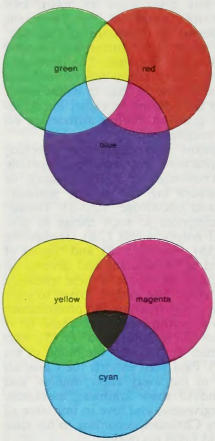
The ancient Greeks made a number of colossuses, such as the archaic Apollo of Delos and Phidias' chryselephantine (gold and ivory) figure of Athena Parthenos. Chares' statue of Helios in Rhodes was considered one of the Seven Wonders of the World. More than 100 feet (30 m) high, it took 12 years to complete. The Romans also erected large statues; Pliny reports, for example, that Zenodorus made a 106-foot (32-metre) colossus of Nero.

Colossal sculpture continued through the European Middle Ages and the Renaissance, as evidenced by the "St. Christopher" at Notre-Dame de Paris (28 feet [8.5 m]) and Michelangelo's "David" (Accademia, Florence). Among the many modern examples are the "Christ of the Andes," between Argentina and Chile, (26 feet [7.9 m] high), and the Statue of Liberty in New York Harbor (about 305 feet [93 m] high).

colostomy, the surgical formation of an artificial anus by making an opening from the colon through the abdominal wall. A colostomy may be made in order to decompress an obstructed colon; to divert the fecal stream when resectioning an inflammatory, obstructive, or perforated lesion or after traumatic injury; to replace the anus as the distal opening of the gastrointestinal tract when the distal colon or rectum is removed; and to protect internal healing. Colostomies may be temporary or permanent. A sigmoid colostomy, which is the most common type of permanent colostomy, requires no appliances (although a light pouch is sometimes worn for reassurance) and allows an individual to lead a life that is in every way normal except for the route of fecal evacuation.

colour, also spelled COLOR, defined generally, the aspect of any object that may be described in terms of hue, lightness, and saturation. In

physics, colour is associated specifically with electromagnetic radiation of a certain range of wavelengths visible to the human eye. Radia-



(Top) Additive and (bottom) subtractive methods of colour combination

tion of such wavelengths comprises that portion of the electromagnetic spectrum known as the visible spectrum—*i.e.*, light.

A brief treatment of colour follows. For full treatment, *see* MACROPAEDIA: Colour.

Major regions of the visible spectrum are seen as different colours by the eye, so that the spectrum appears as a band of colours ranging from red at the long wave end, through orange, yellow, green, blue, and indigo, to violet at the short wave end. Sir Isaac Newton investigated this sequence of colours in a series of experiments on white light in the mid-1660s and made a classification of seven elemental colours in a prototype of the modern colour wheel.

Three characteristics that are commonly used to distinguish one colour from another are hue, saturation, and brightness. Hue is an attribute associated with each of the dominant wavelengths of the spectrum. Saturation pertains to relative purity, or the amount of white light mixed with a hue. High-saturation colours contain little or no white light. Brightness refers to intensity, distinguished by the degree of shading. Hue and saturation, taken together, are called chromaticity. Accordingly, a colour may be characterized by its chromaticity and brightness.

Many ways of specifying and classifying colour have been devised since Newton's invention of the colour wheel. Among the most significant is the Munsell colour system (*q.v.*) developed in 1913 by Albert H. Munsell of the United States. This system defines and arranges colours on the basis of hue, value, and chroma, characteristics that correspond respectively to dominant wavelength, brightness, and purity. Another widely consulted colour system was devised a few years later by Wilhelm Ostwald, a German chemist. Ostwald's method designates colours in terms of purity, whiteness, and blackness. The most widely used system of colorimetry is that adopted in 1931 by the Commission Internationale de l'Éclairage (CIE), commonly called the International Commission on Illumination. The CIE system, revised in 1964, employs three values that correspond to red, green, and blue as basic reference points, designating them as the three primary colours from which all other colours are derived. Any desired hue can be produced when various amounts of two of the primaries are mechanically combined either by addition or by subtraction. Addition involves mixing parts of the spectrum, whereas subtraction entails the removal or absorption of spectral components.

Colours are said to be complementary if they form white when they are combined additively or black when mixed subtractively. The figure shows red, green, and blue-violet primaries mixed additively, and cyan (minus red), magenta (minus green), and yellow (minus blue) primaries mixed subtractively. It is apparent that the complement of any colour is the mixture of the other two in the triad.

colour blindness, inability to distinguish one or more of the three colours red, green, and blue. (Ability to see colour exists in only a few vertebrates, including, among others, man and the other primates, fish, amphibians, some reptiles, and some birds; and in bees and butterflies.) In the retina, the light-sensitive layer of tissue that lines the back and sides of the eyeball, there are, in human beings, three types of cones, the visual cells that function in the perception of colour. One type absorbs light best in wavelengths of blue-violet and another in the wavelengths of green. The third type is most sensitive to wavelengths of yellow but is also sensitive to red.

Colour-blind persons may be blind to one, two, or all of the colours red, green, and blue. (Blindness to red is called protanopia; to green, deuteranopia; and to blue, tritanopia.) Red-blind persons are ordinarily unable to distinguish between red and green, while blue-blind persons cannot distinguish between blue and yellow. Green-blind persons are unable to see the green part of the spectrum.

Colour blindness, which affects about 20 times as many males as females, is a sex-linked recessive characteristic. A woman must inherit the trait from both parents to be colour-blind. A colour-blind man and a woman of normal colour vision have daughters who have normal colour vision but are carriers of the trait—that is, the daughters may have colour-blind sons and daughters who are carriers. The sons of a colour-blind man and a woman with normal vision themselves have normal vision and are unable to pass the colour-blind trait on to offspring. The son of a normal man and a carrier woman may be colour-blind, and the daughter of such a union may be a carrier. Thus, colour blindness tends to skip generations.

colour centre, defect in the regular spacing of atoms within a solid that absorbs visible light of a particular colour or infrared or ultraviolet radiation. Each colour centre involves the absence of an atom from the place it would normally occupy in the solid and the relation of an electron with such an empty place, or vacancy (*q.v.*). Solids without colour centres may still have colour if impurity atoms or other structures that absorb light are present.

There are many types of colour centres. The best understood one, called an F-centre (German *Farbe,* "colour"), results from the absence of a negatively charged ion from a particular point in an ionic solid. This vacancy attracts and traps an electron, which combination constitutes an F-centre. The electron so trapped can absorb only certain colours of light. F-centres in sodium chloride absorb only blue light, giving the solid a yellow-orange tinge. Sodium chloride is usually colourless, however, because its electrons are not free to move to vacancies formed by removal of negative chloride ions from the solid. X-rays striking the solid, for example, may produce colour centres by freeing electrons.

Removal of an electron from an atom leaves an empty site, or hole, that may behave as a positively charged particle within the solid. A second type of colour centre, called a V-centre, corresponds to the entrapment of such a hole by a positive ion vacancy or by a combination of two negative ions. V-centres, which are less well understood than F-centres, disappear after a short time in solids at room temperature.

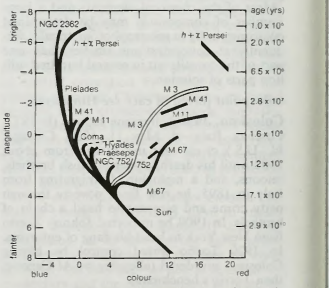
colour index, in igneous petrology, the sum of the volume percentages of the coloured, or dark, minerals contained by the rock. Volume percentages, accurate to within 1 percent, can be estimated under the microscope by using a point-counting technique over a plane section of the rock; volumes also can be approximated visually in hand specimens in the field.

As originally presented, the terms felsic and mafic were used in a broadly descriptive sense to indicate the relative abundances of light-coloured and dark-coloured minerals, respectively, in an igneous rock. The most common light-coloured minerals are the feldspars, feldspathoids, and silica or quartz, giving the term felsic; other felsic minerals are corundum, zircon, muscovite, lepidolite, and calcite. The abundant dark-coloured minerals include olivine, pyroxene, amphibole, biotite, garnet, tourmaline, iron oxides, sulfides, and metals. Most minerals fall within these two broad groups.

Broadly speaking, mineral colour indicates the specific gravity of the mineral; minerals that are lighter in colour are also lighter in weight. Darker minerals typically contain more of the relatively heavy elements, notably iron, magnesium, and calcium.

colour index, in astronomy, the difference between two measurements of the magnitude (brightness on a logarithmic scale) of a star made at different wavelengths, the value found at the longer wavelength being subtracted from that found at the shorter. Usually the two wavelengths are the blue, measured from ordinary photographic plates that are most sensitive to blue light, and the visual, measured on photographic plates sensitized to yellow. The index is a measure of a star's colour, an indication of its temperature, and a fairly crude description of the distribution of its radiated energy through the electromagnetic spectrum. Hot, blue stars have negative colour indices, as they radiate most strongly and therefore have numerically lower magnitudes at short wavelengths, and those of cool, red stars are positive. The colour index of a star is increased by the passage of its light through interstellar matter; the amount by which it exceeds the normal value for its spectral type is called the colour excess. *See also* magnitude; UBV system.

colour–magnitude diagram, in astronomy, graph showing the relation between the ab-



Superposition of colour-luminosity arrays of several galactic clusters and of one globular cluster (M3)

From Otto Struve, *Elementary Astronomy*, copyright © 1959 by Oxford University Press, Inc.; reprinted by permission

solute magnitudes (brightnesses) of stars and their colours, which are closely related to their temperatures and spectral types. It is similar to the Hertzsprung-Russell diagram except that the latter plots spectral types instead of colours and is therefore restricted in its use to relatively nearby stars for which reliable spectra can be obtained.

colour music, music intended for instrumental performance in conjunction with a simultaneous projection of changing colours onto a screen. It has its origins in the theory, prevalent in the Renaissance and systematically set forth by the 17th-century Jesuit music theorist and mathematician Athanasius Kircher (1602–80), that each musical sound has a necessary, objective correspondence to a certain colour. From the 18th to the 20th century, experiments were made by adapting various keyboard instruments in such a way that when a key was depressed it would, in addition to producing a sound, raise a coloured tape or glass through which light was projected on a screen. Several modern composers, notably Arnold Schoenberg and Aleksandr Scriabin, were attracted by the idea and produced examples of colour music.

colour printing, process whereby illustrative material is reproduced in colour on the printed page. The four-colour process is used to produce a complete range of colours. In this process, the material to be reproduced is separated into three basic colours plus black, which is used for density and image contrast. The basic colours are cyan, a combination of blue and green; magenta, a combination of red and blue; and yellow, a combination of red and green. Many ink makers and printers call cyan "process blue," magenta "process red," and yellow "process yellow."

After colour separation in the photoengraving or offset-platemaking process, a separate printing plate is made for each of the four colours. When printed in the proper colour (using transparent ink so that overlapping colours appear to blend) and properly registered (exactly positioned with relation to each other), these four plates can accurately reproduce the colours and shadings of original material. In most printmaking processes, illustrations for colour printing must first be subjected to the halftone process (*q.v.*) in order to render tonal gradations; this may be done either in the same step as the colour separation or separately. Some printing processes—such as conventional gravure and collotype—can print varying densities of ink without use of halftones.

Four-colour printing on a two-colour flatbed press requires that a sheet be passed through the press twice. A sheet-fed rotary press and a web-fed rotary press, the latter of which is fed a continuous length of paper unwinding from a roll, can print four colours in a single pass of the paper, depending on design.

colour vision, ability to distinguish among various wavelengths of light waves and to perceive the differences as differences in hue. The normal human eye can discriminate among hundreds of such bands of wavelengths as they are received by the sensory cells (cones) of the retina. There are three types of cones, each of which contains a distinctive type of pigment; one cone absorbs red light, another green, and the third type blue-violet. A given colour stimulates all three types of receptors with varying effectiveness; the pattern of these responses determines the colour perceived. In 1986 researchers identified the genes that correspond to the red, green, and blue pigments.

Coloured, formerly CAPE COLOURED, in South African society, a person of mixed white and African (black) or Malay (East Indian) descent. Under the apartheid system, Coloured was a formal government census classification for the largest group of racially mixed South Africans. The Coloureds live mostly in Cape Town, its suburbs, and rural areas of Western Cape province. Significant numbers of Coloureds also live in Port Elizabeth and elsewhere in Eastern province and in Northern Cape province. They originated primarily from illicit unions between men of higher and women of lower social groups, for instance, between white men and slave women and between slave men and Khoikhoi (Hottentot) or San (Bushman) women. The slaves were from Madagascar, the Malayan archipelago, Sri Lanka (Ceylon), and India. The black element traditionally has been small.

Under the apartheid social system, the Coloureds held a status intermediate between that of whites and blacks. They speak Afrikaans and English, are Christians, live in a European manner, and regard themselves as affiliated to the whites. Those living outside the towns are mostly labourers on white-owned farms. In the ports of Cape Town and Port Elizabeth, they are teachers and salaried employees; shopkeepers, artisans, and other skilled workers; and casual labourers and factory workers. There is a Muslim minority, the so-called Cape Malays, who live mostly in separate communities and marry among themselves for religious reasons.

During the period of white rule, the Coloureds developed a strong sense of community as a consequence of the whites' refusal to accept them as equals and their own refusal to be classed socially with the blacks. Until World War II there had been considerable intermarriage between lighter-skinned Coloureds and whites, and many Coloureds were absorbed into the white community. After the adoption in 1948 of the policy of apartheid, however, there was more rigid separation of occupation, the Coloureds' voting rights in Cape Province were abolished, and intermarriage and sexual relations with other racial groups were (until 1985) prohibited. Socially, the Coloureds tended to be grouped more and more with the black community as nonwhite. All restrictions on the Coloureds were abolished in the 1990s as the apartheid system was dismantled.

colourpoint (breed of cat): *see* Himalayan.

Colt, Samuel (b. July 19, 1814, Hartford, Conn., U.S.—d. Jan. 10, 1862, Hartford), American firearms manufacturer who popularized the revolver.

When Colt was a young seaman, he carved a wooden model of a revolver, and years later he perfected a working version that was patented in England and France in 1835 and in the United States the following year. Featuring a cartridge cylinder that was rotated by cocking the hammer, Colt's single-barreled pistols and rifles were slow to gain acceptance, and a company that formed to manufacture them in Paterson, N.J., failed in 1842. The following year he devised an electrically discharged naval mine, the first device using a remotely controlled explosive, and he also conducted a telegraph business that utilized the first underwater cable.

Word from military units that Colt's multishot weapons had been effective against Indians in Florida and Texas prompted a government order for 1,000 pistols during the Mexican War, and Colt resumed firearms manufacture in 1847. In 1855 he built the world's largest private armoury on the site of the present Colt Industries plant in Hartford. Assisted by Eli Whitney, Jr., he developed beyond any industrialist before him the manufacture of interchangeable parts and the production line, and he also applied progressive ideas concerning employee welfare. His invention made him a wealthy man. His firm produced the pistols most widely used during the American Civil War, and its six-shot, single-action .45-calibre Peacemaker model, introduced in 1873, became the most famous sidearm of the West.

Colter, John (b. *c.* 1775, in or near Staunton, Va. [U.S.]—d. 1813 [in present-day Missouri, U.S.]), American trapper-explorer, the first white man to have seen and described (1807) what is now Yellowstone National Park.

Colter was a member of Lewis and Clark's company from 1803 to 1806. In 1807 he joined Manuel Lisa's trapping party, and it was Lisa who sent him on a mission to the Crow and other Indian tribes that led Colter to travel alone to the Yellowstone area. In three expeditions to the Three Forks area (head of the Missouri River) in 1808–10, he narrowly escaped with his life in battles involving warring Indian tribes. After the third incident he retired to a farm on the Missouri.

Colton, Gardner Quincy (b. Feb. 7, 1814, Georgia, Vt., U.S.—d. Aug. 9, 1898, Rotterdam, Neth.), American anesthetist and inventor who was among the first to utilize the anesthetic properties of nitrous oxide in medical practice. After a dentist suggested the use of the gas as an anesthetic, Colton safely used it in extracting thousands of teeth.

As he was studying medicine in New York (without taking a degree), Colton learned that the inhalation of nitrous oxide, or laughing gas, produced exhilaration. After a public demonstration of its effects in New York City proved to be a financial success, he began a lecture tour of other cities. On Dec. 10, 1844, at a Hartford, Conn., demonstration, Horace Wells, a dentist, asked Colton to extract one of his teeth while he was under the effects of the gas. Wells began using the gas in his dental practice and later made a controversial claim that he was the first to make practical use of the gas as an anesthetic, which Colton was always careful to acknowledge. Meeting at another lecture in 1863 in New Haven, Conn., J.H. Smith, a dentist, and Colton extracted more than a thousand teeth in less than a month while using the anesthetic.

Colton, with John Allen, established the Colton Dental Association, which was an immensely successful painless tooth-extraction service. The New York City-based organization opened branch offices in six other cities.

In addition to his work with anesthesia, Colton invented an electric motor, which was exhibited in 1847. After moving to California during the Gold Rush days, he practiced medicine there for a short time and was then appointed a justice of the peace in San Francisco.

Coltrane, John, in full JOHN WILLIAM COLTRANE (b. Sept. 23, 1926, Hamlet, N.C., U.S.—d. July 17, 1967, Huntington, N.Y.), American jazz saxophonist, bandleader, and composer who exerted an influence on the jazz of the 1960s and '70s that was at least as strong as Charlie Parker's had been in the 1940s and '50s.

After growing up in Philadelphia, Coltrane worked with Eddie Vinson, Dizzy Gillespie, Earl Bostic, and Johnny Hodges and then came to wide attention by recording with Miles Davis intermittently from 1955 to 1960 and briefly with Thelonious Monk in 1957. During those years Coltrane's tone on the tenor saxophone was huge and dark, with clear definition and full body, even in the high register and with the split-note multiphonics that became his trademark. The cascade of notes during his powerful solos showed his infatuation with chord progressions, culminating in the virtuoso performance of his difficult "Giant Steps."

In the early 1960s Coltrane focused on mode-based improvisation in which solos were played atop one- or two-note accompanying figures that were repeated for extended periods of time (typified in his recordings of the Rodgers and Hammerstein "My Favorite

Things"). From 1960 to 1965 he performed with his own highly acclaimed quartet, featuring drummer Elvin Jones, pianist McCoy Tyner, and bassist Jimmy Garrison. At the same time, his study of the native musics of India and Africa was ultimately expressed on the instrument Coltrane popularized—the soprano saxophone. These influences, combined with a unique interplay with the drums and the steady vamping of the piano and bass, made the Coltrane quartet among the most influential combos of the 1960s.

The short period between 1965 and Coltrane's death saw the dissolution of his quartet, but it also marked the expansion in his work of a free, collective improvisation based on prearranged scales clustered around tonal centres. Coltrane's wife Alice (also a jazz



Coltrane, *c.* 1966
By courtesy of *down beat* magazine

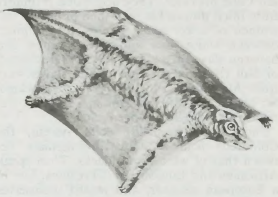
musician and composer) played the piano in his band during the last years of his life. This period is best represented in his albums *Ascension* and *Meditations.*

BIBLIOGRAPHY. Biographies include J.C. Thomas, *Chasin' the Trane: The Music and Mystique of John Coltrane* (1975), with a discography; Cuthbert Ormond Simpkins, *Coltrane* (1975, reissued 1989); and Bill Cole, *John Coltrane* (1976), interweaving his life-style and his music.

colubrid, any member of the most common family of snakes, Colubridae, characterized by complete absence of hindlimbs, absence of the left lung, and lack of teeth on the premaxilla and usually having a loose facial structure, relatively few head scales, and ventral scales as wide as the body. There are more than 1,500 species, accounting for two-thirds or more of the world's snakes. Most have solid and conical teeth; some have grooved fangs at the rear of the upper jaw and venom, usually of a paralyzing kind. Because of the position of the fangs and the small size of the mouth, a bite unaccompanied by chewing is rarely harmful to humans. In a few species the fangs are approximately under the eye, and these may be capable of a single effective bite.

Most colubrids lay eggs, but some (especially the aquatic forms) are live-bearing. Colubrids occur in virtually all habitats and are the only snakes represented in cold regions.

colugo, also called COBEGO, or FLYING LEMUR, any of the lemurlike gliding mammals, perhaps only two species, constituting the primitive order Dermoptera. They are found only in the East Indies and certain of the Philippine Islands. Colugos resemble large flying squirrels, being arboreal climbers and gliders with lateral skin membranes and large feet, webbed and clawed. The form of the



Colugo (*Cynocephalus volans*)
Painting by Richard Ellis

head and the nocturnal habit, however, recall the lemurs, hence the colugos are sometimes called flying lemurs. The tail is short and connected by skin folds with the hind limbs, as in bats. Most peculiar are the teeth, 34 in number. The lower incisors stick out in a comblike structure formed of enamel folds; the second upper incisors are similar to canines and are double-rooted. Canines are absent in the upper jaw. Cheek teeth, premolars and molars, bear sharp cusps. The digestive tract exhibits features that are consonant with a strict vegetarian diet.

Besides the Philippine species, *Cynocephalus volans,* a series of races of *Cynocephalus* (or *Galeopterus*) *variegatus* ranges from Myanmar (Burma) to the Malay Peninsula and from Sumatra to Borneo. Colugos were formerly considered a suborder of the Insectivora but differ from them and from other mammals in several basic anatomical features, especially in the form of the brain and in the dentition.

Colum, Padraic (b. Dec. 8, 1881, Longford, County Longford, Ire.—d. Jan. 11, 1972, Enfield, Conn., U.S.), Irish-born American poet whose lyrics capture the traditions and folklore of rural Ireland.

Influenced by the literary activity of the Celtic revival centred in Dublin at the turn of the century, Colum published the collection of poetry *Wild Earth* (1907). He cofounded *The Irish Review* in 1911, then three years later settled permanently in the United States. Colum's varied literary output includes volumes of poetry, *e.g., Dramatic Legends* (1922)



Colum, pencil sketch by Robert Gregory; in the National Gallery of Ireland, Dublin
By courtesy of the National Gallery of Ireland, Dublin

and *Creatures* (1927); plays, such as *Broken Soil* (first performed 1903); novels; anthologies of folklore; and children's books. The reminiscence *Our Friend James Joyce* (1959) was written with his wife Mary (1887?–1957), a well-known literary critic.

Columba, SAINT, also called COLUM, or COLUMCILLE (b. *c.* 521, Tyrconnell [now County Donegal, Ire.]—d. June 8/9, 597, Iona [Inner Hebrides, Scot.]; feast day June 9), abbot and missionary traditionally credited with the main role in the conversion of Scotland to Christianity.

Columba studied under Saints Finnian of Moville and Finnian of Clonard and was ordained priest about 551. He founded churches and the famous monasteries Daire Calgaich, in Derry, and Dair-magh, in Durrow.

Columba and his 12 disciples erected a church and a monastery on the island of Iona (*c.* 563) as their springboard for the conversion of Scotland. It was regarded as the mother house and its abbots as the chief ecclesiastical rulers even of the bishops. Columba gave formal benediction and inauguration to Aidan MacGabrain of Dunadd as king of Dalriada.

Columba accompanied Aidan to Ireland (575) and took a leading part in a council held at Druim Cetta, which determined the position of the ruler of Dalriada in relation to the king of Ireland. The last years of Columba's life appear to have been spent mainly in Iona, where he was already revered as a saint. He and his associates and successors spread the gospel more than any other contemporary group of religious pioneers in Britain.

Three Latin hymns may be attributed to Columba with some degree of certainty. Excavations in 1958 and 1959 revealed Columba's living cell and the outline of the original monastery.

BIBLIOGRAPHY. The principal source for the life of Columba is that written by St. Adamnan, ninth abbot of Iona, in the 7th century, *Adomnan's Life of Columba,* ed. and trans. by Alan Orr Anderson and Marjorie Ogilvie Anderson (1961).

Columban, SAINT, Latin COLUMBANUS (b. *c.* 543, Leinster [Ireland]—d. Nov. 23, 615, Bobbio [Italy]; feast day November 21), abbot and writer, one of the greatest missionaries of the Celtic church, who initiated a revival of spirituality on the European continent.

Educated in the monastery of Bangor, County Down, Columban left Ireland about 590 with 12 monks (including Saints Attala, Gall, and Columbanus the Younger) and established himself in the Vosges Mountains at Annegray, then in Gaul. For the disciples who came to follow his rule, Columban built the nearby monasteries of Luxovium and Fontaines.

Unpopular because of his attacks on degeneracy in the Burgundian court and among local clergy, he was indicted before a synod of French bishops (603) for keeping Easter according to the Celtic usage, whereupon he wrote Pope Gregory I for aid. A powerful conspiracy was organized against him at the court of King Theodoric II. Forcibly removed from his monastery at Luxovium (610), he went with Gall and other monks to Switzerland, where he preached to the Alemanni, a pagan Germanic people. Compelled to leave, he went to Italy and founded the monastery of Bobbio (*c.* 612–614).

Columban's works include poems, letters, sermons, a rule, and a penitential, proving him a man of learning acquainted with Latin and Greek classics; his writings were edited by G.S.M. Walker, with an introduction and English translation (1957).

columbarium, sepulchral building containing many small niches for cinerary urns. The term is derived from the Latin *columba* ("dove," or "pigeon"), and it originally referred to a pigeon house or dovecote. It later acquired its more common meaning by association.

Columbaria were common during the early Roman Empire, when cremation was normal practice. They were usually erected and supervised by funeral societies to which most of the lower and middle classes in Rome belonged. Originating as variants of traditional Etruscan and republican Roman house tombs, columbaria were ordinarily rectangular brick structures built around an open court, the walls of which contained niches for the urns. Some columbaria were very elaborate, and their

numerous inscriptions, stucco paintings, and mosaics provide information about the otherwise almost totally forgotten life of the lower classes in antiquity. Perhaps the best examples of columbaria are those in the great necropolis discovered in 1915 beneath the Basilica of San Sebastiano in Rome.

When in Hadrian's time (AD 117–138) inhumation replaced cremation, columbaria became obsolete. They did not reappear until the 20th-century revival of cremation.

Columbia, planned community, a new concept in city planning, in Howard county, Maryland, U.S. It lies at the intersection of routes U.S. 29 and Md. 175, between Baltimore (northeast) and Washington, D.C. The community includes a planned complex of scattered villages and a town centre with schools, churches, shopping centres, recreational facilities, and business and industrial parks. Columbia's Merriweather-Post Pavilion is the summer home of the Baltimore Symphony Orchestra and a focus of cultural events. Howard Community College was opened in Columbia in 1970. Pop. (1990) 75,883.

Columbia, city, seat (1817) of Marion county, southern Mississippi, U.S. It lies along the Pearl River, 75 miles (121 km) south-southeast of Jackson. The site was settled as a river port in the early 1800s, and for three months in 1821 it served as the state capital. It thrived as a lumber town until 1929, when its sawmill shut down. New industry (clothing, hosiery, canned goods, naval stores) subsequently developed. A pioneer home 9 miles (14 km) south of the city was the site of the Pearl River Convention (1816), which petitioned for Mississippi's admission to the Union. Inc. 1882. Pop. (1990) 6,815.

Columbia, city, seat of Boone county, near the Missouri River, central Missouri, U.S. It was originally established (1819) as Smithton, but an inadequate water supply forced its move in 1821, when it was laid out and renamed Columbia. The rerouting of Boone's Lick Trail (1822) stimulated its growth. In 1839 the town's residents pledged $117,900 for the location in their city of a state university (now the University of Missouri), the first west of the Mississippi River. Stephens College for women was founded in the town in 1833, and Columbia College in 1851. Schools, professional associations, and insurance companies are now the main economic support, with some light manufacturing. A state cancer hospital and a mental-health clinic are also in the city. Inc. 1826. Pop. (1990) city, 69,101; Columbia MSA, 112,379.

Columbia, borough, Lancaster county, southeastern Pennsylvania, U.S. It lies along the Susquehanna River, 12 miles (19 km) west of Lancaster. The site was settled (1726) by John Wright, a Quaker missionary to the Indians, who remained to become a ferryman, landowner, and judge. Known as Wright's Ferry, the town was laid out in 1788 by Wright's grandson, Samuel, and was named Columbia shortly thereafter. It was one of the places considered (1790) by Congress for the site of the permanent U.S. capital. Columbia was important as the terminus of a railway from Philadelphia, and it reshipped goods by canal to the Juniata River. Escaped slaves knew it as a station on the Underground Railroad. Columbia's manufactures include clothing, glass, and malleable castings. Inc. 1814. Pop. (1990) 10,701.

Columbia, city, capital of South Carolina, U.S., and seat (1799) of Richland county. It lies in the centre of the state on the east bank of the Congaree River at the confluence of the Broad and Saluda rivers. Its history dates from 1786, when the legislature ordered a town laid out on the site to replace Charleston as the state capital—a compromise move designed to placate antagonism mainly between the small farmers of the Up Country and the Low Country (*i.e.,* coastal) plantation owners.

During the American Civil War, Columbia was a transportation centre and the seat of many Confederate agencies. In 1865 it was occupied by Union troops and virtually destroyed by fire. Bronze stars on the south and west walls of the State House mark spots where shells from General William Tecumseh Sherman's Union artillery struck. After the war the city was rebuilt and developed a diversified economy based on government, industry, and agriculture. It became a wholesale and distribution centre. Cotton, peaches, and tobacco are important crops in the surrounding area. The city's chief manufactures include synthetic fibres, textiles, structural steel, and aerospace products.

Columbia is a noted educational centre and is the seat of the University of South Carolina (opened as a college in 1805), Columbia College (1854; Methodist), Columbia Bible College (1928), Lutheran Theological Southern Seminary (1830), Benedict College (1870; Baptist), Allen University (1880; Methodist), and Midlands Technical College (1963). The Town Theatre, Columbia's little-theatre organization, has operated continuously since 1919. The Columbia Museum of Art and Science houses a collection of Italian Renaissance paintings. Points of historic interest include



Robert Mills Historic House, Columbia, S.C.
© Katherine J. Trimnal, Columbia, S.C.

President Woodrow Wilson's boyhood home (a museum since 1930) and the Robert Mills Historic House and Park (including Ainsley Hall Mansion, 1823), designed by Mills, who also designed the Washington Monument in Washington, D.C. The State House, or capitol (begun 1855), is a gray granite structure built in Italian Renaissance style.

Columbia is the headquarters for the Francis Marion and Sumter national forests. Fort Jackson, established during World War I, is now an infantry training post. Lake Murray, impounded by the Saluda Dam, is northeast of the city. Inc. village, 1805; city, 1854. Pop. (1990) city, 98,052; Columbia MSA, 453,331.

Columbia, city, seat (1807) of Maury county, central Tennessee, U.S. It lies along the Duck River, 43 miles (69 km) southwest of Nashville. Founded in 1807, it developed as a centre for the dairy and livestock (mainly mules) trade in a region of fertile farmland and bluegrass. James K. Polk, 11th U.S. president, moved to Columbia as a child from North Carolina; he began his law practice there in 1820, and his home near Court Square is now a historic site. During the American Civil War the city was the Confederate general Nathan Bedford Forrest's operations base, and it was occupied alternately by Federal and Confederate troops. The city's economic base shifted after 1890 with the exploitation of local phosphate deposits. Its manufactures now include phosphorus and phosphate chemicals, carbon and graphite electrodes, air conditioners, clothing, and cellulose sponges. Columbia State Community College opened in the city in 1967. An annual local event is the National Tennessee Walking Horse Jubilee. Inc. town, 1807; city, 1822. Pop. (1990) 28,583.

Columbia Broadcasting System: *see* CBS Inc.

Columbia Encyclopedia, in full THE NEW COLUMBIA ENCYCLOPEDIA, highly regarded one-volume encyclopaedia, international in scope and useful for quick location of accurate information. It is published in New York City.

First published in 1935 and continuing its indirect but important relationship with Columbia University, the encyclopaedia underwent major revisions in 1950 and 1963. The fourth edition (1975), with the present title, met a crucial need for full revision and is current through 1974. It is alphabetically arranged and elaborately cross-referenced and covers 7,000 subjects. There are 50,000 entries, with maps and line drawings interspersed throughout. Almost one-third of the articles are geographic, with coverage including all countries of the world. Forty-five percent of the entries are biographical, covering persons both living and dead, with an emphasis on political leaders. Remaining entries include useful articles on basic scientific subjects and historical aspects of such topics as the Supreme Court, housing, academic freedom, and maritime law.

Columbia Icefield, largest ice field in the Rocky Mountains, astride the British Columbia–Alberta border, Canada. Lying partially within Jasper National Park, it is one of the most accessible expanses of glacial ice in North America. It forms a high-elevation ice cap on a flat-lying plateau that has been severely truncated by erosion to form a huge massif. The glacial area extends between the summits of Mount Columbia (12,294 feet [3,747 m]) on the west and Mount Athabasca (11,452 feet [3,491 m]) on the east.

The eastern side of the ice field is reached by paved highway from Banff, 100 miles (160 km) south, and from Calgary, another 80 miles (130 km) away to the southeast. Although the ice field embraces some 200 square miles (500 square km) of glacial ice extending from its summit plateau to the termini of a dozen outlet glaciers, it is relatively small compared with such vast ice fields of the Alaska-Canada border region as the Juneau Icefield, near Alaska's capital city, Juneau, and the ice sheets of the northeastern Arctic on Ellesmere Island and Greenland.

General description. From the highway, the plateau section of the ice field may be seen on the skyline at the head of Athabasca Glacier, with parts visible as ice cliffs on Snow Dome, Mount Kitchener, and Mount Stutfield. The Athabasca and Saskatchewan glaciers are the two main outlet ice tongues on the north and east.

The ice field has been called "the mother of rivers," because its main accumulation, or nourishment, zone (névé) lies on the Continental Divide. The meltwaters from Athabasca Glacier flow by way of the Athabasca River into Lake Athabasca in northeastern Alberta and thence by the Slave River and Great Slave Lake to the Mackenzie River and on northward through Yukon Territory, a distance of some 2,500 miles (4,000 km), into the Arctic Ocean.

Waters from the Saskatchewan Glacier drain down the Saskatchewan River and pass eastward across the provinces of Alberta, Saskatchewan, and Manitoba for a distance

of some 1,600 miles (2,600 km) into Hudson Bay, an extension of the Atlantic. Glacial drainage from the ice field's northwestern rim courses down the Fraser and Columbia rivers into the Pacific Ocean; the Columbia flows a sinuous 1,240 miles (2,000 km) to its outlet between Oregon and Washington.

The main glacial surface drops off steeply into deep canyons, with the lower glaciers in places riven by crevasses as much as 100 feet (30 m) deep. In the fringing valley region, there are lakes and thick, low-level forests. The gentle configuration of the largest valley glaciers makes it possible for hikers and climbers to reach the crestal zone without extreme difficulty. The average elevation of the summit ice cap is close to 10,000 feet (3,000 m). Ice depths in this highest section are estimated, from surface gradients, to be little more than 420 feet (130 m).

Scientific study. Since the early 1950s, research has been particularly concentrated on the Athabasca and Saskatchewan glaciers. The Athabasca Glacier has a total area of about 11.5 square miles (30 square km). Investigations of its terminal moraines have yielded information typical of most glaciers in the Canadian Rockies, especially with respect to volume fluctuations related to climatic change over the past few centuries. Historical records, mapping, and photographic information date back only to 1897, but tree-ring studies near the ice fronts have provided information that extends back several centuries. It is known that a major ice advance culminated on the Athabasca Glacier about 1715; its terminus was more advanced then than any time in at least the preceding 350 years.

The ice receded after the 1715 advance. By the beginning of the 19th century, a readvance was under way, reaching another maximum position about 1840 that was almost as extensive as the earlier one. Then, changing climatic conditions forced another downwasting of the lower ice-field zone and reduced snow accumulation on its névé. The ensuing retreat of the Athabasca Glacier has continued except for brief standstills. The total amount of ice-front recession from the mid-19th to the late 20th century has been about 1 mile (1.6 km). There are indications of a present reduction in downwasting, possibly heralding another thickening and readvance in the 21st century.

The Saskatchewan Glacier, with an area of 23 square miles (60 square km), is the largest on the Columbia Icefield. Unlike the Athabasca Glacier, it cannot be seen from the highway. A more gently rising surface from the terminus, however, provides easier access to the ice field's higher zone. Ice depths in this glacier have been measured to 1,450 feet (442 m). Its velocity of flow, accumulation, and ablation (loss) are comparable to the Athabasca and other main distributary glaciers.

Research conducted on the ice field, in addition to movement and position surveys and photogrammetric mapping, includes detailed studies of internal structures, thermal measurements, investigations of subsurface water, geophysical research (seismic, gravity, electrical resistivity), sediment studies in terminal lakes, stream gauging of the outflowing rivers, and oxygen-isotope ratios obtained from ice samples at various depths to determine relative coolness and warmness of winters decades ago. Among the interesting findings has been the discovery of a large underground river system draining from beneath the ice field.

Columbia Mountains, range in southeastern British Columbia, Canada, that is bounded by the Rocky Mountain Trench (east), the Columbia River (south), the Interior Plateau (west), and the Fraser River (north). The Columbia Mountains parallel the Canadian Rockies, of which they are sometimes considered a western extension, for about 370 miles (600 km) in a northwesterly-southeasterly direction. The mountains comprise four distinct ranges (Cariboo, Monashee, Selkirk, and Purcell), each rising to over 10,000 feet (3,000 m). The Cariboo Mountains, separated from the others by the North Thompson River, form the northernmost extension of the system, while the southern part consists of the three parallel ranges of Monashee, Selkirk, and Purcell, which are divided by deep, lake-filled trenches. A major recreational area embracing both national and provincial parks, the Columbia Mountains are also a major source of gold, silver, copper, lead, and zinc.

Columbia Pictures Entertainment, Inc., American motion-picture studio that became a major Hollywood studio under its longtime president, Harry Cohn.

Columbia originated in 1920 when Cohn, Joe Brandt, and Harry's brother Jack Cohn founded the C.B.C. Sales Film Corporation to produce shorts and low-budget westerns and comedies. In an attempt to refurbish the studio's reputation, its name was changed to Columbia Pictures in 1924. Brandt was company president from 1924 to 1932, but Cohn was the driving force behind Columbia's rise to a position of equality with the other major Hollywood studios. Cohn served as president from 1932 until his death in 1958.

Columbia's breakthrough came after Harry Cohn hired Frank Capra in the late 1920s to direct the studio's comedies. In 1934 Capra made the hit *It Happened One Night,* starring Clark Gable and Claudette Colbert; it won the Academy Award for best picture of 1934. Capra's other comedies for Columbia include *Mr. Deeds Goes to Town* (1936) and *Mr. Smith Goes to Washington* (1939). During this same period, Howard Hawks and others made some of the finest screwball comedies of the 1930s for Columbia: *The Awful Truth* (1937), *Holiday* (1938), and *His Girl Friday* (1940), all starring Cary Grant.

After Capra's departure in 1939, Columbia languished because leading directors were reluctant to work for the notoriously hard-driving and vulgar Cohn. But in the 1950s Columbia regained its stature through its backing of various independent producers and directors, among them Elia Kazan, Fred Zinnemann, David Lean, Robert Rossen, Otto Preminger, and Joseph Losey. The result was such films as *All the King's Men* (1949), *Born Yesterday* (1950), *From Here to Eternity* (1953), *On the Waterfront* (1954), *The Caine Mutiny* (1954), *The Bridge on the River Kwai* (1957), *Lawrence of Arabia* (1962), *A Man for All Seasons* (1966), *Close Encounters of the Third Kind* (1977), *Tootsie* (1982), *Gandhi* (1982), and *The Last Emperor* (1987). Columbia also financed some of the better youth-oriented films from the late 1960s to the early 1980s, such as *Easy Rider* (1969), *Five Easy Pieces* (1970), *The Last Picture Show* (1971), and *The Big Chill* (1983).

Columbia was purchased by The Coca-Cola Company in 1982. That same year, Columbia helped launch a new motion-picture studio, Tri-Star Pictures, which was merged with Columbia in 1987 to form Columbia Pictures Entertainment, Inc. In 1989 Columbia was acquired by the Sony Corporation of Japan.

Columbia Plateau, also called COLUMBIA INTERMONTANE, geographic region, northwestern United States. It forms part of the intermontane plateaus and is bordered east by the Northern Rocky Mountains and west by the Sierra Nevada–Cascade region. The plateau covers an area of about 100,000 square miles (260,000 square km) in Washington, Oregon, and Idaho and is noted for its diverse landforms. It is uniformly covered with basaltic lava flows, but significant warping and faulting have caused elevations to range from 200 to 5,000 feet (60 to 1,500 m) above sea level. The climate is semiarid, and vegetation is limited mostly to shrubs and grasses. The Columbia and Snake rivers drain the region.

Columbia River, largest river in volume flowing into the Pacific Ocean from North America. It rises in the Canadian Rockies of British Columbia, flows through the east-central portion of the U.S. state of Washington, and, for 300 miles (480 km) to the Pacific at Astoria, Ore., forms the Washington-Oregon boundary.

A brief treatment of the Columbia River follows. For full treatment, *see* MACROPAEDIA: North America.

The Columbia River has a drainage basin of 258,000 square miles (668,000 square km) and a total length of 1,240 miles (2,000 km), comprising some 500 miles (800 km) in Canada and 740 miles (1,200 km) in the United States. Its major tributaries are the Kootenay, Snake, Pend Oreille, Spokane, Okanogan, Yakima, Cowlitz, and Willamette rivers. The Columbia is exceeded in discharge on the continent only by the Mississippi, St. Lawrence, and Mackenzie rivers. It is one of the world's greatest sources of hydroelectric power.

As the only water-level route to the interior, the Columbia River served as the major transportation artery in the Pacific Northwest until the coming of the railroads. The canoes and barges of the fur traders and early immigrants gave way to river steamers by the 1850s. But in 1887 the Northern Pacific Railway reached Tacoma, Wash., on the Puget Sound, directly over the Cascade Range, and the monopoly of the Columbia River route was ended. The abundance of salmon in the river was noted by the early explorers, and from the 1870s on, the Columbia supplied the world with millions of pounds of salmon annually. Modern dam construction and pollution have significantly reduced the salmon population and jeopardized the fishing industry.

The true development of the Columbia River main stem began in the 1930s with construction of the Grand Coulee and Bonneville dams by the U.S. government. Within 50 years, all but 80 feet (24 m) of the 1,290-foot (393-metre) fall of the river within the United States had been converted into a series of "stair steps" by a total of 11 dams. Grand Coulee Dam is the largest and most complex of the dams. The hydroelectric power plants along the Columbia River are the backbone of the power-generating network of the Pacific Northwest. The Columbia Basin Project is the region's largest single irrigation project.

Columbia River Treaty (Jan. 17, 1961), agreement between Canada and the United States to develop and share waterpower and storage facilities on the Columbia River. The treaty called for the United States to build Libby Dam in northern Montana and for Canada to build dams at three locations in British Columbia. Hydroelectric power was to be provided to four northwestern U.S. states and two southwestern Canadian provinces. The treaty, which affords mutual protection against irregular diversion of power by either country, was ratified by the United States on March 16, 1961, and by Canada on Sept. 16, 1964.

Columbia University, major institution of higher education in New York City. Founded in 1754 as King's College, it was renamed Columbia College when it reopened in 1784 after the American Revolution. It became Columbia University in 1912. Columbia College was the undergraduate liberal-arts school for men until 1983, when women began to be admitted. Barnard College, founded 1889 and part of the university since 1900, remains an undergraduate liberal-arts school for women only. Most courses are open to students of both colleges, and their cultural resources

are shared. Upon graduation, a Barnard student receives her degree from Columbia.

Shaped by the dynamic culture of New York City, Columbia has been less affected by tradition than other private Eastern universities of comparable age and esteem. From the outset it differed from other early colleges in its heavier emphasis on such subjects as nature study, commerce, history, government, and navigation. It has created numerous strong graduate and professional schools and various institutes for research and advanced study that have a cosmopolitan outlook. Its Teachers College, with the city for a laboratory, is one of the best known in the nation, and the College of Physicians and Surgeons, together with the Presbyterian Hospital and allied institutions, forms the nucleus of a great medical centre.

Columbian Exposition: *see* World's Columbian Exposition.

Columbidae, bird family (order Columbiformes) that comprises the pigeons and the doves. *See* dove; pigeon.

columbiform, any member of an order of birds (Columbiformes) that includes pigeons, doves, the extinct dodoes, and sandgrouse.

A brief treatment of columbiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

Pigeons and doves (family Columbidae) are distributed worldwide, with the exception of the polar regions and some oceanic islands. The terms pigeon and dove are interchangeable and imply no biological distinction. A few species have become extinct within the last few centuries. The best known of these is the passenger pigeon (*Ectopistes migratorius*) of North America. These gregarious birds traveled in flocks of hundreds of thousands and were shot indiscriminately during the 19th century; the last passenger pigeon died in the Cincinnati, Ohio, zoo in 1914. The dodo (*Raphus cucullatus*), a native of Mauritius, was exterminated by 1681, through the combined efforts of man and his domestic animals. The related solitaires on Réunion and Rodrigues islands (*Raphus solitarius* and *Pezophaps solitaria*, respectively) were extinct by 1791.

Sandgrouse are found in arid areas of Asia and Africa. The earliest known sandgrouse are from the Eocene Epoch in France (about 40 million years ago); they were members of the living genus *Pterocles*. The first pigeon in the fossil record is *Gerandia calcaria* from the Early Miocene Epoch (23.7 to 16.6 million years ago) in France.

The living members of the order are relatively short birds with small heads and long, pointed wings. Species adapted to ground feeding, such as the quail doves (*Gallicolumba*), tend to have longer legs and shorter, rounder wings than their more generalized relatives. Bill shape is related to diet. Slender bills are associated with seed eaters, whereas fruit eaters (such as *Treron*) have a bill that is larger and sharply hooked. The serrated edge of the large bill in the tooth-billed pigeon (*Didunculus strigirostris*) is used to rip leaves, fruits, and the like into small pieces before swallowing. The seed-eating pigeons typically have long intestines and powerful gizzards; the fruit eaters have shorter intestines and do not need strong gizzards. Pigeons have evolved the crop, a pouch on the esophagus, that serves as a storage organ for food, thereby allowing the Columbidae to live as efficient grazers.

A unique characteristic of the Columbidae is their production of crop milk, or pigeon's milk, a secretion used to feed the young. This nutritive substance is secreted from the crop wall (in the bird's gullet) when the hormone prolactin is secreted from the pituitary gland. This pigeon's milk has a composition quite similar to mammalian milk. Another characteristic limited to the Columbidae is their unbirdlike manner of drinking. All other birds take a sip of water and then raise their heads to swallow it; pigeons, however, suck up water using muscular contractions of the esophagus, in a mammal-like fashion. Sandgrouse are said to share this habit, but they must tip up the head to swallow.

The Australasian region supports a large number of species of fruit-eating pigeons, including the green fruit pigeons (*Treron*) and the fruit doves *Ptilinopus* and *Ducula*. Their success in this part of the world is probably enhanced by the absence of monkeys, which in Africa and South America compete for the niche of arboreal fruit-eater. Most of the fruit doves are at least partially green in colour.

In the breeding season males of most species set up a nesting territory, which is defended from other males of the same species. The territory is protected by threat displays, followed if necessary by attack. The male may attract a female to his territory, or he may just court the first female to enter his territory. After various displays, a pair bond forms and is strengthened as the two birds preen each other's head and neck feathers. Pigeons frequently nest several times a year, but no pigeon lays more than two eggs in any clutch, and many fruit doves lay only one; the sandgrouse lays three eggs in a depression in the ground.

Pigeons usually build simple twig nests, either in trees or on rock faces. Incubation and parenting is shared by the pair in many species. Crop milk secretion is stimulated by the process of incubation. The young, called squabs, are brooded continuously at first. The squab feeds by prompting the parent to regurgitate food when the squab inserts its bill into the corner of the parent's mouth. The squab obtains crop milk by poking its bill down the parent's throat.

Columbine, Italian COLOMBINA, stock theatrical character that originated about 1530 in Italian commedia dell'arte as a saucy and adroit servant girl; her Italian name means

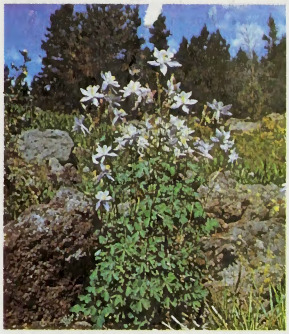


Columbine, etching by Maurice Sand, 1860

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman and Co. Ltd.

"Little Dove." Her costume included a cap and apron but seldom a commedia mask, and she usually spoke in the Tuscan dialect. In French theatre the character became a lady's maid and intrigant and assumed a variety of roles opposite Cassandre, Pantalone (Pantaloon), Harlequin, and Pierrot. In English comedies she was usually the daughter or ward of Pantaloon and in love with Harlequin. The soubrette of the 20th-century musical comedy is a version of the Columbine character.

columbine, any of approximately 70 species of perennial herbaceous plants constituting wi



Aquilegia caerulea, of the Rocky Mountains

Grant Heilman

the genus *Aquilegia* of the buttercup family (Ranunculaceae) native to Europe and North America. Several species of columbine and a number of hybrids are cultivated for their attractive flowers.

Columbines are distinctive for their five-petaled flowers that have long, backward-extending spurs as pouchlike extensions of the petals. Sepals and petals are brightly coloured. The leaflets of the compound leaves are usually rounded and notched.

The common European columbine (*A. vulgaris*) grows 45–75 cm (18–30 inches) tall along roadsides and woodland edges. The species and its several hybrids, which are known for their nodding flowers with short incurved spurs, are cultivated widely in North America. From *A. caerulea* and *A. chrysantha,* both native to the Rocky Mountains, have been developed many garden hybrids with showy long-spurred flowers in a variety of colours ranging from white to yellow, red, and blue. The wild columbine of North America (*A. canadensis*) grows in woods and on rocky ledges from southern Canada southward. It is 30 to 90 cm tall. The flowers are red with touches of yellow.

columbite, hard, black (often iridescent), heavy oxide mineral of iron, manganese, and



Columbite from Pennington County, S.D.

Emil Javorsky

niobium [$(Fe,Mn)(Nb,Ta)_2O_6$]. Tantalum atoms replace niobium atoms in the crystal structure to form the mineral tantalite, which is similar but much more dense. These minerals are the most abundant and widespread of the naturally occurring niobates and tantalates and are important ores, their elements niobium and tantalum serving as constituents of corrosion-resistant metal alloys. Columbite and tantalite are found together in granite, pegmatites, and placer deposits. They occur abundantly in western Australia, Madagascar, and South Dakota, U.S. The element niobium (formerly called columbium) was first recognized in columbite and originally was named after the mineral. For detailed physical properties, *see* oxide mineral (table).

columbium, chemical element discovered and named in 1801. It was rediscovered in 1844 and renamed niobium (*q.v.*).

Columbus, city (since 1971 consolidated with Muscogee county), western Georgia, U.S., at the head of navigation on the Chattahoochee River, opposite Phenix City, Ala. Founded in 1827 and carved out of the wilderness, it had by 1840 become a leading inland cotton port with a thriving textile industry utilizing power from falls in the river. During the American Civil War it was a major supply city of the Confederacy and was the site of the last battle (April 16, 1865) east of the Mississippi, leading to its capture by the Union general James H. Wilson. Its Confederate Naval Museum houses the salvaged gunboat *Muscogee*, set afire and sunk in the river during the conflict.

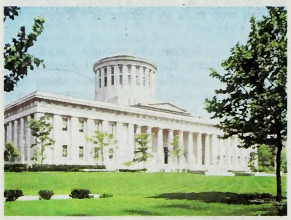
Now highly industrialized, Columbus is one of the largest textile centres in the South, and dams and locks have revitalized river traffic. Fort Benning (1918; named for Confederate General Henry L. Benning), just to the south, is the site of the U.S. Army Infantry Museum. Columbus College was opened in 1958. Inc. 1828. Pop. (1990) city, 179,278; Columbus MSA, 243,072.

Columbus, city, Bartholomew county, south-central Indiana, U.S., on the East Fork of White River, 45 miles (72 km) south of Indianapolis. Founded in 1821 as the county seat, it was named Tiptonia for General John Tipton, who had donated land, but a month later it was renamed Columbus. A diversified industrial community surrounded by productive prairie land, it is known for its modern architecture, with many buildings designed by distinguished architects such as the Saarinens, Harry Weese, Robert Trent Jones, and I.M. Pei. Two of its more notable edifices are the First Christian Church (1942; designed by Eliel Saarinen) and the North Christian Church (1963; designed by Eero Saarinen). Inc. town, 1839; city, 1854. Pop. (1990) 31,802.

Columbus, city, seat (1830) of Lowndes county, northeastern Mississippi, U.S., on the Tombigbee River, 80 miles (129 km) north of Meridian, near the Alabama line. Settled as a trading post (1817), it was known until 1821 as Possum Town. In 1822 the steamboat *Cotton Plant* first docked in Columbus, then a port of entry. During the American Civil War the Confederates maintained a large arsenal in the town, which served as temporary state capital when the city of Jackson fell (1863). Confederate Decoration Day, later observed nationally as Memorial Day, originated there at Friendship Cemetery on April 25, 1866. Many antebellum homes survive. A traditional agricultural and transportation economy is augmented by manufactures (including textiles, chemicals, and rubber products) and Columbus Air Force Base. The Tennessee–Tombigbee Waterway Development Authority (1958) is headquartered in Columbus. Mississippi University for Women originated there in 1884 as the Columbus Female Institute (the first American state-supported college for women), and the city's Franklin Academy (1821) was Mississippi's first free public school. The playwright Tennessee Williams was born (1911) in Columbus. Inc. town, 1822; city, 1884. Pop. (1990) 23,799.

Columbus, city, seat of Platte county, eastern Nebraska, U.S., on the Loup River near its confluence with the Platte. It was founded (1856) at the North Fork Ferry of the Oregon Trail by settlers from Columbus, Ohio. With the coming of the Union Pacific Railroad (1860), it became an outfitting post for wagon trains and a centre for cattle feeding. Its modern economy is based on agriculture and the manufacture of farm machinery and electronic and surgical equipment. Several public power agencies have their headquarters in Columbus, and nearby Lakes North and Babcock are reservoirs for the Loup Power District plant. Platte Technical Community College was opened there in 1969. Inc. town, 1865; city, 1907. Pop. (1990) 19,480.

Columbus, city, Fairfield and Franklin counties, capital (1816) of Ohio, U.S., seat (1824) of Franklin county, in the central part of the state on the relatively flat Ohio till plain, at the junction of the Scioto and Olentangy rivers. It is the centre of a metropolitan complex that includes Grandview Heights, Upper Arlington, Worthington, Bexley, and Whitehall. It was planned in 1812 as a political centre by the Ohio General Assembly and named for Christopher Columbus. The



State House, Columbus, Ohio
Ellis-Sawyer—Shostal/EB Inc.

state government moved to the city in 1816 from Chillicothe, and in 1834 it absorbed the nearby earlier settlement of Franklinton (founded 1797). By 1840, following the extension of the National (Cumberland) Road from Maryland and the opening of a feeder branch of the Ohio and Erie Canal into the city, significant growth occurred. In 1850 the first railroad arrived, and by 1900, when the population exceeded 125,000, Columbus had emerged as an important transportation and commercial centre. Following damaging floods in 1913, the Scioto River was widened and levees, retaining wall, and bridges were built, which allowed riverfront development.

Unprecedented industrial growth occurred after 1940; the location of a large aircraft plant was the initial stimulus, but many branches of national companies were also attracted to the area. The city has grown in size because of a policy of annexation. The city's favourable geographic position has been enhanced by the presence of main-line railroads, an extensive highway network, and airport facilities. The modern economy of the Columbus metropolis is largely supported by industry, governmental agencies, and educational and research institutions. Highly diversified manufactures include airplanes and space equipment, automobile parts, electrical equipment, machinery, glass, coated fabrics, shoes, processed foods, and printed materials.

The Columbus area is the site of Ohio State University (1870), Franklin University (1902), Capital University (1850), Ohio Dominican College (1911; formerly College of St. Mary of the Springs, 1868), Otterbein College (1847), Pontifical College Josephinum (1894), Columbus College of Art and Design (1879), Columbus Technical Institute (1963), Ohio Institute of Technology (1952), and the state schools for the deaf and blind. Research organizations include Battelle Memorial Institute (1929, metallurgy and mineral industries), the Orton Ceramic Foundation, and the Chemical Abstracts Service. The federal government operates a large military depot, as well as Rickenbacker Air Force Base and other facilities. Many of the state's welfare institutions and offices, a state correctional facility (formerly the Ohio Penitentiary), and the state fairgrounds are in the city. The Ohio State House (a limestone structure in Doric style, completed in 1861) has a group of bronze statues by Levi T. Scofield. Also of interest are the McKinley Memorial, Camp Chase Confederate Cemetery, the Ohio Historical Center (1970), the Center of Science and Industry, Battelle Planetarium, and the 44-story LeVeque Lincoln Tower. The city supports an art museum and a symphony orchestra. The Civic Center includes the city hall, a public auditorium, and Central High School.

Local reservoirs—including Griggs (1905), O'Shaughnessy (1925), and Hoover (1955)—are the focus of park and recreational activities. Scioto Downs and Beulah Park have horse racing. Annual events include the state fair, the Columbus Day Celebration, and the Oktoberfest (based at the restored 19th-century German Village, south of the city's centre). Inc. city, 1834. Pop. (1990) city, 632,910; Columbus MSA, 1,377,419.

Columbus, Bartholomew, Italian BARTOLOMEO COLOMBO, Spanish BARTOLOMÉ COLÓN (b. mid-15th century, Genoa [Italy]—d. 1514/15, Santo Domingo, Hispaniola [now Dominican Republic]), Italian explorer, brother of Christopher Columbus, accomplished cartographer and cosmographer, and probably collaborator on his brother's project to sail around the world.

In 1484 he visited Henry VII of England and gave him a map of the world, showing the lands he and his brother wanted to explore. He founded the city of Santo Domingo in 1496 and was its first governor and captain-general. In 1503 Christopher left him in Panama to establish a colony, but Indian attacks forced the evacuation of the expedition.

Columbus, Christopher, Italian CRISTOFORO COLOMBO, Spanish CRISTÓBAL COLÓN (b. between Aug. 26 and Oct. 31?, 1451, Genoa [Italy]—d. May 21, 1506, Valladolid, Spain), first historically important European discoverer of the New World. His four voyages (1492–93, 1493–96, 1498–1500, and 1502–04) opened the way for European exploration, exploitation, and colonization.

A brief treatment of Christopher Columbus follows. For full treatment, *see* MACROPAEDIA: Columbus.

Columbus was the son of a weaver, Domenico Colombo, and his wife, Suzanna Fontanarossa, probably a Spanish-Jewish couple living in the Italian port city of Genoa. Little is known of Columbus' early life, but he undoubtedly went to sea at a young age. Believing he could reach the East by sailing west, Columbus searched for a patron to finance his voyages; King Ferdinand and Queen Isabella of Spain met his requests in 1492. His three ships—the *Santa María*, the *Niña*, and the *Pinta*—sailed from Palos on August 3; they sighted land on October 12. He explored several of the Caribbean islands before returning to Spain. During the second voyage (1493–96), which was filled with misadventures, Columbus founded Isabella, the first European city in the New World. On the third voyage (1498–1500) he

reached the mainland of South America, but he was replaced as viceroy of the Indies because of his poor administration. His final voyage (1502–04) was in deliberate opposition to royal orders.

Columbus was ill upon his return to Europe and never really regained his health. After his death he was buried at Seville, Spain, but was exhumed in 1542 and interred in the cathedral of Santo Domingo in Hispaniola.

Contemporary records cited his death on Ascension Day 1506. A miscalculation later translated that day as May 20, when the true date was May 21.

Columbus, Diego: *see* Colón, Diego.

Columcille, SAINT: *see* Columba, Saint.

Columella, Lucius Junius Moderatus (b. 1st century AD, Gades, Spain), Roman soldier and farmer who wrote extensively on agriculture and kindred subjects in the hope of arousing a love for farming and a simple life. He became in early life a tribune of the legion stationed in Syria, but neither an army career nor the law attracted him, and he took up farming in Italy.

The *De re rustica,* in 12 books, his second and fuller treatment of farming and country life, has survived, as has *De arboribus* ("On Trees"), which was part of an earlier work. Both are written in a lucid, nontechnical style. *Of Husbandry* (1745) is an English translation of *De re rustica* and *De arboribus.*

column, in architecture, a vertical element, usually a rounded shaft with a capital and base, which in most cases serves as a support. A column may also be nonstructural, used for a decorative purpose or as a freestanding monument.

In the field of architectural design a column is used for decoration as well as support. Classical Greek and Roman architecture made use of five major styles of column (*see* order), carved from single blocks or created from stacks of massive stone blocks. In ancient



Doric columns on the Greek temple at Segesta, Sicily, c. 424–416 BC
SCALA/Art Resource, NY

Egypt and the Near East, columns, usually large and circular, were used with great effect to decorate and support massive structures, especially in the absence of arches. In Far Eastern architecture, columns tend to be simple in shape but richly decorated. Craftsmen of the Gothic and Romanesque era used the bases and capitals of supporting stone columns as spaces for intricate carving. Baroque designs often featured sinuously carved columns of marble. Modern columns tend to be made of iron, steel, or concrete and are simply designed.

Columns may be rectangular, circular, or polygonal in shape; they may taper toward the top, or be of uniform diameter. An engaged, attached, or embedded column is one that is built into a wall and protrudes only partially from it; this type of column came to serve a decorative rather than structural purpose in the Roman pilaster. A cluster or compound column is a group of columns connected with each other to form a single unit. A rostral column is a pillar decorated with the prow of a ship, or rostrum, to serve as a naval monument.

column chromatography, in analytical chemistry, method for separating mixtures of substances in which a liquid or gaseous solution of the mixture is caused to flow through a tube packed with a finely divided solid, which may be coated with an adsorbent liquid, or through a long capillary tube bearing a thin film of adsorbent liquid; the components of the mixture separate because they travel through the tube at different rates, determined by the degree to which each is retarded by interacting with the stationary material. *See also* gas chromatography; gel chromatography.

Colwyn, district, Clwyd County, northeastern Wales. It was created in 1974, covers an area of 213 sq mi (533 sq km), and extends from the coastal strip fronting the Irish Sea between Colwyn Bay and Knmel Bay to the town of Maerdy, about 50 mi (80 km) inland. Colwyn district is bordered by the districts of Aberconwy to the west, Meirionnydd to the south, and Glyndwr and Rhuddlan to the east. The discovery of the hill fort of Pen-y-Corddyn in the hills just south of the village of Llanddulas provides evidence of Iron Age settlement; traces of Roman lead mining were also found nearby. Llanddulas is reputed to be the site of Richard II's capture in 1399 by Henry Bolingbroke after Richard was betrayed by the Earl of Northumberland.

Most of the district's population is concentrated along its coastal strip, where tourism is the main industry. Colwyn Bay was designated the administrative seat of Colwyn district in 1974. The town of Abergele, located east of Colwyn Bay, was one of the first places in North Wales where sea bathing became popular; it is now a thriving market centre with weekly cattle markets. Much of the interior district is farmland (including pastureland) and scenic hills. The recently completed Llyn Brenig Reservoir in the heart of the rural area is a developing centre for water recreation. A railroad and a highway traverse northern Colwyn district along the coast. Pop. (1984 est.) 50,300.

Colwyn Bay, seaside resort and seat of Colwyn district, Clwyd county, Wales, on the North Wales coast of the Irish Sea. The town, which dates from the 19th century, grew rapidly after World War I to become contiguous with Old Colwyn and Rhôs-on-Sea, with which it is linked by a 3-mi (5-km) promenade around the sandy bay. Retaining its primary identity as a resort, Colwyn Bay has become one of the largest towns in North Wales. Attractions include Eirias Park, with recreational facilities; the pier pavilion and other theatres; Pwllychrochan Woods; the Welsh Mountain Zoo and Botanic Gardens; and a Harlequin Puppet Theatre at Rhôs-on-Sea. Pop. (1981) urban area, 27,683.

coly, also called MOUSEBIRD, any member of the genus *Colius,* a group of African birds that, because of their long, drooping tails, look much like mice when seen running along branches. The single genus (*Colius*) and six species constitute the family Coliidae, order Coliiformes. The body is sparrow sized, but the tail makes the total length 30–35 centimetres (roughly 12 to 14 inches). Colies sometimes climb like parrots, using the curved finchlike bill for grasping twigs. They also can hang by the feet, swinging beneath a branch using their rear toe, which can be rotated outward and fully forward, to obtain a strong clinging grip. The grayish or brownish body plumage is soft, loose, and hairlike. There is a short erectile crest on the head, and most species have a touch of blue at the nape and some red or blue skin around the eyes. The sexes look alike.

The nest, in a tree, is a grassy cup that may be supported on a platform of twigs. The two to seven eggs are white with brown markings. Both sexes incubate.



Red-faced coly (*Colius indicus*)
© George Wall/NHPA

Colies huddle together to sleep or to preen one another. Small parties move from tree to tree feeding on buds and fruits. In some localities colies damage fruit crops.

Colymbiformes, former taxonomic order that included the water birds known as loons and grebes. Later scholarship determined that these two groups were not related, and ornithologists devised new and separate classifications for them: Gaviiformes (loons) and Podicipediformes (sometimes spelled Podicipitiformes; grebes). The International Commission on Zoological Nomenclature suppressed the order name Colymbiformes and that of the genus *Colymbus,* both of which have been variously applied to grebes in the New World and loons in the Old. The similarities in the two groups are a result of convergent adaptation rather than common evolutionary background. *See also* grebe; loon.

coma, complete lack of consciousness, characterized by loss of reaction to external stimuli and absence of spontaneous nervous activity, usually associated with diffuse injury to the cerebrum. Unconsciousness may accompany a number of metabolic disorders or physical injuries to the brain from disease or trauma.

Different patterns of coma depend on the origin of the injury. Simple concussions cause losses of consciousness of short duration; in contrast, lack of oxygen (anoxia) may result in a coma that lasts for several weeks and is often fatal. Stroke, a rupture or blockage of vessels supplying blood to the brain, can cause sudden loss of consciousness in some patients, while comas caused by metabolic abnormalities or cerebral masses such as tumours are characterized by more gradual onset, passing through stages of lethargy and stupor before reaching true coma. Metabolic comas are also more likely to have associated brain seizures and usually leave pupillary light reflexes intact, whereas comas with physical causes usually eradicate this reflex.

Common causes of metabolic coma include diabetes, alcohol, and barbiturate poisoning. In diabetes, low insulin levels allow the buildup of ketones, breakdown products of fat tissue that destroy the osmotic balance in the brain, damaging brain cells. Ingestion of large quantities of alcohol over a short period can precipitate a coma that may be treated by gastric lavage (stomach pump) in its early stages; alcohol combined with barbiturates is a common cause of coma in suicide attempts. Large doses of barbiturates alone will also produce coma by suppressing cerebral blood flow, thus causing anoxia. Gastric lavage soon after the

drug is taken may remove sufficient barbiturate to allow recovery. For most metabolic comas, the first step in treatment is to protect the brain cells and attempt to eliminate the cause of coma. In some psychiatric conditions, such as catatonic schizophrenia, a comalike state may also occur.

Comana, modern ŞAHR, ancient city of Cappadocia, on the upper course of the Seyhan (Sarus) River, in southern Turkey. Often called Chryse to distinguish it from Comana in Pontus, it was the place where the cult of Ma-Enyo, a variant of the great west Asian mother goddess, was celebrated with orgiastic rites. The service was carried on in an opulent temple by thousands of temple servants. The city, a mere appanage of the temple, was governed by the chief priest, usually a member of the reigning Cappadocian family, who ranked next to the king. Under the emperor Caracalla (reigned AD 211–217), Comana became a Roman colony, and it continued to receive honours until the official recognition of Christianity. It was also important for its position on the road from Caesarea Cappadociae (Kayseri) to Melitene (Malatya), converted by the emperor Septimius Severus into the chief military road to the empire's eastern frontier.

Comanche, nomadic North American Indian group that in the 18th and 19th centuries roved the southern Great Plains. The Comanche were an offshoot of the Wyoming Shoshoni and, prior to their migration south, had been semisedentary hunters and gatherers. They moved south in successive stages, attacking and displacing other Plains tribes, notably the Apache, whom they drove from the southern plains. By the early 1800s the Comanche were a powerful tribe, with a population estimated at between 7,000 and 10,000. Their language, of the Shoshonean branch of the Uto-Aztecan linguistic stock, became a lingua franca for much of the area.



"Comanche Village, Women Dressing Robes and Drying Meat," detail of a painting by George Catlin, 1834–35; in the National Museum of American Art, Washington, D.C.

By courtesy of the National Museum of American Art, Smithsonian Institution, Washington, D.C.; gift of Mrs. Joseph Harrison, Jr.

The Comanche were organized in 12 or so autonomous bands—local groups that lacked the lineages, clans, military societies, and tribal government of most other Plains Indians. Prior to 1874, the Comanche did not perform the sun dance or any other integrating tribal ceremony. Their staple food was buffalo meat. The buffalo also provided them with robes, covering for their tepees, sinew thread, and water carriers made of the animal's stomach.

The Comanche were one of the first tribes to acquire horses from the Spanish and one of the few to breed them to any extent. The highly skilled Comanche horsemen set the pattern of equestrian nomadism that became so characteristic of the Plains Indians in the 18th and 19th centuries. Comanche raids for booty and captives carried them as far south as Durango in Mexico.

In the mid-19th century the Penateka, or southern branch of the Comanche, were settled on a reservation in Indian Territory (now Oklahoma). The northern segment of the tribe, however, continued the struggle to protect the hunting grounds from white settlers. In 1864 Christopher ("Kit") Carson led U.S. forces in an unsuccessful campaign against them. In 1865 the Comanche and their allies the Kiowa signed a treaty with the United States, which granted them what is now western Oklahoma from the Red River north to the Cimarron. Upon U.S. failure to abide by the terms of the treaty, hostilities resumed until 1867, when, in agreements made at Medicine Lodge Creek in Kansas, the Comanche, Kiowa, and Kiowa Apache undertook to settle on a reservation in Oklahoma. The government, however, was unable to keep whites off the land promised to the Indians, and it was after this date that some of the most terrible encounters between U.S. forces and the Comanche took place. In the late 20th century about 3,000 Comanche were living on individual holdings in the vicinity of Lawton, Okla.

BIBLIOGRAPHY. T.R. Fehrenbach, *Comanches: The Destruction of a People* (1974, reissued 1986), details their history and way of life.

Comăneci, Nadia (b. Nov. 12, 1961, Gheorghe Gheorghiu-Dej, Romania), Romanian gymnast, the first to be awarded a perfect score of 10 in an Olympic gymnastic event.

Comăneci was discovered by Bela Karolyi, later the Romanian gymnastic coach, when she was six years old. She first competed in the national junior championships in 1969, placing 13th. In 1970 she won. Her first international competition was in 1972 in a pre-Olympic junior meet for the Communist-bloc countries in which she won three gold medals, and in 1973 and 1974 she was all-around junior champion. In her first international competition as a senior in 1975, she bested the Russian Lyudmila Turishcheva, the five-time European champion, winning four gold medals and one silver. She won the American Cup in New York City in 1976, becoming the first woman to perform a backward double salto as a dismount from the uneven parallel bars.

In the 1976 Olympic Games at Montreal, Comăneci received seven perfect scores and won the gold medals for the balance beam and the uneven bars. She finished a disappointing fourth in the world championships in 1978 and was out of competition during most of 1979 with an infected hand. In the 1980 Olympic Games at Moscow, she won gold medals for the beam and the floor exercises (tying for first in the latter event with Nelli Kim of the U.S.S.R.). She won a silver medal as a member of her team and tied with Maxi Gnauck of East Germany for second place in the all-around individual competition. She retired from competition in 1984. After the 1976 games, she was named a Hero of Socialist Labour by her country. Comăneci defected to the United States in 1989.

Comayagua, city, west-central Honduras, on the right bank of the Humuya River in a fertile valley. Founded in 1537 as Valladolid de Santa María de Comayagua, the town served as the Spanish colonial capital of Honduras province. It suffered damage in the 19th-century political upheavals of Honduras and in rivalry with Tegucigalpa for the position of national capital, but only in 1880 was the capital finally transferred to Tegucigalpa. Colonial buildings include a notable Spanish Baroque cathedral (1715), four 16th-century churches, and a former university (the first in Central America, founded in 1632). Comayagua manufactures pharmaceuticals, shoes, resins, cement products, and ceramics; it is the commercial centre for western Honduras. The national Agricultural Centre is located in the city. The Inter-Oceanic Highway passes through the city, and it also has an airfield, which was upgraded in the early 1980s into a military air base. Pop. (1988 prelim.) 36,414.



The cathedral at Comayagua, Honduras

Charles May—Shostal/EB Inc.

comb-clawed beetle, any member of the insect family Alleculidae (called Cistelidae in some classification systems) in the order Coleoptera, made of about 1,100 species. Their oval bodies are typically a glossy brown or black in colour.

The adults are usually found on flowers or leaves and the larvae in rotten wood or humus. They are 4 to 12 mm (0.16 to 0.47 inch) in length.

comb-footed spider, also called COBWEB WEAVER, any member of the spider family Theridiidae (order Araneida). The more than 1,000 species of comb-footed spiders are distributed around the world, and they include the black widow. The webs of theridiids consist of an irregular network of threads from which the spider often hangs. The common name of the group is derived from a row of bristles on the tarsus, or "foot," of the hind legs, which are used to throw silken strands over prey to ensnare it.



Comb-footed spider (*Achaearanea pallens*) with two egg sacs in its web

Heather Angel

comb jelly (marine invertebrate): *see* ctenophore.

comb pottery, also called COMBWARE, main pottery type of the Korean Neolithic Period (*c.* 3000–700 BC). Derived from a Siberian Neolithic prototype, the pottery is made of sandy clay, and its colour is predominantly brown. The vessel form found in early comb pottery is a simple V-shape with a pointed or rounded bottom. The surface is entirely covered with impressed or incised lines, short, slanting, and parallel, arranged in either horizontal or vertical rows so as to produce a sort of comb pattern.

In later pottery the clay is often tempered with asbestos or talc stone, and the base of the vessel tends to be flattened. The earlier, space-filling linear design yields to more sparsely placed curvilinear designs consisting of dots. At its earlier stage, the pottery was introduced into Kyushu, Japan, resulting in the emergence of the so-called Sobata pottery, a fusion of comb and the local Jōmon pottery.

comb shell: *see* scallop.

combat fatigue, also called BATTLE FATIGUE, or SHELL SHOCK, a neurotic disorder caused by the stress involved in war. This anxiety-related disorder is characterized by (1) hypersensitivity to stimuli such as noises, movements, and light accompanied by overactive responses that include involuntary defensive jerking or jumping (startle reactions), (2) easy irritability progressing even to acts of violence, and (3) sleep disturbances including battle dreams, nightmares, and inability to fall asleep. Although persons in combat differ widely in their susceptibility to combat fatigue, because of hereditary factors and previous training, most cases result from exposure to physical hardship, prolonged and excessive exertion, and emotional conflicts. The emotional conflicts usually are related to loss of comrades, leaders, and group support, together with other precipitating events in the battle setting. Most individuals are best treated by being kept near the front lines and given rest, food, and sedation, provided they are permitted to stay with their units. U.S. armed forces in the late 1960s claimed to have nearly eliminated the occurrence of combat fatigue, attributing their success to practices such as frequent troop rotations, regular hot meals and other comforts for troops in combat areas, rest and recreation leaves away from the war zone, quick evacuation of wounded and good medical care, and application of psychiatric techniques to whole units as well as to individuals. Despite these claims, however, the Vietnam War, especially after 1969, produced a large number of American veterans with behavioral and drug-abuse problems.

combats de taureaux: *see* bullfighting.

Combe, William (b. 1741, Bristol, Gloucestershire, Eng.—d. June 19, 1823, London), prolific English writer of miscellaneous prose and satirical verse whose poem *Tour of Dr. Syntax in Search of the Picturesque* (1812) was one of the most popular books of early 19th century England.



Combe, portrait by George Dance, 1793; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Combe was educated at Eton College. He was left a legacy by a wealthy London merchant, William Alexander, and used it to travel widely and to live in a princely manner. He fell heavily into debt and, after a varied career as private soldier, waiter, teacher, and cook, returned to London about 1771 and thereafter earned his living as a writer. Combe's first Dr. Syntax book and its successors, *The Second Tour of Dr. Syntax in Search of Consolation* (1820) and *The Third Tour . . . in Search of a Wife* (1821), satirize the many 18th- and early 19th-century writers whose "Tours," "Travels," and "Journeys" were vehicles for sententious moralizing, uninspired raptures, and sentimental accounts of amorous adventures. The popularity of Combe's work owed much to the illustrations of Thomas Rowlandson. Combe and Rowlandson also collaborated on *The English Dance of Death* (1815), which contains some of Combe's best verse, and *The Dance of Life* (1816–17).

Combes, (Justin-Louis-) Émile (b. Sept. 6, 1835, Roquecourbe, Fr.—d. May 25, 1921, Pons), French premier (1902–05) who presided over the separation of church and state in the wake of the Dreyfus affair.

A seminarian in his youth, Combes published his doctoral thesis, *La Psychologie de saint Thomas d'Acquin,* in 1860, but before ordination he left the church. He studied



Combes, photograph by H. Manuel; in the Bibliothèque Nationale, Paris

By courtesy of the Bibliotheque Nationale, Paris

medicine and settled in Pons, where he was elected mayor in 1875. In 1885 he was elected to the Senate from the Charente-Inférieure *département,* where he chose to sit with the anticlerical Radical Party.

In 1895 Combes joined the Léon Bourgeois government as minister of education. When he left that post (April 1896), he remained active in politics and supported Pierre Waldeck-Rousseau's efforts to redefine the relationship between church and state.

Combes succeeded Waldeck-Rousseau as premier in 1902 and agreed to laws exiling almost all religious orders from France and dismantling major aspects of the church's public functions, especially in education. These decisions precipitated a break in diplomatic relations between France and the Holy See.

When the Act of Separation (December 1905) was formally adopted, Combes had already fallen from power, the victim of the *affaire des fiches de délation* ("affair of the cards of denunciation") in which his war minister, the militant anticlerical General Louis André, was accused of receiving reports on suspected reactionary and clerical army officers from Masonic groups.

Soon after he left the ministry, Combes wrote *Une Campagne laïque* (1904; "A Secular Campaign"), *Une Deuxième Campagne laïque* (1905; "A Second Secular Campaign"), and *Mon Ministère* (1906). Widely admired by many republicans, he was called to serve as minister without portfolio by his former colleague Aristide Briand in October 1915, despite his advanced age.

combination (mathematics): *see* permutations and combinations.

Combination Acts, British acts of 1799 and 1800 that made trade unionism illegal. The laws, as finally amended, sentenced to three months in jail or to two months' hard labour any workingman who combined with another to gain an increase in wages or a decrease in hours or who solicited anyone else to leave work or objected to working with any other workman. The sentence was to be imposed by two magistrates, and appeal was made extremely difficult. Anyone contributing to the expenses of a person convicted under the act was subject to a fine, and defendants could be forced to bear witness against each other. Other clauses forbade employers' combinations, but these were never in any recorded case put into operation. The repeal of the Combination Acts in 1824 was followed by a number of strikes, and in 1825 an unsuccessful attempt was made to reimpose the acts.

combination tone, in musical acoustics, faint tone produced in the inner ear by two simultaneously sounded musical tones. Because such tones are caused by the ear rather than by the external source of the sound, they are sometimes called subjective, or resultant, tones. There are two varieties: difference tones (*D*) and summation tones (*S*), generated respectively by the frequency differential of the two pitches or the sum of their frequencies. The most commonly heard are difference tones lying below the original pitches; these were discovered by the celebrated violinist-composer Giuseppe Tartini (1692–1770), who regarded the "third tone" as an excellent means of correcting faulty intonations of double stops on the violin.

Combination tones are heard when two pure tones (*i.e.,* tones produced by simple harmonic sound waves having no partial vibrations and, therefore, no overtones), differing in frequency by 50 cycles per second or more, sound together at sufficient intensity. Other, more complex wave forms, such as those produced by singing voices, also occasionally produce combination tones.

A similar subjective phenomenon, aural overtones, results from the ear's distortion of a single pure tone. The distortions produce frequencies in the ear corresponding to multiples of the original frequency (2f, 3f, 4f, . . .), and aural overtones thus have the same pitch as externally produced overtones.

combinatorics, also called COMBINATORIAL MATHEMATICS, the field of mathematics concerned with problems of selection, arrangement, and operation within a finite or discrete system.

A brief treatment of combinatorics follows. For full treatment, *see* MACROPAEDIA: Combinatorics and Combinatorial Geometry.

Examples of combinatorial problems are: (1) What fraction of the possible 5-card hands dealt from a standard 52-card deck have a pair of aces? (2) How can the classes at a school be scheduled so as to accommodate the course selections of all students? (3) How many rods one inch in diameter will fit inside a hollow cylinder two feet in diameter? (4) For a given section of some city, is it possible to devise a postman's tour that traverses each block in that section once without repeating any block (starting and ending at the post office)? (5) In a group of six people, is it always true that three of the people are mutually acquainted (each pair of these three had previously met) or else that some three are mutual strangers?

The problem of class scheduling is so complex that without a high-speed digital computer it could not be solved within the school year.

Combinatorial mathematics has little systematic problem-solving framework. Combinatorial problems cannot be formulated in terms of continuous functions, and there are no standard algebraic manipulations or plots to help solve such problems. Combinatorics has a diverse complexity requiring a careful logical analysis that is often different for each new problem. Combinatorics has its roots in antiquity but has grown in importance in recent years because of its uses in computer and management sciences. Combinatorial problems also arise in other fields of mathematics, such as number theory and algebra.

Basic combinatorics took form in the 17th and early 18th centuries. The leading contributors to the field were the Bernoulli brothers, Pierre de Fermat, Galileo Galilei, G.W. Leibniz, and Blaise Pascal. The motivation for much of early combinatorics was the analysis of gambling games and involved questions similar to the example about the chances of getting a pair of aces in a five-card poker hand. The first major combinatorial computations, made by Galileo, determined the relative likelihoods of different sums when rolling two or more dice. Such analysis of gambling odds was also the start of probability theory. In the 18th and 19th centuries, probability theory and statistics came to draw more on continuous than on combinatorial mathematics, but the advent of computers has made combinatorial approaches to statistical testing feasible and widely used.

The essence of combinatorial reasoning is a logical and exhaustive analysis of possibilities in a given situation, breaking a problem into various steps and subcases. The analysis of an immense number of possible solutions to a problem is greatly simplified if the underlying structure can be found and used to narrow the possibilities. Problems involving maps and networks constitute a major subfield of combinatorics called graph theory.

combine, complex farm machine that both cuts and threshes grain. An early primitive combine was a horse-drawn "combination harvester–thresher" introduced in Michigan in 1836 and later used in California. Combines were not generally adopted until the 1930s, when tractor-drawn models became available. Self-propelled machines, capable of cutting swaths 8 to 18 feet (2.5 to 5.5 m) wide, appeared a decade later. Originally designed to harvest wheat, they came to be used to harvest many other crops.

In design, the combine is essentially a binder-type cutting device that delivers the grain to a threshing machine modified to work as it moves across the field. The cutting–gathering component, designed to take the grain with a minimum of straw, is sometimes called the header. A threshing cylinder rubs grain out of the heads against a concave surface. Some grain and chaff go with the straw to the straw deck, on which grain is shaken out and delivered to the cleaning shoe. Some of the grain and chaff goes directly to the cleaning shoe, on which sieves and a blast of air are used to separate and clean the grain. After passing through the air blast, the grain drops into a clean-grain auger that conveys it to an elevator and into a storage tank. Straw drops out of the back of the combine in a windrow for baling or is scattered over the ground by a fanlike spreader. Some combines for use on steeply rolling land have a body supported in a frame by hydraulic cylinders that automatically adjust to keep the body level.

combined exercises, also called ALL-AROUND, in gymnastics, an event demonstrating a wide range of gymnastic ability, decided by totaling the scores achieved by each competitor in the separate individual events. For men, these are the floor exercise, side horse, rings, long-horse vaulting, parallel bars, and high bar; for women, they are the balance beam, uneven parallel bars, vaulting horse, and floor exercise. For world champions, *see* Sporting Record: *Gymnastics;* for Olympic champions, *see* Olympic Games.

combustion, rapid chemical reaction between substances that is usually accompanied by generation of heat and light in the form of flame. In most cases, oxygen comprises one of the reactants. Other physical phenomena that sometimes occur during combustion reactions are explosion and detonation.

A brief treatment of combustion follows. For full treatment, *see* MACROPAEDIA: Chemical Reactions.

Combustion, one of the most important classes of chemical reaction, is often considered a climax phenomenon in the oxidation of certain types of substances. Although most flames have regions where reduction reactions are important, combustion is primarily the combining of combustible material with oxygen.

Chemical and physical aspects. The chemical processes in combustion are most commonly initiated by such factors as heat, light, and sparks. As the combustible materials achieve the ignition temperature specific to the materials and the ambient pressure, the combustion reaction begins. The combustion spreads from the ignition source to the adjacent layer of gas mixture; in turn, each point of the burning layer serves as an ignition source for the next adjacent layer, and so on. Combustion terminates when equilibrium is achieved between the total heat energies of the reactants and the total heat energies of the products.

Combustion may be propagated by complicated branched-chain reactions, as in hydrogen combustion. Other types of reactions, such as the combustion of carbon monoxide, are characterized by a fast interaction step between a hydroxyl radical (OH^-) and the carbon monoxide molecule (CO). Although the mechanisms of hydrocarbon combustion are not completely known, many of the steps involving hydrogen and oxygen atoms and hydroxyl and organic radicals are similar to those for hydrogen and carbon monoxide combustion.

In addition to the chemical processes in combustion, physical processes that transfer mass and energy also occur. In gaseous combustion, for example, the diffusion of reactants and combustion products depends on their concentrations, pressure and temperature changes, and diffusion coefficients. Convection, which is also responsible for the transport of mass and energy, comprises buoyant and external forces, and turbulent and eddy motions.

Combustion may also emit light energy, mostly in the infrared portion of the spectrum. The light emitted by a flame arises from the presence of particles in electronically excited states and from ions, radicals, and electrons.

Explosions. An acceleration of a combustion reaction, whether caused by a rise in temperature or by an increase in the lengths of reaction chains, can lead to an explosion. In the former case a thermal explosion will occur when the rate of heat released by the reaction exceeds the rate of heat lost from the area. In the latter case a so-called chain explosion will occur when the probability of chain branching equals that of chain termination. When a combustion reaction accelerates progressively so that the flame front area advances at a supersonic velocity, compression from the shock wave causes an increase in temperature that results in self-ignition of the fuel. This phenomenon, called detonation, will not occur when energy loss from the reaction zone exceeds a certain limit.

combware: *see* comb pottery.

Comden, Betty; and Green, Adolf, Comden's original name ELIZABETH COHEN, married name KYLE (respectively b. May 3, 1919, Brooklyn, N.Y., U.S.; b. Dec. 2, 1915, Bronx, N.Y.), American musical-comedy team who wrote scripts—and often the lyrics—for many Broadway shows and Hollywood film musicals. They were paired together longer than any other writing team in the history of Broadway.

Comden studied dramatics at New York University (B.S., 1938). Green attended New York public schools and, during the Great Depression, found his first job as a Wall Street runner. Comden and Green met in 1938 while both were making the rounds of theatrical agents. The Village Vanguard, a bohemian nightclub in Greenwich Village, was seeking a new show; and the group that became known as The Revuers stepped in—Comden, Green, Judy Tuvim, Alvin Hammer, and John Frank. Their satirical show of songs, dances, and skits enjoyed initial success and went from the Vanguard to engagements at uptown theatres and nightclubs and on radio but flopped in Hollywood. (Judy Tuvim stayed on in Hollywood and, except for occasional returns to Broadway, became, as Judy Holliday, one of the most brilliant film comediennes of the 1950s.)

In 1944, back in New York, Comden and Green joined with composer Leonard Bernstein and choreographer Jerome Robbins in creating the musical *On the Town,* which later (1949) was filmed by MGM. In 1951, with *Two on the Aisle,* Comden and Green began their long collaboration with composer Jule Styne, who created the music for most of their shows, including *Peter Pan* (1954), *Bells Are Ringing* (1956), *Say, Darling* (1958), *Do Re Mi* (1960), *Subways Are for Sleeping* (1961), *Fade Out–Fade In* (1964), *Hallelujah, Baby!* (1967), and *Lorelei* (1974).

Comden and Green wrote another musical with Leonard Bernstein, *Wonderful Town* (1953), which won them their first Tony award; they won three others, for *Hallelujah, Baby!, Applause* (1970), and *On the 20th Century* (1978). They also wrote several film scripts, including that of *Singin' in the Rain* (1952), a film that the American Film Institute later voted the best film musical of all time. Among their best-known songs are "Just In Time" and "The Party's Over." In 1980 Comden and Green were named to the Songwriters Hall of Fame.

Comecon: *see* Mutual Economic Assistance, Council for.

comedia de capa y espada: *see* cloak and sword drama.

Comédie-Française, formally LE THÉÂTRE-FRANÇAIS, also called LA MAISON DE MOLIÈRE, national theatre of France and the world's longest established national theatre. After the death of the playwright Molière (1673), his



Comédie-Française, Paris, designed by Victor Louis, 1786–90

Giraudon—Art Resource/EB Inc

company of actors joined forces with a company playing at the Théâtre du Marais, the resulting company being known as the Théâtre Guénégaud. In 1680 the company that has survived as the Comédie-Française was founded when the Guénégaud company merged with that at the Hôtel de Bourgogne, to become the only professional French company then playing in Paris.

The French Revolution caused a division of loyalties within the company; and in 1791 one group, led by the great actor François-Joseph Talma, established separate headquarters at the present home of the Comédie-Française in what is now the Place de Théâtre-Français in the rue de Richelieu, while the more conservative group, under the leadership of René Molé, remained at the original site as the Théâtre de la Nation. The latter organization fell into disfavour with the public, and at least two of its productions provoked riots that resulted in the imprisonment for almost a year of the players involved. In 1803 the Comédie-Française was again reconstituted, this time under Napoleon's administration. A decree issued by him while in Moscow in 1812 established the rules under which the Comédie-Française was to function.

The organization of the Comédie-Française is based on the original Confrérie de la Passion ("Confraternity of the Passion"), an association of Parisian burghers founded in 1402 for the purpose of presenting religious plays. Under this type of organization, which prevails to this day, each member holds a share of the profits within a democratically structured unit that allows for shared duties and responsibilities. Membership is granted on the basis of merit. After a year's trial period, during which time the actor makes his formal debut, the member becomes a *pensionnaire,* or probationary member, with a fixed salary. After an indefinite period of time, which may range from several weeks to several years, he may gain full membership as a *sociétaire,* replacing those members who have either died or retired. Retirement with pension is awarded after 20 years of service.

Throughout its long history, the Comédie-Française has exercised a lasting influence on the development of French theatre, arts, and letters. It has given the world some of the theatre's most illustrious actors: Adrienne Lecouvreur, Mlle Clairon, Henri-Louis Lekain, François-Joseph Talma, Mlle Rachel, Sarah Bernhardt, and Jean-Louis Barrault. Although it remains a theatre primarily rooted in past traditions, the Comédie-Française, after the appointment of Pierre Dux as its head in 1970, also began to introduce the work of new playwrights, directors, and stage designers.



"Italian Comedians," oil painting by Antoine Watteau, 1720, showing stock characters of the Comédie-Italienne, including (centre) Pierrot (Italian: Pedrolino) and (right) Columbine (Colombina); in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., Samuel H. Kress Collection

Comédie-Italienne, the Italian commedia dell'arte as it was called in France. The name was used in France after 1680 to distinguish the commedia dell'arte from native French theatre, the Comédie-Française. Italian commedia dell'arte companies appeared in France from the 16th century and pleased both the courtiers, who understood Italian, and the populace, which enjoyed the improvised antics, dialogue, and pantomime. In 1697, however, their satire was found offensive, and the companies were banished from France. (For early history, *see* commedia dell'arte.)

Prior to 1697 the Comédie-Italienne, at the urging of the French audiences, had increasingly interspersed French words, phrases, and sometimes whole scenes into productions. A leader of one company, Giuseppe Domenico Biancolelli, known as Dominique, eventually received official sanction from Louis XIV to use French, and thereafter the Comédie-Italienne became a new market for French dramatists.

In 1716, when Italian players were allowed to return to France, they began performing French works by French dramatists, particularly Pierre Marivaux, and from that time only some of the spirit of the commedia dell'arte—foreign flavour and the ribaldry, drolleries, pantomime, as well as some of the characters—remained.

French actors gradually replaced the Italians; the last great Italian Arlequin (Harlequin) was Carlo Bertinazzi (1710–83), known as Carlin. Increasingly, their productions turned toward opéra-bouffe (comic opera).

In 1801 the Comédie-Italienne merged with a former rival, the Théâtre Feydeau, to form the Opéra-Comique, and the Italian companies were dissolved.

comédie larmoyante (French: "tearful comedy"), 18th-century genre of French sentimental drama, which formed a bridge between the decaying tradition of aristocratic Neoclassical tragedy and the rise of serious bourgeois drama. Such comedies made no pretense of being amusing; virtuous characters were subjected to distressing domestic crises, but, even if the play ended unhappily, virtue never went unrewarded. If the heroine died, for example, her "moral" triumph was made clear to the audience.

The form is best exemplified in the 40 or so verse plays of Nivelle de La Chaussée, such as *Le Préjugé à la mode* (performed and published 1735; "Fashionable Prejudice"). The effect of the *comédie larmoyante* was to blur the distinctions between comedy and tragedy, drive both from the French stage, and form the basis for the *drame bourgeois,* realistic contemporary comedy heralded by Denis Diderot's *Le Fils naturel* (published 1757, performed 1771; Eng. trans., *Dorval; or, The Test of Virtue*).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

comedy, in Western theatre, type of drama the chief object of which, according to modern notions, is to amuse. It is contrasted on the one hand with tragedy and on the other with farce, burlesque, and other forms of humorous amusement.

A brief treatment of comedy follows. For full treatment, *see* MACROPAEDIA: Literature, The Art of.

Originally derived from Greek, the word comedy passed through various shades of meaning. In the European Middle Ages it meant simply a story with a happy ending. Thus some of Chaucer's tales are called comedies, and Dante used the term in that sense in the title of his poem *La divina commedia.* Subsequently the term was applied to mystery plays with a happy ending. The modern usage combined this sense with that in which Renaissance scholars applied it to the ancient comedies.

The history of comedy shows it to be a form whose complexity cannot adequately be dealt with by any definition that sees it as aiming simply at exciting laughter. Still, laughter is undoubtedly associated with comedy, a condition that has led to the discussion of the two together, notably by Henri Bergson, *Le Rire* (1900; *Laughter,* 1911), J. Sully, *An Essay on Laughter* (1902), and George Meredith, *The Idea of Comedy* (1877). Meredith's thesis that comedy appeals to the intellect and not to the emotions and concerns the social group has been generally rejected as too narrow.

Consideration of comedies as they actually exist suggests that what might be regarded as different kinds derive fundamentally from differences in the attitude of authors toward their subjects, and their intentions with these respectively. When, for whatever purpose, the intention is to ridicule, satirical comedy emerges; when ridicule is turned on persons, the result is the comedy of character; satire of social convention and within social convention creates the comedy of manners; social comedy concerns the structure of society itself; and satire of conventional thinking produces the comedy of ideas. Progress from troubles to the triumph of love in a happy outcome produces romantic comedy, and William Shakespeare's individual brand of this is suffused with a mellow humour rather than wit. The comedy of intrigue derives from a dominant intention of providing amusement and excitement with an intricate plot of reversals with artificial, contrived situations. Such is the comedy of Spain in Lope de Vega, Tirso de Molina, and their fellows. Where the author wants to exploit potentially serious issues merely sentimentally, never really approaching anything like the true emotion of tragedy, sentimental comedy results. Tragicomedy combines elements of the tragic and the comedic. In the 20th century, so-called black comedy and absurdism reflected existentialist concerns. Musical comedy, in which true comedy is often subservient to broad farce and spectacular effects, has been popular in Great Britain and the United States since the late 19th century. Of course these kinds are not mutually exclu-

sive; elements of one or more may appear in any.

comedy of ———: *see under* descriptive word (*e.g.,* humours, comedy of; intrigue, comedy of; manners, comedy of).

Comenius, John Amos, Czech JAN ÁMOS KOMENSKÝ (b. March 28, 1592, Nivnice, Moravia, Habsburg domain [now in Czech Republic]—d. Nov. 15, 1670, Amsterdam, Neth.), Czech educational reformer and religious leader, remembered mainly for his innovations in methods of teaching, especially languages. He favoured the learning of Latin to facilitate the study of European culture. *Janua Linguarum Reserata* (1631; *Gate of Tongues Unlocked,* 1633?) revolutionized Latin teaching and was translated into 16 languages.



Comenius, detail of an engraving by David Loggan after a drawing by Crispijn van de Passe, from the title page of *Didactica Opera Omnia,* 1657

By courtesy of the Pedagogicke Muzeum J.A. Komenskeho, Prague

Life. Comenius was the only son of respected members of a Protestant group known as the Bohemian Brethren. His parents died when he was 12, and after four unhappy years he was sent to school at Přerov. Though the teaching methods there were poor, he was befriended by a headmaster who recognized his gifts and encouraged him to train for the ministry. At the University of Heidelberg, Germany, he came under the influence of Protestant millennialists, who believed that men could achieve salvation on earth. He also read with enthusiasm the works of Francis Bacon and returned home convinced that the millennium could be attained with the aid of science.

As a young minister Comenius found life wholly satisfying, but the outbreak of the Thirty Years' War in 1618 and the emperor Ferdinand II's determination to re-Catholicize Bohemia forced him and other Protestant leaders to flee. While in hiding, he wrote an allegory, *The Labyrinth of the World and the Paradise of the Heart,* in which he described both his despair and his sources of consolation. With a band of Brethren he escaped to Poland and in 1628 settled in Leszno. Believing that the Protestants would eventually win and liberate Bohemia, he began to prepare for the day when it would be possible to rebuild society there through a reformed educational system. He wrote a "Brief Proposal" advocating full-time schooling for all the youth of the nation and maintaining that they should be taught both their native culture and the culture of Europe.

Educational reform. The reform of the educational system would require two things. First, a revolution in methods of teaching was necessary so that learning might become rapid, pleasant, and thorough. Teachers ought to "follow in the footsteps of nature," meaning that they ought to pay attention to the mind of the child and to the way the student learned. Comenius made this the theme of *The Great Didactic* and also of *The School of Infancy*—a book for mothers on the early years of childhood. Second, to make European culture accessible to all children, it was necessary that they learn Latin. But Comenius was certain that there was a better way of teaching Latin than by the inefficient and pedantic methods then in use; he advocated "nature's way," that is, learning about things and not about grammar. To this end he wrote *Janua Linguarum Reserata,* a textbook that described useful facts about the world in both Latin and Czech, side by side; thus, the pupils could compare the two languages and identify words with things. Translated into German, the *Janua* soon became famous throughout Europe and was subsequently translated into a number of European and Asian languages. Comenius wrote that he was "encouraged beyond expectation" by the book's reception.

With the liberation of Bohemia less certain than before, Comenius turned to an even more ambitious project—the reform of human society through education. Others in Europe shared his vision, among them a German merchant living in London, Samuel Hartlib, who invited Comenius to England to establish a college of social reform. With approval from the Brethren, Comenius went to London in 1641, reporting back that he had been "fitted out with new clothes befitting an English divine." He met a number of influential men, engaged in much discussion, and wrote essays of which the most notable was *The Way of Light,* which set out his program. Parliament went so far as to consider setting up a college "for a number of men from all nations." This prospect was shattered by the outbreak of the English Civil War, however, and Comenius was obliged to leave the country in 1642. He had been invited to France by Cardinal Richelieu; and the American John Winthrop, Jr., who was in Europe looking for an educator-theologian to become president of Harvard College, may have met Comenius. Instead, Comenius accepted an offer from the government of Sweden to help reform its schools by writing a series of textbooks modeled on his *Janua.*

He interpreted his agreement with the Swedish government as entitling him to base his textbooks on a system of philosophy he had evolved called "pansophy" (see below). After struggling hard to produce them, however, he found that they failed to satisfy anyone. Nevertheless, in the course of his stay at Elbing, he tried to lay a philosophical foundation for a science of pedagogy. In *The Analytical Didactic,* forming part of his *Newest Method of Languages,* he reinterpreted the principle of nature that he had described in *The Great Didactic* as a principle of logic. He put forward certain self-evident principles from which he derived a number of maxims, some of them full of common sense and others rather platitudinous. His chief attention was directed to his system of pansophy. Ever since his student days he had been seeking a basic principle by which all knowledge could be harmonized. He believed that men could be trained to see the underlying harmony of the universe and thus to overcome its apparent disharmony. He wrote that:

> pansophy propoundeth to itself so to expand and lay open to the eyes of all the wholeness of things that everything might be pleasurable in itself and necessary for the expanding of the appetite.

The "expanding of the appetite" for pansophic understanding became his great aim, spelled out in "A General Consultation Concerning the Improvement of Human Affairs."

Social reform. The Peace of Westphalia (1648), which ended the Thirty Years' War, was a blow to Comenius and other Czech exiles, who thereby lost their last hope of a restoration of ethnic and religious liberty in their homeland. Few of them returned, since they would have been required to recant their beliefs. Comenius left Elbing and returned to Poland, where the Brethren at Leszno had been cast into despair. In 1648 he was consecrated presiding bishop of the Moravians, the last of the Bohemian-Moravian clergy to hold this office.

His next invitation came from Hungary, where the young prince Zsigmond Rákóczi wanted to establish a model pansophic school at Sárospatak. Comenius, arriving there in 1650, received a warm reception. The school opened with about 100 pupils, but it proved unsuccessful. The students were ill-prepared to learn anything beyond the rudiments of reading and writing, and the teachers soon lost interest in a scheme they could not understand. The prince died in 1652, and at about the same time war broke out in Poland.

Comenius returned to Leszno, carrying with him the manuscript of a picture textbook he had written for his pupils but for which he had not yet been able to obtain the necessary woodcuts. He sent the manuscript to Nürnberg in Germany, where the cuts were made. The resulting book, *Orbis Sensualium Pictus* (1658; *The Visible World in Pictures*), was popular in Europe for two centuries and was the forerunner of the illustrated schoolbook of later times. It consisted of pictures illustrating Latin sentences, accompanied by vernacular translations. For example, the chapter "The Head and the Hand" began with a picture of a head and two hands followed by sentences such as:

> In the Head are, the Hair, 1. [which is Combed with a Comb, 2.] two Ears, 3. the Temples, 4. and the Face, 5. . . . In *Capite* sunt *Capillus,* 1. [qui pectitur *Pectine* 2.] *Aures* 3. *binae, & Tempora,* 4. *Facies,* 5.

Comenius had not been back in Leszno long before it was occupied and destroyed, with the loss of many of his manuscripts. He escaped to Amsterdam, where he remained for the rest of his life. In 1657 he gathered together most of his writings on education and published them as a collection, *Didactica Opera Omnia.* He devoted his remaining years to completing his great work, *Consultation.* He managed to get parts of it published, and when he was dying in 1670 he begged his close associates to publish the rest of it after his death. They failed to do so, and the manuscripts were lost until 1935, when they were found in an orphanage in Halle, Ger.

Assessment. During his lifetime the fame of Comenius rested chiefly on his two popular textbooks, the *Janua* and the *Orbis Sensualium Pictus.* He himself would have set more store by his influence as a social reformer, which reached its peak during his visit to England. Men all over Europe had looked to Comenius as a leader; his vision had impressed both those who were seeking a more dynamic form of religion and those who looked to science as an avenue of reform. His pansophism, on the other hand, was not influential either during his lifetime or afterward. His dream of universal harmony was too vague and too grandiose for the mental outlook of the 17th century, which was already shifting in a utilitarian and materialistic direction; it has had even less appeal in modern times.

As a religious leader Comenius helped keep alive the faith of his church in its darkest hour, and he provided the inspiration that led to its subsequent revival as the Moravian Church under Nikolaus, Graf von Zinzendorf,

in the 18th century. He was no sectarian but a champion of the church universal. He was also, for all of his internationalism, a Czech patriot at a time when the Czechs had been nearly crushed. He wrote: "I love my country and its language, and my greatest wish is that it should be cultivated."

In the 19th century Comenius' reputation was revived by the increasing attention given to the study of pedagogy, especially in Germany. At the present day he remains of interest as a prototype of the international citizen. His patriotic feelings for Germany did not prevent him from feeling himself a European and from believing profoundly in the unity of mankind. (J.E.Sa.)

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Comeragh Mountains, mountain range in County Waterford, Ireland, extending from the River Suir valley near Clonmel to the coastal lowland north of Stradbally. Their directional trend is northwest-southeast, and their peaks rise to elevations above 2,000 feet (600 m), with the highest point being 2,597 feet (792 m). The uplands have been heavily glaciated, resulting in a series of impressive steep-walled corries (ice-scooped basins) including Coumshingaun, a corrie with craggy sides 1,000 feet (305 m) high around a lake. The mountains are of sandstone and in effect form a single range with the neighbouring Monavullagh Mountains to the south.

Comercio, El (Spanish: "Commerce"), influential Peruvian newspaper published in Lima. The newspaper is one of the most respected in South America and is dedicated to "order, liberty, knowledge." Founded in 1839 and long owned by the Miró Quesada family, *El Comercio* is the oldest newspaper in Peru and the second oldest on the continent. It is conservative in its editorial outlook and oriented toward business and landowners, but over the years it has won a reputation as an informed and balanced general newspaper.

comet, any of a class of small celestial objects orbiting the Sun and developing diffuse gaseous envelopes and often long luminous tails when near the Sun. Comets are commonly distinguished from other components of the solar system by their rather nebulous appearance and extremely elongated orbits.

A brief treatment of comets follows. For full treatment, *see* MACROPAEDIA: Solar System.

The only component of a comet that can be seen with a large telescope when the comet is still far away from the Sun is the nucleus. The cometary nucleus is an irregularly shaped mass composed of ices (largely frozen water) mixed with substantial amounts of sootlike matter—perhaps carbon in the form of fine dust. The first closeup photographs of a cometary nucleus, those of the core of Comet Halley (Halley's Comet) taken in 1986 by the Giotto spacecraft, revealed that the nucleus was very black in colour, with roughly 90 percent of its surface covered by a "crust" of such dust particles. Cometary nuclei appear to be quite small in size. That of Comet Halley, for example, is an elongated body measuring only about 15 by 8 km (9 by 5 miles) with an estimated mass of 10^{17} grams. As the cometary nucleus approaches the Sun, its dust surface becomes hotter, more heat is transferred through the crust, and the subsurface ice begins to sublimate. The resultant gas leaves the comet and carries with it some of the loosely bound dust particles. Sublimation starts when the comets are closer than about three astronomical units from the Sun (one astronomical unit [AU] equals about 150,000,000 km, or 93,000,000 miles). The chemical composition of the vaporizing gases is dominated by water (about 80 percent), followed by carbon monoxide, carbon dioxide, methane, ammonia, and carbon disulfide, quantitatively in that order. Parent molecules leaving the nucleus quickly break up into daughter molecules, radicals, and ions. These absorb solar radiation and subsequently reradiate it at another wavelength. The dust also scatters sunlight. When within 1 AU of the Sun, a typical cometary nucleus is surrounded by a spherical envelope, or coma, of gas and dust, which can be up to 100,000 km (62,000 miles) across. The coma gases travel outward at a speed of roughly 0.6 km per second, dragging dust particles away from the nucleus.

On nearing the Sun, a comet may develop two tails. The solar wind of high-speed protons and electrons sweeps cometary ions in a direction away from the Sun, producing a straight plasma tail. A second tail consisting of dust particles about a micrometre in size may appear. This dust tail has a greater curvature than the plasma tail and is usually shorter. It also points away from the Sun because of the repulsive force exerted by solar radiation pressure on the minute particles. Larger particles released from the nucleus take up orbits that have nearly the same parameters as the parent comet. Some gain on the comet and others fall behind until eventually an annulus of dust is formed around the comet's orbit. This is called a meteoroid stream. A meteor shower is produced in the Earth's upper atmosphere when it passes through such a stream.

Several theories for the origin of comets have been proposed. According to one widely accepted view, comets are as old as the solar system and are the remnants of the building blocks that produced the giant planets. They were gravitationally perturbed by the accreting outer planets into extremely elongated orbits. Hundreds of millions of comet nuclei exist in a spherical region called the Oort cloud that surrounds the solar system. Such nuclei may travel out of the cloud when disturbed by the gravitational force of a nearby star and enter the inner solar system.

Some accretion models of the solar system suggest that an early cometary bombardment of the Earth may have played a major role in the formation of the atmosphere and the oceans. In addition, comets may have supplied the organic molecules needed for life to develop on the planet. Such theories remain unproved.

Comets are generally divided into short-period comets (those with periods of less than 200 years) and long-period comets (those with periods of more than 200 years). Among those comets that can be seen easily with the naked eye, Comet Halley, with an average period of 76 years, is the only one that returns in a single lifetime.

Cometary bodies were investigated for the first time with spacecraft during the mid-1980s. In 1985 the U.S. probe known as the International Cometary Explorer (ICE) passed through the dust tail of Comet Giacobini-Zinner. The following year, spacecraft launched by Japan and the Soviet Union, along with the aforementioned Giotto probe of the European Space Agency (ESA), flew by Comet Halley, transmitting many useful data about its composition and sending photographs of its nucleus and coma.

Comfort, Alex, byname of ALEXANDER COMFORT (b. Feb. 10, 1920, London, Eng.), English gerontologist and author, best known for his books on sexual behaviour.

Comfort was educated at the University of Cambridge (B.A., 1943; M.A., 1945) and the University of London (Ph.D., 1949) and qualified in medicine at the Royal College of Physicians and London Hospital. He taught and did research both in London and in California, U.S. (from 1974).

His theories on aging are expressed in *The Biology of Senescence* (1956) and *The Process of Aging* (1964), the latter being an introduction to gerontology for the layperson. Comfort advocated greater freedom in sexual behaviour in books ranging from the scholarly *Sexual Behaviour in Society* (1950) to the best-selling *Joy of Sex* (1972) and its sequel, *More Joy* (1974), an examination of the psychological and sociological aspects of a free sexual lifestyle. Among his other works on sexual problems and practices are *Sex in Society* (1975) and *Sexual Consequences of Disability* (1978). He also wrote poetry and novels.

comfrey, any herb plant of the Eurasian genus Symphytum, of the family Boraginaceae, es-

Historic comets*

name	first seen	period of orbit (in years)	absolute magnitude†	perihelion‡ (in astronomical units)	aphelion§ (in astronomical units)
Halley	240 BC	76.09	4.6	0.587	35.33
Tycho Brahe	1577	...	−1.8	...	...
Kirch	1680	8,814	4.0	...	...
De Chéseaux	1744	...	0.5	...	...
Lexell	1770	5.60	7.7	0.674	5.63
Biela	1772	6.62 ‖	7.5	0.861	6.19
Encke	1786	3.30	9.0	0.338	4.09
Flaugergues	1811	3,094	0.0	1.035	423.66
Pons-Winnecke	1819	6.34	8.8	1.247	5.61
Great Comet of 1843	1843	512.57	4.9	0.006	128.09
Donati	1858	1,950	3.3	0.578	311.55
Tebbutt	1861	409.11	3.9	0.822	109.40
Cruls	1882	758.37	0.8	0.008	166.32
Wolf	1884	8.43	6.2	2.506	5.78
Morehouse	1908	...	4.2	0.945	...
Schwassmann-Wachmann I	1925	15.03	5.0–0.0	5.448	6.73
Mrkos	1957	...	4.5	0.316	...
Arend-Roland	1957	...	5.0	0.355	...
Humason	1962	3,000	1.5	2.133	406.91
Seki-Lines	1962	...	6.5	0.031	...
Ikeya-Seki	1965	879.88	6.0	0.008	183.64
Tago-Sato-Kosaka	1969	420,000	...	0.473	...
Bennett	1970	1,680	5.0	0.538	281.86
Kohoutek	1973	75,000	6.5	0.142	...
West	1976	500,000	5.9	0.20	...

... Not available. *Renowned for size, brilliance, and other distinctive features. †Measures the hypothetical brightness a comet would have at one astronomical unit (149,600,000 km [93,000,000 miles]) from both Earth and the Sun; calculation of magnitude based on first period of observations. The smaller magnitudes indicate brighter comets. ‡The point in orbit at which the comet is closest to the Sun. §The point in orbit at which the comet is farthest from the Sun. ‖ After splitting in 1845, it returned on schedule as a double comet in 1852 but has not been seen since.

pecially the medicinal common comfrey (*S. officinale*), used to treat wounds and a source of a gum for treatment of wool. The coiled sprays of comfrey blooms, which are bell-like, deeply parted, five-lobed, and hanging, are usually pollinated by bees.



Common comfrey (*Symphytum officinale*)
Walter Chandoha

Comfrey fruits are four oval nutlets. Common comfrey is about 90 centimetres (3 feet) tall, with winged, hairy stems and blue, purplish, or yellow flowers.

comic opera, also called LIGHT OPERA, general designation for musical plays with light subject matter and happy endings. The dialogue is usually spoken, rather than sung. In addition to operetta and musical comedy, types of comic opera include Italian opera buffa (which has sung dialogue), German *Singspiel*, English ballad opera, and Spanish *tonadilla* and zarzuela. The French opéra-comique originated as comic opera but later dealt with serious subject matter.

comic strip, series of drawings that read as a narrative, usually arranged horizontally on the page of a newspaper, magazine, or book. A bound collection of comic strips, usually in chronological sequence, is known as a comic book. Words are usually used within the drawings but often are omitted altogether.

A brief treatment of the comic strip follows. For full treatment, *see* MACROPAEDIA: Caricature, Cartoon and Comic Strip.

The United States. The art of cartooning went through a rapid youth and adolescence in the United States between 1896 and 1907. Within 50 years it appeared in such diverse publications as booklets of vocational training, pictorial condensations of books of the Bible and well-known novels, and propaganda devices, often utilizing drawing styles with no pretense of being comic, as well as story continuities containing practically nothing funny.

In February and March 1896 the colour-printed Sunday supplement of the *New York World*, which was already stocked with comic drawings, printed a single-panel cartoon featuring a sort of aged baby on whose sacklike yellow garment were printed words that he presumably spoke or thought; his language was earthy, and his comments pithily amusing. The yellow colour was at first a technical experiment; but the colour and the remarks so fascinated the public and were so plainly headed for success that William Randolph Hearst enticed the creator of the "Yellow Kid," Richard F. Outcault, over to his *New York Journal*. Joseph Pulitzer's *World* bought him back, and there were further bids, counterbids, and competitive sensations from which eventually the term yellow journalism arose.

James Swinnerton had, earlier in the '90s, drawn a weekly series, "The Little Bears and Tigers," for the *San Francisco Examiner*; they did not speak, but they appeared regularly, and they were funny. In themselves they were not an absolute novelty, for there had been continuing casts of characters before, as in Wilhelm Busch's *Max und Moritz*. Rudolph Dirks based his "Katzenjammer Kids" (first appearance Dec. 12, 1897, in a supplement to the *New York Sunday Journal*) on Busch. The kids' uproarious slapstick humour added another element to the strip's features of continuing characters and words within the picture. Speeches in balloons were used before the end of 1897 by Outcault for minor characters. Dirks soon adopted the device for all his characters, and he also used regular frames in succession.

Though the comic strip was complete in all essentials by the time Outcault's "Buster Brown" began in May 1902, his drawing and Dirks's were still rather fussy in the contemporary manner of magazine illustration. When Swinnerton started "Little Jimmy" in the *New York Sunday Journal* in 1905, he used a new style of simple outlines, barely indicated background, and comparatively large forms, adapted to rapid scanning at arm's length.

Clare Briggs, in the *Chicago American* in 1904, had begun a daily strip in which tips on horse races were given by a comic character. Newspaper sports pages often brought little, repeating commentator figures into their daily caricatures of sporting personalities, but these were usually single-panel drawings, though there had been few two- or three-panel vertical continuities; most importantly, the strips were still restricted to Sunday appearance. In 1907 Bud Fisher's "Mr. Mutt" (later "Mutt and Jeff") in the *San Francisco Chronicle* put the horizontal strip on a daily basis. The comic strip had thus arrived at maturity, except for the business technique of syndication to several papers, which was brought about by Moses Koenigsberg, editor of the *Chicago American* and founder in 1913 of the syndicate later called King Features Syndicate.

Great Britain. Though British comic strips largely followed the pattern set in the United States, England claimed the first regular strip character, the ne'er-do-well Ally Sloper (drawn by W.F. Thomas), whose adventures, told in captions beneath a sequence of drawings instead of in balloons, appeared in a weekly paper in 1884 and persisted fitfully until 1920. But it was a long time before newspaper publishers realized that adults might enjoy comic strips. Lord Northcliffe's weekly *Comic Cuts*, first published in 1890, was a big success. It was followed by *Puck* in 1910 and by *Rainbow* in 1914. All three were children's papers, *Rainbow* appealing more to younger readers than did the other two.

The shrewd Northcliffe was the first to realize that a strip for children in a daily paper might capture those same children as adult readers. So, in April 1915, "Teddy Tail" first appeared in Northcliffe's *Daily Mail*. Teddy was followed in 1919 by A.B. Payne's "Pip, Squeak and Wilfred" in the *Daily Mirror* and in 1920 by "Rupert" in the *Daily Express*. But the first realization that adults, too, might enjoy comic strips seems to have come to the *Daily Sketch* in 1921, when that paper introduced "Pop," drawn by Millar Watt. Eighteen months later came "Dot and Carrie" in the *Star*. It was drawn by J.K. Horrabin and revolved around a post-World War I phenomenon, the typist. A lull followed until the *Daily Mirror* began to build up its strip "stable," beginning in 1929 with "The Pater," an imitation of "Pop," drawn by Harold Earnshaw, followed in 1931 by "Tich," another daily "gag" about an urchin, created by Frank and Steve Dowling. In 1932 the perky blond "Jane" arrived, in "The Diary of a Bright Young Thing," drawn by Norman Pett.

British comic strips gained wide popularity all over the world after World War II. The *Daily Mirror's* "Andy Capp," a North-country layabout drawn by Reg Smythe, made its first appearance in 1957. "Andy" appeared in more than 500 newspapers, 250 of them in the United States, and was translated into 13 different languages. "Tiffany Jones," drawn by Pat Tourret for the *Daily Sketch*, appeared in more than 100 papers outside Britain, about 60 of them in the United States. "Fred Basset," the *Daily Mail's* pet dog, drawn by Graham, appeared in dozens of papers abroad, as did the *Daily Express* strip version of "James Bond" and his female equivalent, "Modesty Blaise," drawn by Jim Holdaway and written by Peter O'Donnell.

Types of strips and comic books. Comic strips fall into 10 main categories: (1) the gag strip, which depends on an anecdote that ends with a bang in the fourth panel, and whose continuity lies in the cast of characters only, as in "Moon Mullins"; (2) the strip with a single protagonist, a story line, and changing scene and minor characters, such as "Orphan Annie"; (3) conversely, the strip with a fixed cast, a story line, and guest characters who live out a long or short episode, as in "Our Boarding House," or who appear only to be vanquished or die, as the villains of "Dick Tracy"; (4) the strip that has no story line but is really a cartoon of situation, such as "Bringing Up Father" and "Blondie," each of which moves in an orbit of its own; (5) the passage-of-time strip, such as "Gasoline Alley," whose characters grow up and age realistically; (6) the special-milieu strip, such as "Joe Palooka" (boxing), "Steve Canyon" (flying), or "Modest Maidens" (the "dumb" dressed-up city girl); (7) the adventure, or heroic-adversity, strip, such as "Superman" or "Buck Rogers"; (8) the fantasy, which may be quaint ("Krazy Kat" and "Barnaby"), frantic ("Smoky Stover"), or based on mock-human animals ("Donald Duck" and family); (9) the chain-of-subjects strip, as practiced by Fontaine Fox, T.A. Dorgan, Clare Briggs, and H.T. Webster, each of whom employed a variety of settings and topics, jumping (sometimes on set days of the week), for example, from bridge to golf or from the joys of childhood to the exploits of a famous strong woman; and (10) the serious strip, which may be a continuous story of the past, like "Prince Valiant," or an "uplift" chronicle, like that of the benevolently interfering "Mary Worth."

The serious form early became a favourite when collected and sold as magazines or books. Both the newspaper syndicates and other publishers, often publishers of paperback books, began in the 1930s to issue pamphlets, usually in colour and printed on paper somewhat better than newsprint, that either assembled and reprinted newspaper strips or used new material aimed at special groups of possible buyers.

Although "Mutt and Jeff" had been reprinted in book form as early as 1911, it was World War II that gave the comic book its tremendous circulation, particularly among people away from home who needed relaxation. The power of these concentrated picture books was soon observed by such differing groups as educators, the clergy, and the peddlers of pornography, who promptly went to work. By 1954, the outcry against abuse of this power led to a code of self-censorship in the industry.

Violence gave way to domestic drama, gag strips, Walt Kelly's cerebral "Pogo," Charles Schultz's "Peanuts," political satire, parody, and "adult comics." The popularity of comic strips and books remains undiminished. New ones are introduced annually, and more are being translated into other languages than ever before.

Comici Confidènti (Italian: Confident Comedians), either of two companies of the Italian commedia dell'arte that were instrumental in extending the reputation of this form of improvised theatre throughout Europe. The first company, which performed in France and

Spain as well as in Italy, was formed about 1574 under the leadership of the commedia actress Vittoria Piisimi and her actor husband, Giovanni Pellesini, who had created the mask of the character Pedrolino. Early in the 17th century, with the demise of the Gelosi, the leading commedia company, it became the favourite of the Mantuan court.

The second troupe, which traveled principally in Italy, was established about 1610 under the leadership of the producer-director Flaminio Scala and the patronage of Giovanni de' Medici. After its dissolution (*c.* 1621) a number of its actors became associated with the French version of the commedia dell'arte, the Comédie-Italienne in Paris.

Comilla, also spelled KUMILLĀ, town, eastern Bangladesh. It is situated just south of the Gumti River, which is a tributary of the Meghna. Connected by road and rail with Dhākā and Chittagong, Comilla is a centre for the collection of hides and skins and has a thermal power station, a match factory, and jute mills. The main cottage industries are cane and bamboo basketry, woodworking, and cotton weaving. The town is distinguished by the size and number (more than 400) of the tanks (water reservoirs) in its environs; the Dharma Sāgar tank, measuring 1 mile (1.6 km) in circumference, was constructed by a Tippera raja in the 15th century. Constituted a municipality in 1864, the town contains a library, a teacher-training college, and a number of government colleges, including the village development academy of Comilla Government Victoria College, affiliated with the University of Chittagong.

The surrounding area consists chiefly of a level alluvial plain intersected by rivers and inundated during the rainy season. Rice, jute, oilseeds, betel nuts, chilies, and vegetables are the chief crops; some tea and cotton are grown on the hill slopes. The area formed part of the Hill Tippera princely state until 1733, when it was annexed by the Mughals. In 1765 its administration passed to the British East India Company. Pop. (1981) city, 184,132.

Comines, Philippe de: *see* Commynes, Philippe de.

Cominform, formally COMMUNIST INFORMATION BUREAU, or INFORMATION BUREAU OF THE COMMUNIST AND WORKERS' PARTIES, Russian INFORMATSIONNOYE BYURO KOMMUNISTICHESKIKH I RABOCHIKH PARTY, agency of international communism founded under Soviet auspices in 1947 and dissolved by Soviet initiative in 1956.

The Communist Information Bureau was founded at Wilcza Góra, Pol., in September 1947, with nine members—the communist parties of the U.S.S.R., Bulgaria, Czechoslovakia, Hungary, Poland, Romania, Yugoslavia, France, and Italy. The most vehement supporters of the Cominform were the Yugoslav communists under the leadership of Tito; therefore, Belgrade was selected as the seat of the organization. Mounting tension, however, between Yugoslavia and the Soviet Union led ultimately to the expulsion of Tito's party from the Cominform in June 1948, and the seat of the bureau was moved to Bucharest, Rom.

The Cominform's activities consisted mainly of publishing propaganda to encourage international communist solidarity. The French and Italian parties were ineffective in carrying out the chief task assigned to them by the Cominform—to obstruct the implementation of the Marshall Plan and the Truman Doctrine. Like the Third International (Comintern) in its later phases, the Cominform served more as a tool of Soviet policy than as an agent of international revolution.

On April 17, 1956, as part of a Soviet program of reconciliation with Yugoslavia, the Soviets disbanded the Cominform.

Comino, Maltese KEMMUNA, one of the Maltese islands, in the Mediterranean Sea, separated from Malta to the southeast and Gozo to the northwest by narrow channels. It has an area of 1 square mile (3 square km). Comino was the site of a fortress of the Knights of Malta (Hospitalers, or Knights of St. John of Jerusalem); a tower (1618) of the fortress survives. Beeswax, honey, and grapes are produced, and goats and sheep are raised. Pop. (1990 est.) 1,790.

Comintern: *see* International, Third.

Comiso, town, Ragusa *provincia,* southeastern Sicily, Italy, at the foot of the Iblei Mountains just west of Ragusa city. The white limestone of the district has been used in numerous local churches. There is a castle of the Naselli, from which the family tomb was transferred in 1517 to the 13th-century church of San Francesco. Other churches include those of the Madre, Santissima Annunziata, and San Gregorio, which has a Byzantine baptistery. Christian catacombs are in the neighbourhood. Manufactures include textiles, soap, vases, and other commodities. Pop. (1989 est.) mun., 29,708.

Comitán, in full COMITÁN DE DOMÍNGUEZ, city, east-central Chiapas *estado* ("state"), southeastern Mexico, formerly known as Comitán de las Flores because of its profusion of tropical flowers. The city lies at 5,020 feet (1,530 m) above sea level on the central plateau of Chiapas and east-southeast of Tuxtla Gutiérrez, the state capital. It is a commercial centre for an agricultural (corn [maize], bananas, and avocados), forestry, and livestock-raising region; the principal industries are distilleries and textile mills. Only 52 miles (83 km) from the Guatemalan border, the city has a customs house. It is on the Mexico City–Guatemala City link of the Pan-American Highway and also has an airfield. Pop. (1980) 27,374.

comitatus (Latin: "retinue"), in ancient Republican Rome, an elite company of one of the army commanders. A comitatus was formed in the assembly when one of the leading men announced that he needed followers to accompany him on a foray into enemy territory. Those who were attracted by the proposal, usually the more well-to-do warriors, would volunteer their services. At that time the relationship between leader and followers, who were called *comites* ("companions"), was a temporary one, lasting only for the duration of the raid. Later, the arrangement became permanent; the leader fed the comitatus and kept the company about him in peace as well as in war. He supplied the members with their weapons and horses and shared with them the spoils of war. A military force was thus established over which the other warriors had little or no control. Members of the comitatus were willing to fight to the death for their leader; it was a disgrace for them to survive him.

comitia, plural COMITIA, in ancient Republican Rome, a legal assembly of the people. Comitia met on an appropriate site (*comitium*) and day (*comitialis*) determined by the auspices (omens). Within each comitia, voting was by group; the majority in each group determined its vote.

The powers of Republican Roman government were divided between the Senate, the magistrates, and the people (*populus*). Originally the *populus* consisted only of the patricians, who formed a class of privileged citizens. The patricians were divided into 30 curiae, or local groups, and the legal assembly of these curiae, the Comitia Curiata, was for a time the sole legal representative of the entire Roman *populus.* The Comitia Curiata dated from the time of the Roman kings. By late Republican times its importance had dwindled, and its chief functions were simply to confer the *imperium* (supreme executive power) on magistrates and to witness wills, adoptions, and the inauguration of priests.

The Comitia Centuriata, instituted in about 450 BC as a military assembly, decided issues of war and peace, enacted legislation, elected consuls, praetors, and censors, and considered the appeals of Roman citizens convicted of capital crimes. Unlike the Comitia Curiata, this comitia included plebeians as well as patricians, but its organization nevertheless gave greater influence to the rich than to the poor. All Roman citizens were registered in *tribus* (tribes), and a census was made of their property. They were then assigned to classes and *centuriae* (centuries) according to their wealth and the equipment they could provide for military service. Voting in the Comitia Centuriata proceeded by centuries according to precedence, starting with the equites, followed by the first and wealthiest class; these groups constituted a clear majority over the combined votes of the other four classes if they voted as a block.

In 471 BC the Concilium Plebis was established; this body was organized and voted by tribes, and it consisted exclusively of plebeians and could be summoned and presided over only by the plebeian magistrates, *i.e.,* the tribunes. The Concilium Plebis was originally a relatively small and informal advisory assembly, or *concilium,* but after the passage of the Lex Hortensia (287 BC) its resolutions, or *plebiscita,* had the force of law and were binding upon all Roman citizens. The assembly became, in effect, the Comitia Plebis Tributa. Its simpler procedures and the availability of tribunes made this comitia an important legislative body of the middle and later periods of Republican Rome. Its judicial functions, however, were basically limited to fines for noncapital offenses.

The Comitia Populi Tributa was founded around 357 BC in imitation of the Comitia Plebis Tributa, but it differed from the former in that it was an assembly of the whole Roman people, plebeians and patricians, who were organized by tribe. This comitia elected the minor magistrates (curule aediles, quaestors, and military tribunes), held minor trials, and eventually became a regular organ for laws passed by the whole people. Both the Comitia Plebis Tributa and the Comitia Populi Tributa became increasingly influenced by radical tribunes or other demagogic leaders from the period of the Gracchi (*c.* 130 BC) onward.

Imperial Roman territory extended too widely for more than a few citizens to attend the comitia from distant regions. In spite of the emperor Augustus' provision for local councillors to vote for Roman comitia in their own towns, the comitia began to decline, and the various elective, legislative, and judicial functions gradually lapsed under the principate. The last piece of recorded legislation by the comitia is an agrarian law carried by the emperor Nerva in AD 98.

There were also comitia in *municipia* and *coloniae* for the election of magistrates and the passage of local legislation, but these comitia also decayed under the empire.

comma, in music, slight difference in frequency (and therefore pitch) occurring when a note of a scale, say E in the scale of C, is derived according to different systems of tuning. There are two commonly cited commas, the Pythagorean comma and the comma of Didymus, or syntonic comma.

In Pythagorean tuning, the intervals of the scale are derived from natural fifths (the interval that occurs between the second and third tones of the harmonic series). When natural fifths are constructed in sequence, as from C to G to D. . . , a circle back to C (=B♯) occurs: . . . A♯, E♯, B♯. This B♯, however, in-

stead of being exactly in tune with C, is slightly higher, by 0.24 of a semitone. This difference, which is audible, is the Pythagorean comma.

Just intonation derives all intervals from natural fifths and natural thirds (the interval between the fourth and fifth tones of the harmonic series). A natural third is slightly lower than the third derived by Pythagorean tuning, which is disagreeable to Western ears. The difference is the comma of Didymus, or syntonic comma, and equals 0.22 of a semitone.

Commagene, region in northern ancient Syria (modern south-central Turkey) bounded by Cilicia on the west and Cappadocia on the north. Its eastern boundary on the Euphrates River, at the conjunction of several routes over the Taurus Mountains, gave Commagene a strategic position between the Roman and Parthian empires. Commagene broke free from the decaying Seleucid Empire about 162 BC. Its king, Antiochus I (*c.* 69–*c.* 34 BC), by adroitly playing off Rome against Parthia, brought the kingdom to its zenith—a fact attested by the splendid mausoleum built by Antiochus to his own memory on the peak of Nimrud Dağ. Commagene maintained a precarious independence until it was annexed by Rome in AD 17. After a brief restoration (38–72), it was permanently incorporated into the Roman province of Syria.

Consult the INDEX *first*

command economy, economic system in which the means of production are publicly owned and economic activity is controlled by a central authority that assigns quantitative production goals and allots raw materials to productive enterprises. In such a system, determining the proportion of total product used for investment rather than consumption becomes a centrally made political decision. After this decision has been made, the central planners work out the assortment of goods to be produced and the quotas for each enterprise. Consumers may influence the planners' decisions indirectly if the planners take into consideration the surpluses and shortages that have developed in the market. The only direct choice made by consumers, however, is among the commodities already produced.

Prices are also set by the central planners, but they do not serve, as in a market economy, as signals to producers of goods to increase or decrease production. Instead, they are used mainly as instruments of the central planners in their efforts to reconcile the total demand for consumer goods with the supply available, allowing also for revenues to the state.

The central authority in a command economy assigns production goals in terms of physical units and allocates physical quantities of raw materials to enterprises. The process for a large economy with millions of products is extremely complex and has encountered a number of difficulties in practice.

Central planning of this kind is not without advantages, however, since it is able to mobilize resources quickly on a national scale if necessary during wartime or some other national emergency.

commandant, commander of a single place or body of men, such as a military school or training unit, or of a larger organization such as a naval district in the United States. The rank of a commandant depends upon the size and importance of his command: in the British Army a colonel commandant is the senior officer of a regiment; in the French Army a commandant is the commanding officer of a battalion, a rank equivalent to major; and the commandant of the United States Marine Corps is a four-star general. Headquarters commandant denotes a staff officer in charge of the internal administration of a military headquarters, with emphasis on maintenance and security of buildings and grounds.

Commander Islands (Russia): *see* Komandorskiye Ostrova.

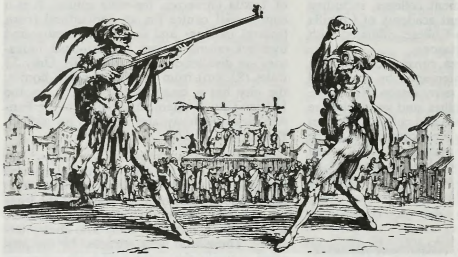
commando, military unit—roughly equivalent to an infantry battalion—consisting of men especially trained to employ guerrilla-like shock tactics ranging from hand-to-hand combat to hit-and-run raids. A member of such a unit is also called a commando. In general usage, the term also refers to irregular or guerrilla tactics carried out by small regular units. The commando originated with the Boers in South Africa, where it was the administrative and tactical unit "commandeered" by law.

commedia dell'arte (Italian: "comedy of art"). Italian theatrical form that flourished throughout Europe from the 16th through the 18th century. Outside Italy, the form had its greatest success in France, where it became the Comédie-Italienne (*q.v.*). In England, elements from it were naturalized in the harlequinade in pantomime (*q.v.*) and in the Punch-and-Judy show, a puppet play involving the commedia dell'arte character Punch (*q.v.*).

The commedia dell'arte was a form of popular theatre that emphasized ensemble acting; its improvisations were set in a firm framework of masks and stock situations, and its plots were frequently borrowed from the classical literary tradition of the commedia erudita, or literary drama. Professional players who specialized in one role developed an unmatched comic acting technique, which contributed to the popularity of the itinerant commedia troupes that traveled throughout Europe. Despite contemporary depictions of scenarios and masks and descriptions of particular presentations, impressions today of what the commedia dell'arte was like are secondhand. The art is a lost one, its mood and style irrecoverable.

Origins and development. Many attempts have been made to find the form's origins in preclassical and classical mime and farce and to trace a continuity from the classical Atellan play to the commedia dell'arte's emergence in 16th-century Italy. Though merely speculative, these conjectures have revealed the existence of rustic regional dialect farces in Italy during the Middle Ages. Professional companies then arose; these recruited unorganized strolling players, acrobats, street entertainers, and a few better-educated adventurers, and they experimented with forms suited to popular taste: vernacular dialects (the commedia erudita was in Latin, or in an Italian not easily comprehensible to the general public), plenty of comic action, and recognizable characters derived from the exaggeration or parody of regional or stock fictional types. It was the actors who gave the commedia dell'arte its impulse and character, relying on their wits and capacity to create atmosphere and convey character with little scenery or costume.

The first date certainly associated with an Italian commedia dell'arte troupe is 1545. The most famous early company was the Gelosi (*q.v.*), headed by Francesco Andreini and his wife, Isabella; the Gelosi performed from 1568 to 1604. Of the same period were the Desiosi (*q.v.*), formed in 1595, to which Tristano Martinelli (*c.* 1557–1630), the famous Arlecchino, belonged; the Comici Confidènti (*q.v.*), active from 1574 to 1621; and the Uniti (*q.v.*), under Drusiano Martinelli and his wife, Angelica, a company first mentioned in 1574. Troupes of the 17th century included a second Confidènti troupe directed by Flaminio Scala, and the Accesi and the Fedeli (*qq.v.*), to which Giovambattista Andreini, called Lelio, one of the great commedia dell'arte actors, belonged. The first mention of a company in France is in 1570–71. The Gelosi, summoned to Blois in 1577 by the king, later returned to Paris, and the Parisians embraced the Italian theatre, supporting resident Italian troupes who developed additional French characters. The Comédie-Italienne was formally established in France in 1653 and remained popular until Louis XIV expelled the Italian troupes in 1697. The Italian players were also popular in England, Spain, and Bavaria.



Commedia dell'arte figures with a platform stage in the background; engraving by Jacques Callot, *Balli di Sfessania*, 1632

By courtesy of the trustees of the British Museum

Each commedia dell'arte company had a stock of scenarios, commonplace books of soliloquies and witty exchanges, and about a dozen actors. Though there was some doubling of masks, most players created their own masks or developed ones already established. This helped to keep a traditional continuity while allowing diversity. Thus, though many players are individually associated with parts—the elder Andreini is said to have created the Capitano (*q.v.*), and Tiberio Fiorillo (1608–94) is said to have done the same for Scaramuccia (the French Scaramouche, *q.v.*)—for an understanding of the commedia dell'arte, the mask is more important than the player.

The masks, or characters. A typical scenario involved a young couple's love being thwarted by their parents. The scenario used symmetrical pairs of characters: two elderly men; two lovers; two *zanni* (*q.v.*; madcap servants); a maidservant; a soldier; and extras. The lovers, who played unmasked, were scarcely true commedia dell'arte characters—their popularity depending on looks, grace, and fluency in an eloquent Tuscan dialect. The parents were clearly differentiated. Pantalone (Pantaloon; *q.v.*) was a Venetian merchant: serious, rarely consciously comic, and prone to long tirades and good advice. Dot-

tore Gratiano (*see* Dottore) was, in origin, a Bolognese lawyer; gullible and lecherous, he spoke in a pedantic mixture of Italian and Latin.

Other characters began as stock masks and developed into well-known characters in the hands of the most talented players. The Capitano developed as a caricature of the Spanish braggart soldier, boasting of exploits abroad, running away from danger at home. He was turned into Scaramuccia by Tiberio Fiorillo, who, in Paris with his own troupe (1645–47), altered the captain's character to suit French taste. As Scaramouche, Fiorillo was notable for the subtlety and finesse of his miming. The *zanni,* who were often acrobats, or "tumblers," had various names such as Panzanino, Buratino, Pedrolino (or Pierrot), Scapino, Fritellino, Trappolino, Brighella, and most notably, Arlecchino and Pulcinella (related to the English Punchinello, or Punch). Pulcinella, like Capitano, "outgrew" his mask and became a character in his own right, probably created by Silvio Fiorillo (d. *c.* 1632), who had earlier created a famous Capitano, Mattamoros. Columbina, a maidservant, was often paired in love matches with Arlecchino, Pedrolino, or the Capitano. With Harlequin she became a primary character in the English pantomime, the harlequinade. The *zanni* had already been differentiated as comic rustic and witty fool. They were characterized by shrewdness and self-interest: much of their success depended on improvised action and topical jokes. Arlecchino (Harlequin; *q.v.*), one of the *zanni,* was created by Tristano Martinelli as the witty servant, nimble and gay: as a lover he became capricious, often heartless. Pedrolino was his counterpart. Doltish yet honest, he was often the victim of his fellow comedians' pranks. As Pierrot, his winsome character carried over into later French pantomimes. The *zanni* used certain tricks of their trade: practical jokes (*burle*)—often the fool, thinking he had tricked the clown, had the tables turned on him by a rustic wit as clever, if not so nimble, as his own—and comic business (*lazzi*).

Decline. The decline of the commedia dell'arte was due to a variety of factors. The rich verbal humour of the regional dialects was lost on foreign audiences. Eventually the physical comedy came to dominate the performance, and, as the comic business became routine, it lost its vitality. As time went on, the actors stopped altering the characters, so that the roles became frozen and no longer reflected the conditions of real life, thus losing an important comic element. The efforts of such playwrights as Carlo Goldoni (*q.v.;* 1707–93) to reform Italian drama sealed the fate of the decaying commedia dell'arte. Goldoni borrowed from the older style to create a new, more realistic form of Italian comedy, and audiences greeted the new comedy with enthusiasm.

The commedia dell'arte's last traces entered into pantomime as introduced in England (1702) by John Weaver at Drury Lane Theatre and developed by John Rich at Lincoln's Inn Fields. It was taken from England to Copenhagen (1801), where, at the Tivoli Gardens, it still survives. Revivals, notably in the 1960s by a Neapolitan troupe led by Peppino de Filippo, by puppet companies in Prague, and by students and repertory players in Bristol and London, however carefully their masks copied contemporary illustrations, however witty their improvisation, could only approximate what the commedia dell'arte must have been.

A more important, if less obvious, legacy of the commedia dell'arte is its influence on other dramatic forms. Visiting commedia dell'arte troupes inspired national comedic drama in Germany, eastern Europe, and Spain. Other national dramatic forms absorbed the comic routines and plot devices of the commedia. Molière, who worked with Italian troupes in France, and Ben Jonson and William Shakespeare in England incorporated characters and devices from the commedia dell'arte in their written works. European puppet shows, the English harlequinade, French pantomime and the cinematic slapstick of Charlie Chaplin all recall the glorious comic form that once prevailed.

commedia erudita (Italian: "learned comedy"), 16th-century Italian dramatic form that, unlike its theatrical contemporary, the vernacular and improvisational commedia dell'arte, followed scripts written in Latin or Italian that were based on the scholarly works of earlier Italian and ancient Roman authors. Because the language used in the commedia erudita was not easily comprehensible to the general public, these plays were performed for the nobility, usually by nonprofessional actors (*dilettanti*). Sources for commedia erudita included the comedies of the Roman dramatists Plautus and Terence and works of the 14th-century Italian humanist Giovanni Boccaccio. Other dramas were contributed by Ludovico Ariosto, considered the best writer of early Italian vernacular comedy and a principal figure in the establishment of this literary form; the philosopher-playwright Giambattista della Porta, author of a number of stinging satires; and Niccolò Machiavelli, whose *La mandragola* (1524; "The Mandrake") was one of the outstanding comedies of the century.

Themes, motifs, situations, and the use of stock characters by the commedia erudita greatly influenced the commedia dell'arte, whose repertoires, especially in northern Italy, resembled the commedia erudita in their tight structures based on the three dramatic unities (time, place, action).

Commelinales, the spiderwort order of monocotyledonous flowering plants, comprising four families of mostly tropical and subtropical weak-stemmed herbs.





(Top) Spiderwort (*Tradescantia ohiensis*), (bottom) oyster plant (*Rhoeo discolor*)
(Top) Joan E. Rahn, (bottom) Walter Dawn

A brief treatment of Commelinales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The spiderwort family (Commelinaceae) is the largest and most important of the order. It includes, among its 38 genera and approximately 700 species, the following genera, which provide species grown as garden and indoor ornamentals: the spiderwort (*q.v.*) genus (*Tradescantia,* 20 species), including the common spiderwort (*T. virginiana*) and one of the wandering Jew plants (*T. fluminensis*); the dayflowers (*Commelina,* 100 species), of which only 3 are grown ornamentally (*C. coelestis, C. diffusa,* and *C. erecta*) for their blue flowers; *Dichorisandra* (30 species), especially *D. mosaica* and *D. thyrsiflora,* both grown as blue-flowered foliage plants; *Rectanthera* (2 species, formerly *Spironema*), especially *R. fragrans,* a fragrant, waxy-white-flowered hanging-basket plant; Moses-in-the-cradle, oyster plant, or boat lily (*Rhoeo spathecea,* or *R. discolor*), grown as a potted plant for its purple-coloured leaves and unusual flowers; and *Zebrina* (*q.v.;* 2 species), especially the other plant known as the wandering Jew (*Z. pendula*).

The second largest family of the order is the yellow-eyed grass family (Xyridaceae), which has 2 genera (*Xyris,* 250 species, and *Achlyphila,* one species). It consists of small, tufted, rushlike marsh plants that mostly grow in the tropics and subtropics of the Americas. Species of *Xyris* are grown in wild gardens, but otherwise the family is of little economic importance.

The family Rapateaceae contains 16 genera and about 80 species of perennial (long-lived) herbs that grow from fleshy rootstocks. These plants, which have leaves with a characteristic 90° lengthwise twist, grow in the dense forests of tropical South America and extreme western tropical Africa. The largest genera are *Stegolepis* (23 species), *Rapatea* (20 species), and *Saxofriderica* (9 species).

The smallest of the order is the bogmoss family (Mayacaceae); it has only one genus (*Mayaca*) with 10 species of freshwater aquatic mosslike herbs. They grow in springs, ponds, and streams in the southeastern United States, Central America, and northern South America. One species of *Mayaca* is found in tropical Africa.

Commelinidae, subclass of herbaceous or sometimes woody monocotyledonous flowering plants. The subclass consists of 7 orders together containing 16 families and about 15,000 species. The majority of Commelinidae species are found in the order Cyperales, which comprises the families Poaceae (grasses) and Cyperaceae (sedges).

A brief treatment of the Commelinidae follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The flowers of Commelinidae species may be either perfect or unisexual; they are pollinated by wind or insects, or they may be adapted to self-pollination. The stamens generally number three or six, or are present in multiples of three, and are often numerous. The perianth is organized in multiples of three, or it may be reduced to bristles or chaff to the point of absence. The two to four carpels are united to form a compound superior ovary.

commensalism, in biology, a relation between individuals of two species in which one species obtains food or other benefits from the other without either harming or benefiting the latter. The commensal (the species that benefits from the association) may obtain nutrients, shelter, support, or locomotion from the host species, which is substantially unaffected. The commensal relation is often

between a larger host and a smaller commensal; the host organism is unmodified, whereas the commensal species may show great structural adaptation consonant with its habits, as in the remoras that ride attached to sharks and other fishes. Both remoras and pilot fishes feed on the leftovers of their hosts' meals. A commensal relation based on shelter is seen in clown fishes (*Amphiprion percula*), which live unharmed among the stinging tentacles of sea anemones, where they are protected from predators. Numerous birds feed on the insects turned up by grazing mammals, while other birds obtain soil organisms stirred up by the plow. Various biting lice, fleas, and louse flies are commensals in that they feed harmlessly on the feathers of birds and on sloughed-off flakes of skin from mammals.

commentarii (Latin: "commentaries"), singular COMMENTARIUS, in Roman history, memoranda and notes that were later used by historians as source materials. Originally, *commentarii* were simply informal personal notes written by people to assist their memory in regard to personal, household, or public business. The typical Roman household, for instance, kept a diary and account book, while men in public life kept notebooks for speeches, legal cases, and items of general business. The first official use of *commentarii* developed in the priestly colleges, which used such notes to list the details of religious ceremonies and rituals. Magistrates too had their regular notes on procedural aspects, which they would hand on to successors in order to maintain the routine of their offices. Provincial governors also kept *commentarii,* which they consulted when writing their reports to the Senate.

Under the empire, the *Commentarii Principis* were a register of the administrative acts of the emperor and included constitutions, rescripts, epistles, and edicts, all set down with official authority. There were also *commentarii diurni,* a journal of daily events at the emperor's court, which later became a system of records known as *ephemerides.*

Personal notes and memoranda could be turned into memoirs when public men of noble family drafted records of their achievements for their family archives. By the 2nd century BC Roman historians had begun consulting such memoirs in their research into earlier Roman history. Sulla and Cicero left their own memoirs as aids to historians, and, when Julius Caesar published his *Commentarii* for propagandistic purposes, his elegant Latin transformed them into a literary form in their own right.

commerce, chamber of, also called COMMERCIAL ASSOCIATION, or BOARD OF TRADE, any of various voluntary organizations of business firms, public officials, professional people, and public-spirited citizens. They are primarily interested in publicizing, promoting, and developing commercial and industrial opportunities in their areas; they also seek to improve community schools, streets, housing, public works, fire and police protection, parks, playgrounds, and recreational and tourist facilities.

International Chamber of Commerce. The one trade association that is truly international in scope is the International Chamber of Commerce. Founded in 1920, it is a world federation of business organizations, business firms, and business people. It frequently acts as the voice of the business community in the international field and presents the business point of view to governments and to world public opinion. The organization was granted the highest consultative status with the Economic and Social Council of the United Nations, that of category A. In addition to publishing a quarterly called *World Trade,* the International Chamber of Commerce operates a court of arbitration that provides conciliation and arbitration facilities for the settlement of commercial disputes for members of disparate nationalities. In the majority of cases the awards of this court are accepted and executed.

National chambers of commerce. Chambers of commerce are common to most industrialized countries operating within a free-enterprise or mixed system. Such organizations generally find the need for some form of national affiliation, so as to present an agreed front to central governments.

The title of chamber of commerce is applied to somewhat differing types of bodies in the various countries. In the United Kingdom and Belgium, for example, they are voluntary associations, whose members provide financial resources by subscription. In the other countries of the European Community and in some Latin-American countries, they are bodies whose functions, membership, financial resources, and organization are prescribed by law. In such circumstances the chambers of commerce often undertake duties that are elsewhere usually performed by local or central governments.

The first use of the name—*chambre de commerce*—was in regard to a temporary commission set up in Paris in 1601 to examine industrial and commercial problems. The Marseilles chamber was established in 1599 by that city and granted letters patent in 1650; it was the first chamber in the sense in which the term is now used. A decree by Louis XIV ordered that chambers be created to nominate deputies to the royal council of commerce in Paris. A number of these organizations were, therefore, founded during the 18th century, principally in the ports. The chambers were abolished during the French Revolution in 1791 and reestablished by Napoleon in 1804. Subsequent legislation has redefined their functions, tasks, and constitution; the law of 1858 still provides the basic framework, putting the French chambers of commerce under close governmental supervision. The functions of these chambers are many; they generally include representing the interests of members to local and national authorities, issuing certificates of origin, nominating members to consultative committees, providing advice on import duties and commercial legislation, establishing training schools, and organizing exhibitions, public works, and administration of ports or airports.

The first British chamber of commerce was founded in Jersey in 1768; as the nearest territory to France, it naturally adopted the French title. There followed Glasgow and Belfast (1783); Edinburgh and Leeds (1785); Manchester (1794); Birmingham (1813); and Liverpool (1850). The Great Exhibition (1851) stimulated the formation of 13 in that decade. Junior chambers of commerce (to provide for businessmen between the ages of 21 and 40) were introduced in 1925; by the late 20th century there were well over a hundred of them.

The oldest chamber of commerce in the United States is that of the state of New York, formed in 1768 when New York was still a British colony. The first city chamber was formed in 1773 in Charleston, S.C. The Chamber of Commerce of the United States, "a national federation working for good citizenship, good government and good business," was founded in 1912. In the late 20th century its membership comprised more than 40,000 business members and more than 4,000 organization members including trade and professional associations and local, state, and regional chambers of commerce. The national chamber of commerce had an underlying membership of more than 5,000,000 individuals and firms. Its various departments provided information and advice on all items of controversy between business and government, notably regulatory measures, expenditures, tariffs, taxes, and labour-management relations. Its monthly magazine, *Nation's Business,* enjoyed a large circulation, as did its research publications, committee reports, special bulletins, and annual booklet on policies that it advocated.

Chambers of commerce are synonymous in Canada with boards of trade. Interest in their formation was stimulated by the success of French chambers in expanding home and overseas trade. The first was established in Halifax in 1750, and the next in Montreal in 1822. Coordination is provided by seven provincial offices. The national body is the Canadian Chamber of Commerce, with headquarters in Montreal; it provides information about federal legislation, disseminates commercial information to members, and encourages business education. There are also a few hundred junior chambers of commerce in Canada.

commerce, interstate: *see* interstate commerce.

commerce clause, in the U.S. Constitution (Article I, section 8), the authorization of the Congress "To regulate Commerce with foreign Nations, and among the several States, and with Indian Tribes." It is the legal foundation of much of the U.S. government's regulatory authority.

In the matter of regulating commerce with foreign nations, the supremacy as well as the exclusivity of the federal government is generally understood. From time to time attempts by state or local authorities to deal in foreign policy matters considered exclusively the province of the federal government have been invariably struck down by the courts. The states do have some limited powers to tax foreign commerce. But, essentially, it may be said that, in dealing with foreign states, the federal government is the sole agent of all the people of the United States.

While it is also generally held that the states may almost exclusively regulate intrastate commerce, the fact is that Congress does have the power to so regulate in certain situations. For example, in the case of *U.S.* v. *Darby Lumber* (1941), although only some of the goods manufactured by Darby were to be shipped through interstate commerce, the Supreme Court held that the Fair Labor Standards Act could be applied to the intrastate production of those goods, because that production was part of the mainstream of the activity that would inevitably affect the interstate status of the goods.

This was a departure from earlier instances in which the court had been more likely to invest the states with implied powers of regulation that were not to be impeded by the federal government; for example, in *Cooley* v. *Board of Wardens of the Port of Philadelphia* (1852), the state of Pennsylvania held that it had the right, under the act of 1789, to regulate matters concerning pilots on its waterways, including the port of Philadelphia. The court agreed that Congress had never intended to deprive the states of all power to regulate commerce, and where no such federal legislation exists, the states retain this power until Congress, at a later date, enacts further legislation to restrict them.

Where Congress is silent (*Southern Pacific Company* v. *Arizona,* 1945) the court found that "in the absence of conflicting legislation by Congress . . . (there is) a residuum of powers in the states to make laws governing matters of local concern. . . ." A three-part test is used to determine this implied condition to regulate interstate commerce: (1) that the law is not intended to discriminate against another state, (2) that the substance of the law must not be one that requires national or uniform regulation, and (3) that the interests of the state outweigh those of the federal government's

right to regulate interstate commerce on the matter at issue. *See also* interstate commerce.

Commercial Appeal, The, morning daily newspaper published in Memphis, Tenn., and one of the leading daily papers of the mid-South in the United States.

Founded in 1840 by Henry van Pelt as a two-page sheet called *The Western World and the Memphis Banner of the Constitution,* it was shortly renamed *The Memphis Daily Appeal.* During the American Civil War its sympathies, like those of most of western Tennessee, were with the Confederacy. The paper loaded its presses onto railway cars and shuttled about the region, continuing to publish for three years while evading the Union armies.

In 1890 the *Daily Appeal* purchased a rival newspaper and became *The Appeal-Avalanche,* which four years later was merged with *The Commercial,* changing its name again to *The Commercial Appeal.* Noted for its independent stance, *The Commercial Appeal* has crusaded for many local and Memphis-area causes. It was acquired by the Scripps–Howard group in 1936.

commercial association: *see* commerce, chamber of.

commercial bank, bank with the power to make loans that, at least in part, eventually become new demand deposits. Because a commercial bank is required to hold only a fraction of its deposits as reserves, it can use some of the money on deposit to extend loans. When a borrower receives a loan, his checking account is credited with the amount of the loan; total demand deposits are thus increased until the loan is repaid. As a group, then, commercial banks are able to expand or contract the money supply by creating new demand deposits.

The name commercial bank was first used to indicate that the loans extended were short-term loans to businesses, though loans later were extended to consumers, governments, and other nonbusiness institutions as well. In general, the assets of commercial banks tend to be more liquid and carry less risk than the assets held by other financial intermediaries. The modern commercial bank also offers a wide variety of additional services to its customers, including savings deposits, safe-deposit boxes, and trust services.

Where the same name may denote a person, place, or thing, the articles will be found in that order

commercial fishing, the taking of fish and other seafood from oceans, rivers, and lakes for the purpose of marketing them.

A brief treatment of commercial fishing follows. For full treatment, *see* MACROPAEDIA: Fishing, Commercial.

Fishing is considered one of the primary forms of food production; it ranks with farming and probably predates it. Hunting-and-gathering peoples of prehistory took what they could from seas and lakes by hand. In many parts of the world, piles of mollusk shells dating back thousands of years attest to such early practices. Fishing techniques developed through the centuries, and, by the Middle Ages, bulk fisheries existed in Europe. So enterprising were the early fishing fleets that they were among the first Europeans to come to the New World, drawn to the excellent cod fishing in the Grand Banks off Newfoundland. The industry became mechanized in the 19th century, and modern commercial fishermen use a variety of power equipment, radar, and underwater sonar; computers are even used to operate large fishing vessels.

The fishing industry employs more than 5,000,000 people worldwide. The major countries engaged in marine fishing are Japan, China, the United States, Chile, Peru, India, South Korea, Thailand, and the countries of northern Europe.

The aquatic life that is harvested includes both marine and freshwater species of fish, shellfish, mammals, and seaweed. They are processed into a variety of products: food for human consumption, animal feeds, fertilizers, and as ingredients in other commercial commodities.

Marine fish constitute about 80 percent of the world's total commercial catch. Those most commonly taken for human food are cod, the various flatfish (flounder, halibut, plaice, and sole), haddock, herring, salmon (Atlantic and Pacific), and tuna (albacore, bigeye, bluefin, bonito, skipjack, and yellowfin). Other important fish are anchovy, grouper, hake, mackerel, menhaden, pilchard, redfish (ocean perch), sardine, sea bass, shad, shark, snapper, sturgeon, and whiting.

Freshwater fish are also taken commercially, although they comprise only about 10 percent of the annual global catch. Among those most commonly eaten are bass, carp, catfish, eel, perch, pike, trout, and whitefish.

Shellfish, a term that includes all invertebrate marine organisms that have visible shells, are usually divided into two classifications: crustaceans and mollusks. Crustaceans taken for food include the varieties of crab, crayfish, lobster, and shrimp. The mollusks harvested include clams, mussels, oysters, scallops, snails (abalone being the best-known), and whelks. Cephalapods, comprising the species of octopus, squid, and cuttlefish, are also caught for food.

The ocean mammals hunted for commercial uses include dolphins, porpoises, seals, walruses, and whales. (The taking of many species of aquatic mammals has been restricted or banned altogether in order to conserve their dwindling numbers or to save them from outright extinction.) Those oceanic mammals that are still taken are mainly used for products other than food, such as whale oil and sealskins. In the Arctic, however, these mammals are a major food source for Eskimos and other inhabitants. Freshwater dolphins are caught for food in such rivers as the Ganges and Amazon.

Seaweed, a form of algae, is collected in its natural state and cultivated in various parts of the world, chiefly in the Far East. The different kinds of edible seaweed are usually processed into food and vitamin-rich animal feeds.

The types of fish caught fall into two categories: demersal and pelagic. Demersal fish, such as cod, haddock, pollack, and the flatfishes, dwell in deep water, usually near the ocean floor. Pelagic fish, such as herring and tuna, are generally found near the surface.

Fishing methods range from simply collecting them near shore without gear to trapping them in enormous mechanically hauled nets. Net fishing, the method that produces the highest yields, is done in several ways, depending on the type of fish sought.

Surrounding nets are those that encircle fish before they are hauled in. The most basic of these is the seine net, which is a long net attached to a float line and weighted on the bottom. It is most commonly used on beaches and in freshwater lakes. In pelagic fisheries a frequently used surrounding net is the lampara net, which has a large central bunt (bagging portion) and short wings that trap the fish from the sides and underneath. The purse seine, in which the bottom of the net is drawn shut with a line running through rings, is the most productive net in sea fishery. A widely used net in demersal fisheries is the boat, or Danish, seine. The net is attached to two long towing ropes, one of which is anchored while the other is brought around by boat in a wide circle, trapping the fish. Trawling, in which a boat pulls a bag-shaped net that scoops fish into its open end, follows purse seining in productivity. Heavy bottom trawls are used to catch demersal fish, while midwater trawls catch pelagic species below the surface of the sea. Other netting methods include gill and drift netting, in which long rows of net sections are anchored or allowed to drift, and lift netting, in which fish, attracted to an overhead light, are surrounded from underneath and lifted out of the water.

Lining is the familiar method of fishing with hook and line. In pole-and-line fishing, manually operated bamboo poles or automated fibreglass rods are used to catch tuna species in the tropics. Off the coasts of Japan, Taiwan, and Korea, where tuna are also caught, a drifting longline is used. The line is composed of 400 to 450 sections, each with a number of hooked branch lines. The total line can measure up to 110 miles (180 km) in length with as many as 2,000 hooks. The bottom longline is used in northern waters to catch such demersal fish as cod and halibut. A main line is fitted with a great number of hooks and anchored at or near the bottom, with buoys above for markers. Lines are usually set to depths of about 300 to 900 feet (90 to 275 m). Hauling loaded lines or nets is hard labour, and power winches have become common equipment.

Fishing is also done with traps. Most fishing traps are simple chambers that do not close mechanically but instead permit easy entry and then make exit difficult. Lobster pots are crates with such one-way apertures. Octopuses are captured in Italy and the Far East using traps that resemble natural hiding places, while the pound nets used for catching salmon resemble undersea coral. Fyke nets are long, tapering sacks with tight apertures fitted on hoops along their length.

Miscellaneous fishing methods include the use of spears, especially the harpoons used in whaling; diving to collect various resources from the seafloor, such as oysters and abalone; the use of trained animals, such as the otters employed by Chinese fishermen; and the use of explosives and electric shocks to stun fish, which are then collected from the surface before they regain their senses.

The idea of farming the sea is increasingly popular in the fishing industry. In some fishing boats, pumps are used to suck squid and small fish directly out of the water. Another such machine dredges up mud from the bottom and onto ships, where clams and mussels in the mud are flushed out with water jets. Kelp is harvested from the surface and loaded onto vessels with conveyer belts. Carp have been raised in ponds in China for thousands of years, and this practice has spread throughout the world. Natural bodies of water are stocked with artificially hatched trout. Virtual underwater oyster farms are operated, in which parallel vertical racks of growing oysters are hung.

The collected fish and shellfish are processed and marketed fresh, frozen, or canned. Some are also preserved by salting or smoking. These products are high in protein and usually rich in vitamins and minerals but low in calories (compared to meats). Aquatic organisms have always been a staple in the diet of people living near bodies of water. Modern preserving techniques and transportation networks have made it possible for people throughout the world to consume these products on a regular basis.

The principal by-products of fish are oils and meal, usually made from fish that are less desirable for human consumption. A large portion of the fish oils and meal that are processed comes from anchovy, herring, mackerel, menhaden, pilchard, and pollack, as well as from the wastes from fish industries. Fish

oil is pressed from the flesh and then refined; it is used in products ranging from paints to margarine. Fish meal is made by drying and grinding the fish; it is used as a high-protein animal feed or as a feed additive.

Other products include such varied items as salmon and whitefish roe (roe from sturgeon is called caviar), leather from shark skins, and fish protein concentrate from meal. By-products are also made into such items as glue, isinglass (fish gelatin), and pharmaceuticals.

By-products from shellfish include natural and cultured pearls from oysters, animal feeds rendered from the ground shells of various species, and costume jewelry chips, buttons, and other ornamental items. The cellulose and polymer carbohydrates of seaweeds are made into such thickening agents as agar, algin, and carrageenan.

Commerzbank AG, major commercial bank in Germany with branches and associates in domestic and foreign finance and banking. Headquarters are in Düsseldorf.

The bank was established in 1870 as the Commerz- und Disconto-Bank in Hamburg. After two name changes, the bank split into three separate institutions in 1952: Commerzbank Bankverein AG, Commerz und Credit-Bank AG, and Commerz und Disconto-Bank AG. These banks were reunited under the present name in 1958.

Commerzbank engages in a full range of commercial banking activities, specializing in foreign business, credit, and security trading and investment. It has investments in a number of diverse German businesses. It also has interests in banks and financial institutions in a number of foreign countries, in addition to fully integrated foreign branches, subsidiaries, and representative offices worldwide.

commesso, also called FLORENTINE MOSAIC, technique of fashioning pictures with thin, cut-to-shape pieces of brightly coloured, semi-



Commesso panel decorating the altar in the Chapel of the Princes, church of San Lorenzo, Florence, 17th century

SCALA—Art Resource/EB Inc

precious stones, developed in Florence in the late 16th century. The stones most commonly used are agates, quartzes, chalcedonies, jaspers, granites, porphyries, petrified woods, and lapis lazuli; all of these, with the exception of lapis lazuli, are "hard stones," or stones that fall between feldspar and diamond in hardness. *Commesso* pictures, used mainly for tabletops and small wall panels, range from emblematic and floral subjects to landscapes, and some are executed with such laborious care and such sensitivity to the pictorial possibilities of the colours and shadings of the stones that they rival paintings in their detailed realism.

Although the first recorded instance of this technique was in the late 14th century in Florence, it was under the 16th-century Medici duke Francesco I, who employed several notable Italian Mannerist painters to design and execute *commesso* pieces, that the art began to be produced extensively. In 1588 Francesco's successor, Ferdinando I, founded the Workshop for Hard Stone (Opificio delle Pietre Dure) as a permanent *commesso* workshop. The first group of artists employed there perfected the art of making *commesso* pictures in highly illusionistic perspective. The Workshop was primarily engaged throughout the 17th century in manufacturing decorations for the family funerary chapel begun by the Medici at the church of San Lorenzo in 1605.

By the beginning of the 18th century *commesso* work was in demand all over Europe, and Florentine craftsmen were soon employed at several European courts. The Florentine Workshop continued to operate as a state-supported institution into the 20th century, producing works of high technical and artistic quality as late as the 1920s.

Commines, Philippe de: *see* Commynes, Philippe de.

commission, in political science, a multi-headed body created to perform a particular function, whether it be administrative, legislative, or judicial in nature. In the United Kingdom commissions are mostly used for special investigations and are distinguished according to their terms of appointment as royal, statutory, or departmental. In general these are appointed for a particular purpose when it is desired that an administrative body (the commission) be independent of the government department concerned. Investigating commissions are less frequently employed in the United States, where their functions are largely performed by legislative committees. In the United States most commissions are charged with the execution or enforcement of statutes. The most important commissions are vested with regulatory powers and are known as regulatory agencies (*see* regulatory agency).

Some American cities and towns are administered by an elected commission, usually consisting of three, five, or seven commissioners. Each commissioner serves as the head of one or more departments. In most cities, however, the commission system has given way to the council–manager system. Commission systems are still widely used to govern specific aspects of local government, such as parks, schools, water, and airports. This administrative method is especially popular for public-school systems, where the commission itself may appoint a professional administrator. The commission form is also used in such state agencies as utility commissions, worker's compensation boards, boards of health and education, and unemployment compensation commissions.

Committee of ———: *see under* substantive word or words (*e.g.*, Public Safety, Committee of).

commode, in dress, wire framework that was worn (*c.* 1690–1710 in France and England) on the head to hold in position a topknot made of ribbon, starched linen, and lace. The



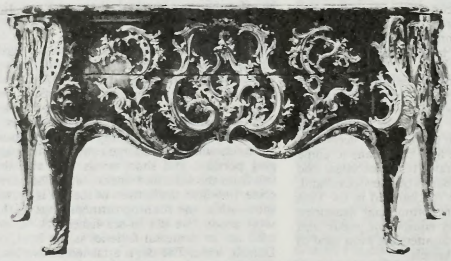
Woman wearing a commode, detail of "Lady of the Court in an Ermine Skirt," an engraving by Nicolas Bonnart I, 1694

By courtesy of the Pierpont Morgan Library, New York City

complete headgear was known as a "fontange," or tower.

Supposedly, it had its beginning when a favourite of Louis XIV, whose hair had become untidy while hunting, tied it up with a garter ribbon. The admiration of the king made it a fashion with the women of the French and English courts, but the simple bow soon became a complex affair—tall, often fan-shaped, and requiring the wire support of the commode and the addition of artificial curls and dangling streamers.

commode, piece of furniture resembling the English chest of drawers, in use in France in the late 17th century. Most commodes had marble tops, and some were fitted with pairs of doors. André-Charles Boulle was among the first to make commodes. These early forms resembled sarcophagi and were commonly called *commodes-tombeau.* Although most French cabinet furniture at the begin-



Commode from the bedchamber of Louis XV at Versailles with marble top, ormolu mounts, and marquetry of different coloured woods by Jacques Caffieri, *c.* 1739; in the Wallace Collection, London

By courtesy of the trustees of the Wallace Collection, London

ning of the 18th century was heavy in form, outlines were gently curved, the sides of commodes being slightly convex, or bombé, and the front serpentine. Most had long cabriole legs. Marquetry and parquetry veneers or japanning (Oriental-style lacquerwork) covered both carcass and legs of the commode; and richly worked gilded bronze, or ormolu, protected the vertical edges, following the curved outlines and frequently disguising the edges of the drawers. In the Louis XV period extravagant Rococo curves became fashionable, and surface ornament in ormolu became more flamboyant. The Louis XVI period brought more restrained forms. The carcass of the commode was given more rectangular lines, the legs being only slightly curved. Breakfronts and the use of rectangular marquetry or parquetry panels became common. Later, straight, tapering, reeded legs, round in section, became the fashion. The 19th-century commode was even more subdued in form, lost its decorative quality, and became a purely functional piece of furniture.

The French commode was copied with variations throughout Europe, though usually with less fine results. In Venice, for example, the bombé outline was carried to extremes, and decoration was usually gaily painted and lacquered. Some of the more graceful versions of the French commode were made in England



Trading floor of the Chicago Mercantile Exchange
Connie Geocaris/TSW/Click/Chicago

when the French fashion became popular there after 1740. The term was used in England for curved chests and low cupboards. English commodes, several of which were illustrated in Thomas Chippendale's *Gentleman and Cabinetmaker's Director* (1754), were much more restrained and had little or no ormolu decoration. The term commode was first used in England to describe chests and low cupboards with serpentine fronts. From the late 18th century, commode was also the term, along with night table, for a cupboard containing a chamber pot. *See also* chest of drawers.

Commodianus (fl. between 3rd and 5th centuries AD), Christian Latin poet, perhaps of African origin. His *Carmen apologeticum* ("Song with Narrative") expounds Christian doctrine, dealing with the Creation, God's revelation of himself to man, Antichrist, and the end of the world. All but two of his *Instructiones*—80 poems in two books—are in acrostic form, undoubtedly because the technique was a useful mnemonic device. In the work he attacked pagan deities, criticized the Jews, and admonished Christians. His verse has no poetic value and is of interest chiefly for its employment of vulgar Latin idiom at a period when the Romance languages were emerging from Latin.

Consult the INDEX *first*

commodity exchange, also called FUTURES MARKET, or FUTURES EXCHANGE, organized market for the purchase and sale of enforceable contracts to deliver a commodity such as wheat, gold, or cotton or a financial instrument such as U.S. Treasury bills or Eurodollars at some future date. Such contracts are known as futures (*q.v.*) and are bought and sold by means of a competitive auction process on the commodity exchange. The financial instruments known as options and indexes are also traded on commodity exchanges. The largest commodity exchange is the Chicago Board of Trade. The seller of a futures contract on a commodity exchange does not normally intend to deliver the actual commodity, nor does the buyer intend to accept delivery; each will, at some time prior to the date of delivery specified in the contract, cancel out his obligation by an offsetting purchase or sale. The parties merely wish to engage in the assumption or delegation of the risk involved in a change in price.

Commodity exchanges are thus ancillary to the markets in which commodities are actually bought and sold; commodity exchanges in effect provide insurance against the risk of price changes by transferring that risk to speculators who are willing to assume it. Commodity exchanges also provide a basis for the determination of prices at which commodities are actually traded.

commodity trade, the international trade in primary goods. Primary goods are raw or partly refined materials whose value mainly reflects the costs of finding, gathering, or harvesting them; they are traded for processing or incorporation into final goods. Examples include crude oil, cotton, rubber, grains, and metals and other minerals.

A brief treatment of commodity trade follows. For full treatment, *see* MACROPAEDIA: International Trade; Markets.

For statistical data on international commodity trade, *see* BRITANNICA BOOK OF THE YEAR.

Trade in commodities generally takes place in three related types of markets: the spot, the forward, and the futures market (the latter is also known as a commodity exchange). The spot market refers to the exchange of immediately or promptly available quantities of the good for immediate payment. The forward market refers to exchange of goods for money at some specified date in the future between specific contracting parties at a given price. The futures market refers to a special type of forward contracting market, modified to reduce risk and increase flexibility.

Spot-market trading is probably the most flexible of markets. The contracting parties need not be in the same place, nor need delivery or payment take place in either location. These and other terms of the transaction, such as price, quantity, quality, condition, mode of payment, etc., can all be negotiated at the same time. Thus, current market conditions can be taken into account without difficulty. Forward contracting arose to address problems relating to very specific requirements in commodities, rapid price fluctuations, and uncertainties about quality. By allowing for future delivery at a given price and set of characteristics, both parties could ensure that those characteristics would be acceptable ahead of time. They would thus be able to plan their operations in the most efficient manner.

The spot and forward markets together are called the "actuals" market, as opposed to the "futures" market. A futures exchange offers itself as a centralized trading place where contracts with standardized characteristics are traded by designated brokers. Compared to forward trading, futures trading is a compromise. In order to retain some of the flexibility of spot contracting, traders accept standardized contracts that differ only in price. For some traders, that is sufficient. However, most traders use the futures market to hedge, that is, to reduce risk due to fluctuating commodity prices in order to better use the spot or forward markets to obtain the actual goods. Hedging relies on the strong consistent linkage between prices in the spot or forward markets and those in the futures market for similar goods. Futures markets are especially common for commodities whose prices are relatively volatile and for which the required linkage between prices is an adequate approximation. Commodities markets subject to price-stabilizing influences such as those attempted by government pricefixing practices or monopolies tend to be less active since there is likely to be less price risk to hedge against.

A crucial feature of international trade in commodities is that many undeveloped nations earn most of their export revenues from sales of primary commodities. They must use that revenue to finance whatever manufactured goods they wish to import. Thus the relative prices of the two types of goods are of great interest. Economists have coined the term "terms of trade" to characterize this ratio. The long-term trend and significance of the terms of trade are controversial; nevertheless, many underdeveloped nations argue that efforts to stabilize and raise prices in these commodities should be undertaken to improve the terms of trade.

Efforts at price stabilization have frequently taken the form of stabilization boards that operate buffer stocks. These agencies buy up supplies when they are plentiful and sell them when they are scarce, with the effect of stabilizing the price of the good. If they succeed, not only are prices stabilized but they may be able to finance their operations from the funds generated from buying low and selling high. Unfortunately, that rarely happens for very long. In addition to the formidable difficulty of knowing when are the right times to buy and sell, these agencies are also char-

acterized by high administrative expenses and are subject to powerful political pressures. As a result, they may even cause prices to be less stable than before. Eventually most attempts cease operations as they exhaust their funds. Other forms of stabilization that have been attempted, such as multilateral contracts and quota agreements, have had mixed results as well.

Commodus, in full CAESAR MARCUS AURELIUS COMMODUS ANTONINUS AUGUSTUS, original name (until AD 180) LUCIUS AELIUS AURELIUS COMMODUS (b. Aug. 31, 161, Lanuvium, Latium [now Lanuvio, Italy]—d. Dec. 31, 192), Roman emperor from 177 to 192 (sole emperor after 180). His brutal misrule



Commodus as Hercules, marble bust; in the Capitoline Museum, Rome
Anderson—Alinari from Art Resource/EB Inc

precipitated civil strife that ended 84 years of stability and prosperity within the empire.

In 177 Lucius was made coruler and heir to his father, the emperor Marcus Aurelius (reigned 161–180). Lucius joined Marcus in his campaign against invading German tribes along the Danube, but after the death of Marcus (March 180) he quickly came to terms with the Germans.

Soon after he became sole ruler, Lucius changed his name to Marcus Aurelius Commodus Antoninus. In 182 Commodus' sister Lucilla conspired with a group of senators to assassinate him. The plot failed, and Commodus retaliated by executing a number of leading senators. Thereafter, his rule became increasingly arbitrary and vicious. In 186 he had his chief minister executed in order to appease the army; three years later he allowed the minister's successor to be killed by a rioting crowd. Political influence then passed to the emperor's mistress and two advisers.

Meanwhile, Commodus was lapsing into insanity. He gave Rome a new name, Colonia Commodiana (Colony of Commodus), and imagined that he was the god Hercules, entering the arena to fight as a gladiator or to kill lions with bow and arrow. Finally, when Commodus announced that he would assume the consulship on Jan. 1, 193, dressed as a gladiator, the public became incensed. On Dec. 31, 192, his advisers had him strangled by a champion wrestler. A grateful Senate proclaimed as emperor the city prefect, Publius Helvius Pertinax, but the empire quickly slipped into civil war.

common cold, a viral infection that starts in the upper respiratory tract, sometimes spreads to the lower structures, and may contribute secondary infections in the eyes or middle ears. The main differences between the common cold and other respiratory infections are the absence of fever and the relative mildness of the symptoms.

About 200 different strains of virus are capable of producing colds. Frequently two or more different viruses can be isolated during a single episode. The cold is spread by person-to-person contact. People can carry the virus and communicate it without themselves experiencing any of the symptoms. Incubation is short—usually one to four days. The viruses start spreading from an infected person before the symptoms appear, and the spread reaches its peak during the symptomatic phase. The incidence of colds peaks during the autumn, and minor epidemics commonly occur throughout the winter. The reason for this incidence is unknown; it may not stem mainly from stresses imposed by chilly weather but rather result from the greater amount of time spent indoors, which increases the likelihood of close contact with those persons carrying cold viruses.

Pathologic changes occurring in the mucous membrane that lines the nose, the nasal sinuses, the nasopharynx, and other upper respiratory passages may include tissue swelling, congestion of blood, and oozing of fluids. During the acute phase of the disease, the respiratory secretions are altered by increase in serum proteins. Parts of cells may also be found in the fluids. Tissue repair is rapid and seems complete, although a relationship might exist between colds and more serious respiratory conditions.

Cold symptoms vary from person to person, but in the individual the same symptoms tend to recur in succeeding bouts of infection. Manifestations may include sneezing, headaches, fatigue, chilling, sore throat, inflammation of the nose (rhinitis), and nasal discharge. There is usually no fever. The symptoms usually last for only a few days. The nasal discharge is the first warning. The secretions become watery, clear, and excessive. Later, they thicken, increase in mucus and pus content, and may colour a yellow-green, with traces of blood. Coughing can be dry or produce amounts of mucus. Other, more serious diseases with similar general symptoms may be mistaken for a cold; some of these are tuberculosis, bronchitis, lung abscesses, and inflammation around the heart (pericarditis).

Treatment is, in most instances, directed toward allaying of symptoms, coupled with rest and adequate fluid intake. Occasionally antibiotics are given to prevent secondary infections.

common frog (species *Rana temporaria*), largely terrestrial frog (family Ranidae), native to Great Britain, Europe, and Asia. It is known in continental Europe as either grass frog or brown frog. The common frog is smooth-skinned and about 7.5 to 8 cm (3 to



Common frog (*Rana temporaria*)
Eric Hosking—Bruce Coleman Inc./EB Inc

3.15 inches) long. Colour and markings vary from gray to greenish, brown, yellowish, or red with few to many spots of reddish brown or black.

The common frog frequents damp, shaded areas. It is often used as a laboratory animal and is eaten in some countries.

common jury: *see* petit jury.

common law, also called ANGLO-AMERICAN LAW, the body of customary law, based upon judicial decisions and embodied in reports of decided cases, which has been administered by the common-law courts of England since the Middle Ages. From this has evolved the type of legal system now found also in the United States and in most of the member states of the Commonwealth of Nations. Common law stands in contrast to the rules developed by the separate courts of equity (*q.v.*), to statute law (*i.e.*, the acts of legislative bodies), and to the legal system derived from civil law (*q.v.*) now widespread in continental Europe and elsewhere.

A brief treatment of common law follows. For full treatment, *see* MACROPAEDIA: Legal Systems, Evolution of Modern Western.

Common law is the law that was developed in England after the Norman Conquest (1066), by judges who ruled in individual cases in the light of precedent or custom, with minimal recourse to statutes or enactments. This body of customary law continued to evolve through the end of the 18th century in England and its overseas colonies. Common law continues to undergo considerable modernization.

Before the Norman Conquest the law in England was administered according to local Anglo-Saxon custom, with the church playing a major role. The Normans brought a new set of attitudes; for example, serious crimes were treated as public matters, not as matters concerning the injured only, as formerly was the case; and the power of the church was restricted to ecclesiastical courts. Although Roman law was being revived on the continent at this time, the Normans opposed its introduction into England. The Normans, in effect, created English common law by establishing a central judiciary that administered common (that is, general) laws based on the writ system. A writ is a written order requiring a person to appear and provide proof of compliance with the decision of the court or to stand trial.

English statutory law owes much to Henry III (reigned 1216–72), under whose reign the famous legal treatise of Henry de Bracton was written, and especially to Edward I (reigned 1272–1307), who enacted a number of historic statutes. Among these was the first Statute of Westminster, making trial by jury compulsory in criminal cases. The enactments of Edward I were long the basis of English statute law, although some of the earlier ones are regarded as simply written reinforcements of the unwritten common law. Also during this king's reign, the professions of judge and barrister were established as full-time occupations, as opposed to functions assumed on occasion by other officials. In the late 15th century the High Court of Chancery was established to handle equity cases. This body, headed by the lord chancellor, decided cases on their individual merits. During the 16th and 17th centuries, a number of courts came into being that were outside the common law. These were known as prerogative courts, since they were set up to exercise royal power. One of them, the Court of Star Chamber, became a symbol of tyranny under the early Stuart monarchs, leading to its abolition in 1641.

By the 16th century the Roman law of continental Europe was beginning at last to influence the English legal system. During the 17th century one of the strongest supporters of the common law was Sir Edward Coke, whose writings reformulated the common law and largely served to preserve it. In the 18th century Sir William Blackstone wrote his *Commentaries on the Laws of England*, a work that had a major role in the dissemination of knowledge of the common law, especially in

America. Its four books, "Persons," "Things," "Private Wrongs," and "Public Wrongs," covered family and public law, real property, liability, and criminal law.

The social and economic effects of the Industrial Revolution and the political repercussions of the French Revolution led to demands for legal reform in England. Among the major reforms undertaken in the 19th century were those according greater protection to the accused and those that codified the criminal law. The judiciary underwent a series of reorganizations beginning in 1857, when church courts were denied jurisdiction over lay matters. The Judicature Acts of 1873–85 brought about the merger into the High Court of Justice of a number of different courts.

In the United States, English common law followed a separate development and rejected a number of specific English practices. Although common law today is still being developed by judges through case law, the trend is more and more toward a system of statute law originated by legislators. The complex societies of today appear to require centralization of law enactment and enforcement. But in the United States the existence of state sovereignty is an impediment to establishing a national code. As for England, that country's membership in the European Community may advance the process.

common-law marriage, marriage undertaken without either a civil or religious ceremony. In a common-law marriage, the parties simply agree to consider themselves married. The common-law marriage is a rarity today, mainly because of the legal problems of property and inheritance that attend it in complex urban societies.

Common-law marriages were valid in England until Lord Hardwicke's Act of 1753. The act did not apply to Scotland, however, and for many years thereafter couples went north across the border to thwart the ban. On the European continent, common-law marriages were frequent in the Middle Ages, but their legality was abolished in the Roman Catholic countries by the Council of Trent (1545–63), which required that marriages be celebrated in the presence of a priest and two witnesses.

British colonial rule in Africa did much to eradicate the equivalent of common-law marriages there, but the independence of African nations has led to a reemergence of what is called customary marriage, although certain formal requirements remain, such as registration.

In the United States by the second half of the 20th century, common-law marriages were valid in about one-third of the states, absolutely or conditionally (if entered into before a certain statute-defined date).

Where common-law marriage was recognized, the only requirement was mutual agreement to undertake matrimonial relations. Such marriages, however, were subject otherwise to the same strictures on age and sanguinity as formal marriages. A formal marriage that had been defectively solemnized (*e.g.*, because of an error on the marriage license) was often declared valid as a common-law marriage.

Common Life, Brethren of the, religious community established in the late 14th century by Geert Groote (*q.v.*) at Deventer, in the Netherlands. Groote formed the brethren from among his friends and disciples, including Florentius Radewyns (*q.v.*), at whose house they lived. After Groote's death, Radewyns and several others became Augustinian Canons and established the Congregation of Windesheim. These two communities became the principal exponents of *devotio moderna* (*q.v.*), a school and trend of spirituality stressing meditation and the inner life and criticizing the highly speculative spirituality of the 13th and 14th centuries.

The brethren spread throughout the Netherlands, Germany, and Switzerland. They were self-supporting and lived a simple Christian life in common, with an absence of ritual.. Among their chief aims were the education of a Christian elite and the promotion of the reading of devout literature. They produced finely written manuscripts and, later, printed books. They kept large schools in which the scholarship (but not the Humanistic spirit) of the Italian Renaissance was found. As a boy Erasmus was deeply influenced by them.

Groote also founded at Deventer the first house of Sisters of the Common Life. They were devoted to education, the copying of books, and weaving.

The entire *devotio moderna* movement was seriously affected by the religious upheaval during the Protestant Reformation, and the brethren ceased to exist early in the 17th century.

Common Market: *see* European Economic Community.

Common Order, Book of, also called ORDER OF GENEVA, or KNOX'S LITURGY, first Reformed manual of worship in English, introduced to the English congregation in Geneva by John Knox in 1556, adopted by the Scottish Reformers in 1562, and revised in 1564. The norm of public worship followed in the book is the ancient service of word and sacrament. A book of common order, as contrasted with a book of common prayer, aims at securing a common pattern of worship without making specific verbal forms compulsory, and the prayers are almost entirely to be said by the minister, in accordance with a practice introduced by John Calvin.

In the 17th century the Stuart kings attempted to adapt Scottish church life to English ways. When Charles I tried to force a new liturgy on the Scottish church in 1637, the Covenanters revolted. This led to a more sympathetic attitude by the Scots toward those Puritans who wanted books to be less prominent in worship. In 1645 the Scottish General Assembly replaced the *Book of Common Order* with the *Directory of Public Worship,* which had been prepared by the Westminster Assembly.

In modern times, the service book used by the Church of Scotland is the *Book of Common Order* (1940), which is based on several earlier service books.

Common Pleas, Court of, English court of law that originated from Henry II's assignment in 1178 of five members of his council to hear pleas (civil disputes between individuals), as distinguished from litigation to which the crown was a party. This group of councillors did not immediately emerge as a body distinct and separate from the *curia regis* ("king's court"). It remained a part of that court and traveled with it until Magna Carta required that civil jurisdiction be assigned to a body convening at a designated place, at which time it settled in Westminster Hall. In 1223 the court began to maintain separate rolls, and in 1272 it acquired a chief justice.

During the later Middle Ages, Common Pleas was the most active though not the highest of the common-law courts; it included within its jurisdiction not only almost all civil litigation but also the supervision of local and manorial courts as well. Its judgments, however, were subject to review by the Court of King's (Queen's) Bench.

Beginning in the 15th century, Common Pleas was engaged in competition with the Court of King's Bench and the Court of Exchequer for common-law business. The result was an accumulation of many complicated and overlapping jurisdictional rules. By the 19th century the multiple form of writs and competing jurisdictions had become unbearable, and the Judicature Act of 1873 brought about a replacement of the three common-law courts, as well as the assumption of equity jurisdiction, by the Supreme Court of Judicature, which remains today as the court of general jurisdiction in England and Wales.

Common Prayer, The Book of, liturgical book used by churches of the Anglican Communion. First authorized for use in the Church of England in 1549, it was radically revised in 1552, with subsequent minor revisions in 1559, 1604, and 1662. The prayer book of 1662, with minor changes, has continued as the standard liturgy of most Anglican churches of the British Commonwealth. Outside the Commonwealth most churches of the Anglican Communion possess their own variants of the English prayer book.

The First Prayer Book of Edward VI, enacted by the first Act of Uniformity in 1549, was prepared primarily by Thomas Cranmer, who became archbishop of Canterbury in 1533. It was viewed as a compromise between old and new ideas and was in places diplomatically ambiguous in its implied teaching; it aroused opposition from both conservatives and the more extreme Reformers. The latter prevailed and in 1552 *The Second Prayer Book of Edward VI* was introduced. The revision made great changes in its text and ceremonies, all in a Protestant direction. In 1553 the new Catholic queen, Mary, restored the old Latin liturgical books. After Elizabeth I became queen in 1558, the prayer book of 1552 was restored by another Act of Uniformity (1559). It included a few small but significant changes, which allowed for belief in the Real Presence of Christ in the Eucharist and removed from the litany an offensive prayer against the pope. The Puritans were not satisfied, however, and, on the accession of James I, renewed demands for change at the Hampton Court Conference (1604) resulted in some concessions in the prayer book of 1604.

The victory of the Parliamentarians in the English Civil War resulted in the proscription of the prayer book under the Commonwealth and Protectorate. After the Restoration (1660) a revision of the prayer book was adopted (1662), which was essentially unchanged. After the Revolution of 1688, a revision of the prayer book was proposed in an attempt to reunite the Puritans with the established church. That proposal failed, however, and further revisions were not attempted until the 20th century. Much controversy resulted from the revision of 1927–28; it was rejected by Parliament, which suspected "Romanizing" tendencies in changes proposed for the ministering of Holy Communion. The Church of England and most of those within the Anglican Communion did, however, develop an experimental liturgy in contemporary language that was widely used; after much controversy it was fully adopted by the Church of England and the Protestant Episcopal Church in the United States at the end of the 1970s.

common sense, philosophy of, 18th- and early 19th-century Scottish school of Thomas Reid, Adam Ferguson, Dugald Stewart, and others, who held that in the actual perception of the average, unsophisticated man, sensations are not mere ideas or subjective impressions but carry with them the belief in corresponding qualities as belonging to external objects. Such beliefs, Reid insisted, "belong to the common sense and reason of mankind"; and in matters of common sense "the learned and the unlearned, the philosopher and the day-labourer, are upon a level."

The philosophy of common sense developed as a reaction against the skepticism of David Hume and the subjective idealism of George Berkeley, both of which seemed to issue from an excessive stress on ideas. This provided what seemed to the common sense philosophers to be a false start leading from fun-

damental premises to absurdities. This false start stemmed from René Descartes and John Locke inasmuch as they gave to ideas an importance that inevitably made everything else succumb to them.

From 1816 to 1870 the Scottish doctrine was adopted as the official philosophy of France; and in the 20th century the teaching of G.E. Moore, a founding father of analytic philosophy (especially in his "Defence of Common Sense," 1925), convinced many British and American philosophers that it was not their business to question the common certainties but rather to analyze them.

common yew: *see* English yew.

commons, in Anglo-American property law, an area of land for use by the public. The term originated in feudal England, where the "waste," or uncultivated land, of a lord's manor could be used for pasture and firewood by his tenants. For centuries this right of commons conflicted with the lord's right to "approve" (*i.e.,* appropriate for his own use) any of his waste, provided he left enough land to support the commoners' livestock. In the 19th century the right of approvement was in effect assumed by the government. Under modern agriculture, common pasturing became obsolete, and commons became public land used mostly for recreation.

In the American Colonies, where there was no manorial system, commons took the form of a town square or green devoted to municipal or recreational use.

Commons, House of, also called COMMONS, popularly elected legislative body of the bicameral British Parliament (for the other house, *see* Lords, House of). Because the House of Commons is predominant over the House of Lords, it is possible to use the name "Parliament" to refer to the House of Commons alone.

The House of Commons is the effective legislative authority in Great Britain. It alone has the right to impose taxes and to vote money to, or withhold it from, the various public departments and services. The House of Lords rarely holds up legislation passed by the Commons, and the British sovereign almost automatically agrees to any bill passed. Acts of Parliament are not subject to judicial review.

The passage of legislation is the House of Commons' primary function. Almost all legislation proceeds from the majority party in the Commons, which forms the government and specifically the Cabinet; the latter is composed of senior ministers chosen by the prime minister from members of his party in the House of Commons. The government's main work in the Commons is to implement the legislative program on which it fought and won the last general election.

At the beginning of each new session of Parliament the House elects from its members the speaker, who presides over and regulates debates and rules on points of order and members' conduct. The calling of members to speak in debate is entirely in the speaker's hands, and his main concern is to ensure that a variety of points of view is heard. By a convention of the constitution not established until the 20th century, the prime minister is always a member of the House of Commons, instead of, as formerly, a member of either house. By thus directly submitting himself (and most of his senior ministers) to the daily criticism of that house, he further enhances its authority as compared with that of the House of Lords. The government party appoints the leader of the House of Commons, not necessarily the prime minister, to manage its program of business through the House. Except for occasional independents, members of both the government and opposition parties are under the control of party management within the Commons, whose discipline, particularly over voting, is exercised by members called "whips."

The tradition that a bill must be read three times in the Commons (and also in the Lords) before it can be voted on is based on the need to allow members to adequately investigate the principles on which the bill is based and the details of its provisions. The first reading is purely formal, but the second reading provides the occasion for debate on the principles involved. The bill then goes into committee, where it is examined clause by clause. Most bills are sent to standing committees, each of which deals with bills belonging to a particular range of topics, with the committees reflecting in their makeup the respective strength of parties in the House. Having examined the bill, the committee then reports back to the House, and, after further amendments may have been proposed in the course of more debate, the bill is read a third time and can then be voted on. In addition to bills proposed by the government, a limited number of private members' bills (*i.e.,* not sponsored by the government) are considered by the House each session.

Aside from its primary task of discussing and debating bills proposed by the government, the most important business of the full House is the question period, which is held on a regular basis. During the question period members may require the minister concerned to answer queries about his department. This period provides opposition members with an opportunity to attack government policy and to raise issues on which the government may be thought to have been negligent.

The House of Commons had its origins in the second half of the 13th century, when landholders and other property owners in the counties and towns were first authorized to send to Parliament representatives empowered to commit their constituents to the payment of taxes and to present grievances and petitions to the king for his assent. In the 14th century, the knights and burgesses chosen as representatives (*i.e.,* the commons) began sitting in a separate chamber, or "house," from that used by the nobles and high clergy (*i.e.,* the lords).

The Lords was initially the more powerful of the two houses, but over the centuries its powers were whittled away. By the late 17th century, the House of Commons—by refusing to proceed with a number of the House of Lords' bills that sought to impose taxes—established the right to be the sole body to initiate taxation measures. The House of Lords retained its veto power over bills passed by the Commons, however, and in 1832, a Liberal government's only recourse was to threaten to flood the House of Lords with new Liberal peers in order to prevent the Lords from rejecting that government's Reform Bill. This same threat was used (by a Liberal government) in 1911 to compel the Lords to approve the Parliament Act, which enables a majority of the House of Commons to override the majority of the Lords in the latter's rejection of a bill. Under this act, the House of Lords lost all power whatsoever to delay financial legislation passed by the Commons for the raising and spending of revenue, and the Lords lost the power to delay other legislation for a period beyond two years; this period was reduced in 1949 to one year.

The House of Commons' membership stood at 658 from 1801 (Act of Union with Ireland) until 1885, when it was increased to 670. In 1918 it was increased to 707. It was changed under subsequent acts, and at the general election in June 1987, 650 members were returned—523 from England, 72 from Scotland, 38 from Wales, and 17 from Northern Ireland. Each constituency returns a single member. Members must be 21 years of age or older. Peers of England, Scotland, or the United Kingdom may not be elected to the House of Commons, but Irish peers may. Certain clergy, judicial officers, members of the armed forces, police officers, and civil servants are ineligible. Women became eligible under an act of 1918. An act of 1911 set the duration of Parliament, if not previously dissolved, at five years; since 1911 members have been paid. *See also* Parliament; Rights, Bill of.

Commons, John R., in full JOHN ROGERS COMMONS (b. Oct. 13, 1862, Hollandsburg, Ohio, U.S.—d. May 11, 1945, Fort Lauderdale, Fla.), economist who became the foremost authority on U.S. labour in the first third of the 20th century.

Commons studied at Oberlin College and at Johns Hopkins University and taught at the University of Wisconsin (1904–32). He established his reputation with the publication of *A Documentary History of American Industrial Society,* 10 vol. (1910–11), and *History of Labour in the United States,* 4 vol. (1918–35). Commons' theory of the evolution of the American labour movement in terms of changes in the market structure was generally accepted. After World War I, Commons broadened his reputation with the publication of *Legal Foundations of Capitalism* (1924) and its sequel, *Institutional Economics* (1934).

Commons drafted much of the reform legislation that made Wisconsin an example for other states. He also made notable contributions to the federal government in the areas of civil service, public utilities, workmen's compensation, and unemployment insurance.

Commonwealth, also called COMMONWEALTH OF NATIONS, formerly (1931–46) BRITISH COMMONWEALTH OF NATIONS, a free association of sovereign states comprising Great Britain and a number of its former dependencies who have chosen to maintain ties of friendship and practical cooperation and who acknowledge the British monarch as symbolic head of their association.

Historically, the Commonwealth was an evolutionary outgrowth of the British Empire (*q.v.*). The traditional British policy of allowing considerable self-government in its colonies led to the existence by the 19th century of several dependent states, which were populated to a significant degree by Europeans accustomed to the forms of parliamentary rule and which possessed large degrees of sovereignty. By 1931 they were recognized as having special status within the empire by the Statute of Westminster, which referred specifically to a "British Commonwealth of Nations." The adjective *British* was dropped from official use in 1946. The rapid growth of nationalism in other parts of the empire from the 1920s on produced a long series of grants of independence, beginning with that to India in 1947, and required a redefinition of the Commonwealth. In 1947 India and Pakistan became members of the Commonwealth, the first with chiefly non-European populations. In 1948 Burma (Myanmar) became independent and rejected membership. Further broadening of the meaning of Commonwealth recognized the possibility of members' choosing republican or other non-parliamentary forms of government and the possibility of resignation from the association, as was done by the Irish Republic in 1948, by South Africa in 1961, and by Pakistan in 1972.

The ties that bound the Commonwealth were highly diverse. Sentiment was one, particularly in the old dominions; trade, investment, and currency agreements were another; population migrations, common educational, professional, and judicial heritages, and sports were still others. Most of the dependent states granted independence in the 1950s, '60s, and

Members of the Commonwealth

country	date of Commonwealth membership	
United Kingdom	1931	
Canada	1931	
Australia	1931	
New Zealand	1931	
South Africa	1931	(left in 1961; rejoined 1994)
India	1947	
Pakistan	1947	(left in 1972; rejoined 1989)
Sri Lanka (formerly Ceylon)	1948	
Ghana	1957	
Malaysia (formerly Malaya)	1957	
Nigeria	1960	
Cyprus	1961	
Sierra Leone	1961	
Tanzania	1961	(Tanganyika in 1961; Tanzania in 1964 upon union with Zanzibar [member 1963])
Jamaica	1962	
Trinidad and Tobago	1962	
Uganda	1962	
Kenya	1963	
Malawi	1964	
Malta	1964	
Zambia	1964	
The Gambia	1965	
Singapore	1965	
Guyana	1966	
Botswana	1966	
Lesotho	1966	
Barbados	1966	
Mauritius	1968	
Nauru*	1968	
Swaziland	1968	
Tonga	1970	
Western Samoa	1970	
Bangladesh	1972	
The Bahamas	1973	
Grenada	1974	
Papua New Guinea	1975	
Seychelles	1976	
Solomon Islands	1978	
Tuvalu*	1978	
Dominica	1978	
Kiribati	1979	
Saint Lucia	1979	
Saint Vincent and the Grenadines	1979	(joined as special member; full member since 1985)
Vanuatu	1980	
Zimbabwe	1980	
Belize	1981	
Antigua and Barbuda	1981	
Maldives	1982	(joined as special member; full member since 1985)
Saint Kitts and Nevis	1983	
Brunei	1984	
Namibia	1990	

*Denotes special members (not entitled to participate in meetings of heads of government).

'70s chose Commonwealth membership. Meetings of Commonwealth heads of government take place every two years. In 1965 a Commonwealth Secretariat was established in London to organize and coordinate Commonwealth activities.

commonwealth, a body politic founded on law for the common "weal," or good. The term was often used by 17th-century writers, for example, Thomas Hobbes and John Locke, to signify the concept of the organized political community. For them it meant much the same as either civitas or res publica did for the Romans, or as "the state" means in the 20th century. Cicero defined the res publica as an association held together by law.

Specifically, commonwealth served as the label of the Cromwellian regime in Great Britain (1649–60). Modern usage has further extended the term. Thus, the Australian colonies were federated as states in 1900 under the official title of the Commonwealth of Australia. Then, as various British colonies evolved from a status subordinate to the United Kingdom into an association of equal partners, the new relationship was named a Commonwealth. After India became a republic and chose to remain inside the Commonwealth, the phrase "head of the Commonwealth" was substituted for "Emperor of India" in the royal title, and Queen Elizabeth II was so crowned in 1953.

In the United States, commonwealth has continued to be the official description of four states (Kentucky, Massachusetts, Pennsylvania, and Virginia). It confers no distinction, other than in name, from the other states.

The same term also was applied to Puerto Rico after an act of Congress of 1950 and adoption of the constitution of 1952.

Commonwealth Games, also called (1930–54) BRITISH EMPIRE GAMES, or (1954–66) BRITISH EMPIRE AND COMMONWEALTH GAMES, or (1966–74) BRITISH COMMONWEALTH GAMES, quadrennial sports competition embracing athletics (track and field), gymnastics, bowls, and swimming events for both men and women, and boxing, cycling, shooting, weight lifting, and wrestling for men only. Rowing, shooting, badminton, and fencing have also been included occasionally. Participants must be amateurs and must be qualified by birth or residence in some member country (or a dependency of a member country) of the Commonwealth.

The Reverend Astley Cooper of Yorkshire, Eng., broached the idea of such games in 1891, and the inaugural British Empire Games were held at Hamilton, Ont., in 1930. Eleven countries sent teams for a program of athletics, lawn bowls, boxing, rowing, swimming, and wrestling, and the English team emerged with the largest share of medals. It was agreed that the games would be held in varying Commonwealth cities at four-year intervals, preferably midway between the Olympic Games. The games have been held except in the years 1942 and 1946. Women were included from the outset, and women's athletics events began to be included in 1934.

Commonwealth of Independent States, Russian SODRUZHESTVO NEZAVISIMYKH GOSUDARSTV, free association of sovereign states formed in 1991, and comprising Russia and 11 other republics that were formerly part of the Soviet Union. The Commonwealth had its origins on Dec. 8, 1991, when the elected leaders of Russia, Ukraine, and Belarus (Belorussia) signed an agreement forming a new association to replace the crumbling Union of Soviet Socialist Republics (U.S.S.R.). The three Slavic republics were subsequently joined by the Central Asian republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, by the Transcaucasian republics of Armenia, Azerbaijan, and Georgia, and by Moldova. (The remaining former Soviet republics of Lithuania, Latvia, and Estonia declined to join the new organization.) The Commonwealth formally came into being on Dec. 21, 1991, and began operations the following month with the city of Minsk in Belarus designated as its administrative centre.

The Commonwealth's functions are to coordinate its members' policies regarding their economies, foreign relations, defense, immigration policies, environmental protection, and law enforcement. Its top governmental body is a council composed of the member republics' heads of state (*i.e.,* presidents) and of government (prime ministers), who are assisted by committees of republic cabinet ministers in key areas such as economics and defense. The Commonwealth's members pledged to keep both their armed forces and the former Soviet nuclear weapons stationed on their territories under a single unified command. In practice this proved difficult, however, as did the members' efforts to coordinate the introduction of market-type mechanisms and private ownership into their respective economies.

Commonwealth v. Hunt (1842), American legal case in which the Massachusetts Supreme Court ruled that the common-law doctrine of criminal conspiracy did not apply to labour unions. Until then, workers' attempts to establish closed shops had been subject to prosecution. Chief Justice Lemuel Shaw asserted, however, that trade unions were legal and that they had the right to strike or take other steps of peaceful coercion to raise wages and ban nonunion workers.

The case stemmed from a demand by the Boston Journeymen Bootmakers' Society that an employer fire one of its members who had disobeyed the society's rules. The employer, fearing a strike, complied, but the dismissed employee complained to the district attorney, who then drew an indictment charging the society with conspiracy. The Boston Municipal Court found the union guilty.

Justice Shaw, hearing the case on appeal, altered the traditional criteria for conspiracy by holding that the mere act of combining for some purpose was not illegal. Only those combinations intended "to accomplish some criminal or unlawful purpose, or to accomplish some purpose, not in itself criminal or unlawful, by criminal or unlawful means" could be prosecuted. Shaw, in effect, legalized the American labour union movement by this decision.

commune, a town in medieval western Europe that acquired self-governing municipal institutions. During the central and later period of the Middle Ages most of the towns west of the Baltic Sea in the north and the Adriatic Sea in the south acquired municipal institutions that have been loosely designated as communal.

No definition embraces satisfactorily every type of commune, but most were characterized by the oath binding the citizens or burghers of a town to mutual protection and assistance. Such an oath between equals, though analogous with other Germanic institutions, contrasts with the oath of vassalage typical of early medieval society, by which one promised obedience to a superior in return for protection. The body became an association, a *communitas* or *universitas,* capable of owning property and entering into agreements, of exercising varying degrees of jurisdiction over its members (who did not normally comprise the entire population of the town), and of exercising governmental powers. There were very marked regional differences between different types of communes. In northern and central Italy (and parts of southern France) the absence of powerful centralizing political authority and, to a lesser extent, the precocious economic development of the towns enabled the commune to acquire a degree of self-government that easily surpassed the transaction of municipal affairs. Here the towns conquered the intervening countryside and pursued independent diplomatic policies, and their de jure superiors, the Holy Roman emperor or the pope, were rarely able to exercise de facto supremacy. The stronger of these city-republics survived—at the expense of their weaker neighbours—into the Renaissance, though by this time most had fallen to a single ruler (signor). Milan and Florence continued as powerful states into the early modern period and Venice right up to the Napoleonic era.

The communes of Flanders were second only to the Italian communes in size and industrial and commercial organization; at times political relations between the count of Flanders, the French king (his overlord), and England gave the Flemish communes—Ghent in particular—a significant role in European affairs. In France, in "Germany" (*i.e.,* the imperial territories north of the Alps), and in the Iberian kingdoms of Castile and Aragon, the

towns were "judicial islands" having their own law and transacting their own business within the field of what would now be styled "local government." Here, as in the English borough, the king or overlord normally retained supremacy but was willing to part with control in detail in return for financial benefits and military or other services. Obviously there are exceptions to these regional generalizations, for each town differed from all others in its social and economic development.

The general importance in European history of the medieval commune lies perhaps in the social and political education acquired by the citizens through their exercise of self-government. It would be inaccurate, however, to imply that the communes were "democracies." The life of all the towns was characterized by a struggle for control, as a result of which the wealthiest and most powerful citizens were usually more or less successful in monopolizing power. Within the communes oligarchy was the norm. The direct inheritance of the modern nation-state from the communes was small, despite their role in parliamentary institutions. When monarchies were sufficiently powerful, they sought to stamp out municipal patriotism and civic organization.

Certain rural zones were also organized as communes, normally in response to the need for collective agrarian organization (pasturage and other rights or property held in common), but their institutions were less elaborate than those of the urban communes.

commune, also called PEOPLE'S COMMUNE, Chinese (Wade–Giles romanization) JEN-MIN KUNG-SHE, Pinyin RENMIN GONGSHE, type of large rural organization introduced in China in 1958. Communes began as amalgamations of collective farms; but, in contrast to the collectives, which had been engaged exclusively in agricultural activities, the communes were to become multipurpose organizations for the direction of local government and the management of all economic and social activity. Each commune was organized into progressively larger units: production teams, production brigades, and the commune itself.

As a basic unit of China's socialist system, the commune reflected the often abrupt changes in political and economic policy after 1949. While the commune's trilevel structure was retained, there was constant conflict revolving around the issues of local decision making, ownership of private plots of land, and payment of wages. During the Great Leap Forward (1958–60), individuals forfeited their private plots to common ownership and wages were equalized. After the economic difficulties of 1959–61, however, the communes were reorganized. Their average size was reduced, more autonomy was granted the local production teams, private plots were returned to farmers, and wages were paid according to the work performed.

The Cultural Revolution (1966–76) brought strict regimentation and a loss of local control to the communes. Responsibility for production decisions rose to the production-brigade and commune levels and was often assumed by party cadres and even the army. This period of turmoil was succeeded—especially after the death of Mao Zedong in 1976—by modernizing reforms that granted unprecedented local and individual autonomy to the communes in communist China. After 1979 the communes were gradually dismantled, and farmers were encouraged to cultivate private plots and sell the produce for profit.

Commune of Paris (1871): *see* Paris, Commune of.

communication, the exchange of meanings between individuals through a common system of symbols. Explicit definitions and theories of communication were not proposed until 20th-century advances in science and technology gave rise to the mass-communications media.

The subject of communication is treated in a number of articles in the MACROPAEDIA. For a general treatment, encompassing the functions, types, and psychology of communication, *see* Communication. For a treatment of animal communication, *see* Behaviour, Animal. For further treatment of the basic components and techniques of human communication, *see* Language; Speech; Writing. For technological aspects, including communications devices and information systems, *see* Broadcasting; Encyclopaedias and Dictionaries; Information Processing and Information Systems; Libraries; Printing, Typography, and Photoengraving; Publishing; Telecommunications Systems.

For statistical data on national communications media, *see* BRITANNICA BOOK OF THE YEAR.

For a description of the place of communication in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Section 514.

communication, privileged (law): *see* privileged communication.

communication theory: *see* information theory.

Communications Satellite Corporation: *see* Comsat.

Communion, Holy: *see* Eucharist.

communion of saints: *see* saints, communion of.

communism, system of political and economic organization in which property is owned by the community and all citizens share in the enjoyment of the common wealth, more or less according to their need. Following the rise to power of the Marxist-inspired Bolsheviks in Russia in 1917 and the consolidation of their power under Vladimir Lenin and Joseph Stalin, communism came to denote a totalitarian system in which a single political party controls the government, which in turn owns the means of production and distributes wealth with the professed aim of establishing a classless (and eventually a stateless) society. The term communism is also applied to revolutionary movements, inspired by Marxist–Leninist principles, that seek to bring about such a society.

A brief treatment of communism follows. For full treatment, *see* MACROPAEDIA: Marx and Marxism; Socio-Economic Doctrines and Reform Movements, Modern.

The origins of the idea of communism lie deep in Western thought. The idea of a classless society, in which all the means of production and distribution are owned by the community as a whole and from which any traces of a state have disappeared, has long held a fascination for human beings. A number of the utopias that have been described in literature, including Thomas More's *Utopia,* provide for the common ownership of property to some extent.

Communism acquired a new meaning in 1848 with the publication of the *Communist Manifesto* by Karl Marx and Friedrich Engels. According to Marx and Engels, communism would occur as the inevitable outcome of a historical process. In their view, all of human history has been a long, protracted struggle between an exploiting class, the capitalists in the present age, and an exploited class, the workers, or proletariat. This historical struggle enters its critical stage in the period of capitalism and its highest achievement, industrialization. The effect of industrialization is to heighten and intensify the internal contradictions in capitalism. In practical terms, Marx and Engels assserted that the ownership of industry would become concentrated in fewer and fewer hands, while the capitalists' exploitation of the urban workers would plunge the latter into a state of ever-increasing misery. The impoverished workers would grow in numbers and organize themselves into a political party that would lead a revolution in which the proletariat dispossess the capitalists. The proletariat would then establish a society governed by a "dictatorship of the proletariat" and based on the communal ownership of wealth. Marx referred to this phase of human society as socialism, and reserved the word communism for the authentically propertyless, classless, and stateless higher phase of society for which he asserted socialism is merely a preparation. Communism is, strictly speaking, the stage of final transcendence of class division and the elimination of a coercive State. This is the reason that "communism" is missing from the name U.S.S.R.; it is the Union of Soviet *Socialist* Republics.

Early on, however, this precise distinction began to be confused. In 1847 Marx himself had founded a party he called the Communist League—to distinguish it, he said, from certain already-existing parties which called themselves socialist but which, to Marx, were not worthy of the term. "Communist" began to be used to apply to a specific party with a specific program, rather than to its final goal.

The individual who did most to unify this party and forge this program was the Russian Marxist ideologue Vladimir Lenin. Lenin felt that the working class was unable to bring about a revolution on its own but needed a professional group of revolutionaries to guide it. Lenin and his Bolsheviks came to power in Russia in 1917. Under Lenin, the Communist Party (as the Bolsheviks renamed themselves) of the Soviet Union took control of the government and outlawed all other political parties. They established this dictatorship so that the Communist Party could ensure the Soviet Union's transition from capitalism to socialism. The new totalitarian political system thus created, along with the principles and methods the Bolsheviks had originated for gaining power in the first place, became known as Leninism (*q.v.*).

Under Joseph Stalin, Lenin's successor as the leader of the Soviet Union, the Soviets forcibly accomplished the transition from capitalism to socialism (the communal ownership of the means of economic production) by nationalizing the Soviet Union's industries and collectivizing its agriculture. A program of rapid industrialization was pushed forward despite the great material deprivations it caused, and police terror was applied indiscriminately to the population to suppress all dissent and opposition. The system thus established became known as Stalinism (*q.v.*).

Communist rule was basically confined to the Soviet Union until after World War II, at which time the victorious Soviet Red Army liberated the countries of eastern Europe from Nazi Germany's control. The Soviets subsequently sponsored the formation of communist governments in Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and North Korea, while more independent communist regimes came to power in Yugoslavia and Albania. Stalinism became the basic model for almost all of these new communist governments.

In 1949 the Chinese Communist Party under the leadership of Mao Zedong emerged victorious from a civil war with the Nationalists. In contrast to Marx, Lenin, and Stalin, who had all believed that a successful socialist revolution could only be carried out by the urban proletariat, Mao had achieved a successful revolution in his country by mobilizing China's immense rural peasantry in a prolonged campaign of guerrilla war. Once in power, Mao

sought an alternative to the bureaucratic and technical elites that had emerged in the Soviet Union. Mao tried to achieve economic growth by sheer revolutionary enthusiasm and the mass mobilization of China's manpower on a strictly egalitarian basis. (*See* Maoism.) This program was eventually rejected by Mao's fellow Chinese communists as impractical, but Mao's revolutionary strategy, and particularly his emphasis on peasant-based guerrilla war, proved influential. In Southeast Asia communists using Maoist strategies came to power in North Vietnam in 1954 and in South Vietnam, Laos, and Cambodia in the mid-1970s. Cuba became a communist nation in 1958. In the meantime, Stalinist practices in the Soviet Union had noticeably softened after Stalin's death in 1953, but the basic elements of the totalitarian system that he had created remained intact for more than four decades in the Soviet Union and its eastern European satellites.

Both as an ideology and as a practical system for the organization of a state, communism entered a period of crisis in the late 20th century. By the 1980s it had become clear that state-owned systems of economic production were unable to provide the same standards of living obtained in many countries with free-market economies. The unequal concentrations of wealth in capitalist countries were matched by glaring concentrations of power in communist ones, and it had become obvious that the maintenance of one-party communist rule tended to limit personal freedoms in a way unknown in parliamentary democracies.

In response to some of these problems, the communist government of China abandoned the economics of Maoism in the late 1970s and '80s and began allowing limited private ownership and the use of market incentives in its economy. The rise to power in the Soviet Union of the reform-minded leader Mikhail S. Gorbachev in the mid-1980s set in motion an even more far-reaching reassessment of the efficacy of communist ideals and practices in that nation. In 1989–90 the communist parties of eastern Europe abandoned their monopoly of power (with the tacit acceptance of the Soviet Union), and communist governments in those countries either fell or submitted themselves to free, multiparty elections. In the Soviet Union Gorbachev's attempts to liberalize the Soviet politico-economic system provoked that system's collapse altogether in 1991, after which communism rapidly withered as a viable ideology in Russia and the other former Soviet republics.

Communist Information Bureau: *see* Cominform.

Communist International: *see* International, Third.

Communist Party: *see* Chinese Communist Party; Democratic Party of the Left (Italian Communist Party); French Communist Party.

Communist Party of Cuba, Spanish PARTIDO COMUNISTA DE CUBA (PCC), Cuban communist party organized by Fidel Castro and others in 1965 but historically dating from communist activity begun in Cuba in 1923. Under the constitution of 1976, it is the only party permitted to function in Cuba.

The Cuban Communist Party (Partido Comunista Cubano) was founded in 1925 by Moscow-trained members of the Third International (Comintern). For three decades it adhered to the Stalinist line but, nevertheless, opportunistically collaborated with the regime of Fulgencio Batista in the 1940s and early '50s, its members even being rewarded with posts in government and labour. From 1954 to 1959, however, the Communists were a target of government suppression.

In 1944 the party had been renamed the People's Socialist Party (Partido Socialista Popular; PSP); it retained this name until 1961, when, after Castro's overthrow of Batista and the victory of the revolution, the party was merged with Castro's 26th of July Movement (Movimiento 26 de Julio) and Revolutionary Directorate (Directorio Revolucionario) to form the Integrated Revolutionary Organizations (Organizaciones Revolucionarias Integradas; ORI). The next year, after a wide purge of members, the ORI was reorganized into the United Party of the Socialist Revolution (Partido Unificado de la Revolución Socialista). This in turn was dissolved on Oct. 5, 1965, and replaced by the Communist Party of Cuba, organized along more orthodox Soviet lines. Its first congress was held in Havana in 1975. Throughout its history the new party was dominated by Fidel Castro and his brother Raúl Castro.

Communist Party of Spain, Spanish PARTIDO COMUNISTA DE ESPAÑA (PCE), Spanish communist party that was founded in 1921 as a splinter group from the Spanish Socialist Workers' Party. Negligible at first, the PCE began to attain strength and its first parliamentary representation in the early 1930s, during the polarization of Spanish politics that preceded the Spanish Civil War (1936–39). Upon that conflict's outbreak the PCE grew extremely rapidly, its membership expanding from 30,000 in early 1936 to almost 1,000,000 by 1937. The PCE became the best-organized, most tightly disciplined, and most militarily effective of all the parties in the Spanish Republic, and it received special amounts of Soviet aid and assistance.

The PCE went underground upon the victory of the Nationalists in 1939, and many of its leaders went into exile. Santiago Carrillo became the party's secretary-general in 1956, and under his leadership the PCE adopted a moderate stance and continued its clandestine organization of a major Spanish labour federation. The PCE was legalized in Spain in 1977. The party embraced the "Eurocommunist" doctrine, pledging adherence to parliamentary democracy at home and independence from the Soviet Union, but the PCE nevertheless lost many voters to the Spanish Socialist Workers' Party over the following years. The PCE received only 4 percent of the vote in the 1982 elections, and by 1986 it had split into several relatively small factions.

Communist Party of the Soviet Union (CPSU), also called (1925–52) ALL-UNION COMMUNIST PARTY (BOLSHEVIKS), Russian KOMMUNISTICHESKAYA PARTIYA SOVETSKOGO SOYUZA, or VSESOYUZNAYA KOMMUNISTICHESKAYA PARTIYA (BOLSHEVIKOV), the major political party of Russia and the Soviet Union from the Russian Revolution of October 1917 to 1991.

The Communist Party of the Soviet Union arose from the Bolshevik wing of the Russian Social Democratic Workers' Party (RSDWP). The Bolsheviks, organized in 1903, were led by Vladimir I. Lenin and argued for a tightly disciplined organization of professional revolutionaries who were governed by democratic centralism and were dedicated to achieving the dictatorship of the proletariat. In 1917 they formally broke with the right, or Menshevik, wing of the RSDWP. In 1918, when the Bolsheviks became the ruling party of Russia, they changed their organization's name to the All-Russian Communist Party; it was renamed the All-Union Communist Party in 1925 after the founding of the U.S.S.R. and finally to the Communist Party of the Soviet Union in 1952.

The Communist Party arose in opposition to both capitalism and the socialists of the Second International who had supported their capitalist governments during World War I. The name communist was specifically taken to distinguish Lenin's followers in Russia and abroad from such socialists.

Following their victory in the Russian Civil War (1918–20), the Soviet Communists followed a cautious policy of limited capitalism during the New Economic Program until Lenin's death in 1924. Then the powerful general secretary Joseph Stalin and leaders around him moved to assume the leadership of the party. The Stalin group easily defeated such rival leaders as Leon Trotsky, Grigory Zinoviev, and Lev Kamenev. Then, in the late 1920s, opposition arose from Stalin's ally Nikolay Bukharin to the policies of rapid industrialization and collectivization. Stalin eliminated Bukharin from the leadership in 1929 and sought to eradicate the last remnants of opposition within the party by launching the Great Purge (1934–38), in which many thousands of his real or assumed opponents were executed as traitors and millions more were imprisoned or sent to forced-labour camps. During Stalin's years in power the party's size expanded from about 470,000 members (1924) to several million from the 1930s on. Following victory in World War II, Stalin faced no further challenges within the party, but discontent with his tyranny and arbitrariness smoldered among the party leadership. Following Stalin's death in 1953, Nikita Khrushchev began a rapid rise and in 1956 repudiated Stalin's tyrannical excesses in his famous "Secret Speech" at the 20th party congress. The next year he decisively defeated his rivals Vyacheslav Molotov, Georgy Malenkov, and others of the "anti-party group" and became the party's undisputed leader. Khrushchev ended the practice of bloody purges of the party membership, but his impulsive rule aroused dissatisfaction among the other party leaders, who ousted him in 1964. Leonid Brezhnev succeeded him and was general secretary until his death in 1982, being in turn succeeded by Yuri Andropov. After Andropov's death in 1984, Konstantin Chernenko became party leader, and after Chernenko's death in 1985 the leadership went to Mikhail Gorbachev, who attempted to liberalize and democratize the party and—more largely—the U.S.S.R.

Internationally the CPSU dominated the Communist International (the Comintern) and its successor, the Cominform, from the 1920s on. But the very spread and success of communist parties worldwide brought challenges to the CPSU's hegemony, first from the Yugoslavs in 1948 and then from the Chinese in the late 1950s and early '60s. The CPSU continued to serve as the model for the Soviet-dominated states of eastern Europe, however, until 1989, at which time the communist parties of eastern Europe either disintegrated or transformed themselves into Western-style socialist (or social democratic) parties.

From 1918 through the 1980s the Communist Party of the Soviet Union was a monolithic, monopolistic ruling party that dominated the political, economic, social, and cultural life of the U.S.S.R. The constitution and other legal documents that supposedly ordered and regulated the government of the Soviet Union were in fact subordinate to the policies of the CPSU and its leadership. Constitutionally, the Soviet government and the CPSU were separate bodies, but virtually all high government officials were party members, and it was this system of interlocking dual membership in party and governmental bodies that enabled the CPSU to both make policy and see that it was enforced by the government.

But by 1990, Mikhail Gorbachev's efforts to restructure the Soviet Union's economy and democratize its political system had eroded both the CPSU's unity and its monopolistic hold on power. In 1990 the CPSU voted to surrender its constitutionally guaranteed monopoly of power, thereby permitting opposition parties to flourish legally in the Soviet

Union. The holding of free (and in some cases multiparty) elections in various union republics hastened the decline in the party's membership and enabled defectors from its ranks (such as Boris Yeltsin) to rise to positions of power in republic governments.

Despite these changes, the party remained the principal obstacle to Gorbachev's attempts to reform the Soviet economy along free-market lines. A failed coup by Communist hard-liners against Gorbachev in August 1991 discredited the CPSU and greatly hastened its decline. In subsequent months the party was stripped of its physical assets; its control of the Soviet government, internal-security agencies, and armed forces was broken; and the party's activities were suspended. The dissolution of the Soviet Union on Dec. 25, 1991, into a group of sovereign republics headed by democratically elected governments marked the CPSU's formal demise, though the party's former members retained much of their control over economic and political decision making in the new republics.

The basic unit of the CPSU was the primary party organization, which was a feature in all factories, government offices, schools, and collective farms and any other body of any importance whatsoever. At the party's peak size in the early 1980s, there were about 390,000 primary party organizations, and above this lowest level there were district, city, regional, and republic committees. At its height the CPSU had some 19 million members.

Nominally, the supreme body in the CPSU was the party congress, which usually met every five years and was attended by several thousand delegates. The party congress nominally elected the 300 or so members of the Central Committee of the CPSU, which met at least twice a year to perform the work of the party in between congresses. In its turn the Central Committee elected the members of various party committees, two of which, the Politburo (*q.v.*) and the Secretariat, were the actual centres of ultimate power and authority in the Soviet Union. The Politburo, with about 24 full members, was the supreme policy-making body in the country and exercised power over every aspect of public policy, both domestic and foreign. The Secretariat was responsible for the day-to-day administrative work of the party machine. The membership of these bodies, though nominally determined by the Central Committee, was in fact self-perpetuating and was largely determined by those bodies' members themselves.

The training ground for future candidates and members of the party was the All-Union Lenin League of Communist Youth, known as the Komsomol (*q.v.*). The principal publications of the party were the daily newspaper *Pravda* and the monthly theoretical journal *Kommunist.*

Consult the INDEX *first*

community, also called BIOLOGICAL COMMUNITY, in biology, an interacting group of various species in a common location. For example, a forest of trees and undergrowth plants, inhabited by animals and rooted in soil containing bacteria and fungi, constitutes a biological community.

A brief treatment of biological communities follows. For full treatment, *see* MACROPAEDIA: Biosphere.

Among the factors that determine the overall structure of a community are the number of species (diversity) within it, the number of each species (abundance) found within it, the interactions among the species, and the ability of the community to return to normal (resilience and stability) after a disruptive influence such as fire or drought. The growth and change of biological communities over time is known as succession, or ecological succession.

The various species in a community each occupy their own ecological niche. The niche of a species includes all of its interactions with other members of the community, including competition, predation, parasitism, and mutualism. The organisms within a community can be positioned along food chains by showing which eats which, and these positions are known as trophic levels. The first level includes the producers—the photosynthetic plants—which convert the Sun's radiant energy into nutrients available to other organisms in the community. These plants are eaten by herbivores (plant-eaters, or primary consumers), the second trophic level. Herbivores are, in turn, eaten by carnivores (flesh-eaters), which are frequently eaten by larger carnivores (secondary and tertiary consumers, respectively). The food chain ends when the last link dies and is attacked by various bacteria and fungi, the decomposers that break down dead organic matter and thereby release essential nutrients back into the environment.

An ecosystem consists of the biological community of an area together with its physical environment. Terrestrial ecosystems include forest, savanna, grassland, scrubland, tundra, and desert. Marine and freshwater aquatic ecosystems include oceans, lakes, rivers, and wetlands. All the Earth's ecosystems together constitute the biosphere. *See also* biome.

Community, Rule of the (Essene document): *see* Manual of Discipline.

community centre: *see* social settlement.

community college: *see* junior college.

community ecology: *see* synecology.

community property, legal treatment of the possessions of married people as belonging to both of them. Generally, all property acquired through the efforts of either spouse during the marriage is considered community property. The law treats this property like the assets of a business partnership.

The history of marital property law shows a gradual spread of the community-property system. In ancient Rome—except for one period—wives had few property rights; whatever was theirs became their husbands' upon marriage.

In the European Middle Ages, parts of Spain, France, and Germany had copartnership-in-acquisition systems, which are thought to have originated among the Germanic tribes and to have been carried to Spain and France by the Goths and Franks. The French and Spanish carried these practices to the Americas.

The English common law considered wives as legal extensions of their husbands and unable to own property. Various statutes in the late 19th century modified this concept in both England and the United States, and the classifications of community and separate property began to assume the features they have today.

The community-property system classifies property upon acquisition as either community or separate, irrespective of declarations of the parties—although contractual specifications between husband and wife may modify this. Separate property must be held and used exclusively by one spouse. Usually property that is acquired before marriage does not become community-owned. Most community-property statutes specify what property acquired after marriage is considered to be separate, and all the rest is classified as community.

Common sense dictates how the property is classified. For example, either spouse's earnings belong to the community, while gifts to one spouse are considered separate property. Generally, any earnings from property (rent, interest, dividends) take their classification from the property that yields them.

Where community and separate property are blended, the whole is presumed to be community unless the great bulk of it is separate. In lawsuits over the classification of property, the presumption is in favour of the community category.

Formerly, the husband held the exclusive right to control community property, but this right has been modified by many statutes.

commutation, in law, shortening of a term of punishment or lowering of the level of punishment. For example, a 10-year jail sentence may be commuted to 5 years, or a sentence of death may be commuted to life in prison. Often, after a person has served part of his sentence, the remainder is commuted owing to specific circumstances. Commutation of sentence differs from pardon, which, if unconditional, removes the stigma both of the court decision and of the punishment and restores the person's civil rights; commutation does neither. Commutation is also distinguished from reprieve, which merely delays or temporarily suspends the sentence.

commutative law, in mathematics, either of two laws relating to number operations of addition and multiplication, stated symbolically: $a+b=b+a$ and $ab=ba$; that is, a finite sum or product is unaltered by reordering the terms or factors. While commutativity holds for many systems, there are exceptions—as in quaternions in which commutativity of multiplication is invalid. Scalar multiplication of two vectors (to give the so-called dot product) is commutative (*i.e.,* $a \cdot b = b \cdot a$), but vector multiplication (to give the cross product) is not (*i.e.,* $a \times b = -b \times a$). The commutative law does not necessarily hold for multiplication of conditionally convergent series. *See also* associative law; distributive law.

Commynes, Philippe de, Commynes also spelled COMINES (b. *c.* 1447, Comines, Flanders [now on the Belgian-French border]—d. Oct. 18, 1511, Argenton-Château, France), statesman and chronicler whose *Mémoires* establish him as one of the greatest historians of the European Middle Ages.

Commynes was the son of a knight of the Order of the Golden Fleece and was the godson of Philip the Good, duke of Burgundy. He was brought up at the Burgundian court and in 1464 became squire to Philip's son Charles of Charolais (Charles the Bold). He took part in a war against Louis XI of France in 1465 and accompanied Charles the Bold



Commynes, portrait drawing by Jacques Le Bouco, 16th century; in the Municipal Library Arras, Fr.
Giraudon—Art Resource

on his first expedition against Liège (1466–67). When Charles succeeded to the duchy of Burgundy in 1467, he appointed Commynes his counselor and sent him as ambassador on missions to England, Brittany, and Spain. In 1468 he was present at the famous meeting at Péronne, when Charles

virtually held Louis XI as prisoner, and was able to negotiate an agreement between them.

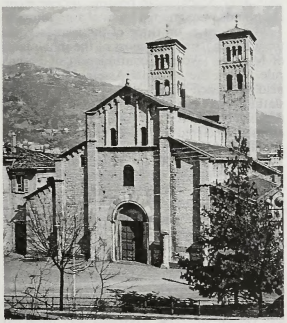
Recognizing Commynes's abilities as a diplomat, Louis persuaded him in 1472 to desert Charles the Bold and enter his service as a chamberlain and confidential adviser; Commynes was rewarded handsomely for his move. After Louis's death in 1483, Commynes was at first one of the counsellors of the regent, Anne of Beaujeu, but he intrigued against the government with the Duke d'Orléans (the future Louis XII of France) and was implicated in the "Mad War" between the two. As a consequence, he was imprisoned for several months but was eventually restored to favour at the end of 1489 by Charles VIII, who used him as a negotiator and later as ambassador to Venice at the beginning of the expedition to Italy (1494–95). He was not in the government during the early years of Louis XII's reign but later helped formulate Louis's Italian policy.

Commynes's *Mémoires* (1524) reveals him as a writer of considerable talent, remarkable for his psychological perceptiveness, his sense of the picturesque, and his vivid narrative. Despite his prejudice for Louis XI, he succeeded in achieving impartiality; but his work contains many errors of fact and omission.

Comnenus FAMILY, Byzantine family from Paphlagonia, members of which occupied the throne of Constantinople for over a century (1081–1185).

Manuel Eroticus Comnenus was the first member of the family to figure in Byzantine history; an able general, he served the emperor Basil II in the East. His son, Isaac I, leader of the military nobles and soldiery of Asia Minor, reigned as emperor from 1057 to 1059. Isaac's nephew, Emperor Alexius I (1081–1118), founder of the Comnenian dynasty, was succeeded by his son John II (1118–43). John II was followed by Alexius I's grandson Manuel I (1143–80) and great-grandson Alexius II (1180–83). With the death of Alexius II, the elder line of the family died out. Andronicus I (1183–85), son of John II's brother Isaac, succeeded Alexius II and was the last Comnenian emperor. The family continued to play an important part in state affairs, however, and was allied by marriage to other ruling families, such as the Angeli and the despots of Epirus. Following the Latin conquest of Constantinople in 1204, Andronicus I's grandsons Alexius and David, with Georgian help, founded the empire of Trebizond, which lasted until 1461, when David Comnenus, its last ruler, was deposed. He was executed some time later by the Ottoman sultan Mehmed II.

Como, Latin COMUM, city, capital of Como *provincia,* Lombardia *regione,* northern Italy,



Church of Sant' Abbondio, Como, Italy
SCALA—Art Resource/EB Inc.

rimmed by mountains at the extreme southwest end of Lake Como, north of Milan. As the ancient Comum, perhaps of Gallic origin, it was conquered by the Romans in 196 BC and became a Roman colony under Julius Caesar. It was made a bishopric in AD 379. In the 11th century, after struggles with the Lombards and the Franks, it became a free commune. Shortly thereafter (1127), however, it was destroyed by the Milanese for having sided with the emperor Frederick I Barbarossa in his conflict with the Lombard League (an alliance of northern Italian towns). Como made peace with Milan in 1183 and after 1335 fell under the rule of the Visconti family and the Sforzas of Milan. During that period its silk industry and wool trade played an important role in the Milanese economy. Later, the city, following the fortunes of Lombardy, came successively under Spanish, French, and Austrian rule, until it was liberated by the Italian patriot Giuseppe Garibaldi in 1859 and became part of the Italian kingdom.

The city's name was part of the term *maestri comacini* ("masters of Como"), applied to itinerant guilds of masons, architects, and decorators who spread the Lombard style throughout Europe during the Middle Ages. Their brick or brick-cut stone-faced walls, excellent mortar, and other structural and stylistic accomplishments are still visible in buildings more than a thousand years old from Catalonia to Germany. The city itself centres on the modern Piazza Cavour, which opens onto the lake and divides the lakeside promenade into eastern and western sections. Notable landmarks include the Cathedral of Santa Maria Maggiore (14th–18th century), a fine example of the fusion of Gothic and Renaissance styles; the Broletto, or Communal Tower (1215; facade rebuilt 1435), the former city hall; and the Church of Sant' Abbondio, formerly the cathedral, consecrated in 1095 on the site of an 8th-century church. Two of the oldest buildings are the Church of San Carpoforo, believed to date from the 4th century and standing on the site of a temple to Mercury, and the 12th-century Basilica of San Fedele. Several towers of the old fortifications survive, notably the Tower of Porta Vittoria (1192). The civic museum has archaeological collections, and there is also a museum of the Risorgimento (the 19th-century movement for Italian political unity).

Printing is an ancient art in Como, where Baldassare di Fossato printed the *Opus statutorum* ("Book of Laws") of Alberico da Rosate in 1477 and the *Vita di S. Giovanni de Capistrano* ("Life of St. John of Capistrano") in 1479. The two Plinys (Roman scholars) were born at Comum, and the physicist Alessandro Volta is commemorated by the Voltiano Temple (1928).

A rail junction and tourist centre, Como is noted for its old established silk industry. It is the site of the National Institute of Silk, with large workshops and laboratories and vocational-training facilities. Pop. (1988 est.) mun., 90,799.

Como, Lake, Italian LAGO DI COMO, also called LARIO, Latin LACUS LARIUS, lake in Lombardy, northern Italy, 25 miles (40 km) north of Milan; it lies at an elevation of 653 feet (199 m) in a depression surrounded by limestone and granite mountains that reach an elevation of about 2,000 feet (600 m) in the south and more than 8,000 feet (2,400 m) in the northeast. Lake Como has three branches of approximately equal length (about 16 miles [26 km]). One stretches northward past Colico; of the other two, one stretches southwestward to the city of Como, the other southeastward beyond Lecco (this branch also known as Lecco Lake), with Bellagio Promontory marking the bifurcation.

Lake Como is about 29 miles (47 km) long and up to 2.5 miles (4 km) wide, with an area of 56 square miles (146 square km) and a maximum depth of 1,358 feet (414 m). It receives the Adda River, which enters it near Colico and issues from it at Lecco, and also the waters of numerous other rivers and mountain streams, including the Mera. It is subject to frequent floods and is swept by two winds, the *tivano* from the north in the morning and the *breva* from the south in the afternoon. Its northern arm once probably extended as far as Chiavenna, enclosing the area now covered by Mezzola Lake. Como is associated with the classical writings of Virgil, the two Plinys, and Claudian.



Villa Melzi Gardens at Bellagio on Lake Como, Italy
Philip Craven/ Robert Harding Picture Library

A luxuriant lakeshore vegetation includes vines and fig, pomegranate, olive, chestnut, and oleander trees. There is fishing for trout, eel, and *agoni,* a type of herring, but pollution has much reduced the fish population. The lake is famous for the natural beauty of its setting and for the handsome villas on its shores. Among the many noted lakeside resorts are Como, Lecco, Bellagio, Tremezzo, Menaggio, and Varenna. Several towns are connected by steamer services.

Comodoro Rivadavia, port city, Chubut *provincia,* southeastern Argentina, on the Gulf of San Jorge. It was founded in 1901 by Francisco Petrobelli, a businessman interested in establishing an Atlantic port to handle the products of Colonia Sarmiento, a farming centre 80 miles (130 km) west-northwest. The name honours Comodoro Martín Rivadavia (1852–1901) of the Argentine navy. The arid, windy plains of the hinterland supported only sheep prior to the discovery of petroleum near the port in 1907. A nationalized corporation administers the oil wells, which produce about one-fifth of Argentina's total output. Oil tankers, a national highway, airlines, and natural-gas lines link the city with La Plata and Buenos Aires, 1,000 miles (1,600 km) to the north. A major base of the Argentine Air Force is located there. Pop. (1980) 96,817.

Comoé, Parc National de la (Côte d'Ivoire): *see* Komoé, Parc National de la.

Comoé River (Côte d'Ivoire): *see* Komoé River.

Comorin, Cape, rocky headland on the Indian Ocean in Tamil Nādu state, southeastern India, forming the southernmost point of the subcontinent. It is the southern tip of the Cardamom Hills, an extension of the Western Ghāts range along the west coast of India. The town of Kanniyākumāri on the headland contains an ancient temple dedicated to Śiva (Shiva), which is a much-frequented Hindu pilgrimage site.

Comoros, in full FEDERAL ISLAMIC REPUBLIC OF THE COMOROS, Arabic JUMHURĪYAT AL-QUMUR AL-ITTIḤĀDIYAH AL-ISLĀMĪYAH, French RÉPUBLIQUE FÉDÉRALE ISLAMIQUE DES COMORES, independent state comprising a group of islands at the northern end



Comoros

of the Mozambique Channel of the Indian Ocean, between Madagascar and the southeast African mainland. The islands from northwest to southeast include Grande Comore (also called Njazidja), Mohéli (also called Mwali), and Anjouan (also called Nzwani) but exclude the French-allied island of Mayotte to the southeast. The capital, Moroni, is located on Grande Comore. Area 719 square miles (1,862 square km). Pop. (1993 est.) 516,000.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Grande Comore (443 square miles [1,148 square km]) is the largest and loftiest island, rising near its southern end in an active volcano, Mount Karthala (7,746 feet [2,361 m]). North of Mount Karthala is a wide plateau averaging 2,000 feet (610 m) in elevation. The surface is generally rocky and the soils shallow. There are no perennial streams, and the coast, without large inlets, is ill suited for shipping. In the southwest is Moroni, capital of the nation, and on the north coast is the town of Mitsamiouli.

Mohéli (112 square miles [290 square km]) is the smallest island of the group. Composed largely of a plateau that averages about 1,000 feet (305 m) in elevation, the island ends in the west in a ridge reaching 2,625 feet (800 m). The valleys are generally fertile, and the hillsides are covered with thick forests. A strong sea swell hampers shipping. Mohéli's chief towns are Fomboni on the northern coast and Nioumachoua in the southwest.

Anjouan (164 square miles [425 square km]) is a triangular island rising centrally in a volcanic massif (Mtingui) that reaches about 5,200 feet (1,580 m). Though the soil cover is good, much erosion has occurred, and many areas are no longer arable. There are no good natural harbours. Mutsamudu, on the northwest coast, is the chief town; its port facilities were modernized in the mid-1980s.

Southeast of Anjouan lies Mayotte (144 square miles [373 square km]), which is claimed by the Comoros, but its status in the early 1990s was unsettled, and it continued to be a de facto dependency of France.

The tropical climate has two clearly marked seasons: a fresh, dry period between May and October and a hot, humid season between November and April. In November the monsoon (*cascassi*) brings the highest afternoon temperatures—about 91° F (33° C). The highest monthly rainfall occurs in January (11–15 inches [275–375 mm]), and the summer is the season of greatest tropical-cyclone frequency. Winter daily maximum temperatures fall to their lowest of about 84° F (29° C) in July. The annual rainfall varies between 43 and 114 inches (1,100 and 2,900 mm), being highest on the windward northeast sides of the islands.

Rain sinks so deeply into the lavas and porous rocks of Grande Comore that wells (*foumbous*) can be sunk only in the coastal lowlands, where the water is brackish. Most of Grande Comore's water supplies come from reservoirs that are filled in the rainy season.

Less than one-sixth of the land remains covered with forest, but rapid deforestation, caused mainly by domestic firewood consumption, threatens to reduce the islands' forested land still more. A coastal zone of mangroves is followed inland by one of coconut palms, mangoes, and bananas up to about 1,300 feet (400 m), above which a forest zone rises to about 5,900 feet (1,800 m). On the highest peaks only broom, heather, and lichens grow. Animals, resembling those of Madagascar, include land birds and a lemur peculiar to the islands. Turtles abound along the coasts and are exported. The Comorian waters are the habitat of the coelacanth, a rare fish once thought to be extinct, which has fossil remains dating back to about 400 million years ago.

The people. The islanders reflect a diversity of origins. Malay immigrants and Arab traders


Mutsamudu on Anjouan, Comoros
Agence Hoa-Qui

have mixed with peoples from Madagascar and with various African peoples brought in as slaves. Most of the island's inhabitants speak Comorian, a Bantu language allied to Swahili, but Arabic and French are the official languages, the latter being the language of instruction and administration. Grande Comore has more than half the country's population, while Mohéli has barely 5 percent. Islām is the state religion. The main population centre is Moroni. The birth and death rates are both high, and, although infant mortality is a major problem, the population growth rate is about twice the world average. Almost half of the population is less than 15 years of age.

The economy. The Comoros, which is one of the world's poorest nations, has an economy based on subsistence agriculture. The country's gross national product (GNP) is growing at a rate somewhat slower than the population; the GNP per capita is among the lowest in the world. Until 1975, when the independent state of Comoros was formed, French aid kept the economy afloat. Following the restoration of diplomatic relations in 1978, French aid was resumed. Saudi Arabia, Oman, Iraq, Japan, Kuwait, and the European Community also have provided financial aid. Although corn (maize), coconut, and poultry projects (aimed at helping the Comoros achieve self-sufficiency in food production) had been established by 1981, the early 1990s found the economy still in a disastrous condition, plagued by overpopulation, poor harvests, and severe unemployment. Although subsistence agriculture yields cassava, sweet potatoes, bananas, and mountain rice, much of the country's food must be imported. Goats, cattle, and sheep are raised. Plantations cultivating vanilla (mostly on Grande Comore), perfume plants (particularly ylang-ylang on Anjouan), coconuts (mostly on Mohéli), coffee, cloves, and cacao cover much of the islands. Manufacturing generally is limited to the processing of agricultural products, primarily vanilla, essential oils, cloves, and copra, for export. There are also sawmills, woodworking establishments, oil and soap factories, and several hydroelectric-power plants. Imports, at about twice the value of exports, include rice, vehicles, fuels, meat and fish, iron and steel, and cement. France is the country's main trading partner.

The islands have roads, some of which are usable throughout the year. There is an international airport near Moroni on Grande Comore. All three islands are linked to Madagascar and eastern Africa by regular shipping and air ferries.

Government and social conditions. According to the constitution approved by referendum in June 1992, the president is elected by direct popular vote for a once-renewable five-year term. The legislature consists of the Federal Assembly, whose 42 members are directly elected for four-year terms, and the Senate, whose 15 members serve six-year terms and are chosen by an electoral college. The government is headed by the prime minister, who is chosen from the majority party in the Assembly. Each of the islands elects its own governor and a governing council with limited authority. The judiciary is headed by the Supreme Court, which is the highest court in the land.

The Comoros has a hospital on each of the main islands but suffers from a shortage of medical personnel. The most serious illnesses are malaria, tuberculosis, leprosy, and parasitic diseases. Average life expectancy is only 56 years. Education, officially compulsory between 7 and 15 years of age, is provided by both traditional Islāmic schools, in which the Qur'ān is studied, and schools established by and patterned on the system of the French. Although school enrollment has increased substantially, less than three-fifths of all school-age children attend school, and student-teacher ratios have remained high.

History. Comoros was shown on the world map (1527) of the Portuguese cartographer Diego Ribero, but the first European known to visit them was the Englishman James Lancaster about 1591. The dominant influence in the islands was then and for long afterward Arab. In 1843 France officially took possession of Mayotte and, in 1886, placed the other three islands under protection. Subordinated to the governor-general of Madagascar in 1914, the Comoros became an overseas territory of France in 1947, a status confirmed by a referendum held in 1958. In 1961, the year after Madagascar became independent, the islands were granted internal autonomy. In 1974 majorities on three of the islands voted for independence, but most of the inhabitants of Mayotte favoured continuation of French rule. When the National Assembly of France held that each island should decide its own status, President Ahmed Abdallah (who was deposed later in the year) of the Comorian government declared the whole archipelago independent on July 6, 1975. France, in December 1975, recognized the sovereignty of the three islands but upheld the autonomy of Mayotte, which in 1976 was temporarily designated a "special collectivity" (neither a territory nor a *département*) of France. As relations deteriorated, France withdrew all development and technical aid from the Comoros. A coup by a group of European mercenaries in May 1978 brought the exiled former president, Abdallah, back into power. Diplomatic relations were resumed with France, a new constitution was drawn up, and Abdallah was reelected president in the latter part of 1978 and ran unopposed in 1984. He survived three coup

attempts but was assassinated in November 1989. French intervention in the Comoros permitted multiparty presidential elections to be held in 1990, but the country remained in a state of chronic political instability thereafter.

compact disc (CD), a molded plastic disc for the reproduction of recorded sound. Unlike that of the phonograph disc produced by the mechanical, or analog, method, the "groove" on the CD is a series of minuscule pits inscribed at varying depths in an outward spiral by the laser of a digital recording instrument.

The mastering of CDs requires an environment free of both vibrations and dust; either can disrupt the focusing of the recording laser on the light-sensitive base layer and produce an unacceptable disc. While transmitting information to the disc, the laser also performs a number of additional operations, such as adjusting the spin rate of the disc (which varies, according to the point on the disc's radius, between 200 and 500 revolutions per minute) and transmitting playing-time information. After the disc has been coded, it is dipped in an etching chemical that eats away the areas that have been exposed to the laser beam and thus produces the pits. Stampers are then produced by means of electroplating, and duplicate discs are pressed in much the same way as phonograph discs. The molded plastic of the duplicates is then exposed to vaporized aluminum or silver, and the unit is sealed in acrylic. When the disc is inserted into a playback unit, a light beam from a low-intensity laser is alternately reflected and scattered by the pits and is "read" by an optical sensor, which converts the varying intensities of light into digital signals. The digital signals are then converted into sound impulses. (*See also* digital sound recording.)

The CD represents a technological advancement over the groove-and-stylus mechanism of the phonograph in that nothing actually touches the surface of the disc; its groove is never worn or damaged by a stylus. Also, because the optical sensor reads light bounced off the inscribed pits, dust or slight scratches on the surface of the disc cause no distortion. The dynamic range of the CD is up to 90 decibels, compared with 70 decibels on the best phonograph discs.

CDs for home use, introduced in the early 1980s, are 12 cm (4.75 inches) in diameter and store more than one hour of sound. A CD player can be connected to phonographic amplifiers and speakers. Because any information that can be digitized can be stored on and reproduced by laser disc, other forms of discs are also produced. Among them are the videodisc (larger in diameter than a compact disc), which can be used, for example, to view motion pictures, and the CD-ROM. (ROM is an abbreviation for "read-only memory.") CD-ROM discs are identical in appearance to the audio compact disc, but they contain computer programs and databases that can be read—with appropriate equipment—on a personal computer.

compactness, in mathematics, property of some topological spaces (a generalization of Euclidean space) that has its main use in the study of functions defined on such spaces. An open covering of a space (or set) is a collection of open sets that covers the space; *i.e.,* each point of the space is in some member of the collection. A space is defined as being compact if from each such collection of open sets, a finite number of these sets can be chosen that also cover the space.

Formulation of this topological concept of compactness was motivated by the Heine-Borel theorem for Euclidean space, which states that compactness of a set is equivalent to the set's being closed and bounded.

In general topological spaces, there are no concepts of distance or boundedness; but there are some theorems concerning the property of being closed. In a Hausdorff space (*i.e.,* a topological space in which every two points can be enclosed in nonoverlapping open sets) every compact subset is closed, and in a compact space every closed subset is also compact. Compact sets also have the Bolzano-Weierstrass property, which means that for every infinite subset there is at least one point around which the other points of the set accumulate. In Euclidean space, the converse is also true; that is, a set having the Bolzano-Weierstrass property is compact.

Continuous functions on a compact set have the important properties of possessing maximum and minimum values and being approximated to any desired precision by properly chosen polynomial series, Fourier series, or various other classes of functions as described by the Stone-Weierstrass approximation theorem.

Compagni, Dino (b. *c.* 1255, Florence [Italy]—d. 1324, Florence), Florentine official and historian, author of a chronicle of the city's political life that is one of the first modern historical analyses.

Born to a wealthy merchant family, Compagni was active in civil affairs, serving in the silk guild (1280), as governing consul (1282–99), in civil administration (1289, 1301), and as a justice official (1293). His name disappeared after the defeat of his political faction, the White Guelfs, but in 1310 he secretly began to write an account of the political struggles between the Guelfs and Ghibellines and between the Black and White factions of the Guelfs from 1280 to 1312. The *Cronica delle cose occorrenti ne' tempi suoi* ("Chronicle of Contemporary Events") is characterized by moral, ethical, and religious fervour; its historical accuracy has been established by later research, and it remains the most dependable document for that period. Its full portrayal of events, personalities, and human motivations places it among the first Renaissance scholarly works, although it was largely unknown until its initial publication in 1726.

Compagnie Française des Indes Orientales: *see* French East India Company.

Companions of Honour, Order of the, British honorary institution founded in 1917 by King George V to reward men and women who have rendered conspicuous national service. It is often awarded to artists or those who have distinguished themselves in the advancement of culture. Membership is limited to 65, although foreigners can become "honorary members." The prime ministers of Commonwealth countries are allowed to make nominations.

Induction into the order does not confer any title or knighthood, but members can add C.H. after their name. The order's badge depicts an oak tree with the shield of royal arms, an armoured knight mounted on a horse, and the motto emblazoned "In action faithful and in honour clear."

Companions of the Prophet, Arabic ṢAḤĀBAH, or AṢḤĀB, in Islām, followers of Muḥammad who had personal contact with him, however slight. In fact, any Muslim who was alive in any part of the Prophet's lifetime and saw him may be reckoned among the Companions. The first four caliphs, who are the *ṣaḥābah* held in highest esteem among Sunnite Muslims, are part of a group of 10 Companions to whom Muḥammad promised paradise. The *muhājirūn* (those who followed the Prophet from Mecca to Medina), the *anṣār* (the Medinese believers), and the *badrīyūn* (those who fought at the Battle of Badr) are all considered Companions of the Prophet. There are differing accounts of who belonged to the various groups.

The Companions, being eyewitnesses, are the most important sources of Ḥadīth, the record of Muḥammad's sayings and activities.

Shī'ite Muslims disregard the *ṣaḥābah,* whom they consider responsible for the loss of the caliphate by the family of 'Alī.

company, in military service, the smallest body of troops that functions as a complete administrative unit. A military company consists of a headquarters and two or more platoons organized and equipped to perform the company's operational functions. It is usually commanded by a captain, who discharges the basic responsibilities for training, discipline, and providing for the welfare of the personnel.

In medieval armies the term company referred loosely to the body of men accompanying a lord or knight into the field. As the organization of European armies developed, individual companies were brought together in larger tactical formations and eventually became subdivisions of brigades or regiments. King Gustav II Adolf in 1631 organized the Swedish infantry into 150-man companies, with four companies to a battalion and three battalions to a brigade. French, British, and early U.S. infantry regiments usually consisted of 10 companies of about 100 men each. As the rifle replaced the musket in the 19th century, infantry companies adopted more dispersed tactical formations and were organized in battalions within the regiment for control. Two comparable bodies—battery of artillery and troop of cavalry—became in most armies equivalent to a company; the artillery battery and the cavalry troop are usually commanded by a captain.

During World War I all armies experimented with the tactical use of supporting weapons in infantry companies, but such weapons were generally too heavy to be carried by foot soldiers. Not until World War II, when lighter machine guns, mortars, and antitank weapons had been developed, did crew-served weapons become a normal part of the infantry rifle company. In the U.S. Army the rifle company in 1945 had a strength of 6 officers and 187 men and was composed of a company headquarters, three rifle platoons of three squads each, and a weapons platoon in which were placed light, crew-served weapons for close-fire support. Although some modifications in personnel and weapons took place after World War II, the structure of the rifle company remained basically the same through several U.S. Army reorganizations that drastically altered the size, composition, and even the names of other types of units. Rifle companies of other nations are similarly organized.

Companies in modern armies vary widely in size and equipment, usually being built around a function or mission (*e.g.,* signal repair, medical ambulance, engineer bridge, reconnaissance, or military police companies) or around a weapon or class of weapons (*e.g.,* tank, rifle or infantry, or mortar companies). One characteristic all companies have in common, however, is basic administrative unity so that they can be absorbed as required into larger military formations, such as the battalion.

company, chartered: *see* chartered company.

comparative advantage, economic theory, first developed by David Ricardo of England, that attributed the cause and benefits of international trade to the differences among countries in the relative opportunity costs (costs in terms of other goods given up) of producing the same commodities. In Ricardo's theory, which was based on the labour theory of value (in effect, making labour the only factor of production), the fact that one country could produce everything more efficiently than another was not an argument against international trade.

In a simplified example involving two countries and two goods, if country A must give up three units of good x for every unit of good y produced, and country B must give up only two units of good x for every unit of good y, both countries would benefit if country B specialized in the production of y and country A specialized in the production of x. B could then exchange one unit of y for between two and three units of x (before trade, for only two units of x), and A could receive between one-third and one-half unit of y (before trade, only one-third unit of y) for every unit of x. This is true even though B may be absolutely less efficient than A in the production of both commodities.

The theory of comparative advantage is a strong argument in favour of free international trade and specialization among countries. The issue becomes more complex, however, as the simplifying assumptions (*e.g.*, a single factor of production, a given stock of resources, full employment, and a balanced exchange of goods) are relaxed.

comparative anatomy, the comparative study of the body structures of different species of animals in order to understand the adaptive changes they have undergone in the course of evolution from common ancestors. The field is largely confined to the study of the vertebrate animals.

Modern comparative anatomy dates from the work of Pierre Belon, who in 1555 showed that the skeletons of humans and birds are constructed of similar elements arranged in the same way. From this humble beginning, knowledge of comparative anatomy advanced rapidly in the 18th century with the work of the Count de Buffon and Louis-Jean-Marie Daubenton, who compared the anatomies of a wide range of animals. In the early 19th century, Baron Georges Cuvier placed the field on a more scientific basis by asserting that animals' structural and functional characteristics result from their interaction with their environment. Cuvier also rejected the 18th-century notion that the members of the animal kingdom are arranged in a single linear series from the simplest up to humans. Instead Cuvier arranged all animals into four large groups (vertebrates, mollusks, articulates, and radiates) according to body plan. Another great figure in the field was the mid-19th-century British anatomist Sir Richard Owen, whose vast knowledge of vertebrate structure did not prevent him from opposing Charles Darwin's theory of evolution. Darwin made extensive use of comparative anatomy in advancing his theory, and it in turn revolutionized the field by explaining the structural differences between species as arising out of their evolutionary descent by natural selection from a common ancestor.

Since Darwin's time, the study of comparative anatomy has centred largely on body structures that are homologous—*i.e.*, ones in different species that have the same evolutionary origin regardless of their present-day function. Such structures may look quite different and perform different tasks, but they can still be traced back to a common structure in an animal that was ancestral to both. For example, the forelimbs of humans, birds, crocodiles, bats, dolphins, and rodents have been modified by evolution to perform different functions, but they are all evolutionarily traceable to the fins of crossopterygian fishes, in which that basic arrangement of bones was first established. Analogous structures, by contrast, may resemble each other because they perform the same function, but they have different evolutionary origins and often a different structure, the wings of insects and of birds being a prime example of this.

comparative ethics, also called DESCRIPTIVE ETHICS, the empirical (observational) study of the moral beliefs and practices of different peoples and cultures in various places and times. It aims not only to elaborate such beliefs and practices but also to understand them insofar as they are causally conditioned by social, economic, and geographic circumstances. Comparative ethics, in contrast to normative ethics, is thus the proper subject matter of the social sciences (*e.g.*, anthropology, history, sociology, and psychology).

Empirical studies show that all societies have moral rules that prescribe or forbid certain classes of action and that these rules are accompanied by sanctions to ensure their enforcement. Of particular interest in comparative ethics are the similarities and differences between the moral practices and beliefs of different people, as explained by physical and economic conditions, opportunities for cross-cultural contacts, and the force of inherited traditions facing new social or technological challenges. It has been observed, for example, that virtually every society has well-established norms dealing with such matters as family organization and individual duties, sexual activity, property rights, personal welfare, truth telling, and promise keeping, but not all societies have evolved the same norms for these various aspects of human conduct.

Some social scientists concentrate their attention on the universality of basic moral rules, such as those forbidding murder, theft, infidelity, and incest. Others are more concerned with the diversity of moral practices—*e.g.*, monogamy versus polygamy; caring for the aged versus parricide; the forbidding of abortion versus voluntary feticide. The question then arises whether similarity or diversity is more fundamental, whether similarity supports the validity of the practice, and whether diversity supports a relativism and skepticism. Clearly a consensus of all peoples in a moral opinion does not of itself establish validity. On the other hand, widespread agreement may support the argument that morality is rooted in human nature, and, if human nature is fundamentally everywhere the same, it will also manifest this similarity in significant ways, including morality. Such questions are philosophical and lie beyond the scope of the social sciences, which are restricted to empirically verifiable generalizations.

Another question concerns the development of morals. Insofar as this is an empirical issue, it must be distinguished from the question whether there is progress in morality. For progress is an evaluative term—whether the moral ideals, for example, or the practices of civilized peoples, or both, are higher than those of primitive peoples is itself a question of moral judgment rather than of social science. Still, social scientists and moral philosophers alike have noted important changes that have taken place in the historical development of various peoples.

comparative linguistics, formerly COMPARATIVE GRAMMAR, or COMPARATIVE PHILOLOGY, study of the relationships or correspondences between two or more languages and the techniques used to discover whether the languages have a common ancestor. Comparative grammar was the most important branch of linguistics in the 19th century in Europe. Also called comparative philology, the study was originally stimulated by the discovery by Sir William Jones in 1786 that Sanskrit was related to Latin, Greek, and German.

An assumption important to the comparative method is the Neogrammarian principle that the laws governing sound change are regular and have no exceptions that cannot be accounted for by some other regular phenomenon of language. As an example of the method, English is seen to be related to Italian if a number of words that have the same meaning and that have not been borrowed are compared: *piede* and "foot," *padre* and "father," *pesce* and "fish." The initial sounds, although different, correspond regularly according to the pattern discovered by Jacob Grimm and named Grimm's law (*q.v.*) after him; the other differences can be explained by other regular sound changes. Because regular correspondences between English and Italian are far too numerous to be coincidental, it becomes apparent that English and Italian stem from the same parent language. The comparative method was developed and used successfully in the 19th century to reconstruct this parent language, Proto-Indo-European, and has since been applied to the study of other language families.

comparative psychology, the study of similarities and differences in behavioral organization among living beings, from bacteria to plants to humans. The discipline pays particular attention to the psychological nature of human beings in comparison with other animals.

In the study of animals, comparative psychology concentrates on discerning qualitative as well as quantitative similarities and differences in animal (including human) behaviour. It has important applications in fields such as medicine, ecology, and animal training. With the rise of an experimental comparative psychology in the latter half of the 19th century and its rapid growth during the 20th, the study of lower animals has cast increasing light on human psychology in such areas as the development of individual behaviour, motivation, the nature and methods of learning, effects of drugs, and localization of brain function. Other animals are easier to obtain in numbers and can be better controlled under experimental conditions than can human subjects, and much can be learned about humans from lower animals. Comparative psychologists have been careful, however, to avoid anthropomorphizing the behaviour of animals; that is, to avoid ascribing to animals human attributes and motivations when their behaviours can be explained by simpler theories. This principle is known as Lloyd Morgan's canon, named after a British pioneer in comparative psychology.

The tendency to endow lower animals with human capacities always has been strong. In recorded history, two different views have developed concerning human beings' relation to the lower animals. One, termed for convenience the man-brute view, stresses differences often to the point of denying similarities altogether and derives from the traditional religious accounts of the separate creations of humans and animals; the other, the evolutionary view, stresses both similarities and differences. Aristotle formalized the man-brute view, attributing a rational faculty to humans alone, lesser faculties to the animals. The modern scientific view, on the other hand, considers humans to be highly evolved animals; evidence indicates that continuity in the evolution of organisms provides a basis for essential psychological similarities and differences between lower and higher animals, including humans.

compass, in navigation or surveying, the primary device for direction-finding on the surface of the Earth. Compasses may operate on magnetic or gyroscopic principles or by determining the direction of the Sun or a star.

A brief treatment of compasses follows. For full treatment, *see* MACROPAEDIA: Navigation.

The oldest and most familiar type of compass is the magnetic compass, which is used in different forms in aircraft, ships, and land vehicles and by surveyors. Sometime in the 12th century, mariners in China and Europe made the discovery, apparently independently, that a piece of lodestone, a naturally occurring magnetic ore, when floated on a stick in water, tends to align itself so as to point in the

direction of the polestar. This discovery was presumably quickly followed by a second, that an iron or steel needle touched by a lodestone for long enough also tends to align itself in a north-south direction. From the knowledge of which way is north, of course, any other direction can be found.

The reason magnetic compasses work as they do is that the Earth itself acts as an enormous bar magnet with a north-south field that causes freely moving magnets to take on the same orientation. The direction of the Earth's magnetic field is not quite parallel to the north-south axis of the globe, but it is close enough to make an uncorrected compass a reasonably good guide. The inaccuracy, known as variation (or declination), varies in magnitude from point to point upon the Earth. The deflection of a compass needle due to local magnetic influences is called deviation.

Over the centuries a number of technical improvements have been made in the magnetic compass. Many of these were pioneered by the English, whose large empire was kept together by naval power and who hence relied heavily upon navigational devices. By the 13th century the compass needle had been mounted upon a pin standing on the bottom of the compass bowl. At first only north and south were marked on the bowl, but then the other 30 principal points of direction were filled in. A card with the points painted on it was mounted directly under the needle, permitting navigators to read their direction from the top of the card. The bowl itself was subsequently hung on gimbals (rings on the side that let it swing freely), ensuring that the card would always be level. In the 17th century the needle itself took the shape of a parallelogram, which was easier to mount than a thin needle.

During the 15th century navigators began to understand that compass needles do not point directly to the North Pole but rather to some nearby point; in Europe, compass needles pointed slightly east of true north. To counteract this difficulty, British navigators adopted conventional meridional compasses, in which the north on the compass card and the "needle north" were the same when the ship passed a point in Cornwall, England. (The magnetic poles, however, wander in a predictable manner—in more recent centuries Europeans have found magnetic north to be west of true north—and this must be considered for navigation.)

In 1745 Gowin Knight, an English inventor, developed a method of magnetizing steel in such a way that it would retain its magnetization for long periods of time; his improved compass needle was bar-shaped and large enough to bear a cap by which it could be mounted on its pivot. The Knight compass was widely used.

Some early compasses did not have water in the bowl and were known as dry-card compasses; their readings were easily disturbed by shocks and vibration. Although they were less affected by shock, liquid-filled compasses were plagued by leaks and were difficult to repair when the pivot became worn. Neither the liquid nor the dry-card type was decisively advantageous until 1862, when the first liquid compass was made with a float on the card that took most of the weight off the pivot. A system of bellows was invented to expand and contract with the liquid, preventing most leaks. With these improvements liquid compasses made dry-card compasses obsolete by the end of the 19th century.

Modern mariners' compasses are usually mounted in binnacles, cylindrical pedestals with provision for illuminating the compass face from below. Each binnacle contains specially placed magnets and pieces of steel that cancel the magnetic effects of the metal of the ship. Much the same kind of device is used aboard aircraft, except that, in addition, it contains a corrective mechanism for the errors induced in magnetic compasses when airplanes suddenly change course. The corrective mechanism is a gyroscope (*q.v.*), which has the property of resisting efforts to change its axis of spin. This system is called a gyromagnetic compass.

Gyroscopes are also employed in a type of nonmagnetic compass called the gyrocompass. The gyroscope is mounted in three sets of concentric rings connected by gimbals, each ring spinning freely. When the initial axis of spin of the central gyroscope is set to point to true north, it will continue to do so and will resist efforts to realign it in any other direction; the gyroscope itself thus functions as a compass. If it begins to precess (wobble), a pendulum weight pulls it back into line. Gyrocompasses are generally used in navigation systems because they can be set to point to true north rather than to magnetic north.

compass chart: *see* portolan chart.

Compère, Loyset (b. *c.* 1445, Hainaut? [now in Belgium]—d. Aug. 16, 1518, Saint-Quentin, France), important composer of the Franco-Netherlandish school, best known for his motets and chansons. He functioned as a transitional figure between Jean d'Ockeghem and Josquin des Prez.

Little is known of Compère's early life. During the mid-1470s he was in the chapel choir of the Duke of Milan. By 1486 he was a *chantre ordinaire* in the service of Charles VIII. Becoming a naturalized French citizen in 1494, Compère probably traveled with Charles during the French invasion of Italy (1494). He was subsequently a dean of St. Géry in Cambrai (1498–1500); provost at St. Pierre in Douai (1500–1503/04); and canon and chancellor at Saint-Quentin. He seems to have continued to serve the French court during his tenure at these churches. Compère's surviving works include several motets, more than 50 chansons, 3 complete masses, and 4 complete Magnificats.

competence and jurisdiction, in law, the authority of a court to deal with specific matters.

The terms are not, per se, interchangeable, but used together they convey the meaning cited above. Competence refers to the legal "ability" of a court to exert jurisdiction over a person or a "thing" (property) that is the subject of a suit. Jurisdiction, that which a competent court may exert, is the power to hear and determine a suit in court. Jurisdiction may also be defined as an authority conferred upon a court (thus making it competent) to hear and determine cases and causes. This authority is constitutionally based. Examples of judicial jurisdiction are: appellate jurisdiction, in which a superior tribunal is invested with legal power to correct, if it so decides, legal errors made in a court below; and concurrent jurisdiction, in which jurisdiction may be exercised by two or more courts over the same matter, within the same area, and at such time as the suit might be brought to either court for original determination. Other examples include federal jurisdiction and original jurisdiction (the first trial).

The matter of geographic distinction is important, because a court may also be vested with authority to treat with a matter within a certain territorial extension. This becomes an important factor when a court must decide whether opposing parties have enough contact with the geographic area in which the court has jurisdiction (in which it is competent to hear and determine the case). If it is an appellate court, for example, the case must have passed through the necessary preliminary stages before being eligible for consideration by that court.

In the United States, jurisdiction is largely personal. If a defendant, either a person as such or a corporation (a legal person) can be served with a subpoena to appear, the court may enter the case. In common-law countries, if personal jurisdiction is impossible to achieve, then jurisdiction may be based on ownership of property. In that decision only a person's property rights are involved, not his individual rights.

In civil-law systems jurisdiction takes different attitudes: in France the courts will enter a case if one party, at least, is a French national; in Italy some link with Italy must be shown by a non-national; whereas in Germany and Austria, the location of property will determine jurisdiction.

competition, in ecology, utilization of the same resources by organisms of the same or of different species living together in a community, when the resources are not sufficient to fill the needs of all the organisms.

Within a species, either all members obtain part of a necessary resource such as food or space, or some individuals obtain enough for their needs while other members, cut off from the resource, die or are forced to inhabit a less suitable or marginal area. Young members of a population are most often adversely affected.

The closer the requirements of two different species, the less likely is it that they can exist in the same area. Species with similar requirements can sometimes exist in the same area if they differ in behavioral ways such as feeding patterns, nesting habits, or activity periods, although they may be forced into direct competition when resources are scarce. Often small populations of two species coexist, but their members have smaller than average bodies or a low reproductive rate.

Compiègne, town, Oise *département,* Picardie *région,* northern France. It lies along the Oise River, at the northwest edge of the forest of Compiègne.

Of Roman origin, it was referred to in 557 as Compendium, a name derived from a word meaning "short cut" (between Beauvais and Soissons). The town flourished in the Middle Ages and was the site of assemblies and councils under the Merovingian kings. In 833



Palace at Compiègne, France, now an art museum
© PHOTO R.M.N.

Louis the Pious was deposed there. Charles II the Bald enlarged the town and founded the Abbey of Saint-Corneille, now the home of the municipal library. Compiègne became a commune in 1153, and a monument to Joan of Arc commemorates her capture there by the Burgundians in 1430.

The town's focal point is the Hôtel de Ville (town hall), a late Gothic structure with a belfry in its facade. Churches dedicated to Saint-Antoine and Saint-Jacques date from the 13th to the 16th century; the former is noted for its windows. In the 18th century, Louis XV built a palace in Compiègne that was later restored by Napoleon I and is now used as an art museum. The palace itself has been the scene of numerous historical events: the welcoming of Marie-Louise of Austria by Napoleon, the entertainment of the emperor Alexander I of Russia by Louis XVIII, and the marriage of Leopold I, king of the Belgians, to Marie-Louise of Orléans in 1832. Under Napoleon III the palace was the residence of the court during the hunting season.

Compiègne was the headquarters of the invading German army in the Franco-German War of 1870–71 and was occupied by the Germans again in World War I. The Armistice was signed on Nov. 11, 1918, in Marshal Ferdinand Foch's personal railway coach on a siding just northeast of the town. The coach was preserved as a monument, and on June 22, 1940, during World War II, the Franco-German armistice was signed in it, in Adolf Hitler's presence. The Germans removed the coach to Germany but destroyed it in April 1945 to prevent its recovery by the advancing Allies.

Compiègne is now an important tourist centre. Its varied industries include petroleum, metal founding, and the manufacture of soap, glass, machinery, and automobile tires. Pop. (1990) 44,703.

complaint, in law, the plaintiff's initial pleading, corresponding to the libel in admiralty, the bill in equity, and the claim in civil law. The complaint, called in common law a declaration, consists of a title, a statement showing venue or jurisdiction, one or more counts containing a brief formal exposition of facts giving rise to the claim asserted, and a demand for relief. Thus, it informs the defendant of the plaintiff's claim and initiates the pretrial process of narrowing the case to one or more sharply defined issues of law or fact. In common law and under early procedural codes, the task of defining the issues was performed solely by the pleadings, but modern procedural systems have added pretrial conferences and deposition and discovery procedures for this purpose.

complement, in blood chemistry, a complex system of at least 20 proteins, known as complement components, found in the normal blood serum of humans and other vertebrates. The complement system mediates many immunological phenomena, including the lysis (bursting) of foreign and infected cells, the phagocytosis (ingestion) of foreign particles and cell debris, and the inflammation of surrounding tissue.

In the late 19th century complement was identified as one of two substances in human serum responsible for killing bacteria, the other substance being antibody. Complement was so named because it "complemented" the action of the antibody, meaning it was necessary for cell lysis to occur.

Each complement component is a protein, made up of polypeptides (chains of amino acids held together by peptide bonds). The immunologic activity of complement begins when one component binds to an antigen-antibody complex and begins a chemical chain reaction with other components. In one process, called complement fixation, activated components pierce the outer membrane of the bacterium or cell to which the antibody is attached, effectively lysing and killing it. In another process, fragments of complement released during the reaction attract macrophages, which engulf and digest the particle. Such fragments can also cause the release of histamine and attract a flood of phagocytic granulocytes, which contribute to the swelling and discoloration common to inflammation.

The components of complement differ in life spans and periods of activity; this factor, as well as the presence of inhibitors in the blood, helps explain why complement is activated only at a site of microbial invasion and not throughout the whole body.

complementarity principle, in physics, tenet that a complete knowledge of phenomena on atomic dimensions requires a description of both wave and particle properties. The principle was announced in 1928 by the Danish physicist Niels Bohr. Depending on the experimental arrangement, the behaviour of such phenomena as light and electrons is sometimes wavelike and sometimes particle-like; *i.e.,* such things have a wave-particle duality (*q.v.*). It is impossible to observe both the wave and particle aspects simultaneously. Together, however, they present a fuller description than either of the two taken alone.

In effect, the complementarity principle implies that phenomena on the atomic and subatomic scale are not strictly like large-scale particles or waves (*e.g.,* billiard balls and water waves). Such particle and wave characteristics in the same large-scale phenomenon are incompatible rather than complementary. Knowledge of a small-scale phenomenon, however, is essentially incomplete until both aspects are known.

Complete Peerage, The, also called A HISTORY OF THE HOUSE OF LORDS AND ALL ITS MEMBERS FROM THE EARLIEST TIMES, exhaustive 13-volume (in 14 volumes) guide to the British peerage, considered the greatest British achievement in the field of genealogy. The first edition was published in London (1887–98) by George Edward Cokayne, Clarenceux King of Arms. The second edition, revised and much enlarged, was issued from 1910 to 1959 and covers, as indicated by its subtitle, the peerage extant, extinct, and dormant of England, Scotland, Ireland, Great Britain, and the United Kingdom. Biographical details are complete regarding parentage, birth, awards and honours, marriage, politics and public service, death, and burial, and entries include meticulous bibliographical citations. Although lines of succession are also given, ancestry and collaterals usually are not.

complex, in chemistry, a substance, either an ion or an electrically neutral molecule, formed by the union of simpler substances (as compounds or ions) and held together by forces that are chemical (*i.e.,* dependent on specific properties of particular atomic structures) rather than physical. The formation of complexes has a strong effect on the behaviour of solutions. *See also* chemical association; coordination compound.

complex number, number of the form $x + yi$, in which x and y are real numbers and i is the imaginary unit such that $i^2 = -1$. *See* number system.

Complutensian Polyglot Bible, the first of several editions of the Bible in which the text was presented in several languages in adjacent columns. The Complutensian Polyglot presented the Old Testament in Hebrew, Greek, and Latin and the New Testament in Greek and Latin. It was prepared at the University of Alcalá de Henares, in Spain, by a group of scholars under the sponsorship of Cardinal Francisco Jiménez de Cisneros and printed (probably 600 copies) in 1514–17. With the authorization of Pope Leo X, the work was published in 1521 or 1522.

Compositae, sole family of plants within the order Asterales (*q.v.*).

composite material, also called COMPOSITE, a solid material that results when two or more different substances, each with its own characteristics, are combined to create a new substance whose properties are superior to those of the original components in a specific application. The term composite more specifically refers to a structural material (such as plastic) within which a fibrous material (such as silicon carbide) is embedded.

A brief treatment of composite materials follows. For full treatment, *see* MACROPAEDIA: Materials Science.

The remarkable properties of composites are achieved by embedding fibres of one substance in a host matrix of another. While the structural value of a bundle of fibres is low, the strength of individual fibres can be harnessed if they are embedded in a matrix that acts as an adhesive, binding the fibres together and lending solidity to the material. The rigid fibres impart structural strength to the composite, while the matrix protects the fibres from environmental stress and physical damage and imparts thermal stability to them. The fibre-matrix combination also reduces the potential for a complete fracture; if one fibre fails the crack may not extend to other fibres, whereas a crack that starts in a monolithic (or single) material generally continues to propagate until that material fails.

Most conventional composites resemble plywood in that they are built in thin layers, each of which is reinforced by long fibres laid down in a single direction. Such materials exhibit enhanced strength only along the direction of the fibres. To produce composites that are strong in all directions, the fibres are woven into a three-dimensional structure in which they lie along three mutually perpendicular axes.

The structural component of a composite may consist of fibres made of glass or carbon-graphite, shorter "whiskers" made of silicon carbide or aluminum oxide, or longer tungsten-boron filaments. The matrix material may be an epoxy resin or other high-temperature plastic, aluminum or some other metal, or a ceramic such as silicon nitride. Fibreglass-reinforced plastic is the best-known composite and has found wide application in both household goods and industrial products. Composites are of greatest use in the aerospace industry, however, where their stiffness, lightness, and heat resistance make them the materials of choice in reinforcing the engine cowls, wings, doors, and flaps of aircraft. Composite materials are also used in rackets and other sports equipment, in cutting tools, and in certain parts of automotive engines.

Composite order, an order of classical architecture that combines characteristics of both the Ionic order and the Corinthian order. *See* order.

composition, in ancient Germanic law, money given to a person who had been wronged or injured by the person responsible for the act. Composition arose among the Germanic peoples as an alternative to blood feud and personal vengeance. The amount paid was determined by a man's worth, or *wer,* which in turn was determined by his status in society. If he died, the money went to his family; in certain cases part went to the lord or king, as compensation for loss of a vassal. Although the right to composition and the amount paid originally arose out of an agreement between the parties involved, these issues were later settled by law. *See also* wergild.

composition, in modern law, an agreement among the creditors of an insolvent debtor to accept an amount less than they are owed, in order to receive immediate payment. When it appears that a debtor will not be able to satisfy all or even any of his creditors, the latter will often agree to accept equal proportions of what they are owed—for example, 25 cents on the dollar. At this point the initial claims are liquidated. If the debtor does not fulfill the agreement, then the creditors may demand only what is due them under it, rather than the full amount.

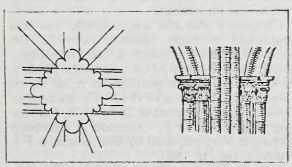
It is necessary, however, to distinguish between a composition among creditors and one that falls within jurisdiction of a court. The former is regulated entirely by the creditors, while the latter is supervised by the court. With court supervision, the creditors have a greater protection against fraud and a greater assurance that their interests will be safeguarded. A court-regulated composition requires litigation, however, often saddling the debtor with additional fees that may affect his ability to fulfill the agreement or, indeed, even lower the amount that he is able to agree to. Composition out of court has, therefore, become the preferred procedure.

compound (chemistry): *see* chemical compound.

compound-nucleus model, description of atomic nuclei proposed (1936) by the Danish physicist Niels Bohr to explain nuclear reactions as a two-stage process comprising the formation of a relatively long-lived intermediate nucleus and its subsequent decay. First, a bombarding particle loses all its energy to the target nucleus and becomes an integral part of a new, highly excited, unstable nucleus, called a compound nucleus. The formation stage takes a period of time approximately equal to the time interval for the bombarding particle to travel across the diameter of the target nucleus (about 10^{-21} second). Second, after a relatively long period of time (typically from 10^{-19} to 10^{-15} second) and independent of the properties of the reactants, the compound nucleus disintegrates, usually into an ejected small particle and a product nucleus. For example, the compound nucleus silicon-28 is formed by bombarding aluminum-27 with protons (hydrogen-1 nuclei). This compound nucleus is excited or in a high-energy state and may decay into magnesium-24 and helium-4 (an alpha particle), silicon-27 and a proton, a more stable form of silicon-28 and a gamma-ray photon, or sodium-24 plus three protons and one neutron.

The compound-nucleus model is very successful in explaining nuclear reactions induced by relatively low-energy bombarding particles (that is, projectiles with energies below about 50 million electron volts).

compound pier, in Romanesque and Gothic architecture, feature of a nave arcade designed for the support of arches and to bring arch



Plan and elevation of a compound pier from the Abbey of Saint-Denis, at Saint-Denis, France, *c.* 1231

From Erwin Panofsky, *Gothic Architecture and Scholasticism*

and pier into harmony. The forerunner of the Gothic clustered column, it is cross-shaped in section, with shafts placed in the recesses. It occurs widely in France and in England, where it is found in some English parish churches and in monumental form in such Norman (Romanesque) cathedral churches as those of Durham, Winchester, Ely, and Peterborough.

comprador (Portuguese: "buyer"), also spelled COMPRADORE, member of the Chinese merchant class who aided Western traders in China in the late 18th, 19th, and early 20th centuries. Hired by contract, the comprador was responsible for a Chinese staff of currency-exchange specialists, interpreters, coolies, and guardsmen. Many compradors became extremely wealthy and established businesses of their own. In recent times, the term comprador has come to denote those people who aided Western exploitation of China.

comprehensive school, in England, secondary school offering the curricula of a grammar school, a technical school, and a secondary modern school, with no division into separate compartments. Pupils are placed in A, B, or C "streams" according to their aptitudes and abilities. Comprehensives are similar to the large, multipurpose American high school, in which the ability grouping system is known as "tracking."

The purpose of the comprehensive school is to democratize education, do away with early selection procedures, and provide equal opportunity for all children. In 1975 legislation was passed in the United Kingdom to hasten the transition to this system, reflecting the long-term policy of the Labour government to organize all secondary education on a comprehensive basis. Although some comprehensive schools have been quite successful, the transition has been slow, and the issue is complicated by mixed attitudes toward the long-revered public schools and strong residual devotion to the traditional grammar school system. *Compare* grammar school; public school.

compression, decrease in volume of any object or substance resulting from applied stress. Compression may be undergone by solids, liquids, and gases and by living systems. In the latter, compression is measured against the standard pressure to which an organism is subjected—*e.g.,* the pressure of the atmosphere at sea level is the standard, or reference, for most land animals, but the standard for deep-sea fishes and similar specialized forms is the normal pressure of their environment.

compression ratio, in an internal-combustion engine, degree to which the fuel mixture is compressed before ignition. It is defined as the maximum volume of the combustion chamber (with the piston farthest out) divided by the volume with the piston in the full-compression position. A compression ratio of six means that the mixture is compressed to one-sixth its original volume by the action of the piston in the cylinder. The maximum possible ratio based on cylinder dimensions may not be achieved if the intake valve closes after the piston begins its compression stroke. A high ratio promotes efficiency but may cause engine knock.

compressive strength test, mechanical test measuring the maximum amount of compressive load a material can bear before fracturing. The test piece, usually in the form of a cube, prism, or cylinder, is compressed between the platens of a compression-testing machine by a gradually applied load.

Brittle materials such as rock, brick, cast iron, and concrete may exhibit great compressive strengths; but ultimately they fracture. The crushing strength of concrete, determined by breaking a cube, and often called the cube strength, reaches values of about 3 tons per square inch, that of granite 10 tons per square inch, and that of cast iron from 25 to 60 tons per square inch.

Some ductile metals, such as mild steel, have very great compressive strengths; but the actual values are difficult to measure. When a load is applied to a ductile metal, it deforms elastically up to a certain point, and then plastic deformation occurs. Increasing loads may even completely flatten a test piece without any definite fracture occurring, so that no value can be obtained for the compressive strength. The custom of quoting tensile-strength values in these cases is inaccurate but safe, compressive strength being always greater.

compressor, device for increasing the pressure of a gas by mechanically decreasing its volume. Air is the most frequently compressed gas but natural gas, oxygen, nitrogen, and other industrially important gases are also compressed. The three general types of compressors are positive displacement, centrifugal, and axial. Positive displacement compressors are usually of the reciprocating piston type, in which the gas is drawn in during the suction stroke of the piston, compressed by decreasing the volume of the gas by moving the piston in the opposite direction, and, lastly, discharged when the gas pressure exceeds the pressure acting on the outlet valve. Reciprocating compressors are useful for supplying small amounts of a gas at relatively high pressures.

Centrifugal compressors increase the kinetic energy of the gas with a high-speed impeller and then convert this energy into increased pressure in a divergent outlet passage called the diffuser. Centrifugal compressors are particularly suited for compressing large volumes of gas to moderate pressures. In axial compressors the gas flows parallel to the axis of rotation of the rotor, which has many rows of aerodynamically shaped blades extending radially outward. The rotor is surrounded by a stationary casing that contains a similar number of rows of blades extending inward and fitting between the rows of rotor blades. As gas passes through the compressor, its velocity is alternately increased and decreased. During each increase in velocity the kinetic energy of the gas is increased, and during each decrease in velocity this kinetic energy is converted into an increase in pressure. This type of compressor is used for jet aircraft engines and gas turbines.

Compromise of 1850: *see* 1850, Compromise of.

Compsognathus, genus of very small predaceous dinosaurs in Europe during the Late Jurassic Period (163 to 144 million years ago). One of the smallest of known dinosaurs, *Compsognathus* grew only about as large as a chicken, with a length of about 60 cm (2 feet) and a weight of about 5.5 kg (12 pounds). A swift runner, it was lightly built and had a long neck and tail and strong hind limbs. Of special interest is a tiny skeleton preserved within the rib cage of one fossil *Compsognathus* that was once mistakenly thought to be an embryo; further study has shown it to be a tiny lizard, thus documenting the predatory habits of *Compsognathus.*

Comptes, Chambre des (French law): *see* Chambre des Comptes.

Compton, city, Los Angeles county, southwestern California, U.S. The tract was originally part of the Rancho San Pedro, a 1784 Spanish land grant. Founded as a Methodist colony in 1867 and named for G.D. Compton, a pioneer settler, it developed as a farming village and was incorporated in 1888. Following an earthquake (March 10, 1933), which severely damaged the business district, the city was extensively modernized. It is now a residential suburb and market centre, surrounded by diversified industries. Compton

Community College was established in 1927. Pop. (1992 est.) 93,818.

Compton, Arthur Holly (b. Sept. 10, 1892, Wooster, Ohio, U.S.—d. March 15, 1962, Berkeley, Calif.), American physicist and joint winner, with C.T.R. Wilson of England, of the Nobel Prize for Physics in 1927 for his discovery and explanation of the change in the wavelength of X rays when they collide with electrons. This so-called Compton effect (*q.v.*) is caused by the transfer of energy from the photon to the electron. Its discovery in 1922 confirmed the dual nature of electromagnetic radiation as both a wave and a particle.

Compton, a younger brother of the physicist Karl T. Compton, received his Ph.D. from Princeton University in 1916 and became head of the department of physics at Washington University, St. Louis, in 1920. From 1923 to 1945 he was professor of physics at the University of Chicago. In 1941 Compton was chairman of the committee of the National Academy of Sciences that studied the military potential of atomic energy. In this capacity he was instrumental, with the physicist Ernest O. Lawrence, in initiating the Manhattan Project, which created the first atomic bomb. From 1942 to 1945 he was director of the Metallurgical Laboratory at the University of Chicago, which developed the first self-sustaining atomic chain reaction and paved the way for controlled release of nuclear energy. He became chancellor of Washington University in 1945 and was professor of natural history there from 1953 until 1961.

Compton, Henry (b. 1632, Compton Wynyates, Warwickshire, Eng.—d. July 7, 1713, Fulham, Middlesex), staunchly Protestant bishop of London (1675–1713) who played a leading part in English politics during the crisis of King James II's reign.

Educated at Queen's College, Oxford, Compton was ordained in 1666 and became bishop of Oxford in 1674 and of London in 1675. His Protestantism brought him into disfavour with the Roman Catholic James II, who in 1685 deprived him of his seat in the privy council. The next year, for refusing to suspend John Sharp, rector of St. Giles-in-the-Fields, whose antipapal sermons had offended



Henry Compton, detail of a portrait by Sir Godfrey Kneller; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

the king, Compton was himself suspended. He gave his support to the seven bishops who made a petition against the king's Declaration of Indulgence (1687), and he was the only ecclesiastic to sign the invitation to William of Orange to come to England to overthrow James.

When John Tillotson was preferred to him as archbishop of Canterbury (1691), Compton suffered a bitter disappointment. Under Queen Anne, Compton gave full support to the Tories, and Francis Atterbury, bishop of Rochester, was his protégé. As bishop of London, Compton encouraged the newly founded Society for the Propagation of the Gospel and missionary work in America.

Compton, Karl Taylor (b. Sept. 14, 1887, Wooster, Ohio, U.S.—d. June 22, 1954, New York, N.Y.), American educator and physicist who was closely associated with development of the atomic bomb.

After obtaining his Ph.D. from Princeton University in 1912, Compton (an older brother of the Nobel prizewinner Arthur Holly Compton) joined the faculty of Reed College, Portland, Ore., as a physics instructor. He later became assistant professor of physics at Princeton University. World War I interrupted his teaching and research, but he returned to Princeton, conducting research in fundamental problems in atomic physics and promoting development of the graduate program. In 1930 he was chosen president of the Massachusetts Institute of Technology (MIT), where he broadened and modernized the curriculum, adding classes in the humanities and social sciences. After resigning the presidency of MIT in 1948, Compton served as chairman of its corporation until 1954.

Compton served on many governmental, academic, and industrial advisory bodies. He was chairman (1948–49) of the research and development board of the National Military Establishment (the precursor of the U.S. Department of Defense) and had been a member of several similar groups, including the Office of Scientific Research and Development (1941–47). In these positions, Compton, with his wide background in both research and administration, played an important role in development of the atomic bomb and radar.

Compton, Spencer: *see* Northampton, Spencer Compton, 2nd Earl of; Wilmington, Spencer Compton, Earl of.

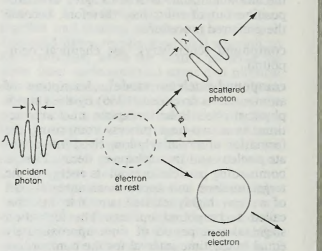
Compton-Burnett, Dame Ivy (b. June 5, 1884, Pinner, Middlesex, Eng.—d. Aug. 27, 1969, London), English writer who developed a distinct form of novel set almost entirely in dialogue to dissect personal relationships in the middle-class Edwardian household.

Compton-Burnett was born into the type of large family she wrote about. She grew up in Richmond, Surrey, and in Hove, Sussex, studying at home until she went to Royal Holloway College of the University of London, where she graduated in 1906. At age 35 she met Margaret Jourdain, her lifelong companion.

Pastors and Masters (1925), Compton-Burnett's second novel, was published 14 years after her first, and it introduced the style that was to make her name. In this book the struggle for power, which occupies so many of her characters, is brought to light through clipped, precise dialogue. She achieved her full stature with *Brothers and Sisters* (1929), which is about a willful woman who inadvertently marries her half brother. *Men and Wives* (1931) has at its centre another determined woman, one whose tyranny drives her son to murder her. Murder again appears in *More Women Than Men* (1933), this time by a woman bent on keeping her nephew under her domination. The tyrant is a father in *A House and Its Head* (1935). The range of her characterization is considerable. It is the butler Bullivant who is the most memorable of the cast of *Manservant and Maidservant* (1947; also published as *Bullivant and the Lambs*), while the children in *Two Worlds and Their Ways* (1949) are the most tellingly drawn. She was created Dame of the British Empire in 1967.

Compton effect, increase in wavelength of X rays and other energetic electromagnetic radiations that have been elastically scattered by electrons; it is a principal way in which radiant energy is absorbed in matter. The effect has proved to be one of the cornerstones of quantum mechanics, which accounts for both wave and particle properties of radiation as well as of matter.

The American physicist Arthur Holly Compton explained (1922; published 1923) the wavelength increase by considering X rays as composed of discrete pulses, or quanta, of electromagnetic energy, which he called photons. Photons have energy and momentum just as material particles do; they also have wave characteristics, such as wavelength and frequency. The energy of photons is directly proportional to their frequency and inversely proportional to their wavelength, so lower-energy photons have lower frequencies and longer wavelengths. In the Compton effect, individual photons collide with single electrons that are free or quite loosely bound in the atoms of matter. Colliding photons transfer some of their energy and momentum to the electrons, which in turn recoil. In the instant of the collision, new photons of less energy and momentum are produced that scatter at angles the size of which depends on the amount of energy lost to the recoiling electrons.



Compton scattering of a photon by a free electron

Because of the relation between energy and wavelength, the scattered photons have a longer wavelength that also depends on the size of the angle through which the X rays were diverted. The increase in wavelength or Compton shift does not depend on the wavelength of the incident photon.

This phenomenon was discovered independently by Peter Debye in early 1923.

Compton's Encyclopedia and Fact-Index, formerly (1922–68) COMPTON'S PICTURED ENCYCLOPEDIA, a general reference work for home, school, and library, designed primarily for children and young people in the upper elementary grades and high school and for family use.

In the late 20th century *Compton's* contained about 5,200 main articles in 25 volumes. A 26th volume, the Fact-Index, included more than 26,000 shorter articles on subjects that might not be fully treated in the main articles, 63,500 brief entries, and nearly 300,000 references to main-entry text and cross-references within the Fact-Index.

Compton's Pictured Encyclopedia was first published in eight volumes in 1922. (Its founder, Frank E. Compton, had previous experience in the field of encyclopaedia publication, having bought publication rights to the *Student's Cyclopedia* in 1912.) The number of volumes had increased to 26 by 1974. Publishing rights to the F.E. Compton & Company products were acquired by Encyclopædia Britannica, Inc., in 1961.

Compton's was called a "pictured" encyclopaedia because it was the first to use photographs and drawings on the same pages with the text. With the 1968 edition the word *Pictured* was removed from the title; the encyclopaedia remained nevertheless profusely illustrated, with recent editions containing more than 22,500 illustrations, including about 2,000 maps. *Compton's* is kept up-to-

date by means of continual revision of the 26 volumes and the annual publication of *Compton's Yearbook.*

For use on personal computers, a single-disc CD-ROM (compact disc–read-only memory) version of *Compton's* was first released in 1990. Entitled *Compton's MultiMedia Encyclopedia,* this first true multimedia encyclopaedia contained lavish graphics, animation, and sound. Compton's MultiMedia Publishing Group was acquired by the Tribune Company, a Chicago-based media firm, in 1993.

compurgation, also called WAGER OF LAW, in early English law, method of settling issues of fact by appeal to a type of character witness. Compurgation was practiced until the 16th century in criminal matters and into the 19th century in civil matters.

The essence of the procedure lay in oath making. The party responsible for proving a fact had to produce a number of witnesses (usually 12) who would swear that he was telling the truth; they did not testify about the fact itself and, indeed, might have no personal knowledge concerning it. The value of a man's oath might vary with his status; sometimes it was necessary for a defendant to meet a charge by assembling oaths of a prescribed monetary value. Because oath making often had religious implications for those who served as oath helpers and because there was also a possibility of legal sanctions, individuals might refuse to give oaths for persons with bad reputations. One reason for the long survival of the practice was that compurgations were often considered better evidence than account books in cases of debt.

computational linguistics, language analysis that makes use of electronic digital computers. Computational analysis is most frequently applied to the handling of basic language data—*e.g.,* making concordances and counting frequencies of sounds, words, and word elements—although numerous other types of linguistic analysis can be performed by computers.

The period of greatest interest in computational linguistics was from about 1955 to 1965, when researchers undertook projects that would lead to computerized or mechanical translation involving grammatical and semantic analysis of sentences. Support for research in mechanical translation diminished after it became apparent that the problem of producing automatic translations of high quality was far more difficult than it had been thought to be. Techniques developed in computational linguistics have been used in other fields; *e.g.,* the study of style in literature often uses frequency counts of language elements, and information retrieval usually makes use of automated grammatical analysis.

computer, any of various automatic electronic devices that solve problems by processing data according to a prescribed sequence of instructions. Such devices are of three general types: analog, digital, and hybrid. They differ from one another in terms of operating principle, equipment design, and application.

A brief treatment of computers follows. For full treatment, *see* MACROPAEDIA: Computer Science; Computers; Information Processing and Information Systems.

The analog computer (*q.v.*) operates on data represented by continuously variable quantities, such as angular positions or voltages, and provides a physical analogy of the mathematical problem to be solved. Capable of solving ordinary differential equations, it is well suited for use in systems engineering, particularly for implementing real-time simulated models of processes and equipment. Another common application is the analysis of networks, such as those for electric-power distribution.

Unlike the analog computer, which operates on continuous variables, the digital computer (*q.v.*) works with data in discrete form—*i.e.,* expressed directly as the digits of the binary code. It counts, lists, compares, and rearranges these binary digits, or bits, of data in accordance with very detailed program instructions stored within its memory. The results of these arithmetic and logic operations are translated into characters, numbers, and symbols that can be readily understood by the human operator or into signals intelligible to a machine controlled by the computer. Digital computers can be programmed to perform a host of varied tasks. As a consequence, more than 90 percent of the computers in use today are of this type. Government and business make extensive use of the digital computer's ability to organize, store, and retrieve information by setting up huge data files. Its capacity to adjust the performance of systems or devices without human intervention also lends itself to many applications. For example, the digital computer is used to control various manufacturing operations, machine tools, and complex laboratory and hospital instruments. The same capability has been exploited to automate the operational systems of high-performance aircraft and spacecraft. Among the multitude of other significant applications of the digital computer are its use as a teaching aid (*e.g.,* in the remedial instruction of basic language and mathematics skills) and its employment in scientific research to analyze data and generate mathematical models.

The hybrid computer combines the characteristics and advantages of analog and digital systems; it offers greater precision than the former and more control capability than the latter. Equipped with special conversion devices, it utilizes both analog and discrete representation of data. In recent years hybrid systems have been used in simulation studies of nuclear-power plants, guided-missile systems, and spacecraft, in which a close representation of a dynamic system is essential.

Mechanical analog and digital computing devices date back to the 17th century. A logarithmic calculating device, which was the precursor of the slide rule and is often regarded as the first successful analog device, was developed in 1620 by Edmund Gunter, an English mathematician. The first mechanical digital calculating machine was built in 1642 by the French scientist-philosopher Blaise Pascal. During the ensuing centuries, the ideas and inventions of many mathematicians, scientists, and engineers paved the way for the development of the modern computer.

The direct forerunners of present-day analog and digital systems emerged about 1940. John V. Atanasoff built the first electronic digital computer in 1939. Howard Aiken's fully automatic large-scale calculator using standard machine components was completed in 1944. J. Presper Eckert and John W. Mauchly completed the first programmed general-purpose electronic digital computer in 1946. The first stored-program computers were introduced in the late 1940s, and subsequent computers have increasingly become faster and more powerful.

computer-aided engineering (CAE), in industry, the integration of design and manufacturing into a system under the direct control of digital computers. CAE combines the use of computers in industrial-design work, computer-aided design (CAD), with their use in manufacturing operations, computer-aided manufacturing (CAM). This integrated process is commonly called CAD/CAM. CAD systems generally consist of a computer with one or more terminals featuring video monitors and interactive graphics-input devices; they can be used to design such things as machine parts, patterns for clothing, or integrated circuits. CAM systems involve the use of numerically controlled machine tools and high-performance, programmable industrial robots. In a CAE system, drawings developed and revised during the design process are converted directly into instructions for the production machines that will manufacture the desired object. CAE systems reduce the time needed to develop new products and increase productivity by optimizing production flow and scheduling and by providing greater flexibility in altering machine operations.

computer-assisted instruction (CAI), a program of instructional material presented by means of a computer or computer systems.

The use of computers in education started in the 1960s. With the advent of convenient microcomputers in the 1970s, computer use in schools has become widespread from primary education through the university level and even in some preschool programs. Instructional computers are basically used in one of two ways: either they provide a straightforward presentation of data or they fill a tutorial role in which the student is tested on comprehension.

If the computer has a tutorial program, the student is asked a question by the computer; the student types in an answer and then gets an immediate response to the answer. If the answer is correct, the student is routed to more challenging problems; if the answer is incorrect, various computer messages will indicate the flaw in procedure, and the program will bypass more complicated questions until the student shows mastery in that area.

There are many advantages to using computers in educational instruction. They provide one-to-one interaction with a student, as well as an instantaneous response to the answers elicited, and allow students to proceed at their own pace. Computers are particularly useful in subjects that require drill, freeing teacher time from some classroom tasks so that a teacher can devote more time to individual students. A computer program can be used diagnostically, and, once a student's problem has been identified, it can then focus on the problem area. Finally, because of the privacy and individual attention afforded by a computer, some students are relieved of the embarrassment of giving an incorrect answer publicly or of going more slowly through lessons than other classmates.

There are drawbacks to the implementation of computers in instruction, however. They are generally costly systems to purchase, maintain, and update. There are also fears, whether justified or not, that the use of computers in education decreases the amount of human interaction.

computer crime, any crime that is committed by means of the special knowledge or expert use of computer technology. Computer crime became a serious problem with the proliferation of such technology in the late 20th century.

Since the first reported case of computer abuse in 1958, computers have been involved in most types of crimes, including theft, burglary, larceny, fraud, embezzlement, extortion, sabotage, espionage, kidnapping, and murder. Computer systems themselves can be the targets of attack, as when a computer virus (*q.v.*) is surreptitiously introduced into a system to alter or destroy data. Breaking into private computer systems to destroy, steal, or alter information became easier once modems (devices that allow computers to communicate over telephone lines) were introduced in the 1960s. Technically expert computer hobbyists who use personal computers and modems to break into and tamper with computer systems are known as "hackers." Most serious computer crimes, however, are committed in the banking and financial-service industries, where money, credit, and other financial as-

sets are recorded in electronic databases and are transmitted as signals over telephone lines. Persons with access to such systems may falsify or manipulate these records for their own purposes by, for example, illegally transferring money balances to their own accounts.

computer graphics, the use of computers to produce pictorial images. The images produced can be printed documents or animated motion pictures, but the term computer graphics refers particularly to images displayed on a video display screen, or display monitor. These screens can display graphic as well as alphanumeric data. A computer-graphics system basically consists of a computer to store and manipulate images, a display screen, various input and output devices, and a graphics software package—*i.e.,* a program that enables a computer to process graphic images by means of mathematical language. These programs enable the computer to draw, colour, shade, and manipulate the images held in its memory.

A computer displays images on the phosphor-coated surface of a graphics display screen by means of an electron beam that sweeps the screen many times each second. Those portions of the screen energized by the beam emit light, and changes in the intensity of the beam determine their brightness and hue. The brightness of the resulting image fades quickly, however, and must be continuously "refreshed" by the beam, typically 30 times per second.

Graphics software programs enable a user to draw, colour, shade, and manipulate an image on a display screen with commands input by a keyboard. A picture can be drawn or redrawn onto the screen with the use of a mouse, a pressure-sensitive tablet, or a light pen. Pre-existing images on paper can be scanned into the computer through the use of scanners, digitizers, pattern-recognition devices, or digital cameras. Frames of images on videotape also can be entered into a computer. Various output devices have been developed as well; special programs send digital data from the computer's memory to an imagesetter or film recorder, which prints the image on paper or on photographic film. The computer can also generate hard copy by means of plotters and laser or dot-matrix printers.

Pictures are stored and processed in a computer's memory by either of two methods: raster graphics and vector graphics. Raster-type graphics maintain an image as a matrix of independently controlled dots, while vector graphics maintain it as a collection of points, lines, and arcs. Raster graphics are now the dominant computer graphics technology.

In raster graphics, the computer's memory stores an image as a matrix, or grid, of individual dots, or pixels (picture elements). Each pixel is encoded in the computer's memory as one or several bits—*i.e.,* binary digits represented by 0 or 1. A 2-bit pixel can represent either black or white, while a 4-bit pixel can represent any of 16 different colours or shades of gray. The constituent bits that encode a picture in the computer's memory are called a bit map. Computers need large processing and memory capacities to translate the enormous amounts of information contained in a picture into the digital code of a bit map, and graphics software programs use special algorithms (computional processes) to perform these procedures.

In raster graphics, the thousands of tiny pixels that make up an individual image are projected onto a display screen as illuminated dots that from a distance appear as a contiguous image. The picture frame consists of hundreds of tiny horizontal rows, each of which contains hundreds of pixels. An electron beam creates the grid of pixels by tracing each horizontal line from left to right, one pixel at a time, from the top line to the bottom line.

Raster graphics create uniform coloured areas and distinct patterns and allow precise manipulation because their constituent images can be altered one dot at a time. Their main disadvantage is that the images are subtly staircased—*i.e.,* diagonal lines and edges appear jagged and less distinct when viewed from a very short distance. A corollary of television technology, raster graphics emerged in the early 1970s and had largely displaced vector systems by the '90s.

In vector graphics, images are made up of a series of lines, each of which is stored in the computer's memory as a vector—*i.e.,* as two points on an x-y matrix. On a vector-type display screen, an electron beam sweeps back and forth between the points designated by the computer and the paths so energized emit light, thereby creating lines; solid shapes are created by grouping lines closely enough to form a contiguous image. Vector-graphics technology was developed in the mid-1960s and widely used until it was supplanted by raster graphics. Its application is now largely restricted to highly linear work in computer-aided design and architectural drafting, and even this is performed on raster-type screens with the vectors converted into dots.

Computer graphics have found widespread use in printing, product design and manufacturing, scientific research, and entertainment since the 1960s. In the business office, computers routinely create graphs and tables to illustrate text information. Computer-aided design systems have replaced drafting boards in the design of a vast array of products ranging from buildings to automotive bodies and aircraft hulls to electrical and electronic devices. Computers are also often used to test various mechanical, electrical, or thermal properties of the component under design. Scientists use computers to simulate the behaviour of complicated natural systems in animated motion-picture sequences. These pictorial visualizations can afford a clearer understanding of the multiple forces or variables at work in such phenomena as nuclear and chemical reactions, large-scale gravitational interactions, hydraulic flow, load deformation, and physiological systems. Computer graphics are nowhere so visible as in the entertainment industry, which uses them to create the interactive animations of video games and the special effects in motion pictures. Computers have also come into increasing use in commercial illustration and in the digitalization of images for use in CD-ROM products, online services, and other electronic media.

computer memory, physical device that is used to store such information as data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer. The memory of a typical digital computer retains information of this sort in the form of the digits 0 and 1 of the binary code. It contains numerous individual storage cells, each of which is capable of holding one such binary digit (or "bit") when placed in either of two stable electronic, magnetic, or physical states corresponding to 0 and 1. The main memories of digital computers usually operate by means of transistor circuits. In these electronic circuits, binary digits are represented as states of electric charge—on or off, closed or open, conducting or nonconducting, resistive or nonresistive—that can be held, detected, and changed for purposes of storing or manipulating the data represented by the digits.

Most digital computer systems have two levels of memory—the main memory and one or more auxiliary storage units. Besides the main memory, other units of the computer (*e.g.,* the control unit, arithmetic-logic unit [ALU], and input/output units) also use transistor circuits to store electronic signals.

The flow of electric current through the transistors in memory units is controlled by semiconductor materials. Semiconductor memories utilizing very-large-scale integration (VLSI) circuitry are extensively used in all digital computers because of their low cost and compactness. Composed of one or more silicon chips only about a quarter of an inch in size, they contain several million microelectronic circuits, each of which stores a binary digit. Semiconductor memories provide great storage capacity but are volatile—*i.e.,* they lose their contents if the power supply is cut off.

A special type of transistor circuit for temporary storage of a binary digit is called a flip-flop. A single flip-flop consists of four or a few more transistors. Once a flip-flop stores a binary digit 0 or 1, it keeps that digit until it is rewritten to 1 or 0, respectively. A set of flip-flops that temporarily stores a program instruction (or two or three instructions in the case of certain types of computers) or a number (as in a computational result) is called a register. Numerous flip-flops and registers are used not only in the memory unit but in the ALU and control unit as well.

Main memory. The memory unit of a digital computer typically has a main (or primary) memory, cache, and secondary (or auxiliary) memory. The main memory holds data and instructions for immediate use by the computer's ALU. It receives this information from an input device or an auxiliary storage unit. In most cases, the main memory is a high-speed random-access memory (RAM)—*i.e.,* a memory in which specific contents can be accessed (read or written) directly in a very short time regardless of the sequence (and hence location) in which they were recorded. Two types of main memory are possible with random-access circuits—static random-access memory (SRAM) and dynamic random-access memory (DRAM). A single memory chip is made up of several million memory cells. In a SRAM chip, each memory cell consists of a single flip-flop (for storing the binary digits 1 or 0) and a few more transistors (for reading or writing operation). In a DRAM chip, each memory cell consists of a capacitor (rather than a flip-flop) and a single transistor. When a capacitor is electrically charged, it is said to store the binary digit 1, and when discharged, it represents 0; these changes are controlled by the transistor. Because it has fewer components, DRAM requires a smaller area on a chip than does SRAM, and hence a DRAM chip can have a greater memory capacity, though its access time is slower than that of SRAM.

The cache is a SRAM-based memory of small capacity that has faster access time than the main memory and that temporarily stores data and part of a program for quicker processing by the ALU. (*See also* cache memory.)

Auxiliary, or secondary, memory. Auxiliary storage units are an integral part of a computer's peripheral equipment. They can store substantially more information than can a main memory but operate at slow speeds. The most common forms of secondary storage are magnetic disk or tape. (*See also* magnetic recording.)

Magnetic disks are flat, circular plates coated with a magnetic material. There are two types: hard disks, which are made of aluminum or glass and are physically rigid; and floppy disks, which are made of plastic and are flexible. Both types of disks come in diameters of 3.5 and 5.25 inches (9 and 13 cm). Hard disks that can store anywhere from 20 megabytes to 2 gigabytes (20 million to 2 billion bytes, or small groups of adjacent binary digits constituting a subunit of information) are readily available for desktop computers, and still larger ones can be had. Floppy disks have a

much smaller capacity of only two to three megabytes. In both types of disk, data on their surfaces is arranged in concentric tracks. A tiny magnet, called a magnetic head, writes a binary digit (1 or 0) by magnetizing a tiny spot on a disk in different directions and reads digits by detecting the magnetization direction of the spots. A magnetic-disk drive is an assembly of one or more disks, magnetic heads, and a mechanical device for rotating the disks for reading or writing purposes.

Magnetic tapes are also sometimes used in auxiliary storage units. They have an even greater memory capacity than disks, but their access time is far slower because they are sequential-access memories—*i.e.*, ones in which data in consecutive addresses are sequentially read or written as a tape is unwound. Magnetic disks are partly random-accessed (because a magnetic head for reading or writing goes to a desired circular track) and partly sequential-accessed (because data is read or written sequentially from that track as the disk rotates).

Hard disks are routinely used for storing current records and applications software on personal and other small computers. Larger computers may use RAID (redundant array of inexpensive drives), which consists of a group of hard-disk drives that work together as one disk drive. A typical RAID consists of five or more drives with 3.5-inch or 5.25-inch hard disks; this array yields reasonably high access speeds and is more reliable yet less expensive than a traditional single drive with large hard disks. RAIDs are widely used with mainframe computers that require auxiliary memory of very large capacity.

Nonvolatile memories. Besides main and auxiliary memories, other forms of memory exist for specialized purposes. An increasingly important class is that of nonvolatile memories, which, unlike SRAMs and DRAMs, do not lose their content when the power supply is cut off. Some nonvolatile memories, such as read-only memory (ROM), are not rewritable once manufactured or written. Each memory cell of a ROM chip either has a transistor or none, representing the binary digits 0 or 1, respectively. ROMs are generally employed for programs designed for repeated use without modification, as, for example, the operating system of a personal microcomputer; the ROM is used for storing the microprogram used in the control unit of the microcomputer. By contrast, EPROM (erasable programmable ROM), EAROM (electrically alterable ROM), and flash memory are types of nonvolatile memories that are rewritable, though the rewriting is far more time-consuming than reading. They are thus used as special-purpose memories where writing is seldom necessary.

Another form of memory is the optical disk, which uses optical rather than electrical means for reading and writing. It developed from videodisc (*q.v.*) technology during the early 1980s. Optical disks have a greater memory capacity than most magnetic disks; the largest ones can store 1.5 gigabytes of information, which is equal to about 700,000 pages of printed material. Optical disks come in sizes ranging from 3.5 to 12 inches (30 cm). They are widely used as auxiliary memory when large memory capacity is required.

In one type of optical disk, the CD-ROM (compact disc–read-only memory), digital data is stored as a pattern of tiny pits on a compact disc (*q.v.*) by the heat of a high-power laser beam or by a stamping machine. Once the information is stored, it can be read but cannot be rewritten. For reading, the digitally coded data are tracked by a low-power optical laser scanner; variations in the intensity of laser light reflected from the pits are detected by a photocell that converts them into electric signals. Because they are not rewritable, CD-ROMs are used to distribute relatively static data, for example in encyclopaedias and other reference works, and their large capacity makes them ideal for combinations of text with audio and graphics or other multimedia formats. (*See also* CD-ROM.) WORM (write once read many) is a variation of CD-ROM that allows a user to write information on each disk only once, with subsequent erasure impossible.

In magneto-optical disks, which can be erased and rewritten, information is written into or read from the disk by means of the magnetic properties of spots on its surface. In reading, spots with different directions of magnetization give different polarization in the reflected light of a low-power laser beam. In the writing process, which erases all previous information, every spot on the disk is heated by a strong laser beam and is then cooled under a magnetic field. Thus every spot is magnetized in one direction; in other words, every spot stores 0. Then, reversing the direction of the magnetic field, only desired spots are magnetized in the opposite direction by a strong laser beam, storing 1. (*See also* optical storage.)

computer music, music utilizing digital computers and other electronic data-processing machinery developed about 1948 in application to musical composition and for musical research. The techniques of computer technology permit the indexing of specific genres, or types, of music (such as 16th-century Italian music or the works of a given composer) and have proved useful in the analysis of style, tonal and harmonic structure, and the process of composition.

In using a computer as a tool in composition, the composer programs the computer to produce pitches, rhythms, tone colours, and other musical elements and to screen these elements through criteria also chosen by the composer. The output may be transcribed for performance by conventional instruments or fed into another device for conversion into sound. In 1963, at the Bell Telephone Laboratories, Max Vernon Mathews and his coworkers devised a computer capable of synthesizing sound directly. The composer's input, in the form of mathematical functions, is translated by the computer into synthesized musical sounds that are stored in digital form and can be played back at will. Because the machinery is flexible and precise, it can yield a wide variety of musical applications. Although a computer can be programmed to produce music in traditional styles and instrumental colours, its principal attraction to composers has been its ability to expand the previously available range of musical elements, such as tone colours and pitches, and the new approaches to musical form it makes possible.

computer network, also called NETWORK, two or more computers that are connected with one another for the purpose of communicating data electronically. Besides physically connecting computer and communication devices, a network system serves the important function of establishing a cohesive architecture that allows a variety of equipment types to transfer information in a near-seamless fashion. Two popular architectures are ISO Open Systems Interconnection (OSI) and IBM's Systems Network Architecture (SNA).

Two basic network types are local-area networks (LANs) and wide-area (or long-haul) networks. LANs connect computers and peripheral devices in a limited physical area, such as a business office, laboratory, or college campus, by means of permanent links (wires, cables, fibre optics) that transmit data rapidly. A typical LAN consists of two or more personal computers, printers, and high-capacity disk-storage devices called file servers, which enable each computer on the network to access a common set of files. LAN operating system software, which interprets input and instructs networked devices, allows users to communicate with each other; share the printers and storage equipment; and simultaneously access centrally located processors, data, or programs (instruction sets). LAN users may also access other LANs or tap into wide-area networks. LANs with similar architectures are linked by "bridges," which act as transfer points. LANs with different architectures are linked by "gateways," which convert data as it passes between systems.

Wide-area networks connect computers and smaller networks to larger networks over greater geographic areas, including different continents. They may link the computers by means of cables, optical fibres, or satellites, but their users commonly access the networks via a modem (a device that allows computers to communicate over telephone lines). The largest wide-area network is the Internet (*q.v.*), a collection of networks and gateways linking millions of computer users on every continent.

computer program, detailed plan or procedure for solving a problem with a computer; more specifically, an unambiguous, ordered sequence of computational instructions necessary to achieve such a solution. The distinction between computer programs and equipment is often made by referring to the former as software and the latter as hardware.

Programs stored in the memory of a computer enable the computer to perform a variety of tasks in sequence or even intermittently. The idea of an internally stored program was introduced in the late 1940s by the Hungarian-born mathematician John von Neumann. The first digital computer designed with internal programming capacity was the EDVAC (acronym for Electronic Discrete Variable Automatic Computer), constructed in 1949.

A program is prepared by first formulating a task and then expressing it in an appropriate computer language, presumably one suited to the application. The specification thus rendered is translated, commonly in several stages, into a coded program directly executable by the computer on which the task is to be run. The coded program is said to be in machine language, while languages suitable for original formulation are called problem-oriented languages. A wide array of problem-oriented languages has been developed, some of the principal ones being COBOL (Common Business-Oriented Language), FORTRAN (Formula Translation), BASIC (Beginner's All-Purpose Symbolic Instruction Code), and Pascal. (*See also* computer programming language.)

Computers are supplied with various programs designed primarily to assist the user to run jobs or optimize system performance. This collection of programs, called the operating system, is as important to the operation of a computer system as its hardware. Current technology makes it possible to build in some operating characteristics as fixed programs (introduced by customer orders) into a computer's central processing unit at the time of manufacture. Relative to user programs, the operating system may be in control during execution, as when a time-sharing (*q.v.*) monitor suspends one program and activates another, or at the time a user program is initiated or terminated, as when a scheduling program determines which user program is to be executed next. Certain operating-system programs, however, may operate as independent units to facilitate the programming process. These include translators (either assemblers or compilers), which transform an entire program from one language to another; interpreters, which execute a program sequentially, translating at each step; and debuggers, which execute a program piecemeal and monitor various circumstances, enabling the programmer to check whether the operation of the program is correct or not.

computer programming language, any of various languages for expressing a set of detailed instructions for a digital computer. Such a language consists of characters and rules for combining them into symbols and words.

Many kinds of programming languages have been developed over the years. Initially programmers had to write instructions in machine language. This coded language, which can be understood and executed directly by the computer without conversion or translation, consists of binary digits representing operation codes and memory addresses. Because it is made up of strings of 1s and 0s, machine language is difficult for humans to use. Assembly language was eventually devised for greater convenience. It enabled programmers to express instructions in alphabetic symbols (*e.g.,* AD for add and SUB for subtract) rather than in numbers. Although assembly language with its mnemonic code was easier to use than machine language, it was clearly desirable to develop programming languages that more closely resembled human communication. The first so-called high-level language was FORTRAN (acronym for Formula Translation), invented in 1956. FORTRAN was well suited to scientists and mathematicians because it was similar to mathematical notations. It did, however, present some difficulty for those in nonmathematically oriented fields. As a result, a more practical programming language known as COBOL (Common Business-Oriented Language) was devised several years later (1960). COBOL employs words and syntax resembling those of ordinary English. Later, other languages even easier to learn and use were introduced. BASIC (Beginner's All-Purpose Symbolic Instruction Code), for example, can be readily mastered by the layperson and is used extensively in schools, businesses, and homes for microcomputer programming. C is a high-level language that can function as an assembly language; much commercial software is written in this flexible language. Another versatile language widely used for microcomputer as well as minicomputer applications is Pascal (probably named for the French scientist-philosopher Blaise Pascal).

Other high-level programming languages possess unique features that make each one suitable for a specific application. Some examples are APT (Automatically Programmed Tools), for numerical control of industrial machine tools, and GPSS (General-Purpose Simulation System), for constructing simulation models. LISP (List Processing) can be used to manipulate symbols and lists rather than numeric data; it is often used in artificial-intelligence applications. Fourth-generation languages (4GLs) are closer to human language than are high-level (or third-generation) languages. They are used primarily for database management or as query languages; examples include FOCUS, SQL (Structured Query Language), and dBASE. Object-oriented programming languages, such as C++ and Smalltalk, write programs incorporating self-contained collections of data structure or computational instructions (called "objects"). New programs can be written by reassembling and manipulating the objects. *See also* computer program.

computer science, field of study that deals with the structure, operation, and application of computers and computer systems.

A brief treatment of computer science follows. For full treatment, *see* MACROPAEDIA: Computer Science.

Computer science includes engineering activities, such as the design of computers and of the hardware and software of computer systems, and theoretical, mathematical activities, such as the analysis of algorithms and performance studies of systems. It also involves experimentation with new computer systems and their potential applications.

Computer science was established as a discipline in the early 1960s. Its roots lie mainly in the fields of mathematics (*e.g.,* Boolean algebra) and electrical engineering (*e.g.,* circuit design). The major subdisciplines of computer science are (1) architecture (the design and study of computer systems), an area that overlaps extensively with computer engineering; (2) software, including such topics as software engineering, programming languages, operating systems, information systems and databases, artificial intelligence, and computer graphics; and (3) theory, including computational methods and numerical analysis as well as data structures and algorithms.

computer security, the protection of computer systems and information from harm, theft, and unauthorized use. Computer hardware is typically protected by the same means used to protect other valuable or sensitive equipment, namely, serial numbers, doors and locks, and alarms. The protection of information and system access, on the other hand, is achieved through other tactics, some of them quite complex.

The most basic means of protecting a computer system against theft, vandalism, invasion of privacy, and other irresponsible behaviours is to electronically track and record the access to, and activities of, the various users of a computer system. This is commonly done by assigning an individual password to each person who has access to a system. The computer system itself can then automatically track the use of these passwords, recording such data as which files were accessed under particular passwords and so on. Another security measure is to store a system's data on a separate device, or medium, such as magnetic tape or disks, that is normally inaccessible through the computer system. Finally, data is often encrypted so that it can be deciphered only by holders of a singular encryption key. (*See* data encryption.)

Computer security has become increasingly important since the late 1960s, when modems (devices that allow computers to communicate over telephone lines) were introduced. The proliferation of personal computers in the 1980s compounded the problem because they enabled hackers (irresponsible computerphiles) to illegally access major computer systems from the privacy of their homes. The development of advanced security techniques continues to diminish such threats, though concurrent refinements in the methods of computer crime (*q.v.*) pose ongoing hazards.

computer simulation, the use of a computer to represent the dynamic responses of one system by the behaviour of another system modeled after it. A simulation uses a mathematical description, or model, of a real system in the form of a computer program. This model is composed of equations that duplicate the functional relationships within the real system. When the program is run, the resulting mathematical dynamics form an analog of the behaviour of the real system, with the results presented in the form of data. A simulation can also take the form of a computer-graphics image that represents dynamic processes in an animated sequence.

Computer simulations are used to study the dynamic behaviour of objects or systems in response to conditions that cannot be easily or safely applied in real life. For example, a nuclear blast can be described by a mathematical model that incorporates such variables as heat, velocity, and radioactive emissions. Additional mathematical equations can then be used to adjust the model to changes in certain variables, such as the amount of fissionable material that produced the blast. Simulations are especially useful in enabling observers to measure and predict how the functioning of an entire system may be affected by altering individual components within that system.

The simpler simulations performed by personal computers consist mainly of business models and geometric models. The former includes spreadsheet, financial, and statistical software programs that are used in business analysis and planning. Geometric models are used for numerous applications that require simple mathematical modeling of objects, such as buildings, industrial parts, and the molecular structures of chemicals. More advanced simulations, such as those that emulate weather patterns or the behaviour of macroeconomic systems, are usually performed on powerful workstations or on mainframe computers. In engineering, computer models of newly designed structures undergo simulated tests to determine their responses to stress and other physical variables. Simulations of river systems can be manipulated to determine the potential effects of dams and irrigation networks before any actual construction has taken place. Other examples of computer simulations include estimating the competitive responses of companies in a particular market and reproducing the movement and flight of space vehicles.

computer virus, a portion of a program code that has been designed to furtively copy itself into other such codes or computer files. It is usually created by a prankster or vandal to effect a nonutilitarian result or to destroy data and program code.

A virus consists of a set of instructions that attaches itself to other computer programs, usually in the computer's operating system, and becomes part of them. In most cases, the corrupted programs continue to perform their intended functions but surreptitiously execute the virus's instructions as well. A virus is usually designed to execute when it is loaded into a computer's memory. Upon execution, the virus instructs its host program to copy the viral code into, or "infect," any number of other programs and files stored in the computer. The infection can then transfer itself to files and code on other computers through magnetic disks or other memory-storage devices, computer networks, or online systems. The replicating viruses often multiply until they destroy data or render other program codes meaningless. A virus may simply cause a harmless joke or cryptic message to appear on a computer user's video monitor each time he turns on his computer. A more damaging virus can wreak havoc on an extremely large computer system within a matter of minutes or hours, causing it to crash and thereby destroy valuable data.

computerized axial tomography, also called COMPUTED TOMOGRAPHY, method of obtaining cross-sectional images of internal bodily structures; a computer enhancement of tomography (*q.v.*).

computerized typesetting, method of typesetting in which characters are generated by computer and transferred to light-sensitive paper or film by means of either pulses from a laser beam or moving rays of light from a stroboscopic source or a cathode-ray tube (CRT). The system includes a keyboard that produces magnetic tape—or, formerly, punched paper—for input, a computer for making hyphenation and other end-of-line and pagemakeup decisions, and a typesetting unit for output. The keyboard may be a counting keyboard, which allows the operator to decide placement and spacing and is suitable for tables, formulas, and equations, or a noncounting keyboard, which is faster and cheaper to operate and suitable for solid text.

The computer must be programmed carefully for optimal word spacing and correct hyphenation. Older typesetters have a photounit with an optical type font carried as a negative

image or image master. It may be a grid, disk, drum, or film strip. Light flashed through the characters projects them through a lens onto light-sensitive paper or film. The optical systems are supplanted in newer equipment by laser beams that form the various parts of each character in response to computer-generated electric pulses.

Some systems have a video display terminal (VDT), consisting of a keyboard and a CRT viewing screen, that enables the operator to see and correct the words as they are being typed. If a system has a line printer, it can produce printouts of "hard copy."

An optical character recognition (OCR) system "reads" typed copy and records the characters on a machine-readable tape. It converts the tape into electronic signals that enter the recognition unit and are converted into copy without an operator at the keyboard.

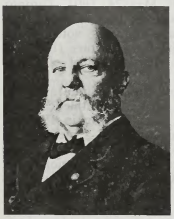
Photocomposition is perhaps the most important innovation in typesetting since the development of movable type; it and other forms of computerized typesetting eliminate metal casting and produce a page that is virtually indistinguishable from one produced by metal type. Its main advantage is speed. A linecasting machine produces 5 characters per second; an early phototypesetting system can set between 30 and 100. A fully computerized typesetter with sophisticated electronics can set up to 10,000 characters per second, the actual speed being limited by the speed of the film transport mechanism. *See also* photocomposition.

Comsat, abbreviation of COMMUNICATIONS SATELLITE CORPORATION, private corporation authorized by the U.S. Congress in 1962 to develop commercial communications satellite systems. It was officially incorporated in 1963, with 50 percent of the stock being sold to the public and the balance to private communications companies.

Agencies from 17 other countries joined Comsat in 1964 in forming the International Telecommunications Satellite Consortium (Intelsat [*q.v.*]) for the purpose of establishing a global commercial communications network. As the managing agency for this international organization, Comsat launched a series of communications satellites, beginning with Early Bird in 1965. It also developed other advanced communications satellites for service within the United States.

Comsat is also the U.S. representative to the International Maritime Satellite Organization (Inmarsat), which provides communications services to shipping and offshore industries. Intelsat and Inmarsat services are regulated by the Federal Communications Commission.

Comstock, Anthony (b. March 7, 1844, New Canaan, Conn., U.S.—d. Sept. 21, 1915, New York, N.Y.), one of the most powerful American reformers, who for more than 40 years led a crusade against what he considered obscenity in literature and in other forms of expression. The epithet "comstockery" came to be synonymous with moralistic censorship.



Anthony Comstock

By courtesy of the Library of Congress, Washington, D.C.

A Union Army veteran of the American Civil War, Comstock began about 1872 to work with the Young Men's Christian Association in New York City. In 1873 he lobbied successfully for the enactment of a severe federal statute known as the Comstock Law, which outlawed the transportation of obscene matter in the mails. From that year until his death he served (without pay until 1906) as a special agent of the U.S. Post Office Department. Also in 1873 he founded the New York Society for the Suppression of Vice.

Ordinarily, Comstock attacked commercial pornography rather than serious writing, but he sometimes took action against established modern works and the classics on the principle of "morals, not art or literature." Personally vindictive toward "libertines," he is said to have boasted of the number of persons he had driven to suicide. More creditable were his efforts to suppress fraudulent banking schemes, mail swindles, and medical quackery.

Comstock Lode, rich deposit of silver in Nevada, U.S., named for Henry Comstock, part-owner of the property on which it was discovered in June 1859. Virginia City, Washoe, and other mining "boomtowns" quickly arose in the vicinity, and in 10 years the lode's output justified establishment of a U.S. branch mint (closed in 1893) at Carson City. In the meantime, Republican leaders eager to add another loyal state to the Union used the probability that the lode would attract additional thousands to justify the admission of Nevada as a state in 1864. In the peak years of 1876–78, silver ore worth about $36,000,000 was extracted annually. Production declined sharply thereafter, and the rich lower levels of the lode were flooded in 1882. Virginia City and the other mining towns disappeared or became tourist attractions.

Comtat-Venaissin, also called COMTAT, or VENAISSIN, former province of France and papal enclave, bounded on the north and northeast by Dauphiné, on the south by the Durance River, on the east by Provence, and



Comtat-Venaissin in 1789

on the west by the Rhône River. It comprises the present *département* of Vaucluse. Its capital was Carpentras. Comtat-Venaissin is a picturesque territory, varying in scenery between the foothills of the Alps and large plains, which are irrigated by canals supplied by the Rhône, Durance, and Sorgue rivers.

The Comtat-Venaissin (Comitatus Venassinus), the territory of the Gallic people known as the Cavares, subsequently belonged to the counts of Provence and then to the counts of Toulouse. Ceded to the pope in 1218 by Raymond VII, count of Toulouse, and again in 1274 by Philip the Bold, it was not united to France until 1791, during the French Revolution.

The town of Avignon, anciently distinct from the Comtat-Venaissin, was incorporated in it by Pope Clement VI at the beginning of the 14th century. Avignon, a bishopric since the 1st century AD, became an archbishopric in 1475. Carpentras was a bishopric from 483 until 1805.

Comte, Auguste, in full ISIDORE-AUGUSTE-MARIE-FRANÇOIS-XAVIER COMTE (b. Jan. 19, 1798, Montpellier, France—d. Sept. 5, 1857, Paris), French philosopher known as the founder of sociology and of positivism. Comte gave the science of sociology its name and established the new subject in a systematic fashion.



Comte, drawing by Tony Toullion, 19th century; in the Bibliothèque Nationale, Paris

H. Roger-Viollet

Life. Comte's father, Louis Comte, a tax official, and his mother, Rosalie Boyer, were strongly royalist and deeply sincere Roman Catholics. But their sympathies were at odds with the republicanism and skepticism that swept through France in the aftermath of the French Revolution. Comte resolved these conflicts at an early age by rejecting Roman Catholicism and royalism alike. He was intellectually precocious and in 1814 entered the École Polytechnique—a school in Paris that had been founded in 1794 to train military engineers but was soon transformed into a general school for advanced sciences. The school was temporarily closed in 1816, but Comte soon took up permanent residence in Paris, earning a precarious living there by the occasional teaching of mathematics and by journalism. He read widely in philosophy and history and was especially interested in those thinkers who were beginning to discern and trace some order in the history of human society. The thoughts of several important French political philosophers of the 18th century—such as Montesquieu, the Marquis de Condorcet, A.-R.-J. Turgot, and Joseph de Maistre—were critically worked into his own system of thought.

Comte's most important acquaintance in Paris was Henri de Saint-Simon, a French social reformer and one of the founders of socialism, who was the first to clearly see the importance of economic organization in modern society. Comte's ideas were very similar to Saint-Simon's, and some of his earliest articles appeared in Saint-Simon's publications. There were distinct differences in the two men's viewpoints and scientific backgrounds, however, and Comte eventually broke with Saint-Simon. In 1826 Comte began a series of lectures on his "system of positive philosophy" for a private audience, but he soon suffered a serious nervous breakdown. He made an almost complete recovery from his symptoms the following year, and in 1828/29 he again took up his projected lecture series. This was so successfully concluded that he redelivered it at the Royal Athenaeum during 1829–30. The following 12 years were devoted to his

publication (in six volumes) of his philosophy in a work entitled *Cours de philosophie positive* (1830–42; "Course of Positive Philosophy"; Eng. trans. *The Positive Philosophy of Auguste Comte*).

From 1832 to 1842 Comte was a tutor and then an examiner at the revived École Polytechnique. In the latter year he quarreled with the directors of the school and lost his post, along with much of his income. During the remainder of his life he was supported in part by English admirers such as John Stuart Mill and by French disciples, especially the philologist and lexicographer Maximilien Littré. Comte married Caroline Massin in 1825, but the marriage was unhappy and they separated in 1842. In 1845 Comte had a profound romantic and emotional experience with Clotilde de Vaux, who died the following year of tuberculosis. Comte idealized this sentimental episode, which exerted a considerable influence on his later thought and writings, particularly with regard to the role of women in the positivist society he planned to establish.

Comte devoted the years after the death of Clotilde de Vaux to composing his other major work, the *Système de politique positive*, 4 vol. (1851–54; *System of Positive Polity*), in which he completed his formulation of sociology. The entire work emphasized morality and moral progress as the central preoccupation of human knowledge and effort and gave an account of the polity, or political organization, that this required. Comte lived to see his writings widely scrutinized throughout Europe. Many English intellectuals were influenced by him, and they translated and promulgated his work. His French devotees had also increased, and a large correspondence developed with positivist societies throughout the world. Comte died of cancer in 1857.

Comte was a rather sombre, ungrateful, self-centred, and egocentric personality, but he compensated for this by his zeal for the welfare of humanity, his intellectual determination, and his strenuous application to his life's work. He devoted himself untiringly to the promotion and systematization of his ideas and to their application in the cause of the improvement of society.

His other writings include *Catéchisme positiviste* (1852; *The Catechism of Positive Religion*) and *Synthèse subjective* (1856; "Subjective Synthesis"). In general, his writing was well organized, and its exposition proceeded in impressively orderly fashion, but his style was heavy, laboured, and rather monotonous. His chief works are notable mainly because of the scope, magnitude, and importance of his project and the conscientious persistence with which he developed and expressed his ideas.

Thought. Comte lived through the aftermath of the French Revolutionary and Napoleonic periods, at a time when a new, stable social order—without despotism—was sought. Modern science and technology and the Industrial Revolution had begun transforming the societies of Europe in directions no one yet understood. People experienced violent conflict but were adrift in feeling, thought, and action; they lacked confidence in established sentiments, beliefs, and institutions but had nothing with which to replace them. Comte thought that this condition was not only significant for France and Europe but was one of the decisive junctures of human history.

Comte's particular ability was as a synthesizer of the most diverse intellectual currents. He took his ideas mainly from writers of the 18th and early 19th centuries. From David Hume and Immanuel Kant he derived his conception of positivism—*i.e.*, the theory that theology and metaphysics are earlier imperfect modes of knowledge and that positive knowledge is based on natural phenomena and their properties and relations as verified by the empirical sciences. From various French clericalist thinkers Comte took the notion of a hypothetical framework for social organization that would imitate the hierarchy and discipline found in the Roman Catholic church. From various Enlightenment philosophers he adopted the notion of historical progress. Most importantly, from Saint-Simon he came to appreciate the need for a basic and unifying social science that would both explain existing social organizations and guide social planning for a better future. This new science he called "sociology" for the first time.

Comte shared Saint-Simon's appreciation of the growing importance of modern science and the potential application of scientific methods to the study and improvement of society. Comte believed that social phenomena could be reduced to laws in the same way that the revolutions of the heavenly bodies had been made explicable by gravitational theory. Furthermore, he believed that the purpose of the new scientific analysis of society should be ameliorative and that the ultimate outcome of all innovation and systematization in the new science should be the guidance of social planning. Comte also thought a new and secularized spiritual order was needed to supplant what he viewed as the outdated supernaturalism of Christian theology.

Comte's main contribution to positivist philosophy falls into five parts: his rigorous adoption of the scientific method; his law of the three states or stages of intellectual development; his classification of the sciences; his conception of the incomplete philosophy of each of these sciences anterior to sociology; and his synthesis of a positivist social philosophy in a unified form. He sought a system of philosophy that could form a basis for political organization appropriate to modern industrial society.

Comte's "law of the three stages" maintained that human intellectual development had moved historically from a theological stage, in which the world and human destiny within it were explained in terms of gods and spirits; through a transitional metaphysical stage, in which explanations were in terms of essences, final causes, and other abstractions; and finally to the modern positive stage. This last stage was distinguished by an awareness of the limitations of human knowledge. Knowledge could only be relative to man's nature as a species and to his varying social and historical situations. Absolute explanations were therefore better abandoned for the more sensible discovery of laws based on the observable relations between phenomena.

Comte's classification of the sciences was based upon the hypothesis that the sciences had developed from the understanding of simple and abstract principles to the understanding of complex and concrete phenomena. Hence, the sciences developed as follows: from mathematics, astronomy, physics, and chemistry to biology and finally to sociology. According to Comte, this last discipline not only concluded the series but would also reduce social facts to laws and synthesize the whole of human knowledge, thus rendering the discipline equipped to guide the reconstruction of society.

Though Comte did not originate the concept of sociology or its area of study, he greatly extended and elaborated the field and systematized its content. Comte divided sociology into two main fields, or branches: social statics, or the study of the forces that hold society together; and social dynamics, or the study of the causes of social change. He held that the underlying principles of society are individual egoism, which is encouraged by the division of labour, and the combination of efforts and the maintenance of social cohesion by means of government and the state.

Comte revealed his conception of the ideal positivist society in his *System of Positive Polity*. He believed that the organization of the Roman Catholic church, divorced from Christian theology, could provide a structural and symbolic model for the new society, though Comte substituted a "religion of humanity" for the worship of God. A spiritual priesthood of secular sociologists would guide society and control education and public morality. The actual administration of the government and of the economy would be in the hands of businessmen and bankers, while the maintenance of private morality would be the province of women as wives and mothers.

Though unquestionably a man of genius, Comte inspired discipleship on the one hand and derision on the other. His plans for a future society have been described as ludicrous, and Comte was deeply reactionary in his rejection of democracy, his emphasis on hierarchy and obedience, and his opinion that the ideal government would be made up of an intellectual elite. But his ideas influenced such notable social scientists as Émile Durkheim of France and Herbert Spencer and Sir Edward Burnett Tylor of Great Britain. Comte's belief in the importance of sociology as the scientific study of human society remains an article of faith among contemporary sociologists, and the work he accomplished remains a remarkable synthesis and an important system of thought. (R.Fl./H.E.B./Ed.)

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Con Son, also called CON DAO, town, island, and island group, southern Vietnam. The island group consists of 13 volcanic islands and islets about 60 miles (100 km) southeast of the Ca Mau Peninsula in the South China Sea. Con Son Island, which is 13 miles (21 km) long and 5 miles (8 km) wide, is well wooded and has an indented coast. It has also been known as Penitentiary Island because it was used for political prisoners.

The town of Con Son is on an east-facing bay at the centre of the main island and has a hospital, a penitentiary, and an old French East India Company fort. There is a commercial airport at the northern end of Con Son Island. In 1787 the islands, then known as Poulo Condore, were granted, together with Da Nang (Tourane), to France by Nguyen Anh, later the emperor Gia Long. In 1862 they were formally deeded to France by Emperor Tu Duc. Economic activities on the islands include lumbering and the raising of tobacco, peanuts (groundnuts), and coffee. Pop. (1972 est.) island, 3,300.

Conacher, Lionel, in full LIONEL PRETORIA CONACHER (b. May 24, 1901, Toronto, Ont., Can.—d. May 26, 1954, Ottawa), athlete and politician who was voted Canada's Athlete of the Half Century (1900–50) and was a Liberal Party member of Parliament.

Conacher dropped out of school after the eighth grade to work. His athletic career stemmed from a prize he won in 1916 for selling the most newspapers—a membership card in a YMCA gymnasium. He won the Ontario 125-pound wrestling championship at age 16 and the Canadian light-heavyweight boxing championship at 20. He played on the championship Ontario lacrosse team in 1922 and on the Toronto American Athletic Association championship baseball team in 1926. He also played rugby for Toronto in the On-

tario Football Rugby Union (1920) and for the Toronto Argonauts (1921–22). His most sustained professional sport was ice hockey; he played as a defenseman in the National Hockey League (1926–37) with the Pittsburgh Pirates, the Chicago Black Hawks, the New York Americans, and the Montreal Maroons and was a member of Stanley Cup winning teams in 1934 (Chicago) and 1935 (Montreal).

Conacher was elected to the Ontario legislature in 1937. During World War II he was recreational director for the Royal Canadian Air Force. He was elected to Parliament in 1949 and 1953. He died of a heart attack after hitting a triple in a softball game between members of Parliament and the parliamentary press gallery.

Conakry, also spelled KONAKRY, national capital, largest city, and chief Atlantic port, western Guinea. Conakry lies on Tombo (Tumbo) Island and the Kaloum Peninsula. Founded by the French in 1884, it derived its name from a local village inhabited by the Susu (Soussou) people. Subsequently it became capital of the protectorate of Rivières du Sud (1891), of the colony of French Guinea (1893), and of independent Guinea (1958). Tombo Island, the site of the original settlement, is linked to the peninsula by a 328-yard (300-metre) causeway; it contains Conakry's deep-water harbour (accommodating vessels of 36-foot [11-metre] draft), which exports alumina (treated bauxite), bananas, oranges, pineapples, coffee, palm produce, and fish. The port is the terminus of motor roads, a 411-mile (661-kilometre) railroad from Kankan, and a 90-mile (145-kilometre) branch line from Fria. Guinea's international airport is 9.5 miles (15 km) northeast.



The Boulbinet section and the fishing harbour at Conakry, Guinea
Shostal

Conakry became industrialized in the 1950s with the development of iron mining on the Kaloum Peninsula and the exploitation of bauxite on the nearby Los Islands. Local enterprises include fruit canning, fish packing, printing, automobile assembly, and the manufacture of aluminum utensils and plastics. Major industrial plants, however, lie to the northeast at Sanouya (textiles), Wassawassa (tobacco and matches), Sofoniya (furniture), Kobala (bricks), Simbala (mining explosives), and Camp Alpha Yaya (shoes and clothing).

Conakry is the nation's educational centre and the seat of the University of Conakry (1962). There are also teacher-training, vocational, nursing, midwifery, and military schools. Conakry's museum, library, and national archives were established in 1960; its botanical garden at Camayenne (a residential district) was founded by the French. Prominent structures in the city include the National Assembly building (Palais du Peuple), the sports stadium (Stade du 28-Septembre), the monument to anticolonial martyrs, the central mosque, and the Roman Catholic cathedral. There are several distinct quarters, including the Centre (commercial), Boulbinet (with its picturesque fishing harbour), and Administrative sections. Pop. (1990 est.) region, 1,127,000.

Conanicut Island (Rhode Island, U.S.): *see* Jamestown.

Conant, James B., in full JAMES BRYANT CONANT (b. March 26, 1893, Dorchester, Mass., U.S.—d. Feb. 11, 1978, Hanover, N.H.), American educator and scientist, president of Harvard University, and U.S. high commissioner for western Germany following World War II.



Conant
By courtesy of Harvard University Archives

Conant received his A.B. and Ph.D. (1916) degrees from Harvard and, after spending a year in the research division of the chemical warfare service during World War I, returned to Harvard as instructor in chemistry. He won recognition as a brilliant research chemist, becoming department chairman by the age of 38. He specialized in research into free radicals, the chemical structure of chlorophyll, and the quantitative study of organic reactions.

In 1933 Conant was elected president of Harvard. As president he led the university toward a broadening of the social and geographic makeup of the student bodies of the undergraduate college and the professional schools. An advocate of aid to the Allies as early as the late 1930s, Conant became a central figure in organizing American science for World War II, including the development of the atomic bomb. After the war he served as a senior adviser to the National Science Foundation and to the Atomic Energy Commission. In 1953 he was appointed U.S. high commissioner for western Germany and in 1955 ambassador. He became known as a defender of the democratic spirit in the new Germany. Returning to the United States in 1957, he took up an earlier interest in public education and conducted studies of the comprehensive high school and the junior high school.

Conant's publications include two textbooks, *Practical Chemistry,* written with N.H. Black (1920), and *Chemistry of Organic Compounds* (1933). He was particularly successful in writing about science for the nonscientifically trained person, as in *On Understanding Science* (1947). Among his books on educational policy are *Education and Liberty* (1953), *The American High School Today* (1959), *Slums and Suburbs* (1961), and *The Education of American Teachers* (1963). His autobiography, *My Several Lives,* was published in 1970.

concealing coloration, in animals, the use of biological coloration to mask location, identity, and movement, providing concealment from prey and protection from predators. Background matching is a type of concealment in which an organism avoids recognition by resembling its background in coloration, form, or movement. In disruptive coloration, the identity and location of an animal may be concealed through a coloration pattern that causes visual disruption because the pattern does not coincide with the shape and outline of the animal's body. Countershading is a form of concealing coloration in which the upper surfaces of the body are more darkly pigmented than the unilluminated lower areas, giving the body a more uniform darkness and a lack of depth relief.

conceit, figure of speech, usually a simile or metaphor, that forms an extremely ingenious or fanciful parallel between apparently dissimilar or incongruous objects or situations. The Petrarchan conceit, which was especially popular with Renaissance writers of sonnets, is a hyperbolic comparison made generally by a suffering lover of his beautiful and cruel mistress to some physical object—*e.g.,* a tomb, the ocean, the sun. The metaphysical conceit, associated with the Metaphysical poets of the 17th century, is a more intricate and intellectual device. It usually sets up an analogy between one entity's spiritual qualities and an object in the physical world and sometimes controls the whole structure of the poem. For example, in the following stanzas from "A Valediction: Forbidding Mourning," John Donne compares two lovers' souls to a draftsman's compass:

> If they be two, they are two so
> As stiffe twin compasses are two,
> Thy soule the fixt foot, makes no show
> To move, but doth, if the'other doe.
>
> And though it in the center sit,
> Yet when the other far doth rome,
> It leanes, and hearkens after it,
> And growes erect, as that comes home.

Conceits often were so farfetched as to become absurd, degenerating in the hands of lesser poets into strained ornamentation. With the advent of Romanticism they fell into disfavour along with other poetic artifices. In the late 19th century they were revived by the French Symbolists and are commonly found, although in brief and condensed form, in the works of such modern poets as Emily Dickinson, T.S. Eliot, and Ezra Pound.

concentration camp, internment centre for political prisoners and members of national or minority groups who are confined for reasons of state security, exploitation, or punishment, usually by executive decree or military order. Persons are placed in such camps often on the basis of identification with a particular ethnic or political group rather than as individuals and without benefit either of indictment or fair trial. Concentration camps are to be distinguished from prisons interning persons lawfully convicted of civil crimes and from prisoner-of-war camps in which captured military personnel are held under the laws of war. They are also to be distinguished from refugee camps or detention and relocation centres for the temporary accommodation of large numbers of displaced persons.

During war, civilians have been concentrated in camps to prevent them from engaging in guerrilla warfare or from providing aid to enemy forces, or simply as a means of terrorizing the populace into submission. During the South African War (1899–1902) the British confined noncombatants of the republics of Transvaal and Cape Colony in concentration camps. Another instance of interning noncombatant civilians occurred shortly after the outbreak of hostilities between Japan and the United States (Dec. 7, 1941), when more than 100,000 Japanese and Japanese-Americans on the West Coast were taken into custody and placed in camps in the interior.

Political concentration camps instituted primarily to reinforce the state's control have been established in various forms under many totalitarian regimes—most extensively in Nazi Germany and the Soviet Union. To a consid-

erable extent, the camps served as the special prisons of the secret police. Nazi concentration camps were under the administration of the SS; forced-labour camps of the Soviet Union were operated by a succession of organizations beginning in 1917 with the Cheka and ending in the early 1990s with the KGB.

The first German concentration camps were established in 1933 for the confinement of opponents of the Nazi Party—Communists and Social Democrats. Political opposition soon was enlarged to include minority groups, chiefly Jews, but by the end of World War II many gypsies, homosexuals, and anti-Nazi civilians from the occupied territories had also been liquidated. After the outbreak of World War II the camp inmates were used as a supplementary labour supply, and such camps mushroomed throughout Europe. Inmates were required to work for their wages in food; those unable to work usually died of starvation, and those who did not starve often died of overwork. The most shocking extension of this system was the establishment after 1940 of extermination centres, or "death camps." They were located primarily in Poland, which Adolf Hitler had selected as the setting for his "final solution" to the "Jewish problem." The most notorious were Auschwitz, Majdanek, and Treblinka. (*See* extermination camp.) At some camps, notably Buchenwald, medical experimentation was conducted. New toxins and antitoxins were tried out, new surgical techniques devised, and studies made of the effects of artificially induced diseases, all by experimenting on living human beings.

In the Soviet Union by 1922 there were 23 concentration camps for the incarceration of persons accused of political offenses as as well as criminal offenses. Many corrective labour camps were established in northern Russia and Siberia, especially during the First Five-Year Plan, 1928–32, when millions of rich peasants were driven from their farms under the collectivization program. The Stalinist purges of 1936–38 brought additional millions into the camps—said to be essentially institutions of slavery.

The Soviet occupation of eastern Poland in 1939 and the absorption of the Baltic states in 1940 led to the incarceration of large numbers of non-Soviet citizens. Following the outbreak of war with Germany in 1941, the camps received Axis prisoners of war and Soviet nationals accused of collaboration with the enemy. After the death of Joseph Stalin in 1953, many prisoners were released and the number of camps was drastically reduced. *See also* Gulag.

Concepción, in full CONCEPCIÓN DE LA MADRE SANTÍSIMA DE LA LUZ, capital of Concepción *provincia* and of Bío-Bío *región,* south-central Chile. Concepción lies near the mouth of the Bío-Bío River. Chile's second largest city, it was founded in 1550 on the site of what is now Penco and was shortly afterward burned twice by Araucanian Indians. It was struck by numerous earthquakes, two of them followed by tidal waves (1730, 1751), and in 1754 it was moved inland to its present site, 6 miles (10 km) from the river's mouth and 43 feet (13 m) above sea level.

Despite frequent earthquakes, Concepción has become a major commercial and industrial centre, its other geographic assets aiding its development. Concepción Bay, to the north, is large and protected; and the Bío-Bío River provides a corridor through the coastal mountains to a valley region where agricultural and forest industries are well developed. The river's volume and hydroelectric potential are ample for the region's foreseeable requirements. Most of Chile's coal is mined near the city. The railway serving the major mines



Part of the university campus, Concepción, Chile
Charles May—Shostal

ends in Concepción, as do the railways that follow the Bío-Bío and Itata rivers into the interior. The Itata railway links the industrial and resort towns on the eastern shore of Concepción Bay, while a local railway serving the southwestern side of the bay joins the outport of Talcahuano (*q.v.*), Huachipato, and San Vicente with Concepción. San Vicente is both a resort and a source of fresh and preserved seafood for Santiago, the nation's capital, 260 miles (420 km) northeast. The Huachipato steel mill (operational since 1950), a petroleum refinery (1966), and the San Vicente chemical complex (established in the early 1970s) were major additions to Concepción's industries, which include textiles, food processing, woodworking, glassmaking, and brewing. South of the river is a paper factory, and upstream is a cotton mill. Concepción is an episcopal see and the seat of an appellate court and has a university founded in 1919. Pop. (1993 est.) mun., 318,140.

Concepción, city, north-central Paraguay. It lies on the east bank of the Paraguay River. Founded in 1773 and one of Paraguay's 10 largest cities, Concepción is the base of operations for the entire Chaco Boreal region of Paraguay. It is a transportation hub from which roads run in several directions; the General-Bernadino Caballero highway extends to Pedro Juan Caballero and to Brazil. The navigable Paraguay River creates commercial shipping activity in the city's port. The city contains sawmills, flour mills, cotton gins, sugar and castor-oil refineries, and tanneries that process hides from cattle raised in the region. Concepción is also a free port for trade with Brazil. As seat of the bishop of the Chaco, it is a religious centre and has a Catholic Salesian school and church. Concepción has a small airport. Pop. (1992 prelim.) 35,485.

Concepción de la Vega (Dominican Republic): *see* La Vega.

Concepción del Uruguay, city, eastern Entre Ríos *provincia,* northeastern Argentina. It lies on the Uruguay River south of Paysandú, Uruguay. Founded in 1783, it was the site of an uprising in 1870 and is now a major commercial and industrial centre. Products from the surrounding region are processed to yield frozen meat, dairy foods, cider, yerba maté (Paraguayan tea), and flour. The city also has sawmills and quarries. Trade with Uruguay is important, mostly in grains and beef. The port can accommodate oceangoing vessels, and the city is linked to Buenos Aires, 150 miles (240 km) south, by highway, railroad, hydrofoil, and steamer. Pop. (1980) 46,247.

concept, in the Analytic school of philosophy, the subject matter of philosophy, which philosophers of the Analytic school hold to be concerned with the salient features of the language in which people speak of concepts at issue. Concepts are thus logical, not mental, entities. A typical instance of the use of concept is in *The Concept of Mind* (1949) by Gilbert Ryle, an Oxford Analyst, which implies that the purpose of the author is not to investigate matters of fact empirically (*i.e.,* by the methods of psychology) about the mind itself but to investigate its "logical geography." Similarly, investigation of the logical features of discourse about pleasure or duty or remembering is concerned with the concepts of pleasure or duty or memory. To be able to use these linguistic expressions is to apply, or possess, the concepts.

concept formation, the process of sorting specific experiences into general rules or classes. It figures prominently in cognitive development and was a subject of great importance to the Swiss psychologist Jean Piaget.

A brief treatment of concept formation follows. For full treatment, *see* MACROPAEDIA: Learning and Cognition, Human.

Concept formation is a complex phenomenon that can be distinguished from discrimination, the relatively concrete ability to respond to differences among stimuli. Various laboratory experiments have been devised to understand how concepts are formed.

The process seems to involve two main phases: in the first a person identifies important characteristics and in the second identifies how the characteristics are logically linked. Beyond simple classifications, concepts also may serve as norms or models that account for the potential of some things to fluctuate in some respects while remaining constant in others.

While experimenters and theorists generally agree about observations of conceptual behaviour, there are wide metaphysical and epistemological differences concerning the nature and origins of concepts, the movement between intuitive and rational thought, and the question of "cognitive universals." The stimulus-response theory of the American psychologist B.F. Skinner disallows reference to mental contents, stating that learning occurs through trial and error. The cognitive theory of Piaget contends that learning entails an understanding of unifying relationships and essences. The American psycholinguist Noam Chomsky argued that cognitive structures are structurally innate in human beings.

Piaget argued that a child's interaction with environmental "universals" such as space, time, causality, chance, number, and identity (conservation of mass) makes possible his cognitive development. For Piaget, an infant's first concepts include the awareness that he is separate from his environment. The child's psychomotor skill development and hand-eye coordination play important functions in concept formation. His cognitive scheme grows through adulthood, when the mature adult can reflect and construct adaptive concepts.

According to current thought, human beings do not have a monopoly on concept formation. Research on the development of concepts among animals, especially primates, has been extensive. Many researchers do not rule out the possibility that animals are capable of abstract thinking. In addition, the relationship of computer information-processing to human concept formation has been an important part of research in artificial intelligence. *See also* developmental psychology; thought.

Conception Bay, inlet of the Atlantic Ocean indenting the north coast of the Avalon Peninsula in southeastern Newfoundland, Canada. It was named by Gaspar Côrte-Real, the Portuguese explorer who visited the coast in 1500 on the Feast of the Conception (December 8).

The bay is about 30 miles (50 km) long and 12 miles (19 km) wide. Its shore areas are among the oldest and most densely settled of Newfoundland; Cupids, on the southwestern shore, was the first English settlement made by John Guy (1610). Major coastal towns include Harbour Grace, Carbonear, and Wabana, the latter on Bell Island in the southeastern part of the bay. In addition, there are many small fishing communities supporting salmon, cod, and lobster canneries and beach resorts such as Holyrood. Part of the bay is underlaid with rich iron-ore deposits, which were mined from Bell Island until 1966.

conceptismo (from Spanish *concepto,* "literary conceit"), in Spanish literature, an affectation of style cultivated by essayists, especially satirists, in the 17th century. *Conceptismo* was characterized by its use of striking metaphors, expressed either concisely and epigrammatically or elaborated into lengthy conceits. *Conceptismo* played on ideas as the related *culteranismo (q.v.)* played on language.

Concerned primarily with the stripping off of appearances in a witty manner, *conceptismo* found its best expression in the satirical essay. Its chief exponents were Francisco Gómez de Quevedo y Villegas, who is generally considered the master satirist of his age, in *Los sueños* (1627; "Dreams"); and Baltasar Gracián, the theoretician of *conceptismo,* who codified its stylistic precepts in *Agudeza y arte de ingenio* (1642, enlarged 1648; "Wit and Art of Ingenuity"). By the middle of the century, however, the style had lost its original vitality as it became more rigid and mannered.

concert horn (musical instrument): *see* mellophone.

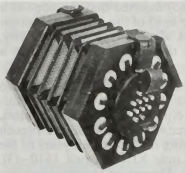
Concert of Europe: *see* Europe, Concert of.

concertato style, musical style characterized by the opposition of two often-unequal groups of instruments or voices. The term is derived from the Latin *concertare,* "to compete," a fact that suggests the essence of the style, the competition between different performing groups. The advent of the concertato style took place in Venice during the late 16th and early 17th centuries. There, the polychoral music (using two or more choirs) of Andrea and Giovanni Gabrieli made frequent use of the alternation between various combinations of singers and instrumentalists, thus producing novel antiphonal effects (*i.e.,* of alternating groups of performers) in the spacious Cathedral of St. Mark. These compositions (which were occasionally entitled concerti) demonstrate those traits—simple homophonic (chordal) texture, strong declamatory rhythm, varied alternation and combination of blocks of sound—that became prominent in Baroque instrumental and choral music.

The concertato style continued throughout the early 17th century and is exemplified by the choral works of the Italians Lodovico Viadana, Adriano Banchieri, and Orazio Benevoli; the German Heinrich Schütz; and others. The aesthetic of this style was taken over in the purely instrumental mid-Baroque concerto grosso, in which a large body of players (ripieno, or tutti) alternates with a small group of soloists (concertino).

concertina, free-reed musical instrument patented by Sir Charles Wheatstone in London in 1829. Hexagonal hand bellows are fastened between two sets of boards that carry the reeds in fraised sockets, as well as the pallet valves and finger buttons, by which air is selectively admitted to the reeds. The steel or brass reed tongues are attached to individual brass frames by screwed plates.

The concertina employs "double action," each note being given by a pair of reeds, one to sound on the press of the bellows, the other on the draw. In the original and most common model, the chromatic scale is divided between the two hands; in some later models, such as the duet-system concertina, a chromatic scale is provided for each hand. The compass extends four octaves upward from the G below



Wheatstone concertina, 1829
By courtesy of C. Wheatstone & Company

middle C. After the great days of the 19th-century concertina virtuoso, the instrument was gradually superseded from about 1910 by the accordion.

concertino, short solo concerto (*see* Konzertstück); also the group of soloists in the concerto grosso (*q.v.*).

concerto, plural CONCERTI, or CONCERTOS, a musical composition for instruments in which a solo instrument is set off against an orchestral ensemble. They interrelate by alternating, competing, or combining.

A brief treatment of the concerto follows. For full treatment, *see* MACROPAEDIA: Musical Forms and Genres.

The forerunners of the concerto were the concerti grossi of the late 17th and early 18th centuries in which a group of players were set off from another, larger group. The chief proponents of this genre were Arcangelo Corelli and George Frideric Handel, who both wrote extensively in the form. In his famous Brandenburg concertos, Johann Sebastian Bach introduced solo instruments, and Antonio Vivaldi and Handel also began writing concertos for solo instruments and orchestra, developing the three-movement form, which became standard. Vivaldi introduced virtuoso solos and expressive passages, which were followed by his successors. Bach's sons and their contemporaries carried on the tradition until the appearance of Wolfgang Amadeus Mozart, whose 27 piano concertos remain a unique contribution to the genre in both their command of form and their expressive range. The works became longer and more complex than they had been in the Baroque era, with a greater daring in harmony and in the treatment of the solo instrument. Though Mozart was a greatly accomplished player himself, display is not the most significant part of his concerto writing. Nor is it in the works of Ludwig van Beethoven, who carried the innovations of Mozart even further in his five piano concertos and one violin concerto. In the works of both Mozart and Beethoven, the first movement usually conforms to sonata form (though highly varied), the second tends to have an ABA form, sometimes with episodes, and the finale is customarily a rondo.

In the Romantic era the concerto took on an increasingly virtuoso character. Robert Schumann (one piano concerto) and Johannes Brahms (two for piano, one for violin, and one for violin and cello) considerably expanded the role of the orchestra, and Felix Mendelssohn and to a greater extent Frédéric Chopin and Franz Liszt not only loosened the form of the concerto but also increased the role of the soloist. Niccolò Paganini did a similar service for the violin in his concertos for his chosen instrument. Peter Ilich Tchaikovsky's three concertos for the piano and one for the violin are conceived on idiosyncratic lines, at once rhetorical and impassioned, imbued with the composer's particular kind of melancholy, and structurally fairly free. Edvard Grieg and Sergey Rachmaninoff chose a similar approach, original in concept yet conforming largely to the structure of the Romantic concerto as conceived by their predecessors. Edward Elgar's violin and cello concertos, though written in the 20th century, conform to the Brahmsian ethic, though they are imbued with a specifically English feeling.

More recently Béla Bartók, Igor Stravinsky, Arnold Schoenberg, Alban Berg, Dmitry Shostakovich, Benjamin Britten, and Sir Michael Tippett have been the most prominent contributors to the concerto. As in other spheres of music, it has been broadly adapted in the present century to many differing modes of composition. Often the solo instrument is set in opposition to the orchestra or instrumental ensemble, and the piano has been used more percussively than in the past.

In still more recent times, the musical term concerto has often been bypassed to allow the composer even greater freedom in writing for solo instrument and orchestra. Elliott Carter, Thea Musgrave, Hans Werner Henze, and Alexander Goehr, however, have usually kept the term, even if they have each interpreted the form in private ways.

concerto grosso, plural CONCERTI GROSSI, principal orchestral music of the Baroque era (*c.* 1600–*c.* 1750), characterized by contrast between a small group of soloists (soli, concertino, principale) and the full orchestra (tutti, concerto grosso, ripieno). The titles of early concerti grossi often reflected their performance locales, as in *concerto da chiesa* ("church concerto") and *concerto da camera* ("chamber concerto," played at court), titles also applied to works not strictly concerti grossi. Ultimately the concerto grosso flourished as secular court music.

The typical instrumentation for the concertino was that of the trio sonata, the prevalent genre of chamber music: two violins and continuo (bass melody instrument such as a cello, and a harmony instrument such as a harpsichord); wind instruments also were common. The ripieno normally consisted of a string orchestra with continuo, often augmented by woodwinds or brass instruments.

Beginning about 1700 with Arcangelo Corelli, the number of movements varied, although some composers, such as Giuseppe Torelli and Antonio Vivaldi, who were more committed to the solo concerto, adopted a three-movement pattern of fast-slow-fast. Fast movements often used a ritornello structure, in which a recurrent section, or ritornello, alternates with episodes, or contrasting sections, played by the soloists.

About 1750, having reached its apogee with George Frideric Handel's Opus 6 (1740), the concerto grosso was eclipsed by the solo concerto. In the 20th century, composers such as Igor Stravinsky and Henry Cowell revived the form.

Concertstück (music): *see* Konzertstück.

conch, marine snail of the subclass Prosobranchia (class Gastropoda), in which the outer whorl of the shell is broadly triangular in outline and has a wide lip, often jutting toward the apex.

True conchs are those of the family Strombidae; they feed on fine plant matter in warm waters. The queen conch (*Strombus gigas*), found from Florida to Brazil, has an attractive ornamental shell; the aperture, or opening into the first whorl in the shell, is pink and may be 30 cm (12 inches) long. Spider conchs, with prongs on the lip, belong to the genus *Lambis.*

In the family Melongenidae are fulgur conchs (or whelks), of the genus *Busycon;* among these clam eaters are the channeled conch

(*B. canaliculatum*) and the lightning conch (*B. contrarium*), both about 18 cm long and common on the Atlantic coast of the United States. Another melongenid is the Australian trumpet, or baler (*Syrinx aruanus*), which may be more than 60 cm long—the largest living



Florida horse conch (*Pleuroploca gigantea*)
© E.R. Degginger, The National Audubon Society Collection/Photo Researchers, Inc.

snail. It is rivaled by the Florida horse conch (*Pleuroploca gigantea*), sometimes more than 50 cm long, in the family Fasciolariidae, which includes tulip conchs (*Fasciolaria*).

Conchos River, Spanish RÍO CONCHOS, river in Chihuahua *estado* ("state"), northern Mexico. After descending eastward onto the inland plateau from the Sierra del Pandos, in the Sierra Madre Occidental, the river flows through Lake Boquilla, formed by the Boquilla Dam, and then turns north-northwestward across the state to join the Rio Grande (Río Bravo del Norte) just north of the town of Ojinaga.

The waters of the Conchos, the only important river in the state, are used primarily for irrigation of the arid but fertile plateau lands. Hydroelectric plants are located along the river at Boquilla Dam and several other sites. The river's total length is approximately 350 miles (560 km).

conciliarism, in the Roman Catholic church, a theory that a general council of the church has greater authority than the pope and may, if necessary, depose him. Conciliarism had its roots in discussions of 12th- and 13th-century canonists who were attempting to set juridical limitations on the power of the papacy. The most radical forms of the conciliar theory in the Middle Ages were found in the 14th-century writings of Marsilius of Padua, an Italian political philosopher who rejected the divine origin of the papacy, and William of Ockham, an English philosopher who taught that only the church as a whole—not an individual pope or even a council—is preserved from error in faith.

The 15th century saw serious attempts to put the conciliar theories into practice. The Council of Constance (1414–18) invoked the doctrine to depose three claimants to the papal throne; it then elected Pope Martin V as sole legitimate successor to St. Peter, thereby effectively healing the Western (Great) Schism (1378–1417). Though this council is recognized by Rome as the 16th ecumenical council, neither was it convened by a legitimate pope nor were its declarations ever formally approved in their totality; the council's condemnation of John Wycliffe and Jan Hus (pre-Reformation reformers) was approved, but not the decree *Sacrosancta* espousing conciliarism. The faction-ridden Council of Basel, which opened in 1431, reaffirmed *Sacrosancta.* The theory has continued to live on, and its theses have influenced such doctrines as Gallicanism, a French position that advocated restriction of papal power.

The first Vatican Council in 1870 explicitly condemned conciliarism. The second Vatican Council (1962–65) asserted that the pope as a member and the head of the college of bishops forms with it at all times an organic unity, especially when the council is gathered in a general council.

Concini, Concino, MARQUIS D'ANCRE, also called MARÉCHAL (Marshal) D'ANCRE (b. Florence [Italy]—d. April 24, 1617, Paris, France), Italian adventurer who dominated the French government during the first seven years of the reign of King Louis XIII (reigned 1610–43).

The son of a Florentine notary, Concini joined the entourage of Marie de Médicis shortly before she left Italy to marry the French king Henry IV (reigned 1589–1610). In 1601 he married the queen's foster sister, Leonora Dori Galigai. Concini exercised such a strong influence over the queen that Henry IV threatened several times to banish him from the court. Upon the assassination of the king, Concini (now Marquis d'Ancre) and his wife acted as chief advisers to Marie, who had become regent for her young son, King Louis XIII. The Concinis treated Louis with contempt and set about enriching themselves at France's expense.

In 1613 Concini was appointed marshal of France, even though he had never seen combat. Taking advantage of his unpopularity, the great nobles, led by Henri II de Bourbon, prince de Condé, raised two rebellions. In 1616 Concini managed to have Condé arrested. He momentarily strengthened his position by bringing such able administrators as the future Cardinal de Richelieu into the government; but by 1617 the nobles were again threatening to revolt. Louis XIII's favourite, Charles d'Albert de Luynes, then initiated a plot against the marquis. Concini was shot by the royal guards on the drawbridge of the Louvre, and a mob dismembered his corpse. His widow was condemned to death for sorcery and was beheaded and burned on July 8, 1617.

Concise Encyclopædia Britannica, Wade-Giles romanization CHIEN-MING PU'IEH-TIEN PAI-K'E CH'UAN-SHU, Pinyin JIANMING BU-LIEDIAN BAIKE QUANSHU, 10-volume short-entry encyclopaedia in the Chinese language, published in Peking and believed to be the first joint venture by a socialist state and a privately owned Western publishing enterprise.

Published (1984–86) as a joint venture of the Greater Encyclopaedia of China Publishing House (an official agency of the People's Republic of China) and Encyclopædia Britannica, Inc., the encyclopaedia reflects a Chinese government policy to modernize and restore educational facilities suspended during the Cultural Revolution (1966–76).

The *Concise Encyclopædia Britannica* is based on translations from the *Micropædia* portion of the 15th edition of the *Encyclopædia Britannica*. All articles on China and Chinese subjects, however, were prepared by the staff of the Greater Encyclopaedia of China Publishing House in Peking. All editorial decisions were supervised by a joint editorial board composed equally of Chinese and American scholars headed by the deputy editor in chief of the new encyclopaedia, Liu Zunqi, and the vice chairman of the board of editors of the *Encyclopædia Britannica,* Frank B. Gibney.

The Greater Encyclopaedia of China Publishing House also published a 74-volume topically arranged large-entry encyclopaedia, *Zhongguo Da Baike Quanshu* ("China Great Encyclopaedia"). This work was issued one volume at a time, beginning in 1980 with a volume on astronomy; the final volume was completed in 1993.

conclave, in the Roman Catholic church, the assembly of cardinals gathered to elect a new pope, and the system of strict seclusion to which they are submitted.

In the early church, election of the bishop of Rome was carried out the same as was the election of bishops in other towns; the Roman clergy was the electoral body, with the neighbouring bishops acting as presidents of the assembly and judges of the election, and the laity indicated their approval or disapproval more or less tumultuously. Because disputes and disruptions sometimes occurred, civil power was needed to maintain order, and eventually the newly elected pope could not receive episcopal consecration until his election was confirmed by the emperor, who often presided over the election and at times imposed a candidate.

This system lasted until the middle of the 11th century; in 1059 Pope Nicholas II issued a bull reforming the electoral procedure. The election was to be carried out by the cardinals, among whom the cardinal bishops had the predominating position. The third Lateran Council of 1179 made all cardinals equally electors and required a two-thirds majority of the votes to decide the election.

Nevertheless, abuses still occurred. When 17 cardinals failed to elect a pope for two years after the death of Clement IV in 1268, the local magistrate locked the electors in the episcopal palace and finally removed the roof and allowed the cardinals nothing but bread and water until they elected Gregory X. At the second Council of Lyon in 1274, Gregory X promulgated a constitution that provided for the cardinals to meet in closed conclave with strict regulations to guide the election. Various refinements of the process occurred over the years, and the entire procedure was codified in a constitution issued by Pius X (Dec. 25, 1904), which superseded all other legislation on the conclave. Pius XII's constitution (Dec. 8, 1945) introduced modifications and increased the required majority of the votes cast to two-thirds plus one. Paul VI added several more procedural directives.

On the death of a pope, the cardinal camerlengo, who is the personal representative of the Sacred College of Cardinals in the ordinary administration of the church, takes up residence in the Vatican Palace. Every morning from the death of the pope to the beginning of the conclave, all the cardinals meet to consult on current business. Eighteen days after the death of the pope, the cardinals enter into conclave. From the beginning to the end of the conclave, the part of the Vatican Palace that is reserved to it is closed to outsiders, and the doors giving access to the area are walled up. Within the conclave area are only the cardinals with their secretaries, the masters of ceremonies, certain other ecclesiastics with definite duties, doctors, and the service staff. The interior of the area is divided into small apartments (*cellae*), one for each cardinal, assigned by lot.

The cardinals vote by secret ballot twice each day in the Sistine Chapel. Immediately after the count, the voting papers are burned in a stove in the chapel, and the smoke, passing up a pipe through a window, enables the crowd assembled in St. Peter's Square to know how the voting has gone: when no candidate receives the required majority, the votes are burned with wet straw so that the smoke shows black; when a pope is elected, the votes are mixed with dry straw so that the smoke is white.

When one person has received the required majority, the dean of the cardinals formally asks him whether he accepts his election and what name he wishes to assume. On his acceptance, the news is announced to the assembled populace by the senior cardinal deacon from the central balcony in the facade of St. Peter's. Soon afterward, the new pope, wearing the

pontifical robes, appears at the same balcony and gives his first blessing to the crowd. The conclave ends when the new pope disbands it, usually after addressing the body of cardinals. The coronation of the new pope takes place a few days later, the day being fixed by the pope himself.

Concord, city, Contra Costa county, California, U.S. Laid out in 1868 as Todos Santos ("All Saints") on the Rancho Monte del Diablo, it was renamed in 1869 for Concord, Mass., and developed as an orchard and poultry centre after the Oakland, Antioch and Eastern Railroad was built in 1912. Now mainly residential, it is connected to the San Francisco–Oakland area by freeways and the Bay Area Rapid Transit system. A U.S. naval weapons station is located in Concord. The Concord Pavilion is a performing arts and exhibit centre. Inc. 1905. Pop. (1992 est.) 112,688.

Concord, town (township), Middlesex county, eastern Massachusetts, U.S. It lies along the Concord River, 20 miles (32 km) northwest of Boston. Founded and incorporated in 1635 as Musketaquid, it was the first Puritan settlement away from tidewater and ocean commerce and was renamed Concord (indicative of peaceful agreements with the Indians). In 1774 the first county convention to denounce the "Coercion Acts" (which deprived Massachusetts of its charter and the right to choose its own magistrate) met there, followed by the convening of the first and second Massachusetts provincial congresses. Concord shares with Lexington the honour of opening the military phase of the American Revolution.



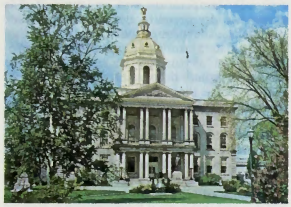
The home of Nathaniel Hawthorne, Concord, Mass.
J. Latta—Photo Researchers

Following the initial skirmish at nearby Lexington, British soldiers entered Concord on April 19, 1775, for the purpose of destroying arms and ammunition collected by provincials, but, forewarned, the residents had already removed most of the supplies. Minutemen met the British at the North Bridge, and the resulting gunfire was immortalized by the transcendentalist philosopher Ralph Waldo Emerson in the "Concord Hymn" as "the shot heard round the world."

During the 19th century, Concord was a noted cultural centre, being the home of Emerson, the naturalist Henry David Thoreau, the sculptor Daniel Chester French, and the authors Nathaniel Hawthorne and Louisa May Alcott (all buried in Sleepy Hollow Cemetery). The Concord Summer School of Philosophy (founded by A. Bronson Alcott, father of Louisa) met there from 1879 to 1888. About 1850 Ephraim Bull perfected the Concord grape, marking the beginning of commercial cultivation of table grapes in the United States.

Concord was a small farming community until the turn of the century and is now primarily residential with some diversified manufacturing. The town preserves its early American character, and tourism is important. Of special interest are the Minute Man National Historic Park (including the reconstructed North Bridge and French's famous bronze minuteman statue), the Antiquarian Museum (containing Emerson's study), Walden Pond State Reservation, and the homes of Emerson, Hawthorne, and the Alcotts. The Great Meadows National Wildlife Refuge is nearby. Pop. (1992 est.) 17,391.

Concord, city, capital (since 1808) of New Hampshire, U.S., and seat (1823) of Merrimack county. It lies along the Merrimack River above Manchester. The site was granted by the Massachusetts Bay Colony in 1725 as Penacook Plantation. Settled in 1727, the



The State House, Concord, N.H.
Dick Smith

community was incorporated in 1733 by Massachusetts as Rumford. In 1741 it was determined that the town was within the jurisdiction of the Province of New Hampshire. Bitter litigation ended in an appeal to the Privy Council in England, and the dispute was not settled until 1762. In 1765 the town was reincorporated by New Hampshire and named Concord to signify the peaceful settlement of the boundary dispute. In 1808 New Hampshire's legislature finally settled there after having moved from place to place since 1775.

Printing, an important industry in the town's development, was soon overshadowed by carriage making and granite quarrying. By the end of the 19th century, railroads and repair shops had become predominant. Concord's economy is now well diversified and includes manufacturing (electrical equipment, leather goods, wood products, and textiles), insurance, and agricultural activities (dairy products, apples). Concord granite (used in the construction of the State House [1819] and the Library of Congress in Washington, D.C.) is still quarried.

The museum of the New Hampshire Historical Society in Concord displays early Americana. The home of President Franklin Pierce, who practiced law in Concord, has been preserved. Mary Baker Eddy, founder of Christian Science, was born at nearby Bow. The New Hampshire Technical Institute (1964) is in the city; St. Paul's School (1853; Protestant Episcopal) is 2 miles (3 km) west. Inc. city, 1853. Pop. (1992 est.) 35,636.

Concord, Battle of: *see* Lexington and Concord, Battles of.

Concord, Book of, collected doctrinal standards of the Lutheran church, published in German (June 25, 1580) and in Latin (1584). Its publication climaxed 30 years of effort to heal the schisms that had broken out in the Lutheran movement after Martin Luther's death and to keep the Lutheran churches from being absorbed into an all-Protestant union. After two political conferences (in 1558 and 1561) had failed to produce agreement, the Protestant princes of the Holy Roman Empire entrusted the project to several theologians, who produced the Formula of Concord, an orthodox interpretation of the Augsburg Confession, which was written primarily by Jakob Andreä and Martin Chemnitz and put in final form in 1577. The *Book of Concord* was subsequently compiled. It was not adopted in total by all Lutheran churches, but it has remained the standard of orthodox Lutheranism.

It consists of: (1) a preface signed by 51 electors, bishops, princes, and nobles of the Holy Roman Empire and representatives of 35 free cities; (2) the three ecumenical creeds (Apostolic, Nicene, and Athanasian); (3) the Unaltered Augsburg Confession (1530) and (4) its Apology (1531); (5) the Schmalkaldic Articles (1536–37); (6) Philipp Melanchthon's *Treatise on the Power and Primacy of the Pope* (1537); (7) Martin Luther's Small and Large Catechisms (1529); (8) the Formula of Concord (1577); and (9) the Catalogue of Testimonies (1580), an optional supplement of citations from the writings of early Church Fathers.

Concord coach, American stagecoach, first manufactured in Concord, N.H., U.S., by the Abbot, Downing Company in 1827, and famous for its use in the American West. The body was supported on two reinforced leather straps running from front to back.



Concord coach, *c.* 1875; in the Suffolk Museum and Carriage House, Stony Brook, Long Island, N.Y.
By courtesy of the Suffolk Museum and Carriage House at Stony Brook, Long Island, N.Y., gift from W. Knight II

Relatively light models used on turnpikes in the East held four passengers and were pulled by two horses. Western Concord coaches, however, weighed about 2,500 pounds (1,130 kg) and were usually pulled by six or eight paired horses. Six or nine passengers could sit on the three seats inside; others sometimes sat in roof seats. The driver's seat accommodated a driver and one or two armed guards when necessary. These coaches were used in the West regularly until about 1910. They were also exported to South Africa, South America, and Australia.

concordat, a pact, with the force of international law, concluded between the ecclesiastical authority and the secular authority on matters of mutual concern; most especially a pact between the pope, as head of the Roman Catholic church, and a temporal head of state for the regulation of ecclesiastical affairs in the territory of the latter. Matters often dealt with in concordats include: the rights and liberties of the church; the creation and suppression of dioceses and parishes; the appointment of bishops, pastors, and military chaplains, sometimes with provision for their support; ecclesiastical immunities (*e.g.,* exemption from military service); church property; questions relating to marriage; and religious education.

The earliest concordats were associated with the investiture controversy that profoundly agitated Christian Europe in the 11th and 12th centuries; the most important was the Concordat of Worms (1122) between Pope Calixtus II and Emperor Henry V. In the 19th century a long list of concordats was concluded, of which a good number remain in force. The first in date and importance was that of 1801,

concluded for France by Napoleon and Pope Pius VII after laborious negotiations; it was denounced by the French government in 1905 with its law of separation of church and state. During the 20th century many new concordats were made, including the Lateran Treaty (1929–85) with Italy, which recognized papal sovereignty over the Vatican city-state.

Concordat of ——— : *see under* substantive word (*e.g.,* Worms, Concordat of; 1801, Concordat of).

Concordia, in Roman religion, goddess who was the personification of "concord," or "agreement," especially among members or classes of the Roman state. She had several temples at Rome, the oldest and most important one, dating from the middle of the 4th century BC, located in the Forum. It was restored after the death of Gaius Gracchus and again by Augustus. Concordia often appeared on coins as a matron holding a cornucopia in her left hand and either an olive branch or a patera (a dish used in sacrifices) in her right.

Concordia, city, northeastern Entre Ríos *provincia,* northeastern Argentina. It lies along the Uruguay River, opposite Salto, Uruguay. Founded in 1832, Concordia is the province's major commercial and manufacturing centre. Tanneries, sawmills, flour and rice mills, lime kilns, and other factories produce a wide variety of goods, while cereals and citrus fruits, the principal exports, are shipped overseas as well as to Brazil, Paraguay, and Uruguay. Concordia's port is one of the points of transfer to the shallow-draft vessels that ply the upper Uruguay River. The Salto Grande hydroelectric project, a joint undertaking of Argentina and Uruguay completed in 1983, has also provided a new international road and railway across the Uruguay River at a point 20 miles (32 km) north of Concordia. The city has several recreational facilities, including a racecourse and a golf club; salmon and dorado fishing in the Uruguay River is an added tourist attraction. Buenos Aires is accessible by highway, railroad, and water, and Concordia has an airport. Pop. (1991 prelim.) 138,905.

concrete, in construction, structural material consisting of a hard, chemically inert particulate substance, known as aggregate (usually sand and gravel), that is bonded together by cement and water.

Among the ancient Assyrians and Babylonians, the bonding substance most often used was clay. The Egyptians developed a substance more closely resembling modern concrete by using lime and gypsum as binders. Lime (calcium oxide), derived from limestone, chalk, or (where available) oyster shells, continued to be the primary pozzolanic, or cement-forming, agent until the early 1800s. In 1824 an English inventor, Joseph Aspdin, burned and ground together a mixture of limestone and clay. This mixture, called portland cement, has remained the dominant cementing agent used in concrete production.

Aggregates are generally designated as either fine (ranging in size from 0.025 to 6.5 mm [0.001 to 0.25 inch]) or coarse (from 6.5 to 38 mm [0.25 to 1.5 inch] or larger). All aggregate materials must be clean and free from admixture with soft particles or vegetable matter, because even small quantities of organic soil compounds result in chemical reactions that seriously affect the strength of the concrete.

Concrete is characterized by the type of aggregate or cement used, by the specific qualities it manifests, or by the methods used to produce it. In ordinary structural concrete, the character of the concrete is largely determined by a water-to-cement ratio. The lower the water content, all else being equal, the stronger the concrete. The mixture must have just enough water to ensure that each aggregate particle is completely surrounded by the cement paste, that the spaces between the aggregate are filled, and that the concrete is liquid enough to be poured and spread effectively. Another durability factor is the amount of cement in relation to the aggregate (expressed as a three-part ratio—cement to fine aggregate to coarse aggregate). Where especially strong concrete is needed, there will be relatively less aggregate.

The strength of concrete is measured in pounds per square inch or kilograms per square centimetre of force needed to crush a sample of a given age or hardness. Concrete's strength is affected by environmental factors, especially temperature and moisture. If it is allowed to dry prematurely, it can experience unequal tensile stresses that in an imperfectly hardened state cannot be resisted. In the process known as curing, the concrete is kept damp for some time after pouring to slow the shrinkage that occurs as it hardens. Low temperatures also adversely affect its strength. To compensate for this, an additive such as calcium chloride is mixed in with the cement. This accelerates the setting process, which in turn generates heat sufficient to counteract moderately low temperatures. Large concrete forms that cannot be adequately covered are not poured in freezing temperatures.

Concrete that has been hardened onto imbedded metal (usually steel) is called reinforced concrete, or ferroconcrete. Its invention is usually attributed to Joseph Monier, a Parisian gardener who made garden pots and tubs of concrete reinforced with iron mesh; he received a patent in 1867. The reinforcing steel, which may take the form of rods, bars, or mesh, contributes tensile strength. Plain concrete does not easily withstand stresses such as wind action, earthquakes, and vibrations and other bending forces and is therefore unsuitable in many structural applications. In reinforced concrete, the tensile strength of steel and the compressional strength of concrete render a member capable of sustaining heavy stresses of all kinds over considerable spans. The fluidity of the concrete mix makes it possible to position the steel at or near the point where the greatest stress is anticipated.

Another innovation in masonry construction is the use of prestressed concrete. It is achieved by either pretensioning or posttensioning processes. In pretensioning, lengths of steel wire, cables, or ropes are laid in the empty mold and then stretched and anchored. After the concrete has been poured and allowed to set, the anchors are released and, as the steel seeks to return to its original length, it compresses the concrete. In the posttensioning process, the steel is run through ducts formed in the concrete. When the concrete has hardened, the steel is anchored to the exterior of the member by some sort of gripping device. By applying a measured amount of stretching force to the steel, the amount of compression transmitted to the concrete can be carefully regulated. Prestressed concrete neutralizes the stretching forces that would rupture ordinary concrete by compressing an area to the point at which no tension is experienced until the strength of the compressed section is overcome. Because it achieves strength without using heavy steel reinforcements, it has been used to great effect to build lighter, shallower, and more elegant structures such as bridges and vast roofs.

In addition to its potential for immense strength and its initial ability to adapt to virtually any form, concrete is fire resistant and has become one of the most common building materials in the world.

concrete, in philosophy, such entities as persons, physical objects, and events (or the terms or names that denote such things), as contrasted with such abstractions as numbers, classes, states, qualities, and relations. Many philosophers, however, add a third category of collective names, or concrete universals, *i.e.,* names of classes or collections of concrete things, distinct from the abstract.

The distinction between abstract and concrete, though clear enough in general, is not a very sharp one, and borderline cases may be found. The series of terms "theory, true proposition, fact, and event" is an example, as, in theoretical physics, is the series "conductivity, speed, heat, magnetic field, light, electric charge, electron, molecule, quartz crystal." In each case, the series begins with an abstract term; and it is fairly well agreed that the terms grow successively more concrete. If an absolute separation into abstract and concrete is demanded, however, it is difficult to decide where to draw the line.

In existential philosophy, the concreteness of human existence in the world is strongly stressed; thus, the specific events of an individual's lived-through experience are characterized as concrete in contrast to the lifeless formalisms of logical analysis and the tenuous webs of metaphysical speculation. Understood in this sense, a "turn to the concrete" emerged as perhaps the most fundamental feature of mid-20th-century continental European philosophy, as also of the existentialist strands in American philosophy.

concrete poetry, type of graphic art that uses typeface and other typographical elements in such a way that chosen units—letter fragments, punctuation marks, graphemes (letters), morphemes (any meaningful linguistic unit), syllables, or words (usually used in a graphic rather than denotative sense)—and graphic spaces form an evocative picture.

The origins of concrete poetry are roughly contemporary with those of *musique concrète* (*q.v.*), an experimental technique of musical composition. Max Bill and Eugen Gomringer were among the early practitioners of concrete poetry. The movement drew inspiration from Dada, Surrealism, and other early 20th-century movements. Concrete poetry can be distinguished from pattern poetry (*q.v.*) by its extreme visual bias; it often cannot be read aloud to any effect, and its essence lies in its appearance on the page, not in the words or typographic units that form it.

concubinage, the state of cohabitation of a man and a woman without the full sanctions of legal marriage. The word is derived from the Latin *con* ("with") and *cubare* ("to lie").

The Judeo-Christian term concubine has generally been applied exclusively to women, although a cohabiting male may also be called a concubine. In Roman law concubinage was the permanent cohabitation of a man and a woman outside of their existing formal marriages. The partners in such relationships and the offspring of their union did not have the same legal rights accorded married persons and their legitimate children. *See also* common-law marriage.

concussion, a period of paralysis of nervous function resulting from a relatively mild injury to the brain, not necessarily associated with cerebral hemorrhage, contusion, or laceration. Unconsciousness caused by concussion usually lasts less than 5 minutes and rarely more than 10. In some cases there may be a long-continued disturbance of consciousness, with some residual symptoms. Amnesia always accompanies concussion. Recovery from simple, uncomplicated concussion is almost always complete.

Condé, PRINCES OF, titled French nobility of a major branch of the house of Bourbon, grouped below chronologically and indicated by the symbol ●. The 3rd, 4th, and 5th princes were premier princes of the blood. The 1st, 2nd, 3rd, 4th, and 5th princes were known according to the byname Monsieur le Prince; the 6th, 7th, 8th, and 9th were each known as

Monsieur le Duc (with reference to the additional title of duc de Bourbon).

• Condé, Louis I de Bourbon, 1er prince de (1st prince of) (b. May 7, 1530, Vendôme, Fr.—d. March 13, 1569, Jarnac), military leader of the Huguenots in the first decade of France's Wars of Religion. He was the leading adult prince of the French blood royal on the Huguenot side (apart from the king of Navarre).

Louis de Bourbon was the hunchback youngest son of Charles, duc de Vendôme, and Françoise d'Alençon. Brought up among Huguenots, he was married in 1551 to Éléonore de Roye, a Huguenot herself. He served in Henry II's armies in the campaigns of 1551–57, but won no favour. On Henry II's death (1559), Condé came forward as the military leader of the Huguenots: he needed their backing to make himself at all considerable politically; they needed a princely patron more resolute than his eldest brother Anthony of Bourbon, king of Navarre, though Condé's licentious way of life accorded ill with their principles. On the failure of the Huguenot conspiracy of Amboise (March 1560), Condé fled from court. On presenting himself to Francis II at Orléans (October 1560), he was arrested and, on November 26, sentenced to death. The King's death (December 5) saved him, as the new regent, Catherine de Médicis, needed him to counterbalance the Guises, with whom he was formally reconciled in August 1561. After the massacre of the Huguenots at Vassy (March 1562) he occupied Orléans and marched on Paris, but was defeated and captured by François de Guise at Dreux (December 19).

For the three years following the Peace of Amboise (March 1563) Condé tried to restrain the Huguenots and collaborated with the government. His first wife died in 1564, and he married Mlle de Longueville (Françoise d'Orléans) in 1565. Finally, however, disappointed in his hope of being made lieutenant general of the kingdom and alarmed at the government's dealings with Spain, he left the court again (July 1567) and led the Huguenots in another attack on Paris. Defeated in battle at Saint-Denis (November 10), he made a skillful withdrawal and then, reinforced by German mercenaries, went to besiege Chartres (February 1568). He signed the Peace of Longjumeau (March 1568) against the Admiral de Coligny's advice. When war broke out again in August, he found himself tied down to operations in western France. He was killed while fighting to save Coligny at Jarnac.

• Condé, Henri I de Bourbon, 2e prince de (2nd prince of) (b. Dec. 29, 1552, La Ferté-sous-Jouarre, Fr.—d. March 5, 1588, Saint-Jean-d'Angély), prince of Condé who continued the leadership of the Huguenots begun by his father, Louis I de Bourbon, 1st prince of Condé.

His father's death left him and his cousin Henry of Navarre (the future Henry IV) as titular leaders of the Huguenots. After the Peace of Saint-Germain (1570) Condé retired to Béarn and married Marie de Clèves. She died after giving birth to his daughter Catherine (1574–93). Condé, meanwhile, caught in Paris during the Massacre of St. Bartholomew's Day (1572), had been forced to profess Catholicism. Nominally governor of Picardy, he was kept under surveillance until, in 1574, he escaped to Alsace and began raising troops for the Huguenots. Invading France with a horde of mercenaries to collaborate with the Duc d'Alençon, he was disappointed at the terms which Alençon made with the government (1576). In the next civil wars he became rather an embarrassment to Henry of Navarre, set himself up as chief of the most fanatical Huguenots, and failed conspicuously in his travels abroad in search of foreign help (1580) and in his campaign of 1585 in western France—when he was driven to take refuge in Guernsey. Returning to France, he married, in 1586, Charlotte de La Trémoille (1565–1629), who renounced Catholicism for him and bore him a daughter, Éléonore (1587–1619). Wounded at the Battle of Coutras (October 1587), Condé died within a few months.

• Condé, Henri II de Bourbon, 3e prince de (3rd prince of) (b. Sept. 1, 1588, Saint-Jean-d'Angély, Fr.—d. Dec. 26, 1646, Paris), premier prince of the blood (posthumous son of the 2nd prince of Condé) who became estranged from Henry IV but reconciled to his successor Louis XIII.

His mother, the princess de Condé (La Trémoille), was accused of having poisoned her husband, and doubts were even cast on the paternity of Henri II de Bourbon. Henry IV of France, however, recognized his cousin as his heir presumptive until the birth of the dauphin, later Louis XIII.

The 3rd prince de Condé was brought up as a Catholic by his mother, who had abjured Calvinism in 1596. In 1609 he married Charlotte de Montmorency (1594–1650). The new princess, however, had already attracted Henry IV so much that Condé had to send her out of the country and then to flee abroad himself to escape the King's fury. After Henry IV's assassination he returned to France (July 1610) to compete with the other princes and nobles in making demands on the regent, Marie de Médicis. When she and the Marquis d'Ancre began to refuse his demands, he twice blackmailed them by open rebellion, obtaining not only money but the governments of important strongholds under the treaties of Sainte-Menehould (May 1614) and Loudun (May 1616). Finally he was arrested (September 1616).

Three years of prison (until October 1619) changed Condé's mind. Thenceforth he aided the crown, operating against the rebellious princes in 1620 and against the Huguenots in 1621 and in 1627–29 and fighting in frontier campaigns until 1638, when his invasion of Spain ended in disaster at Fuenterrabia. Rewards included the government of Burgundy (1631), which remained a family perquisite, and most of the property confiscated from his brother-in-law Henri de Montmorency (executed in 1632). Under Anne of Austria's regency he supported Cardinal Mazarin.

• Condé, Louis II de Bourbon, 4e prince de (4th prince of), byname THE GREAT CONDÉ, French LE GRAND CONDÉ, also called DUC (duke) D'ENGHIEN (b. Sept. 8, 1621, Paris—d. Dec. 11, 1686, Fontainebleau, Fr.), leader of the last of the series of aristocratic uprisings in France known as the Fronde (1648–53). He later became one of King Louis XIV's greatest generals.



The Great Condé, engraving by Robert Nanteuil, 1662

By courtesy of the Bibliotheque Nationale, Paris

The princes de Condé were the heads of an important French branch of the House of Bourbon. The Great Condé was the elder son of Henry II de Bourbon, 3rd prince de Condé, and of his wife, Charlotte de Montmorency.

His father gave to the Duc d'Enghien, as the Great Condé was at first called, a complete and strict education: six years with the Jesuits at Bourges, as well as mathematics and horsemanship at the Royal Academy at Paris. His studies completed, he was presented to Louis XIII (Jan. 19, 1636) and then accompanied his father to the Duchy of Burgundy (the government of which had become a family perquisite since 1631), where he received the King on September 19 of the same year.

His father betrothed him to the young Claire-Clémence de Maillé-Brézé (Cardinal de Richelieu's niece) before his son's departure to the army of Picardy, with which he, in July 1640, saw action before the siege of Arras. On his return, despite the passion that he had conceived for Marthe du Vigean, a young lady of the inner circle of Parisian society, the young duke was obliged, on Feb. 9, 1641, to go through the marriage that had been imposed on him and from which little but conjugal distrust and hatred was to ensue. She was barely 13, and they began so badly that the Cardinal summoned him to Narbonne (1642).

The Duc d'Enghien won his first great victory over the Spaniards as head of the royal army at Rocroi (May 19, 1643). It was the greatest French victory for a century and was due, beyond doubt, to his personal effort. He followed his success at Rocroi with successes in the area of the Rhine at Thionville and Sierck. With the Marshal de Turenne, he was victorious at Freiburg, Philippsburg, Mainz, and Nördlingen. He also conducted a brilliant campaign in Flanders (1646).

Louis's father died on Dec. 26, 1646, and he then became both prince de Condé and heir to an enormous fortune. He was sent by Cardinal Mazarin—ever distrustful of so prestigious a prince—to Catalonia, in Spain, where on June 18, 1647, he was defeated at Lérida. On his recall to Flanders, however, he won another great victory at Lens (Aug. 19–20, 1648).

But a change in his destiny came with the civil wars of the Fronde. During the first of these wars, he conducted the siege of Paris (January-March 1649) for the government but afterward behaved with such arrogance as the government's saviour that Mazarin, in collusion with his former opponents, had Condé, his brother, and their brother-in-law the Duc de Longueville (Henri d'Orléans) arrested on Jan. 18, 1650, when they were in attendance at court. (They were in prison for 13 months.) Thereupon, his friends launched the second war of the Fronde, which ended with Condé's release and Mazarin's first voluntary exile. Condé, however, again tried to extract too high a price for his goodwill toward the Queen Regent. When she took up the challenge, he launched an open rebellion in the southwest (September 1651), allied himself with Spain, and made his way to Paris, where he was able for a time to defy the royal army commanded by Turenne. His position, however, soon became both politically and militarily untenable, and he left Paris (October 1652) to take service with the Spaniards, whose generalissimo he became. He was sentenced to death as a rebel on Nov. 25, 1654.

With varying fortunes he opposed the royal army for four years more but was finally defeated at the Battle of the Dunes before Dunkirk (Dunkerque) on June 14, 1658. After the Peace of the Pyrenees had been signed (1659), Condé returned to Paris and, reentering the King's good graces, was received by him at Aix-en-Provence on Jan. 27, 1660.

Thenceforth, he comported himself as a humble and loyal servant of the King, who, however, was long at pains to keep him from any military command.

At one moment Condé entertained the idea of having himself elected king of Poland, but, despite his determined measures and the support of Louis XIV, he was unsuccessful. (This dream of kingship he was to pursue vainly for several years.)

When in 1668 the King at last entrusted to his command the attack of the Spanish-held Franche-Comté, Condé took Artois, Besançon, Dôle, and Gray in 15 days. Then, totally restored to Louis XIV's favour, Condé, with Turenne, was placed by the King in command of the army that was going to invade the United Provinces of the Netherlands (1672). He was wounded in the famous crossing of the Rhine near Arnhem (June 12, 1672) but, nevertheless, went on to defend Alsace from invasion. Having completed the evacuation of the United Provinces, he halted the Prince of Orange's army at Seneffe in the Spanish Netherlands (Aug. 11, 1674), then raised the siege of Oudenarde. The following year, again in the company of Louis XIV and of the army of Flanders, he had to reach Alsace, which had been threatened by Turenne's death, hastily. There, he once more confronted an old adversary, Raimondo Montecuccoli, Austria's foremost commander, whom he forced to raise the siege of Haguenau and to withdraw across the Rhine. This was his last campaign and victory. A prey to gout in later life and living quietly in his palace of Chantilly, he surrounded himself with his family, friends, and the writers and artists whom he loved. His deathbed conversion is not entirely convincing, for it came at the end of a life without religion.

Portraits and busts of Condé suggest rapacity: wide, protruding eyes and a prominently downcurving "Bourbon" nose dominate a thin and bony face in which a willful mouth overshadows a receding chin. Though he was without doubt, with Turenne, the greatest captain of his day, he was also a man of unrestrained temper and limitless pride—in himself, his race, and his house. His will admitted no constraint, and his arrogance augured nothing for his equals but distrust. But he was also a man of wide intellectual interests, of unconventional habits, and possessed of an uncommonly sound independence of mind. His attitude both to religion and to politics was unorthodox, for he was as rebellious to ecclesiastical dogma as to the authority of the King. The moral temper and philosophy of this prince, so removed from the conventional standards of his day, were revealed by his libertine youth and by doctrinally questionable relationships—among them that with Pierre-Michon Bourdelot, a philosopher and skeptical doctor, and with the philosopher Spinoza, whom he tried to meet in Holland—by his nonobservance of all religious practices, and by his aggressive atheism—despite his honourable fidelity to the Jesuits who had instructed him. To these traits he added peerless courage—as may be seen by his help and protection of Protestants who were persecuted after the revocation of the Edict of Nantes (1685).

A cultivated man, according to Mlle de Scudéry, who depicted him in her novel *Artamène, ou le Grand Cyrus* (1649–53), he was also a patron of the arts. He maintained a troupe of comedians who toured the provinces; he protected Jean de La Fontaine, Nicolas Boileau, and Molière; and he chose Jean de La Bruyère to tutor his son, Henri-Jules. Even on his military campaigns he read the novels of Gaultier de Coste de La Calprenède, the histories of Livy, and the tragedies of Pierre Corneille. André Le Nôtre landscaped his park at Chantilly; Pierre Mignard and Charles Le Brun decorated the walls of his palace with mythological paintings; Antoine Coysevox sculpted a famous bust of him; and Pérelle and Jean Berain painted views of his palace. He also enjoyed the conversation of Bishop Bossuet, François Fénelon, and Nicolas Malebranche, all of whom were at Chantilly. (G.Mn.)

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• Condé, Henri-Jules de Bourbon, 5e prince de (5th prince of), also called (1646–86) DUC (duke) D'ENGHIEN (b. July 29, 1643, Paris—d. April 1, 1709, Paris), the eldest son of the Great Condé (the 4th prince), whom he accompanied on military campaigns.

Known from 1646 as the Duc d'Enghien, he was taken to and fro by his mother during the Fronde and eventually into exile with his father, returning to France in 1659. He was married in 1663 to Anne of Bavaria, daughter of Edward, Prince Palatine. At this time he was proposed as a candidate for the Polish throne. His father tried to embark him on a military career, but Henri-Jules showed no aptitude, though he served in campaign after campaign between 1666 and 1693.

On his father's death (1686), he devoted himself chiefly to expanding and improving Chantilly, the principal country seat of the Condés. A little man, interested in the arts, the sciences, and technology, an able courtier and a magnificent host, he was eccentric, given to malicious practical jokes, and a terror to his wife and children. In his last years he was mentally quite deranged. Of his nine children by his wife, one son and three daughters survived him, the most notable being Anne-Louise Bénédicte (1676–1753), duchesse du Maine.

• Condé, Louis III, 6e prince de (6th prince of), DUC (duke) DE BOURBON, byname MONSIEUR LE DUC (b. Oct. 10, 1668, Paris—d. March 4, 1710, Paris), prince of Condé who distinguished himself in the Dutch Wars. He was the 5th prince's second son and eventual successor.

He was short, with an enormous head and a yellow complexion, and was notoriously malevolent and offensive. In 1685 he was married to one of Louis XIV's bastards, Louise Françoise de Bourbon (previously known as Mlle de Nantes). As a soldier (from 1688), he showed bravery, notably in the battles of Steinkerk (1692) and Neerwinden (1693). On his father's death he was unable to assume the designation Monsieur le Prince since the Condés could no longer claim the rank of premier prince of the blood. He therefore never used his title of prince de Condé, continuing to be known as Monsieur le Duc (he was Duc de Bourbon).

• Condé, Louis-Henri, 7e prince de (7th prince of), DUC (duke) DE BOURBON, byname MONSIEUR LE DUC (b. Aug. 18, 1692, Versailles, Fr.—d. Jan. 27, 1740, Chantilly), chief minister of King Louis XV (ruled 1715–74) from 1723 until 1726.

Condé was the son of Louis III de Condé and Mademoiselle de Nantes, an illegitimate daughter of King Louis XIV. After the death of Louis XIV on Sept. 1, 1715, Condé became duc de Bourbon and was appointed head of a council of regency by Philippe II, duc d'Orléans, regent for King Louis XV. Nevertheless, he neglected his administrative duties and occupied himself with financial speculations and hunting. In 1719 he took as his mistress the ambitious Marquise de Prie.



Louis-Henri, 7e prince de Condé, engraving by Louis Jacob, 18th century, after a portrait by Pierre Gobert
By courtesy of the Bibliotheque Nationale, Paris

After the death of Orléans in December 1723, Condé, as the eldest prince of the blood, was made *premier ministre* ("first minister"), but he remained under the influence of his mistress. On her advice he appointed as his financial adviser Duverney, whose attempts to increase taxes aroused widespread discontent. The severely repressive police measures instigated by Condé increased the unpopularity of his regime.

Condé's chief aim, however, was to prevent the crown from passing to the Orléans branch of the royal family in the event of the death of the sickly Louis XV. Since the Spanish infanta Mariana, to whom Louis had been betrothed in 1721, was too young to produce a royal heir, Condé cancelled that engagement and married the King in September 1725 to the 21-year-old Maria Leszczyńska, daughter of a dethroned Polish king. The move aroused the hostility of Spain and led to an alliance between Spain and France's traditional enemy, Austria. Condé then plotted to secure the dismissal of the King's influential tutor André-Hercule de Fleury, but in June 1726 Louis dismissed Condé and made Fleury his chief minister. Exiled to Chantilly, Condé dabbled in scientific studies until his death.

• Condé, Louis-Joseph, 8e prince de (8th prince of), DUC (duke) DE BOURBON (b. Aug. 9, 1736, Paris—d. May 13, 1818, Paris), one of the princely émigrés during the French Revolution.

He was the only son of the Duc de Bourbon and Charlotte of Hesse and assumed the Condé title on his father's death (1740). In 1753 he married Godefride de Rohan-Soubise (d. 1760). Brought up for the army, he did good service in the Seven Years' War. On the fall of the Bastille (1789), he was one of the first princes to emigrate. Establishing himself at Worms in 1791, he set about raising the émigré "army of Condé," which took part, not very effectively, in the antirevolutionary campaigns of 1792–96. After the Franco-Austrian peace of 1797, Condé went to Russia, served with the Russians in 1799, then passed to Austria in 1800 and to England in 1801. Returning to France in 1814, he died in Paris four years later.

• Condé, Louis-Henri-Joseph, 9e prince de (9th prince of), DUC (duke) DE BOURBON (b. April 13, 1756, Paris—d. Aug. 27, 1830, Saint-Leu, Fr.), last of the princes of Condé, whose unfortunate son and sole heir, the Duc d'Enghien, was tried and shot for treason on Napoleon's orders in 1804, ending the princely line.

The 9th Prince of Condé was married in 1770 to Louise-Marie-Thérèse d'Orléans (1750–1822), who bore him a son, Louis-Antoine, duc d'Enghien, in 1772, but from whom he

parted in 1780. Emigrating with his father and son in 1789 at the outbreak of the Revolution, he went in 1795 to England to prepare the abortive expedition of the Comte d'Artois (the future Charles X) to the Vendée. Returning to France in 1814, he tried to organize resistance in Anjou during the Hundred Days, then escaped to Spain until the Second Restoration.

On his father's death in 1818 he inherited but did not assume the Condé title. As he had no heirs, he left the residue of the Condé inheritance (after splendid bequests to his mistress) to Henri d'Orléans, duc d'Aumale. Within a few months he was found hanging from a window fastening in his bedroom at Saint-Leu, the magnificent estate that he had bought six years earlier.

Condell, Henry (d. December 1627, London), English actor, apparently one of the chief movers in sponsoring and preparing the Shakespeare First Folio of 1623. He and John Heminge jointly signed the letters to the noble patrons and "the great variety of readers" that preface the volume.

Condell may have been acting as early as 1590–91, but he first certainly appeared in 1598 in Jonson's *Every Man In His Humour*. Thereafter he was regularly with Shakespeare's company (Chamberlain's Men; after 1603, King's Men) and retired about 1623. His name and that of John Heminge were linked with Shakespeare's for 30 years: they had been associates financially and were fellow actors in the Blackfriars Theatre and the Globe Theatre; Shakespeare left each of them a token remembrance in his will.

condemnation (property law): *see* eminent domain.

condensation, deposition of a liquid or a solid from its vapour, generally upon a surface that is cooler than the adjacent gas. A substance condenses when the pressure exerted by its vapour exceeds the vapour pressure of the liquid or solid phase of the substance at the temperature of the surface where condensation occurs. Heat is released when a vapour condenses. Unless this heat is removed, the surface temperature will increase until it is equal to that of the surrounding vapour.

If air were free of tiny particles, called aerosols, condensation would only occur when the air was extremely supersaturated with water vapour. In the atmosphere, however, there is an abundant supply of aerosols, which serve as nuclei, called condensation nuclei, on which water vapour may condense. Some are hygroscopic (moisture-attracting), and condensation begins on them when the relative humidity is less than 100 percent, but other nuclei require some supersaturation before condensation begins.

In the atmosphere the relative humidity of the air is increased, and condensation results when air temperature is reduced to the dew point or when sufficient water vapour is added to saturate the air. Condensation accounts for the formation of dew, fog, and clouds. For rain to occur, other physical processes are required.

condensation nucleus, tiny suspended particle, either solid or liquid, upon which water vapour condensation begins in the atmosphere. Its diameter may range from a few microns to a few tenths of a micron (one micron equals 10^{-4} centimetre). There are much smaller nuclei in the atmosphere, called Aitken nuclei, but they ordinarily play no role in cloud formation because they do not induce condensation unless the air is highly supersaturated with water vapour. Nuclei that have diameters of several microns and are composed of a hygroscopic, or moisture-attracting, substance (*e.g.*, sea salt) are called giant condensation nuclei.

Most condensation nuclei are produced by natural and man-made fires over land and by wave action over the oceans. When mixed with the more hygroscopic material, dust and soil particles blown into the atmosphere also are sources of nuclei. *See also* nucleation.

condensation reaction, any of a class of organic reactions in which two molecules combine, usually in the presence of a catalyst, with elimination of water or some other simple molecule. The combination of two identical molecules is known as self-condensation. Aldehydes, ketones, esters, alkynes (acetylenes), and amines are among several organic compounds that combine with each other and, except for amines, among themselves to form larger molecules, many of which are useful intermediate compounds in organic syntheses. Catalysts commonly used in condensation reactions include acids, bases, the cyanide ion, and complex metal ions.

condensation trail (aerology): *see* vapour trail.

condenser, device for reducing a gas or vapour to a liquid. Condensers are employed in power plants to condense exhaust steam from turbines and in refrigeration plants to condense refrigerant vapours, such as ammonia and fluorinated hydrocarbons. The petroleum and chemical industries employ condensers for the condensation of hydrocarbons and other chemical vapours. In distilling operations, the device in which the vapour is transformed to a liquid state is called a condenser.

All condensers operate by removing heat from the gas or vapour; once sufficient heat is eliminated, liquefaction occurs. For some applications, all that is necessary is to pass the gas through a long tube (usually arranged in a coil or other compact shape) to permit heat to escape into the surrounding air. A heat-conductive metal, such as copper, is commonly used to transport the vapour. A condenser's efficiency is often enhanced by attaching fins (*i.e.*, flat sheets of conductive metal) to the tubing to accelerate heat removal. Commonly, such condensers employ fans to force air through the fins and carry the heat away. In many cases, large condensers for industrial applications use water or some other liquid in place of air to achieve heat removal.

Condillac, Étienne Bonnot de (b. Sept. 30, 1715, Grenoble, Fr.—d. Aug. 2/3, 1780, Flux), philosopher, psychologist, logician, economist, and the leading advocate in France of the ideas of John Locke (1632–1704).

Ordained a Roman Catholic priest in 1740, Condillac began a lifelong friendship in the



Condillac, engraving by Pierre-Nicolas Ransonnette
By courtesy of the Bibliotheque Nationale, Paris

same year with the philosopher J.-J. Rousseau, employed by Condillac's elder brother, Jean, as a tutor. Moving to Paris, Condillac became acquainted with the Encyclopaedists, a group of writers led by Denis Diderot. There his position was established in the literary salons by his first book, *Essai sur l'origine des connaissances humaines* (1746; "Essay on the Origin of Human Knowledge"), and by his second, *Traité des systèmes* (1749; "Treatise on Systems"). In 1752 he was elected to the Berlin Academy. His *Traité des sensations* (1754; "Treatise on Sensations") and *Traité des animaux* (1755; "Treatise on Animals") followed, and in 1758 he was appointed tutor to the young prince Ferdinand of Parma. He was elected to the Académie Française in 1768 and later published *Le Commerce et le gouvernement considérés relativement l'un à l'autre* (1776; "Commerce and Government Considered in Relation to One Another"). Finding the irreligious climate of Parisian intellectual society offensive, he retired to spend his last years at Flux, near Beaugency.

In his works *La Logique* (1780) and *La Langue des calculs* (1798; "The Language of Calculation"), Condillac emphasized the importance of language in logical reasoning, stressing the need for a scientifically designed language and for mathematical calculation as its basis. His economic views, which were presented in *Le Commerce et le gouvernement*, were based on the notion that value depends not on labour but rather on utility. The need for something useful, he argued, gives rise to value, while prices result from the exchange of valued items.

As a philosopher, Condillac gave systematic expression to the views of Locke, previously made fashionable in France by Voltaire. Like Locke, Condillac maintained an empirical sensationalism based on the principle that observations made by sense perception are the foundation for human knowledge. The ideas of the *Essai* are close to those of Locke, though on certain points Condillac modified Locke's position. In his most significant work, the *Traité des sensations,* Condillac questioned Locke's doctrine that the senses provide intuitive knowledge. He doubted, for example, that the human eye makes naturally correct judgments about the shapes, sizes, positions, and distances of objects. Examining the knowledge gained by each sense separately, he concluded that all human knowledge is transformed sensation, to the exclusion of any other principle, such as Locke's additional principle of reflection.

Despite Condillac's naturalistic psychology, his statements concerning the nature of religion are consistent with his priestly vocation. He maintained a belief in the reality of the soul, which did not conflict, in his view, with the opening words of the *Essai:* "Whether we rise to heaven, or descend to the abyss, we never get outside ourselves—it is always our own thoughts that we perceive." This doctrine became the foundation of the French philosophical movement known as Idéologie and was taught for more than 50 years in French schools.

Studies of Condillac's thought include *The Naturalism of Condillac* (1926), by Z. Schaupp, and *La Psychologie de Condillac* (1937), by G. le Roy.

condition, in logic, a stipulation, or provision, that needs to be satisfied; also, something that must exist or be the case or happen in order for something else to do so (as in "the will to live is a condition for survival").

In logic, a sentence or proposition of the form "If A then B" [in symbols, $A \supset B$] is called a conditional (sentence or proposition). Similarly, "Whenever A then B" (in symbols, $(x)\,[A(x) \supset B(x)]$) may be called a general conditional. In such uses, "conditional" is a synonym for "hypothetical" and is opposed to "categorical." Closely related in meaning are the common and useful expressions "sufficient condition" and "necessary condition."

If some instance of a property *P* is always accompanied by a corresponding instance of some other property *Q*, but not necessarily vice versa, then *P* is said to be a sufficient condition for *Q* and, equivalently, *Q* is said to be a necessary condition for *P*. Thus, a severed spinal column is a sufficient, but not a necessary, condition for death; while lack of consciousness is a necessary, but not a sufficient, condition for death. In any case in which *P* is both a necessary and a sufficient condition for *Q*, the latter is also a necessary and sufficient condition for the former, each being regularly accompanied by the other. The terminology is also applicable to logical or mathematical or other nontemporal properties; thus, it is proper to speak of "a necessary condition for the solution of an equation" or "a sufficient condition for the validity of a syllogism." *See also* implication.

In metaphysics, the above uses of the term condition have led to the contrast between "conditioned" and "absolute" being (or "dependent" versus "independent" being). Thus, all finite things exist in certain relations not only to all other things but possibly also to thought; *i.e.*, all finite existence is "conditioned." Hence, Sir William Hamilton, a 19th-century Scottish philosopher, spoke of the "philosophy of the unconditioned"; *i.e.*, of thought in distinction to things that are determined by thought in relation to other things. An analogous distinction was made by H.W.B. Joseph, an Oxford logician, between the universal laws of nature and conditional principles, which, though regarded as having the force of law, are yet dependent or derivative; *i.e.*, cannot be treated as universal truths. Such principles hold good under present conditions but may be invalid under others; they hold good only as corollaries from the laws of nature as they operate under existing conditions.

conditioning, in physiology, a behavioral process whereby a response becomes more frequent or more predictable in a given environment as a result of reinforcement (providing a natural stimulus or reward for the desired response). The history of this concept shows its dependence upon experimental techniques for the study of reflexes. Physiologists in Russia, England, and the United States contributed the original procedures, observations, and definitions. After the 1920s psychologists carried on the larger share of experimental work on the nature and prerequisites of conditioning.

At the heart of the principles of conditioning are the stimulus-response theories, various theoretical positions based on the assumption that human behaviour is learned. One of the early contributors to the field, American psychologist Edward L. Thorndike (1874–1949), postulated the Law of Effect which stated that those behavioral responses (R) that were most closely followed by a satisfactory result were most likely to become established patterns and to reoccur in response to the same stimulus (S). This basic stimulus-response (S-R) scheme is referred to as unmediated. When an individual organism (O) affects the stimuli in any way, for example, by thinking about a response, the response is considered mediated. The S-O-R theories of behaviour are often drawn to explain social interaction between individuals or groups.

Conditioning is a form of learning in which either (1) a given stimulus (or signal) becomes increasingly effective in evoking a response or (2) a response occurs with increasing regularity in a well-specified and stable environment. The type of reinforcement used determines which of these consequences obtains. When two stimuli are presented in an appropriate time and intensity relationship, one of them will come to induce a response resembling that of the other. The process can be described as one of stimulus substitution. This procedure is called classical (or respondent) conditioning. In the traditional technique, based on the work of the Russian physiologist Ivan P. Pavlov, a dog is placed in a harness within a sound-shielded room. On each conditioning trial the sound of a bell or a metronome is promptly followed by food powder blown by an air puff into the dog's mouth. Here the tone of the bell is known as the conditioned (or sometimes conditional) stimulus, abbreviated as CS. The dog's salivation upon hearing this sound is the conditioned response (CR). The strength of conditioning is measured in terms of the number of drops of saliva the dog secretes during test trials in which food powder is omitted after the bell has rung. The dog's original response of salivation upon the introduction of food into its mouth is called the unconditioned response (UR) to food, which is the unconditioned stimulus (US). Using a variety of stimuli and responses, psychologists in the United States have shown that in humans and other mammals there is a very consistent optimum interval between the CS and the US which the experimenter may utilize. This interval is approximately half a second. For cold-blooded animals the optimum interval for conditioning is longer. In fish, for example, the CS may best precede the US by 1.5 seconds. When the CS is appropriately followed by the US, reinforcement is said to occur. If the US is omitted on any trial or series of trials, the procedure is referred to as extinction, since without reinforcement the frequency of the CR gradually decreases.

Instrumental, or operant, conditioning differs from classical conditioning in that reinforcement occurs only after the organism executes a predesignated behavioral act. When no US is used to initiate the specific act to be conditioned, the required behaviour is known as an operant or, once it occurs with regularity, also as a conditioned response to correspond to its counterpart in classical conditioning. Operant conditioning was studied in great detail by the American psychologist B.F. Skinner and his students. A spontaneous (or operant) behaviour is either rewarded, that is, reinforced, or punished. With rewarded behaviour, the frequency of that behaviour increases; with punishment it decreases. For example, a hungry animal will respond to a situation in a way that is most natural for that animal. If one of these responses leads to the reward of securing food, it often turns out that the specific response which led to the food reward is repeated and thus learned. The behaviour that has been instrumental in obtaining the reward becomes especially important to the organism. The same type of conditioning can also be applied to an action that allows the organism to escape from or avoid painful or noxious stimuli.

Psychologists generally assume that most learning occurs as a result of instrumental rather than of classical conditioning. Central to all forms of behavioral interaction, however, is the concept that a change occurs in an organism's behaviour and that the change, brought about by some form of conditioning, results in learning.

condom, contraceptive device consisting of a sheath that fits over the penis and that is intended to prevent the escape of semen into the vagina. It is made of very thin, flexible rubber or a rubberlike plastic (latex). The condom has long been used as protection against venereal infections and other sexually transmitted diseases, and by the 17th century it was utilized as a contraceptive as well. Early condoms were generally made of animal gut or fish membrane and were often inefficient. Legend is confused on the origin of the term *condom*—one story telling of a man named Condom devising such a contraceptive for Charles II of England. Since the 1840s most condoms have been made of vulcanized rubber or, since the 1930s, of latex. At first they were usually washable but now are generally disposable and slightly lubricated. Efficient, convenient, but still disliked for its dulling of physical sensation, the condom fails mainly because of irregular use. It is an effective form of protection against a broad range of sexually transmitted diseases. *See* contraception.

condominium, in modern property law, the individual ownership of one dwelling unit within a multidwelling building, with an undivided ownership interest in the land and other components of the building shared in common with other owners of dwelling units in the building. The condominium as a type of cooperative ownership has been present in various forms in Europe since the end of the Middle Ages. In the United States, condominium ownership appeared in the latter half of the 19th century and has been popular in crowded urban areas.

In Roman law "condominium" meant common ownership by two or more persons of undivided fractional shares in the same property. The term later came to mean joint sovereignty, or rule over one territory by two or more states.

Condominium, Anglo-Egyptian: *see* Anglo-Egyptian Condominium.

Condon, Edward U(hler) (b. March 2, 1902, Alamogordo, N.M., U.S.—d. March 26, 1974, Boulder, Colo.), American physicist for whom the Franck–Condon principle was named and who applied quantum mechanics to an understanding of the atom and its nucleus.

During World War II Condon made valuable contributions to the development of both atomic energy and radar. In 1943 he helped J. Robert Oppenheimer recruit the group that made the first atomic bombs at Los Alamos, N.M. In 1946 he was a consultant to the committee of the Senate that drafted the legislation that created the Atomic Energy Commission; in the aftermath of the struggle to put atomic energy under civilian control he was attacked by the House Committee on Un-American Activities, one of the strongest opponents of civilian control. Condon was director of the National Bureau of Standards (1945–51) and president of both the American Physical Society (1946) and the American Association for the Advancement of Science (1953). In 1966 the Air Force Office of Scientific Research appointed him director of a project to investigate flying saucers, from which grew the Condon report, *The Scientific Study of Unidentified Flying Objects* (1969).

condor, either of two huge species of New World vultures (family Cathartidae): the Andean condor, *Vultur gryphus*, and the California condor, *Gymnogyps californianus*. They are two of the largest flying birds, each about 130 cm (50 inches) long and 10 kg (22 pounds) in weight.

The Andean condor has slightly longer wings, reaching 3 m (10 feet) or more. It is a black



California condor (*Gymnogyps californianus*)
John Borneman—The National Audubon Society Collection/Photo Researchers

bird with a white ruff and bare pinkish head, neck, and crop. The male has a large caruncle, or fleshy protuberance, on the forehead. The species ranges from the Pacific coast of South America to the high Andes, frequenting open country and feeding on dead animals, including quantities of fish. It breeds (every other year) at altitudes above 3,000 m (10,000 feet). Eggs laid are two in number, white, and about 10 cm (4 inches) long.

The California condor, an endangered species, is nearly black, with white wing linings, bare yellow head, and red neck and crop. It is one of the world's rarest birds and appeared to be heading toward extinction in the late 20th century. A small number of California condors were in zoos, and the few known survivors left wild in southern California were trapped and taken into a similar protective captivity. The first California condor to be bred in captivity hatched in 1988 at the San Diego Wild Animal Park. In their wild state the birds foraged in open land near the coast, preferring fresh carrion. They bred every other year, laying a single egg per pair, greenish or bluish in colour, about 10 cm long.

Condor Legion, German LEGION CONDOR, a unit of the German air force, or Luftwaffe, detailed by Hermann Göring for special duty with General Francisco Franco's Nationalist forces in the Spanish Civil War (1936–39). It was sent to Franco on the condition that it stay under German command. The Legion consisted of four bomber squadrons (of 12 bombers each) and four fighter squadrons and was backed by antiaircraft and antitank units. It engaged in several raids, especially on Barcelona. On April 27, 1937, it attacked the Basque city of Guernica with great devastation and loss of life.

Condorcanqui, José Gabriel: *see* Tupac Amaru.

Condorcet, Marie-Jean-Antoine-Nicolas de Caritat, marquis de (b. Sept. 17, 1743, Ribemont, Fr.—d. March 29, 1794, Bourg-la-Reine), French philosopher of the Enlightenment and advocate of educational reform, one of the major Revolutionary formulators of the ideas of progress, or the indefinite perfectability of mankind.

He was descended from the ancient family of Caritat, who took their title from Condorcet,



Condorcet, detail of a bust by J.-A. Houdon; in the Musée de Versailles

Cliche Musees Nationaux, Paris

a town in Dauphiné. He was educated at the Jesuit college in Reims and at the Collège de Navarre in Paris, where he showed his first promise as a mathematician. In 1769 he became a member of the Academy of Sciences, to which he contributed papers on mathematical and other subjects.

Condorcet was the friend of almost all the distinguished men of his time and a zealous propagator of the progressive views then current among French men of letters. A protégé of the French philosopher and mathematician Jean Le Rond d'Alembert, he took an active part in the preparation of the *Encyclopédie.* He was elected to the permanent secretaryship of the Academy of Sciences in 1777 and to the French Academy in 1782 and was a member of other European academies. In 1785 he published his *Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix* (*Essay on the Application of Analysis to the Probability of Majority Decisions*), a remarkable work that has a distinguished place in the history of the doctrine of probability. A second edition, greatly enlarged and completely recast, appeared in 1805 under the title of *Éléments du calcul des probabilités et son application aux jeux de hasard, à la loterie et aux jugements des hommes.*

In 1786 he married Sophie de Grouchy (1764–1822), who was said to have been one of the most beautiful women of her time. Her *salon* at the Hôtel des Monnaies, where Condorcet lived in his capacity as inspector general of the mint, was quite famous.

Condorcet published his *Vie de M. Turgot* in 1786 and his *Vie de Voltaire* in 1789. These biographies of his friends reveal his sympathy with Turgot's economic theories about mitigating the suffering of the French populace before the French Revolution and with Voltaire's opposition to the church. Both works were widely and eagerly read and are perhaps, from a purely literary point of view, the best of Condorcet's writings.

The outbreak of the French Revolution, which he greeted with enthusiasm, involved him in a great deal of political activity. He was elected to represent Paris in the Legislative Assembly and became its secretary; was active in the reform of the educational system; was chief author of the address to the European powers in 1791; and in 1792 he presented a scheme for a system of state education, which was the basis of that ultimately adopted. Condorcet was one of the first to declare for a republic, and in August 1792 he drew up the declaration justifying the suspension of the king and the summoning of the National Convention. In the convention he represented the *département* of Aisne and was a member of the committee on the constitution. His draft of a new constitution, representative of the Girondins, the more moderate political group during the Revolution, was rejected, however, in favour of that of the Jacobins, a more radical political group whose dominating figure was Robespierre. In the trial of Louis XVI he voted against the death penalty. But his independent attitude became dangerous in the wake of the Revolution when Robespierre's radical measures triumphed, and his opposition to the arrest of the Girondins led to his being outlawed.

To occupy his mind while he was in hiding, some of his friends prevailed on him to engage in the work by which he is best-known, the *Esquisse d'un tableau historique des progrès de l'esprit humain* (1795; *Sketch for a Historical Picture of the Progress of the Human Mind*). Its fundamental idea is that of the continuous progress of the human race to an ultimate perfection. He represents humans as starting from the lowest stage of savagery with no superiority over the other animals save that of bodily organization and as advancing uninterruptedly in the path of enlightenment, virtue, and happiness. The stages that the human race has already gone through, or, in other words, the great epochs of history, are regarded as nine in number.

There is an epoch of the future—a 10th epoch—and the most original part of Condorcet's treatise is that which is devoted to it. After insisting that general laws regulative of the past warrant general inferences as to the future, he argues that the three tendencies that the entire history of the past shows will be characteristic features of the future are: (1) the destruction of inequality between nations; (2) the destruction of inequality between classes; and (3) the improvement of individuals, the indefinite perfectibility of human nature itself—intellectually, morally, and physically. The equality to which he represents nations and individuals as tending is not absolute equality but equality of freedom and of rights. Nations and men, he asserts, are equal if equally free and are all tending to equality because all are tending to freedom.

As to indefinite perfectibility, he nowhere denies that progress is conditioned both by the constitution of humanity and by the character of its surroundings. But he affirms that these conditions are compatible with endless progress and that the human mind can assign no fixed limits to its own advancement in knowledge and virtue or even to the prolongation of bodily life. This theory explains the importance that he attached to popular education, to which he looked for all sure progress. The book is notable for its intense aversion to all religion, especially Christianity, and to monarchy. Pervaded by a spirit of excessive hopefulness, it contains numerous errors of detail, due to the circumstances in which it was written. Its value lies in its general ideas. Condorcet's ethical position gives emphasis to the sympathetic impulses and social feelings and had considerable influence upon the French philosopher and sociologist Auguste Comte. While he was under proscription as a Girondin, some of the other works he wrote were published by friends and others were issued after his death. Still interested in public affairs and believing that the house in which he had been hiding was watched, he escaped and, after hiding in thickets and quarries for three days, entered the village of Clamart on the evening of March 27, 1794. His appearance betrayed him, and he was taken to Bourg-la-Reine and imprisoned. On the morning of March 29 he was found dead, whether from exhaustion or by poison is unknown.

Wholly a man of the Enlightenment, an advocate of economic freedom, religious toleration, legal and educational reform, and the abolition of slavery, Condorcet sought to extend the empire of reason to social affairs. Rather than elucidate human behaviour, as had been done thus far, by recourse to either the moral or physical sciences, he sought to explain it by a merger of the two sciences that eventually became transmuted into the discipline of sociology. (H.B.A.)

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condottiere, plural CONDOTTIERI, leader of a band of mercenaries engaged to fight in numerous wars among the Italian states from the mid-14th to the 16th century. The name was derived from the *condotta,* or "contract," by which the condottieri put themselves in the service of a city or of a lord.

The first mercenary armies in Italy (often called free companies) were made up of foreigners. The earliest (1303) was composed of Catalans who had fought in the dynastic wars of the south. In the mid-14th century the Grand Company, composed mainly of Germans and Hungarians, terrorized the country, devastating Romagna, Umbria, and Tuscany. It was one of the first to have a formal orga-

nization and a strict code of discipline, developed by the Provençal adventurer Montréal d'Albarno. The Englishman Sir John Hawkwood, one of the most famous of the non-Italian condottieri, came to Italy in the 1360s during a lull in the Hundred Years' War and for the next 30 years led the White Company in the confused wars of northern Italy.

By the end of the 14th century, Italians began to raise mercenary armies, and soon condottieri were conquering principalities for themselves. The organization of the companies was perfected in the early 15th century by Muzio Attendolo Sforza, in the service of Naples, and his rival Braccio da Montone, in the service of Perugia. Muzio's son, Francesco Sforza, who won control of Milan in 1450, was one of the most successful of all the condottieri.

Less fortunate was another great condottiere, Carmagnola, who first served one of the viscounts of Milan and then conducted the wars of Venice against his former masters but at last awoke the suspicion of the Venetian oligarchy and was put to death before the palace of St. Mark (1432). Toward the end of the 15th century, when the large cities had gradually swallowed up the small states and Italy itself was drawn into the general current of European politics and became the battlefield of powerful armies—French, Spanish, and German—the condottieri, who proved unequal to the gendarmery of France and the improved Italian troops, disappeared.

The soldiers who fought under the condottieri were almost entirely heavy-armoured cavalry and were noted for their rapacious and disorderly behaviour. With no goal beyond personal gain, the armies of the condottieri often changed sides, and their battles often resulted in little bloodshed.

conduct, disorderly (law): *see* disorderly conduct.

conductor, in music, a person who conducts an orchestra, chorus, opera company, ballet, or other musical group in the performance and interpretation of ensemble works. At the most fundamental level, a conductor must stress the musical pulse so that all the performers can follow the same metrical rhythm. The keeping of this rhythmic beat is accomplished by a stylized set of arm and hand movements that outline the basic metre—*e.g.,* two beats to the measure (as in a polka), three beats (as in a waltz or mazurka), or four beats (as in a march), in each case the primary accent being indicated by a downstroke.

For nearly two centuries, conductors favoured a baton, or thin wand, in the right hand as a device for emphasizing the metrical outline, reserving the left hand for indicating entries of different parts and nuances. Some contemporary conductors, however, follow a practice long established in unaccompanied choral conducting and dispense with the baton; the absence of the baton frees both hands for more elaborately interpretive directions. With the removal of the baton and the elimination, through memorization, of the printed score in public performance, the conductor is free to use not only his hands and arms but also the movement of his torso and facial muscles to express to the group his wishes in the execution of phrasing, dynamic level, nuance, individual entrances, and other aspects of a finished performance.

Conducting became a specialized form of musical activity only in the early 19th century. As early as the 15th century, performances by the Sistine Choir in the Vatican were kept together by slapping a roll of paper (or in other cases, a lengthy pole, or baton) to maintain an audible beat. This practice continued until it became an actual intrusion on the performance and was of necessity abandoned. By the time of J.S. Bach and George Frideric Handel (late 17th to mid-18th century), the role of key musician was not only to compose music on demand but to conduct it as well, usually from the composer-performer's chair at the organ or harpsichord. At the Paris Opéra, the position of the conductor fell to the concertmaster, operating from the first violin desk and handling his complicated chores as best he could. But throughout this time, the "conductor" was largely a major functionary, first among equals, whose chief responsibility was to perform with the ensemble and only secondarily to lead it.

The 19th century bred a new kind of musician—the composer-conductor, as exemplified by Carl Maria von Weber, Hector Berlioz, Felix Mendelssohn, and Richard Wagner—men of autocratic and creative character who assumed full control over performance and brought to their work a singleminded creative viewpoint and a cultivated sensitivity that was a hallmark of much of the 19th-century period in music. In some instances, this new breed commanded such influence that they were able successfully to champion unpopular causes, such as Mendelssohn's revival of the music of Bach, considered at the time to be old-fashioned and academic. Hermann Levi, Hans Richter, and Felix Mottl followed Wagner's example of imaginative gesture and control in conducting, and Hans von Bülow epitomized the virtuoso conductors who flourished at this time. In their pivotal role between composer, performer, and public, Bülow and other conductors acquired stature and prestige unequaled among musicians.

In the years encompassing World Wars I and II particularly, exceptional conductors often achieved international fame through wellnigh legendary control over their musicians in their quest for the perfect interpretation. Arturo Toscanini was the personification of such figures. The most effective 20th-century conductors have been both gifted musicians and skilled and sensitive leaders, capable of dealing authoritatively with professionals in their own field while possessing the deftness to understand the needs of their economic supporters and public. Among the most notable conductors since World War II have been Sir Georg Solti, Herbert von Karajan, and Leonard Bernstein. Women conductors—most notably the American Sarah Caldwell—began to achieve recognition after the mid-20th century.

conductus, plural CONDUCTUS, in medieval music, a metrical Latin song of ceremonial character for one, two, or three voices. The word first appeared in mid-12th-century manuscripts with reference to processional pieces.

In the 13th century the conductus was one of three genres that dominated French polyphonic music. Unlike the organum and the motet, however, which were based on preexisting chants, the conductus was a freely composed setting of a single metrical Latin text. Of particular importance for future developments was its homophonic texture (all voices moving at the same rhythmic rate or, from the modern perspective, "chordally"), which offered welcome points of departure for the Burgundian polyphonists of the 15th century.

The 13th-century commentator Franco of Cologne distinguished between conductus *cum* and *sine littera* (with and without words); while the former was in simple syllabic style, the latter was not only untexted but, in some instances, quite florid in nature and hence suitable for use as *caudae* (singular *cauda*), extended lively passages inserted into relatively unadorned compositions.

conduit, channel or pipe for conveying water or other fluid or for carrying out certain other purposes, such as protecting electric cables.

In water-supply systems the term is usually reserved for covered or closed sections of aqueduct, especially those that transport water under pressure. Large conduits may be fabricated of steel sections joined in the field or of reinforced concrete, often precast and prestressed, or they may be driven at depth through solid rock, for example, under mountainous terrain or under rivers. Smaller pressure conduits are usually made of cast iron, steel, or asbestos cement. Pressure conduits are usually kept below the hydraulic grade line—that is, the line representing the height to which the water would rise if free—to avoid possible entrapment of air.

Condulmer, Gabriele (pope): *see* Eugenius IV.

Condylarthra, extinct order of hoofed mammals that includes the ancestral forms of later, more advanced ungulates (hoofed mammals with a plant diet). The condylarths are transitional between the insectivores and advanced ungulates. The condylarths existed mostly in the Paleocene Epoch (66.4 to 57.8 million years ago), but some forms persisted through the Eocene Epoch into the Early Oligocene (until 30 million years ago). The origins of the condylarths seem to lie in the Cretaceous Period; a Late Cretaceous form is the genus *Protungulatum,* which appears to be the oldest known ungulate. A well-known condylarth genus is *Phenacodus,* an Eocene form that grew to be as large as a modern tapir.

The condylarths were a diverse group that developed a great many traits of adaptive significance. Some forms remained relatively small, while others attained large size. The teeth of some of the condylarths appear almost carnivore-like.

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cone, also called STROBILUS, in botany, mass of scales or bracts, usually ovate in shape, containing the reproductive organs of certain nonflowering plants. The cone, a distinguishing feature of pines and other conifers, is roughly analogous to the flower of other plants. Cones (strobili) are also found on club mosses and horsetails.

cone, in mathematics, the surface traced by a moving straight line (the generatrix) that always passes through a fixed point (the vertex). The path, to be definite, is directed by some closed plane curve (the directrix), along which the line always glides. In a right circular cone, the directrix is a circle, and the cone is a surface of revolution. The axis of this cone is a line through the vertex and the centre of the circle, the line being perpendicular to the plane of the circle. In an oblique circular cone, the angle that the axis makes with the circle is other than 90°. The directrix of a cone need not be a circle; and if the cone is right, planes parallel to the plane of the directrix produce intersections with the cone that take the shape, but not the size, of the directrix. For such a plane, if the directrix is an ellipse, the intersection is an ellipse.

The generatrix of a cone is assumed to be infinite in length, extending in both directions from the vertex. The cone so generated, therefore, has two parts, called nappes or sheets, that extend infinitely. A finite cone has a finite, but not necessarily fixed, base, the surface enclosed by the directrix, and a finite, but not necessarily fixed, length of generatrix, called an element. *See also* conic section.

cone, in neurology, light-sensitive neuron with a conical projection in the retina of the vertebrate eye, associated with colour vision and perception of fine detail. Shorter and far fewer

than the eye's rods (light-sensitive cells), cones are less sensitive to low illumination levels and are mediators of photopic rather than scotopic (Greek *skotos,* "dark") vision. Cones are mostly concentrated at the central yellow body containing the fovea (depression in the retina), where no rods are present, while at the outer edges of the retina, cones are sparse. Chemical changes that occur when light strikes the cones are relayed as impulses to optic-nerve fibres leading to the occipital lobe of the brain. *See also* colour vision.

Cone, Fairfax M., in full FAIRFAX MASTICK CONE, byname FAX CONE (b. Feb. 21, 1903, San Francisco, Calif., U.S.—d. June 20, 1977, Carmel, Calif.), a founder and chairman of Foote, Cone & Belding, and one of the pre-eminent American advertising executives of the 20th century.

Cone's father was a prospector and mining engineer, and his mother was a schoolteacher. He studied English at the University of California, working as a summertime copy boy on the *San Francisco Bulletin.* After graduation, Cone worked for three years as a clerk, writer, and illustrator in the classified advertising department of the *San Francisco Examiner.* He became a copywriter at the San Francisco office of Lord & Thomas in 1929.

Cone became manager of that office in 1939, and two years later he moved to New York City to take charge of the Lucky Strike cigarettes account, the largest at Lord & Thomas. In 1942 he became executive vice president at the firm's Chicago headquarters. In the same year, Albert Lasker, the proprietor, decided to dissolve the agency and allow Cone and two fellow vice presidents, Emerson Foote and Don Belding, to reorganize it as Foote, Cone & Belding. By 1959 both Foote and Belding had retired, so Cone guided the agency single-handedly until his retirement in 1970.

Cone had great respect for the judgment of the supermarket shopper and strove for clarity and candour in advertising; he disliked copy that was facetious or "gimmicky." He was noted for his devotion to educational and philanthropic projects.

cone-headed grasshopper, any insect of the subfamily Copiphorinae within the long-horned grasshopper family Tettigoniidae (order Orthoptera). These green- or brown-coloured grasshoppers have a cone-shaped head, long antennae, and a slender body about 4 cm (1.6 inches) long. They may use their strong jaws to bite, if handled. Cone-headed grasshoppers live in weeds or high grass.

Each species has a characteristic song; the song of one of the largest and most common cone-headed grasshoppers (*Neoconocephalus ensiger*) consists of one note repeated continuously. A loud North American species, *N. robustus,* produces a continuous buzz that is accompanied by a droning hum, probably created by wing vibrations. The song of *N. retusus* is a loud, shrill whir in a high key.

cone shell, any of several marine snails of the subclass Prosobranchia (class Gastropoda) comprising the genus *Conus* and the family Conidae. The shell is typically straight-sided, with a tapering body whorl, low spire, and narrow aperture (the opening into the shell's first whorl). Cones inject a paralyzing toxin by means of a dart; a few of the larger species have fatally stung humans. The usual prey is worms and mollusks; a few capture fish. Most species occur in the Indo-Pacific region.



Cone shell (*Conus textile*)
Douglas Faulkner

The most valuable shell in the world—fewer than 100 specimens are known—is found on the glory-of-the-seas cone (*C. gloriamaris*) of the Philippines and Indonesia; 10 to 13 cm long, it is golden brown, with a fine net pattern.

coneflower, any of three genera of weedy plants in the family Asteraceae, all native to North America. Some species in each genus have reflexed ray flowers. Purple-flowered perennials of the genus *Echinacea,* especially



Coneflower (*Rudbeckia amplexicaulis*)
Phil Clark

E. angustifolia and *E. purpurea,* often are cultivated as border plants. They have strong-smelling black roots, hairy stems, and basal leaves on long leafstalks.

Plants of the genus *Ratibida* have yellow ray flowers, brownish disk flowers, and segmented leaves. Prairie coneflower (*Ratibida columnaris*) and *R. pinnata* are grown in wildflower gardens. The third genus, *Rudbeckia,* has about 25 annual, biennial, and perennial species with simple or segmented leaves, yellow ray flowers, and brown or black disk flowers. Black-eyed susan (*R. hirta*), thimbleflower (*R. bicolor*), and coneflower (*R. laciniata*) are grown as border plants. Golden glow (*R. laciniata* variety *hortensia*) is a popular double-flowered variety.

Conegliano, town, Treviso *provincia,* Veneto *regione,* northeastern Italy, near the Piave River, just north of the city of Treviso. It is dominated by a castle with a museum and a cathedral (1352), which has a bell tower (1497) and a fine altarpiece (1493) by the painter Cima da Conegliano, a native of the town. There is modern construction along the old perimeter of the town. Noted for its wines, Conegliano is the seat of a national school of viticulture and is an industrial and commercial centre with diversified manufactures. Pop. (1993 est.) mun., 35,536.

Conegliano, Emanuele (Italian librettist): *see* Da Ponte, Lorenzo.

Conemaugh Series, geochronological division of the Pennsylvanian Period in the United States, which is approximately equivalent to the Late Carboniferous Period (320 to 286 million years ago). It was named for exposures studied along the Conemaugh River in Pennsylvania, and it also occurs in Ohio, Maryland, Virginia, and West Virginia.

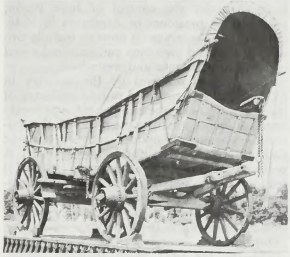
The Conemaugh Series overlies rocks of the Allegheny Series and underlies those of the Monongahela Series; it consists of coal beds, marine shales, limestones, sandstones, red beds, and some freshwater limestones. The coals, marine shales, and limestones are confined to the lower part of the series, whereas the predominantly continental deposits occur in the upper portions.

In Maryland, the Conemaugh Series is approximately 274 m (900 feet) thick, but it thins to the west until, in Ohio, it is only 122 m (400 feet) thick. The Ames Limestone, a well-known marker horizon in the Conemaugh Series, serves as a useful reference point in determining stratigraphic sequences and correlations; it contains abundant marine invertebrate fossil fauna dominated by clams, brachiopods, and snails.

Conestoga (people): *see* Susquehanna.

Conestoga wagon, horse-drawn freight wagon that originated during the 18th century in the Conestoga Creek region of Lancaster county, Pennsylvania, U.S. Ideally suited for hauling freight over bad roads, the Conestoga wagon had a capacity of up to six tons, a floor curved up at each end to prevent the contents from shifting inside, and a white canvas cover to protect against bad weather; it was pulled by four to six horses.

A descendant of the Conestoga wagon was the prairie schooner, used by the pioneers to transport their possessions westward. Named



Conestoga wagon
Encyclopædia Britannica, Inc.

for its white canvas top, which at a distance made it resemble a sailing ship, the prairie schooner had a flat body and lower sides than the Conestoga wagon.

coney (animal): *see* cony.

Coney Island, amusement area in the southern part of the borough of Brooklyn in New York, N.Y., U.S., fronting the Atlantic Ocean. Formerly an island, it was known to Dutch settlers as Konijn Eiland ("Rabbit Island"), which was presumably Anglicized as Coney Island. It became part of Long Island after Coney Island Creek silted up to form a sandbar (about 5 miles [8 km] long and 0.25–1 mile [0.4–1.6 km] wide) between Gravesend Bay (north), Sheepshead Bay (east), and Lower Bay (south). The coming of the subway in 1920 made it a popular playground.

Coney Island is one of the best-known amusement parks in the United States, with its 3.5-mile Boardwalk fronted by a sand beach. Numerous concessions have been developed with

rides, exhibitions, restaurants, and souvenir shops. The Sea Gate district at its western end is a residential section, and a large housing



The Boardwalk at Coney Island, New York City, before World War II
Archive Photos

project occupies the site of Luna Park. In 1957 the New York Aquarium was built on the Boardwalk.

confection (food product): *see* candy.

Confederación General del Trabajo (CGT), English GENERAL CONFEDERATION OF LABOUR, major labour federation in Argentina. The CGT was formed in 1930. Its leadership was contested by socialist and Communist factions from 1935 until the early 1940s, when it came under the control of Juan Perón, who became president of Argentina in 1946. During his government it grew to include two million affiliated members and acquired a vast network of patronage and welfarism.

After Perón's removal by the military in 1955, the CGT continued to be a mainstay of the Peronists, but the movement was weakened by factional struggles; by 1963 the federation was equally divided between Peronist and non-Communist Independent blocs. A period of military rule in Argentina (1966–73) led the CGT to pursue political as well as economic goals, although these were sometimes contradictory, and led to further fragmentation of the group in the late 1960s.

During the second Peronist government (1973–76), the CGT again achieved considerable political power and expanded to embrace white-collar as well as industrial workers. During the subsequent period of military rule (1976–83), the government suppressed the CGT, though it continued to operate illegally. President Raúl Alfonsín (1983–89), whose Radical government clashed with the CGT, most dramatically in a series of general strikes, officially reinstated the federation in 1985.

Confederate States of America, also called CONFEDERACY, in the American Civil War, the government of 11 Southern states that seceded from the Union in 1860–61, carrying on all the affairs of a separate government and conducting a major war until defeated in the spring of 1865.

Convinced that their way of life, based on slavery, was irretrievably threatened by the election of President Abraham Lincoln (November 1860), the seven states of the Deep South (Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas) seceded from the Union during the following months. When the war began with the firing on Fort Sumter (April 12, 1861), they were joined by four states of the upper South (Arkansas, North Carolina, Tennessee, and Virginia).

A provisional government, established in February 1861 at Montgomery, Alabama, was replaced by a permanent government at Richmond, Va., a year later. The Confederacy, operating under a structure similar to that of the United States, was headed by President Jefferson Davis and Vice President Alexander H. Stephens. The new nation soon acquired other symbols of sovereignty, such as its own stamps and a flag known as the Stars and Bars.

The main concern of the Confederate States was raising and equipping an army. The Southern Congress first voted to permit direct volunteering up to 400,000, but conscription was begun in April 1862. The total number of Confederate soldiers is estimated at 750,000, as opposed to twice that many Federal troops. (Confederate population stood at about 5,500,000 whites and 3,500,000 black slaves, as against 22,000,000 Northerners.) In railroads, the South had only 9,000 miles, the industrial North 22,000.

The Confederacy's early attempts to raise funds centred on printing money, which proved highly inflationary, and issuing bonds that could be paid for in kind. Because of the Federal blockade of Southern ports, tariff revenues proved inadequate. In 1863 a general tax bill was passed, imposing license and occupational taxes, a profits tax, and a 10 percent tax on farm products, collected in kind. Profitable private blockade running was put under strict supervision in 1864. Prices of farm products for the army were eventually fixed to check profiteering.

In foreign affairs, the South had been initially confident of the power and influence of "King Cotton" (*q.v.*), the crop that accounted for more than half the value of U.S. exports before the war. Confederates felt that the importance of cotton would force diplomatic recognition from the Federal government and European countries. Neither the commissioners sent abroad in 1861 nor the permanent envoys who replaced them were able to secure recognition from Great Britain, France, or any other European power. The South was able, however, to buy considerable war matériel and several fast ships that destroyed much Federal shipping on the high seas.

President Davis took an active part in dictating military policy and major strategy, but the great leader on the battlefield was Gen. Robert E. Lee. Heartened by a series of military victories in the first two years of fighting, the Confederacy was convinced of its ultimate success. But disillusionment set in with almost simultaneous Federal victories at Gettysburg and Vicksburg (July 1863). Not even the brilliant tactics of Lee in the East or of General Joseph E. Johnston in the West could indefinitely hold off the stronger Northern armies. After Lee surrendered his dwindling, half-starved army at Appomattox, Va., on April 9, 1865, the Confederacy soon collapsed.

Confederation, Articles of, first U.S. constitution (1781–89), which served as a bridge between the initial government by the Continental Congress of the Revolutionary period and the federal government provided under the U.S. Constitution of 1787. Because the experience of overbearing British central authority was vivid in colonial minds, the drafters of the Articles deliberately established a confederation of sovereign states.

On paper, the Congress had power to regulate foreign affairs, war, and the postal service and to appoint military officers, control Indian affairs, borrow money, determine the value of coin, and issue bills of credit. In reality, however, the Articles gave the Congress no power to enforce its requests to the states for money or troops, and by the end of 1786 governmental effectiveness had broken down.

Nevertheless, some solid accomplishments had been achieved: certain state claims to western lands were settled, and the Northwest Ordinance of 1787 established the fundamental pattern of evolving government in the territories north of the Ohio River. Equally important, the Confederation provided the new nation with instructive experience in self-government under a written document. In revealing their own weaknesses, the Articles paved the way for the Constitutional Convention of 1787 and the present form of U.S. government.

Confédération Française Démocratique du Travail, English FRENCH DEMOCRATIC CONFEDERATION OF LABOUR, French labour organization founded in 1919 as the Confédération Française des Travailleurs Chrétiens (French Confederation of Christian Workers). Its founders were Roman Catholic workers who opposed both the Syndicalist and Communist movements of the day. The confederation, based on Catholic social and anti-Marxist principles, rejected the theory of class warfare but occasionally collaborated on strikes with the Confédération Générale du Travail.

In 1964 the organization, in a secularizing action, changed its name to eliminate the word Christian. From 1968 to 1977 the confederation pursued radical policies but afterward readopted a moderate position. In 1989 it joined the International Confederation of Free Trade Unions. Most of its members worked in the private sector of the economy.

Confédération Générale du Travail (CGT), English GENERAL CONFEDERATION OF LABOUR, France's largest labour union federation. The CGT was formed in 1895 and united in 1902 with the Fédération des Bourses du Travail (Federation of Labour Exchanges). The confederation advocated the use of collective bargaining and the general strike to gain economic ends, but it was also concerned with achieving more revolutionary social changes through class warfare. In 1906 Syndicalists took control of the CGT, but by World War I the leadership was sufficiently moderate to support the government in the war.

In 1921 the CGT expelled its more radical unions, which were led by Anarchists, Syndicalists, and Communists. They responded by forming the Confédération Générale du Travail Unitaire; this organization rejoined the CGT in 1936. By supporting the Popular Front government of the 1930s, the CGT won a number of victories, including a 40-hour week and an all-round wage increase ranging from 7 to 15 percent. Shortly after World War II, the CGT became closely allied with the Communist Party; Léon Jouhaux and four other members of the executive board left the CGT in 1947 to form the Confédération Générale du Travail–Force Ouvrière in 1948.

The CGT is stronger among production workers and blue-collar civil servants than are the other two principal French union federations. It is a member of the World Federation of Trade Unions.

Confédération Générale du Travail–Force Ouvrière (CGT–FO), English GENERAL CONFEDERATION OF LABOUR–WORK FORCE, French labour union federation most influential among white-collar civil servants and clerical workers. It was formed in 1948 as a result of a split within the Confédération Générale du Travail (CGT). The split occurred in 1947, when Léon Jouhaux (the first head of CGT–FO) resigned along with four other members of the CGT executive board. Their resignations were caused by their objection to the pro-Communist political position of the CGT, which became most evident during the general strike of 1947.

The CGT–FO is socialist in outlook but not officially connected with the French Socialist

Party. It is a member of the International Confederation of Free Trade Unions, which Jouhaux helped to found.

Confederation group, Canadian English-language poets of the late 19th century whose work expressed the national consciousness inspired by the Confederation of 1867. Their transcendental and romantic praise of the Canadian landscape dominated Canadian poetry until the 20th century. The Confederation group is also called the Maple Tree school because of the love characteristically shown for that dominant feature of the Canadian landscape. The group includes four poets, all born between 1860 and 1862: Charles G.D. Roberts, whose *Orion and Other Poems* (1880) heralded the movement; Bliss Carman, who wrote lyrics on nature, love, and the open road; Archibald Lampman, outstanding for his vivid descriptions of nature; and Duncan Campbell Scott, who composed ballads and dramas of the northern Ontario wilderness.

The group's members wrote in a classic form, often on themes of love or philosophical speculation against the backdrop of nature; and they all reacted to the growing industrialization of Canada by retreating to the as yet unspoiled wilderness.

Confederation of the Rhine: *see* Rhine, Confederation of the.

Confederazione Elvetica: *see* Switzerland.

Confederazione Generale Italiana del Lavoro (CGIL), English GENERAL ITALIAN CONFEDERATION OF LABOUR, Italy's largest trade union federation. It was organized in Rome in 1944 to replace the dissolved Fascist syndicates. Its founders, who included Communists, Social Democrats, and Christian Democrats, intended it to be the sole labour federation in Italy and to be generally independent of political parties. Within three years, however, Roman Catholics left the CGIL, on the ground that it had become Communist dominated, and formed the Libera Confederazione Generale Italiana dei Lavoratori (LCGIL). Opposition to the CGIL became firmly established in 1950 with the founding of the Confederazione Italiana Sindacati Lavoratori (CISL), which draws its support mainly from workers with Christian Democratic leanings, and the Unione Italiana del Lavoro (UIL), which consists of workers of socialist and republican tendencies. The CGIL remained primarily a Communist group, affiliated with the World Federation of Trade Unions.

Confederazione Italiana Sindacati Lavoratori (CISL), English ITALIAN CONFEDERATION OF SYNDICATED LABOURERS, Italy's second largest trade union federation. The CISL was formed in 1950 by the merger of the Libera Confederazione Generale Italiana dei Lavoratori and the Federazione Italiana del Lavoro. From its founding it had strong ties with Roman Catholics and Christian Democrats. It vigorously opposed Italy's largest trade union federation, the Communist-led Confederazione Generale Italiana del Lavoro (CGIL). The CISL has been much less militant than the CGIL and has viewed workers' problems within their current economic and social context. The CISL is affiliated with the International Confederation of Free Trade Unions.

Confederaziun Helvetica: *see* Switzerland.

Conference of ——— : *see under* substantive word or words (*e.g.*, San Remo, Conference of).

Conference on Science and World Affairs: *see* Pugwash Conferences.

Confessing Church, German BEKENNENDE KIRCHE, movement for revival within the German Protestant churches that developed during the 1930s from their resistance to Adolf Hitler's attempt to make the churches an instrument of National Socialist (Nazi) propaganda and politics. The German Protestant tradition of close cooperation between church and state, as well as dislike for the Weimar Republic that governed Germany after World War I, at first caused the churches to take a favourable attitude toward Hitler. But Hitler's church party, the German Christians, gained control of the German Evangelical Church, a federation formed in 1933 of Lutheran, Reformed, and United territorial churches. Ludwig Müller, supported by the Nazis, was elected *Reichsbischof* ("imperial bishop") and threatened the authoritative position of the Scriptures and the confessional writings of the Reformation by tolerating the Nazi doctrine of the racial superiority of so-called Aryans.

In opposition to the German Christians, the Young Reforming Movement was formed within the churches under the leadership of Hanns Lilje, Martin Niemöller, and others. In November 1933 Niemöller founded the Pastors' Emergency League, which resisted the programs of the German Christians. The Synod of Barmen was held in May 1934, and its theological declaration transformed the defensive movement against Nazi control of the churches into an organized revival, especially where German territorial churches were subject to Nazi administration.

At the end of 1934, at the second synod of the Confessing Church at Dahlem, the church proclaimed its emergency law: the true church in Germany was that which accepted the Barmen Declaration, and, where church leadership was no longer faithful to the true confession, ministers and parishes were to follow the orders of the Confessing Church. Thus, in practice, two Protestant churches developed in Germany: the one under state control and the Confessing Church, which the state did not recognize. The Confessing Church, together with the churches of Bavaria, Württemberg, and Hanover (which had remained independent of Nazi rule), formed the provisional government of the German Evangelical Church.

In 1936 internal confessional and political differences led the Lutheran territorial churches to form the Council of the Evangelical Lutheran Church in Germany, thus eroding the unity of the Confessing Church. The Reformed and United sections of the Confessing Church remained particularly active in protesting against euthanasia and the persecution of the Jews. Nazi pressure was gradually intensified, and increasingly the Confessing Church was forced underground. In 1937 Niemöller and other clergy were arrested. After the outbreak of World War II in 1939, the Confessing Church continued, although it was seriously handicapped by the conscription of clergy and laity. In 1948 it ceased to exist when the territorial churches formed the reorganized Evangelical Church in Germany.

Confessio Augustana (Lutheran confession): *see* Augsburg Confession.

Confessio Belgica: *see* Belgic Confession.

Confessio Bohemica: *see* Bohemian Confession.

Confessio Gallicana (French Reformed Church statement of faith): *see* Gallican Confession.

Confessio Scoticana (Scottish Reformed Church creedal document): *see* Scots Confession.

confession, in criminal law, a voluntary statement made by a person charged with a crime in which he acknowledges that he is guilty of committing that crime. The statement may be made in court in the course of legal proceedings, or it may be made out of court to any person, either an official or a nonofficial.

A confession admits the entire criminal charge, whereas an admission covers only particular facts in the charge. Although a confession is competent evidence of guilt, it is not necessarily sufficient evidence of guilt. It must usually be corroborated by other competent evidence. And most important, the circumstances under which the confession was given may negate its value by making it inadmissible as evidence. *See also* interrogation.

confession, in the Judeo-Christian tradition, the acknowledgment of sinfulness in public or private, regarded as necessary to obtain divine forgiveness. The need for confession is frequently stressed in the Bible. The mission of the Old Testament prophets was to awaken in the people a sense of sinfulness and an acknowledgment of their guilt, both personal and collective. Before the destruction of the Temple of Jerusalem (AD 70), the sin offerings on the Day of Atonement (Yom Kippur) were prefaced by a collective expression of sinfulness (Lev. 16:21), and, since the destruction of the Temple, the Day of Atonement has continued in Judaism as a day of prayer, fasting, and confession.

In the New Testament the public ministry of Jesus was prepared for by John the Baptist, who baptized the people; the baptism was accompanied by a public confession of sins (Matt. 3:6). The necessity of confession is discussed in many places in the New Testament, although there is no direct evidence that confession had to be specific or detailed or that it had to be made to a priest.

A detailed confession to a bishop or priest, however, appeared early in the church's history. In the 5th-century discipline of the Roman Church, the practice was to hear confessions at the beginning of Lent and to reconcile the penitents on Holy Thursday. Gradually, however, the practice of reconciling, or absolving, sinners immediately after confession and before fulfillment of penance was introduced. By the end of the 11th century, only notorious sinners were reconciled on Holy Thursday. Often, those guilty of serious sins put off penance until death approached. To correct this abuse, the fourth Lateran Council (1215) established the rule that every Christian should confess to a priest at least once a year.

In modern times the Roman Catholic Church teaches that penance is a sacrament, instituted by Christ, in which a confession of all serious sins committed after Baptism is necessary. The doctrine of the Eastern Orthodox churches concerning confession agrees with that of the Roman Catholic Church.

During the Reformation the Church of England resisted attempts to have all references to private confession and absolution removed from the prayer book. In the 19th century, the Oxford Movement encouraged a revival of private confession, and it was accepted by some Anglo-Catholics. Many Anglicans, however, favour the general confession and absolution of the Communion service.

Most Protestants regard the general confession and absolution of the Communion service as sufficient preparation for the Lord's Supper. Among Lutherans, private confession and absolution survived the Reformation for a time but were eventually given up by most members. John Calvin also recognized the value of private confession and absolution for those troubled in conscience, but he denied that such confession was a sacrament or that it was necessary for the forgiveness of sins. In some Pentecostal and Fundamentalist churches, confession of sins is an important part of the worship service.

Most Protestants consider auricular or private confession to be unbiblical and consider confession viewed as a sacrament to be equally

unbiblical. These Protestants stress that God alone can forgive sins.

confession, in literature, an autobiography, either real or fictitious, in which intimate and hidden details of the subject's life are revealed. The first outstanding example of the genre was the *Confessions* of St. Augustine (*c.* AD 400), a painstaking examination of the Saint's progress from juvenile sinfulness and youthful debauchery to conversion to Christianity and the triumph of the spirit over the flesh. Others include the *Confessions of an English Opium-Eater* (1822), by Thomas De Quincey, focussing on the writer's early life and his gradual addiction to drug taking, and *Confessions* (1781–88), the intimate autobiography of Jean-Jacques Rousseau. Also in the tradition are the "confession magazines," collections of sensational and usually purely fictional autobiographical tales popular in the mid-20th century.

confession of faith, formal statement of doctrinal belief ordinarily intended for public avowal by an individual, a group, a congregation, a synod, or a church; confessions are similar to creeds, although usually more extensive. They are especially associated with the churches of the Protestant Reformation.

A brief treatment of confessions of faith follows. For full treatment, *see* MACROPAEDIA: Rites and Ceremonies, Sacred.

The medieval Christian Church did not attempt an official codification of its doctrine. The creeds inherited from antiquity (Nicene Creed) or formulated in the early Middle Ages (Apostles' Creed, Athanasian Creed) were used in liturgical worship to confess the Christian faith (*see* creed). Certain doctrinal points were defined by councils as a result of doctrinal controversies. A decree on the seven sacraments issued by the Council of Ferrara-Florence in 1439 was a statement concerning one important part of the doctrinal system. But there was still no codification of doctrine. Nor did the heretical movements in the Middle Ages produce comprehensive declarations of faith.

The Reformation in the 16th century led to the formulation of declarations aiming at a definition of all the main points of the doctrinal system. Most of these documents were compiled with the purpose of expressing the church's doctrine; a few of them originally served other purposes (*e.g.*, Luther's catechisms) but were soon given the rank of doctrinal standards.

The first confessional documents of the Reformation were the drafts preceding the Augsburg Confession of 1530. This example set by the Lutherans was followed by the other Reformation churches, and it was even followed by the Council of Trent (1545–63), whose decrees and canons, together with the *Professio fidei Tridentina* of 1564, were a codification of Roman Catholic doctrinal tenets.

Other important Protestant confessions include the Lutheran Schmalkaldic Articles (1537), Formula of Concord (1577), and Book of Concord (1580); the Reformed Helvetic Confessions (1536, 1566), Gallican Confession (1559), Belgic Confession (1561), Heidelberg Catechism (1563), and Canons of Dort (1619); the Presbyterian Westminster Confession (1648); and the Anglican Thirty-nine Articles (1571).

confessional, in Roman Catholic churches, box cabinet or stall in which the priest sits to hear the confessions of penitents. The confessional is usually a wooden structure, with a compartment (entered through a door or curtain) in which the priest sits and, on one or both sides, another compartment or compartments for penitents; the latter is separated from the priest's compartment by a partition, with a latticed opening for the penitent to speak through, and contains a step on which he kneels. By this arrangement the priest is hidden; the penitent may or may not be visible to others. Confessionals often form part of the architectural scheme of the church, but they may be movable pieces of furniture.

In its present form the confessional dates no farther back than the 16th century. Before that time the priest normally administered the sacrament in its private form while seated on a chair in some part of the church; the penitent stood or sat beside him and knelt for the absolution. St. Charles Borromeo first ordered the use of a metal grill between priest and



"The Confessional," oil painting by Giuseppe Maria Crespi; in the Galleria Sabauda, Turin, Italy
SCALA—Art Resource/EB Inc

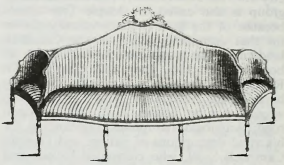
penitent in Milan in 1565, and the practice spread rapidly.

Confessions, Book of, compilation of creeds and confessions that was prepared by a committee of the United Presbyterian Church in the U.S.A. and was adopted by that church in 1967. It includes the Nicene Creed, the Apostles' Creed, the Scots Confession (1560), the Heidelberg Catechism (1562), the Second Helvetic Confession (1566), the Westminster Confession and the Westminster Shorter Catechism (1648), the Barmen Declaration (1934), and the new Confession of 1967.

The union that formed the United Presbyterian Church in the U.S.A. in 1958 had stipulated that the new church would draft "a brief contemporary statement of faith." The assumption had been that this new statement would be a brief and simple version of the Westminster Confession. The committee that began work on the project in 1959 soon found, however, that a simplified version of a 300-year-old confession would not suffice as a statement of faith. The committee then secured permission to develop a Book of Confessions that would deal adequately with the problem of continuity and tradition and would include a new creed.

The Confession of 1967 was designed explicitly to presuppose, continue, and supplement the historic creeds of the Book of Confessions without repeating their contents. Comprising three major sections, "God's Work of Reconciliation," "The Ministry of Reconciliation," and "The Fulfillment of Reconciliation," the new creed was primarily concerned with the task of the church, Presbyterian or any other, in the modern world. Reconciliation in Christ, the confession asserted, must mean the willingness to reexamine even the contemporary church's conceptions of right and wrong. The confession illustrates this point briefly by reference to the modern problems of racism, war, poverty, and the breakdown of personal relations. The Confession of 1967 also expresses clearly the church's conviction that critical study of the Bible is an aid to, rather than an attack upon, the use of the Bible in the church.

confidante, type of sofa that has a seat at each end separated from the main seat by an



Confidante designed by George Hepplewhite and illustrated in his *Cabinet-Maker and Upholsterer's Guide,* London, 1788
By courtesy of the Victoria and Albert Museum, London

upholstered arm. This form was first used in France in the mid-18th century and was subsequently introduced into England. George Hepplewhite illustrated one in *Cabinet-Maker and Upholsterer's Guide* (1788).

The name was revived in the second half of the 19th century for various types of seats accommodating two or more couples side by side, each couple facing a different direction. A common form was an S-shape for two couples, the couples seated side by side but facing in the opposite direction.

confidence game, any elaborate swindling operation in which advantage is taken of the confidence the victim reposes in the swindler. Some countries have created a statutory offense of this name, though the elements of the crime have never been clearly defined by legislation, and the scope of proscribed behaviour remains subject to varying interpretations among jurisdictions.

In its most highly developed form, the confidence game, which has generated its own jargon, victimizes wealthy and prominent individuals. In a typical scheme, an "inside man" induces the victim, or "mark," into a dishonest gambling establishment. There, the mark sees decoys, or "shills," who appear to be making big winnings. The inside man advances the mark's funds, and he is allowed to win with uncanny regularity. When he has reached the point at which he is convinced that additional investment will bring him a substantial win, or a "killing," the mark is persuaded to leave the game in order to obtain money or documents conveying title to property. When he returns and places his bet, his luck suddenly changes, and his fortune disappears in a matter of minutes.

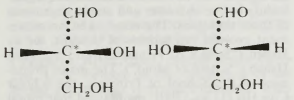
By the early 1900s, payoffs of as much as $100,000 attracted the interest of racketeers, particularly in the U.S. More elaborate schemes were devised in order to exploit sophisticated and wealthy victims. "Ropers," posing as rich financiers, industrialists, and millionaire sportsmen, began travelling the world in search of victims. The game itself took on more complicated and convincing formats. A popular swindle, known as past posting, required a dummy telegraph office that was used to persuade the mark that horserace results could be delayed long enough for him to bet on the winner after the race was won. As soon as the mark committed a large amount of money, sometimes as much as $250,000, the operators disappeared. Another game, called "the rag," used a fake brokerage house, where the victim was deceived by false stock quotations placed by swindlers, or "con men," posing as investment brokers.

Confidence games continue to flourish, pri-

marily because prominent victims rarely report them, for fear of being prosecuted for their own complicity in a criminal activity.

configuration, in chemistry, the spatial arrangement of atoms in a molecule. The configuration is usually depicted by means of a three-dimensional model (a ball-and-stick model), a perspective drawing, or a plane projection diagram.

Until late in the 20th century, the experimental determination of absolute or actual configuration (*i.e.,* the true three-dimensional form of the molecule) was a difficult process; therefore, there were few substances with known absolute configurations (*e.g.,* tartaric acid). Many configurations were, for convenience, assigned by correlation with glyceraldehyde, for which the following configurations (as represented by plane projection diagrams) have been determined:



d- or (+)-glyceraldehyde

l- or (−)-glyceraldehyde

The configuration of *d*-glyceraldehyde, in which the hydroxyl group is attached to the right of the asymmetric carbon centre (starred in the formulas), is designated as D, and the configuration of *l*-glyceraldehyde, in which the hydroxyl group is to the left of the asymmetric carbon, is designated as L. Thus, the complete designation of *d*-glyceraldehyde is given by D-*d*-glyceraldehyde (D to specify configuration and *d* to specify the direction of optical rotation); and that of *l*-glyceraldehyde, L-*l*-glyceraldehyde.

Today, optical and chemical methods make it possible to determine the absolute configuration of practically any molecule. In the most modern scheme for specifying absolute configurations, D-*d*-glyceraldehyde is designated (*R*)-(+)-glyceraldehyde, and L-*l*-glyceraldehyde is (*S*)-(−)-glyceraldehyde. The letters *R* and *S* denote the absolute configurations at the asymmetric carbon atoms according to a set of rules that assign priorities to the four attached atoms or groups, and the + and − signs indicate the directions of the optical rotations.

Compounds are then assigned D or L configurations on the basis of their genetic relationship with the appropriate form of glyceraldehyde. In the imagined transformation of glyceraldehyde to the substance whose configuration is in question, it is assumed that none of the steps involved causes any change in the configuration at the asymmetric carbon. For compounds containing several asymmetric carbon atoms, it is essential to specify which carbon atom was compared with glyceraldehyde. When the *R*-*S* system is used, the absolute configuration must be stated for each asymmetric carbon atom in the molecule.

confirmation, Christian rite by which the relation between man and God established previously in baptism is said to be confirmed (or strengthened and established in faith).

During the first several centuries of Christian history, when most of those who joined the church were adult converts from paganism, the baptism of these adults and the ceremony admitting them to the full rights of membership (equivalent to, but not yet called, confirmation) probably coincided. Early Christian theologians, therefore, closely connected the meaning and effects of confirmation with those of baptism. But as the baptism of infants rather than of adults became customary, a sharper distinction between baptism and confirmation became necessary. In those Christian churches where confirmation is still observed, its connection with and its distinction from baptism influence both the practice and the theological interpretation of the rite. (Virtually all Christian churches acknowledge baptism as a sacrament.)

The Roman Catholic church views confirmation as a sacrament instituted by Jesus Christ. It confers the gifts of the Holy Spirit (grace, strength, and courage) upon the recipient, who must be a baptized person at least seven years old. A bishop normally performs the rite, which includes the laying on of hands and anointing the forehead with chrism.

The Eastern Orthodox churches and some Eastern churches in communion with Rome permit a priest to administer confirmation. In Eastern Orthodoxy, the child generally receives the three sacraments of baptism, confirmation (*see* chrismation), and the first communion all in the same service.

After the Protestant Reformation, Anglicanism and Lutheranism retained a form of confirmation. In the Anglican church a bishop must administer the rite. Lutheranism rejects the sacramental definition of confirmation and considers it a public profession of the faith into which the candidate was baptized as an infant. In both Anglicanism and Lutheranism, confirmation is usually preceded by instruction in the catechism.

Other Protestant bodies deny that confirmation is a sacrament and ascribe its origin at the earliest to the Apostles, but they sometimes use the term confirmation for acceptance of baptized members into full membership of the church, including the right to receive Holy Communion.

confiscation, in property law, act of appropriating private property for state or sovereign use. Confiscation as an incident of state power can be traced back to the Roman Empire and earlier; it has existed in some form in most countries around the world. It was most often predicated on the doing of some prohibited act resulting in the forfeiture by the wrongdoer of his property to the state or crown. International crimes, such as acts of war, still carry the penalty of confiscation, although it is not often exercised. *See also* eminent domain.

Confiscation Acts (1861–64), in U.S. history, series of laws passed by the federal government during the American Civil War that were designed to liberate slaves in the seceded states. The first Confiscation Act, passed on Aug. 6, 1861, authorized Union seizure of rebel property, and it stated that all slaves who fought with or worked for the Confederate military services were freed of further obligations to their masters.

President Abraham Lincoln objected to the act on the basis that it might push border states, especially Kentucky and Missouri, into secession in order to protect slavery within their boundaries. He later convinced Congress to pass a resolution providing compensation to states that initiated a system of gradual emancipation, but the border states failed to support this plan. And Lincoln repudiated the position of Generals John C. Frémont and David Hunter, who proclaimed that the first Confiscation Act was tantamount to a decree of emancipation.

The second Confiscation Act, passed July 17, 1862, was virtually an emancipation proclamation. It said that slaves of civilian and military Confederate officials "shall be forever free," but it was enforceable only in areas of the South occupied by the Union Army. Lincoln was again concerned about the effect of an antislavery measure on the border states and again urged these states to begin gradual compensated emancipation.

On March 12, 1863, and July 2, 1864, the federal government passed additional measures ("Captured and Abandoned Property Acts") that defined property subject to seizure as that owned by absent individuals who supported the South. The Confederate Congress also passed property confiscation acts to apply to Union adherents. But the amount of land actually confiscated during or after the war by either side was not great. Cotton constituted nearly all the Southern nonslave property confiscated.

With the issuance of the Emancipation Proclamation (1863) and passage of the Thirteenth Amendment to the Constitution, however, Southern slaveholders lost an estimated $2,000,000,000 worth of human property.

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conflict, in psychology, the arousal of two or more strong motives that cannot be solved together. A youngster, for example, may want to go to a dance to feel that he belongs to a group and does what his friends do. For an adolescent in Western culture, that is a strong motive. But the youth may be a clumsy dancer and sensitive to the real or imagined ridicule of his fellows. Therefore, he also has a motive to avoid the dance to escape humiliation. He is in a dilemma; whether he goes or stays he will experience distress. This type of situation is termed an approach-avoidance conflict. Psychologically, a conflict exists when the reduction of one motivating stimulus involves an increase in another, so that a new adjustment is demanded.

Conflicts are not all equally severe. A conflict between two desired gratifications (approach-approach conflict), as when a youth has to choose between two attractive and practicable careers, may lead to some vacillation but rarely to great distress. A conflict between two dangers or threats (avoidance-avoidance conflict) is usually more disturbing. A man may dislike his job intensely but fear the threat of unemployment if he quits. A conflict between a need and a fear may also be intense. A child may be dependent on his mother but fear her because she is rejecting and punitive. The conflicts that involve intense threat or fear are not solved readily but make the person feel helpless and anxious. Subsequent adjustments may then be directed more to the relief of anxiety than to the solution of real problems.

Conflicts are often unconscious, in the sense that the person cannot clearly identify the source of his distress. Many strong impulses—such as fear and hostility—are so much disapproved by the culture that a child soon learns not to acknowledge them, even to himself. When such impulses are involved in a conflict, the person is anxious but does not know why. He is then less able to bring rational thinking to bear on the problem.

conflict of laws: *see* laws, conflict of.

conformation, any one of the infinite number of possible spatial arrangements of atoms in a molecule that result from rotation of its constituent groups of atoms about single bonds.

Different conformations are possible for any molecule in which a single covalent bond connects two polyatomic groups, in each of which at least one atom does not lie along the axis of the single bond in question. The simplest such molecule is that of hydrogen peroxide, in which the two hydroxyl groups can rotate with respect to one another about the axis of the oxygen-oxygen bond. The presence of more than one such single bond in a molecule—as in that of propane ($CH_3-CH_2-CH_3$), for example—merely adds to the complexity of the situation without changing its nature. In molecules such as those of cyanogen ($N\equiv C-C\equiv N$) or butadiyne ($H-C\equiv C-C\equiv C-H$), all the atoms lie along the axis of the central single bond, so that no distinguishable conformations exist.

In general, every distinguishable conformation of a molecule represents a state of different potential energy because of the operation of attractive or repulsive forces that vary with the distances between different parts of the structure. If these forces were absent, all conformations would have the same energy, and rotation about the single bond would be completely free or unrestricted. If the forces are strong, different conformations differ greatly in energy or stability: the molecule will ordinarily occupy a stable state (one of low energy) and undergo a transition to another stable state only upon absorbing enough energy to reach and pass through the unstable intervening conformation.

The intramolecular forces in ethane, for example, are so weak that their existence can be inferred only from subtle effects on thermodynamic properties such as enthalpy and entropy. (Even if internal rotation in ethane were severely restricted, its three most stable conformations are indistinguishable.) The molecular structures of certain more complex compounds, however, impose such strong barriers to rotation that stereoisomeric forms—differing only in conformation—are stable enough to be isolated.

Confrérie de la Passion, English CONFRATERNITY OF THE PASSION, association of amateur actors drawn from the merchants and craftsmen of Paris, for the presentation of religious plays. In 1402 Charles VI granted them permission to produce mystery plays in the city, and their seasonal performances came to be highly regarded. Their privileges were renewed in 1518, with the consequence that none outside the Confrérie could organize plays, thus giving them a monopoly over all acting in Paris.

In the years that followed, however, their performances came under increasing attack from churchmen, who protested the liberties taken with religious subjects. The confraternity was accused of adding apocryphal matter to the plays to make them longer and of introducing indecent farces and pantomimes into their productions. It was also charged that they had extended their playing season until it lasted six or seven months, keeping the people from their business. Driven from their first hall as a result of these scandals, the confraternity built a new theatre, the Hôtel de Bourgogne, completed in 1548. In the same year, however, they were forbidden to perform religious plays and gradually gave up acting altogether, preferring to lease the theatre to traveling companies. They eventually acquired a permanent company that remained with the Hôtel de Bourgogne until 1673, when it left to merge with other companies that were later to form the Comédie-Française.

The confraternity's monopoly on acting in Paris continued to hinder professional acting companies until 1595, when provincial actors were permitted to perform at the fairs of Saint-Germain and Saint-Laurent. The association was finally dissolved by an edict in 1676.

Confucianism, the way of life propagated by Confucius in the 6th–5th century BC and followed by the Chinese people for more than two millennia. It has traditionally been the substance of learning, the source of values, and the social code of the Chinese. Confucianism has sometimes been viewed as a religion and sometimes as a philosophy. More than a creed, it affected the daily life and culture of Taoists, Buddhists, and Christians alike in China before the establishment of the communist regime. Its influence has also extended to Korea, Japan, and Vietnam.

A brief treatment of Confucianism follows. For full treatment, *see* MACROPAEDIA: Confucianism, Confucius and.

Confucian thought before the Han dynasty. Confucius (551–479 BC) lived in an era of political violence and social disintegration in China. As a master teacher concerned with modes of thought and action that could be potentially restorative of order and harmony, Confucius was said to have attracted 3,000 students, of whom 72 were close disciples. Confucianism became considered in the late Chou period one of six major philosophical schools, the others being Taoism, Moism, Legalism, the School of Yin–Yang, and the School of the Dialecticians. It was not until the Han dynasty (206 BC–AD 220), however, that Confucianism was adopted as the state orthodoxy.

The teachings of Confucius were transmitted to all later generations through the *Lun yü* (*Analects,* or "Conversations"), which were compiled by his disciples. Believing in the perfectibility of all persons, Confucius focused his teachings on his concept of jen—variously translated as "love," "human-heartedness," and "virtue." In the most complete sense, jen signified supreme moral achievement and excellence in character in accord with li (ritual norms) and the principles of *chung* (loyalty to one's true nature), shu (reciprocity), *yi* (righteousness), and *hsiao* (filial piety). The paradigmatic individual was the *chün-tzu* (literally, "prince-son"), who in Confucius' view attained nobility by means of character rather than inheritance. Confucius found models of inspiration in legendary sage-kings who ruled by moral suasion rather than by might.

Revered as the "Second Sage" of the Confucian heritage, Mencius (*c.* 371–289 BC) has been remembered most notably for two important and interrelated theories: (1) the intrinsic goodness of human nature and (2) "kingly government." Mencius sharply contrasted governments established on the basis of moral virtue (jen) and of the mandate of heaven with those established on the basis of tyrannical authority. Indeed, Mencius defended the right of the people to rebel against rulers intent only on power and profit. With regard to human nature, Mencius asserted that all people were innately good, endowed with compassion, right judgment, propriety, and wisdom. Evil, therefore, was self-violation, self-abandonment. Self-cultivation, on the other hand, aimed at recovering one's "childlike heart" and serving heaven. Mencius' theory of innate goodness, though held as orthodox by later tradition, was challenged by the Confucian master Hsün-tzu (*c.* 298–*c.* 230 BC), who stressed the corrective role of cultural norms for naturally evil tendencies.

Classical texts considered important in the Confucian (Ju) tradition included the *Shu Ching* ("Classic of History"), the *Shih Ching* ("Classic of Poetry"), the *I Ching* ("Classic of Changes"), the *Li Chi* ("Collection of Rituals"), and the *Ch'un ch'iu* ("Spring and Autumn Annals"). In addition to the *Lun Yü* and the *Mencius,* other classical texts, such as the *Ta hsüeh* ("Great Learning"), *Chung yung* ("Doctrine of the Mean"), and the *Hsiao Ching* ("Classic of Filial Piety"), also became of central importance.

Confucianism during the Han dynasty. Following centuries of feudal wars in the late Chou period, China was unified with the founding of the Ch'in dynasty (221–206 BC). Though the Ch'in court's legalistic authoritarianism led to the suppression of free philosophical inquiry and the infamous Burning of the Books, the succeeding Han dynasty adopted Confucianism as state orthodoxy. A cult of Confucius developed, and the mastery of Confucian literature became the basis for a civil service examination system that survived until the waning years of the Ch'ing dynasty in the first decade of the 20th century. The primary characteristic of Confucianism in the Han period was eclecticism. Tung Chung-shu (*c.* 179–*c.* 104 BC), the greatest of Han Confucian scholars, attempted to synthesize the cosmological theories of the Yin–Yang school, numerological speculation and divination, and classical Confucian positions on human nature and government.

Buddhist influence and the development of neo-Confucianism. Active Buddhist propagation in China began sometime around the 1st century AD. In the period from the fall of the Han dynasty (AD 220) to the founding of the Sung dynasty (AD 960), Confucianism remained central to Chinese culture, but Buddhism and Taoism became the major stimuli to religious practice and philosophical inquiry. The movement to reestablish the supremacy of the Confucian heritage, initiated in the Sung period, is commonly referred to as neo-Confucianism. Though the movement was predicated on a total rejection of Buddhism and Taoism, its religio-philosophical agenda was nevertheless influenced significantly by the character and accomplishments of those traditions. The neo-Confucian movement evolved two schools of thought, the Li Hsüeh ("School of Principle") and the Hsin Hsüeh ("School of Mind"). The major proponent of the School of Principle, the scholar Chu Hsi (1130–1200), maintained that moral cultivation entailed the rational investigation of all things in order to fully comprehend their essential principle (*li*). According to Chu Hsi, "If we know why things are as they are, our will will not be perplexed, and if we know what they should be, our action will not be wrong." Lu Chiu-yüan (1139–1193) and, later, Wang Yang-ming (1472–1529) attacked such rationalism, calling rather for the investigation of mind (*hsin*) and the preservation of its original purity. Though the Lu–Wang School of Mind was very influential, at times eclipsing Chu Hsi's system, clearly the most profound impact on Chinese thought was made by the Confucian School of Principle.

Confucianism in the modern period. Direct confrontation of China with Western culture and governments, beginning in the mid-19th century, led to radical reconsideration of the Chinese worldview and way of life. When Confucianism lost its institutional support at the close of the Ch'ing dynasty and the beginning of the Republican era (1911), there were both scholars and leaders who sought to preserve something of its heritage and those who regarded it as a relic of the past. As a school of thought and practice, Confucianism has passed from the scene in modern China. Yet its principles and paradigms remain embedded in Chinese culture.

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Confucius, Chinese (Wade-Giles) K'UNG-FU-TZU, or K'UNG-TZU, or (Pinyin) KONGFUZI, or KONGZI, original name K'UNG CH'IU, literary name CHUNG-NI (b. 551 BC, Ch'ü-fu, state of Lu [now in Shantung province, China]—d. 479, Lu), China's most famous teacher, philosopher, and political theorist, whose ideas have influenced the civilizations of all of eastern Asia.

A brief treatment of Confucius follows. For full treatment, *see* MACROPAEDIA: Confucianism, Confucius and.

Although little reliable information exists on Confucius' early life, his family was probably of the impoverished nobility; he was orphaned at an early age and grew up poor. He was largely self-educated but apparently became the most learned man of his day.

Learning, however, was not his greatest interest; Confucius was deeply disturbed by the political and social conditions of his times. Unable to obtain an official position in which he might implement his ideas of reform, he spent the greater part of his life educating a group of disciples.

Confucius was not a religious leader in the

ordinary sense, for his teaching was essentially a social ethic. Though his interest in books was secondary to his passion for reform, many of the ancient classics were attributed to his authorship and editorship. These books, interpreted in Confucian terms, formed the basic curriculum of Chinese education for more than 2,000 years.

cong (Chinese jade): *see* ts'ung.

cong-hong (Chinese guild): *see* cohong.

Cong Tum (town, Vietnam): *see* Kon Tum.

conga, a dance of African origin, developed primarily in Cuba but popular in many Latin-American countries. The music is in $\frac{2}{4}$ time and is based on a two-measure rhythmic pattern, with a symmetrical first measure and a syncopated second, serving as a basis for constantly repeated short phrases of two to four measures. Dancers stand behind one another, forming a chain, and march in a 1–2–3–kick pattern. The conga was popular as a ballroom dance in the 1930s and early 1940s.

Congaree River, river, central South Carolina, U.S., formed by the confluence of the Broad and Saluda rivers at Columbia. After a course of about 52 miles (84 km), part of which forms the boundary between Richland and Calhoun counties, the Congaree joins the Wateree southeast of Columbia to become the Santee River. The Congaree, named for an Indian tribe, is navigable. The Congaree Swamp, 70,000 acres (28,340 hectares), about 20 miles (32 km) southeast of Columbia, is one of the last of the South's great virgin swamp forests. Its 700-year-old cypress and giant pine and oak trees have been described as "the forest of champions, the redwoods of the East."

Congaree Swamp National Monument, national monument in central South Carolina, U.S., 20 miles (32 km) southeast of Columbia,



Congaree Swamp National Monument, South Carolina
Robert C. Clark/Stock Option

authorized in 1976. Containing the last significant tract of virgin Southern bottomland hardwoods in the southeastern United States, the park covers 15,138 acres (6,126 hectares) of alluvial floodplain on the Congaree River. The tract includes loblolly pine, sweet gum, water tupelo, hickory, and oak—some of record size—and also rare and endangered species of both plants and animals.

congé d'élire, English PERMISSION TO ELECT, formal message conveying the English sovereign's permission for the dean and chapter of the cathedral of a vacant bishopric to proceed in regular chapter to a new election. Before the Norman Conquest (1066) it was the king's prerogative to appoint bishops to vacant sees. This came to be contested by the popes, though the sovereign usually was able to secure the appointment of his nominees.

The appointment of bishops was vested in the crown by the Annates' Statute (1534) of Henry VIII. The statute provided that when the king's *congé d'élire* was sent to the dean and chapter, a letter missive accompanied it in which was given the name of the person to be elected. In the event of a delay of 12 days to elect, the king might appoint to the see by letters patent; if, however, the dean and chapter delayed more than 20 days to elect in accordance with the letter missive, penalties of praemunire came into effect, which allowed the crown to punish the inactive clergy. Another act was passed in 1547 providing for nomination by letters patent in all cases, but this was repealed under Mary Tudor. The act of 1534, reinstated by the Act of Supremacy in 1559, has operated in the Church of England since that time except that praemunire was repealed in 1967.

congenital disorder, particularly in human beings, any abnormality of structure, deficiency of function, or disease that is present at the time of birth, whether caused by genetic transmission, accident, or infection. The more restrictive term birth defect denotes abnormalities present at birth apart from such diseases as syphilis that can attack the child before birth and damage structures already formed. Among infections possibly only rubella (German measles) affects the embryo during its period of development, producing true malformations.

The unborn human infant acquires its essential form, and its organs and tissues are all laid down and defined, within the first eight weeks after conception. This is the period during which the child is often, but not always, described as an embryo; only afterward is it called a fetus. After the first eight weeks there is differentiation and growth, and some anomalies may arise, especially of the brain, eye, and inner ear; but all gross disturbances of form will already have occurred. The distinction between embryo and fetus is useful if it emphasizes the early period of development critical in the production of congenital defects. Many biochemical defects may not be manifest until the metabolism is separated at birth from that of the mother; all such defects, however, have their inception in an earlier failure to develop some enzyme system.

Causes. Grossly malformed children have at different times and in different cultures inspired either awe or revulsion. They have been regarded as the playthings of the gods, and some gods have been modeled on human or animal malformations. The defects have been regarded as signs and portents or as punishment for sin. The ancient belief that they are produced by maternal emotional impressions or shock still lingers today. In its more absurd form it is expressed by such things as the belief that if a mother is frightened by a frog or a rabbit, the child in consequence will lack the top of its head or may have a harelip. There is no evidence in favour of such beliefs. Nor is there evidence that maternal emotional stress or anxiety contributes in any nonspecific way to the production of malformations.

It must be emphasized that birth defects do not all have the same basis, and it is even possible for apparently identical defects in different individuals to result from different causes. Though the basis of most defects is still uncertain, almost all are due to genetic factors, environmental influences, or a combination of these two. Genetic factors must include not only inherited familial defects but also spontaneous genetic mutations and chromosomal anomalies arising during division of the cells.

Some birth defects can be recognized as the direct outcome of Mendelian dominant or recessive inheritance. Two genes at the same location—these genes are called alleles—on a set of two chromosomes—homologous chromosomes—represent alternative characteristics, such as yellowness or greenness of peas. In dominant inheritance only one of the alleles need be for the characteristic; in recessive inheritance the pair of alleles must be identical: that is, if one of the two genes for colour of peas is for yellow and one is for green, the yellow is inherited; if both are for green—a recessive trait—greenness is inherited. Such direct inheritance may be modified by the environment; the manifestation of most of these defects may be modified in such a way that the pattern of Mendelian inheritance is obscured—some defects may be difficult to recognize in individual cases, and large and detailed pedigrees may be necessary to determine patterns of their recurrence. A high incidence of defects occurring in the offspring of cousin marriages may point to recessive inheritance of conditions rare in the community. The skeletal anomalies of achondroplasia (abnormal conversion of cartilage into bone with resultant dwarfism) and osteogenesis imperfecta (a disease marked by fragility of the bones) exemplify defects with dominant inheritance. Albinism (absence of pigment in skin, hair, and eyes), microcephaly (possession of an abnormally small or imperfectly developed brain), and many inborn errors of metabolism are determined by recessive inheritance.

Such a relatively simple pattern of inheritance fails to explain many common anomalies, such as harelip (with or without cleft palate) and congenital dislocation of the hip, and yet these conditions do show some tendency to recur in families. It is thought possible that several sets of alleles—polygenic inheritance—may be involved, in which each defect would represent the summation of the operation of these several independent sets of alleles; and only when these come together, as they are more likely to do in offspring of kindred, does the defect appear. This pattern of inheritance is difficult to prove, but from mathematical study of many families, supporting evidence is accumulating. When the pattern operates, the occurrence of two defective children increases the probability of a third, in contrast to the constant ratio of risk when only one set of alleles is involved. A severe form of any anomaly, or an anomaly present in the sex in which it does not usually occur, carries a higher risk to members of the family. The relative risk of the anomaly within a kindred is proportionately greater for those anomalies that are rare in the community. In many other anomalies, such as heart defects, obstruction or narrowing of the gut, defects of the brain, kidneys, bladder, and urinary passages, there is little or no increased incidence in particular families, and polygenic inheritance appears an inadequate explanation.

In chromosomal defects, there is defective sharing of the chromosomes among the cells, usually during division of the sex cells; this results in a gross genetic error. Such gross genetic disturbances probably account for 25 to 30 percent of early abortions; but few affected offspring apart from those with Down syndrome (also called mongolism) survive to show birth defects. In inherited conditions,

such as achondroplasia and the blood disease hemophilia, the death rate before reproduction is so high that the gene concerned would be eliminated if it were not renewed by spontaneous mutation. In achondroplasia only one out of five individuals receives the dominant gene from the family. In the other four it appears as a spontaneous mutation. If a mutant, dominant gene produces a condition so severe that the affected individuals fail to reproduce, the condition cannot be recognized. This is probably a rare occurrence, but it cannot be proven or disproven. By increasing the mutation rate, nuclear and other high-energy radiation can increase the incidence of congenital defects.

The association of fetal anomalies with maternal rubella (German measles) infections and more recently with thalidomide has focussed attention on the possible effects of environmental factors. These had been extensively studied in free-swimming embryos, but the mammalian embryo was thought to be protected within the uterus. The incidence of fetal malformations due to maternal German measles varies in different epidemics and with the stage of the pregnancy at which the infection occurs. The greatest number of defects result when the infection occurs between the fifth and eighth week following the last menstrual period, but even then only rarely do as many as 20 percent of the infections cause defects. Even in epidemic periods the disease can be the cause of only 2 or 3 percent of all congenital defects. Such defects as deafness and cataracts result from infections during the fetal period; in earlier infections cardiovascular anomalies predominate. Thalidomide tends to involve the arms and legs. These are shortened, intermediate segments are missing, and the hands and feet are deformed. The embryo exposed to radiation may suffer damage to cells most actively dividing at that time, but this is very rarely the cause of human malformations. Despite observations in experimental animals, it is doubtful that shortage of oxygen or nutrient substance produces defects in man. When an abnormality is produced in an animal by drugs or other agents, the incidence and nature of the abnormality are often dependent on the species and strain of animal used; and the effect of the agent may be to cause a preexisting and latent genetic defect to become manifest rather than to act directly on the embryo and cause the defect.

The embryo floats cushioned in amniotic fluid and shielded in the maternal uterus, and it is extremely doubtful that physical injury ever determines a congenital defect. If the amniotic fluid is scanty near the end of the pregnancy, the fetus may be molded by continued pressure within or upon the uterus. Ears may be distorted or limbs bowed, but these defects of later fetal life often correct themselves.

A genetic factor can only express itself in a suitable environment. Much of the environment of the developing embryo is dependent on the operation of other genetic factors, and this is in part the basis of polygenic inheritance. Unknown and presumably chemical influences from the mother do, however, operate. Variations in the implantation and subsequent development of the placenta must also be important. Even when genetic factors are established, the genetically identical eggs of "identical" (monozygotic) twins may produce one affected and one unaffected child. This conditioning of the genetic inheritance by the environment is of the greatest importance. Its future understanding provides the best hope of limiting the occurrence of some abnormalities, in some cases by preventing the unmasking of harmful genetic factors by drugs, toxic agents, and maternal deficiencies. Unfortunately little is yet known of this interaction.

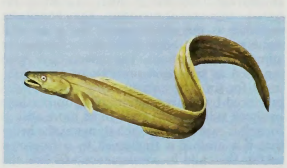
Incidence. The incidence of birth defects depends on what is classified as a defect. About 20 percent of all babies born dead, or dying in the first week of life, die because of some serious malformation. This is about six per thousand births. Significant malformations will usually be detectable in the first two weeks of life in just under 20 per thousand total births. By the age of five years, another five or six per thousand will have been recognized. When serious metabolic errors such as fibrocystic disease of the pancreas and defects undetected or appearing later are added, a figure of 30 per thousand births is probably a conservative estimate for significant birth defects. If all classifiable structural anomalies found on careful dissection are included, nearly half the population will show some anomaly and, if all local tissue malformations such as skin blemishes and moles are included, there will be few unaffected.

Some conditions, such as anencephaly (the absence of all or most of the brain), account for up to 4 percent of stillbirths and early neonatal deaths in Ireland and western Britain but may have an incidence as low as one-twentieth of this elsewhere. There is wide variation in the incidence of different defects in different racial groups. It is much less certain that the total incidence of congenital defects varies significantly.

Offspring with severe malformations do not survive the embryonic period, and all but a few chromosomal defects are eliminated as early abortions. Most defects represent a local failure of growth often allied to a failure of differentiation. This can include a failure to canalize a passage or failure of a septum (thin dividing wall) or ridge to fuse. When there is imbalance in the constituents present in an area, the part may be enlarged, and the useful functioning tissue reduced. Failure to differentiate and arrange cells properly is often also local, with an imbalance in their proportion in tissues and organs. Such areas of faulty development may range from skin nevi ("birthmarks") to totally malformed kidneys and disorganized brains. Cells not taking part in normal development may later proliferate, forming aggressive and malignant tumours (embryomas) or tumours that are found especially in testes and ovaries and that show a mixture of elements of the various embryonic layers (teratomas). Whether areas once formed degenerate or fail to grow because of disturbed blood supply or some degenerative disturbance is uncertain. *See also* entries on particular disorders (*e.g.,* cystic fibrosis of the pancreas; Down's syndrome).

congenital heart disease (medicine): *see* heart malformation.

conger eel, any of about 100 species of marine eels of the family Congridae (order Anguilliformes). Congers are scaleless eels with large heads, large gill slits, wide mouths, and strong teeth. They are usually grayish to blackish, with paler bellies and black-edged fins. Carnivorous fish found in all oceans, sometimes in deep water, conger eels may grow to a length of about 1.8 metres (6 feet). Many species, such as the European conger (*Conger conger*), are valued as food. The American conger, or sea eel (*C. oceanicus*), is a fierce game fish.



American conger (*Conger oceanicus*)
Painting by Richard Ellis

Congleton, district (borough), in the southeastern corner of the county of Cheshire, England, with a total of 82 sq mi (211 sq km). Most of the borough consists of level farming land typical of the Cheshire Plain, with a line of hills along the eastern side reaching 1,000 ft (305 m) in places and including Mow Cop, the birthplace of Primitive Methodism.

Silk spinning was introduced to Congleton in 1752, followed by cotton spinning in 1784. The silk industry declined in the first part of the 19th century, but textiles are still important, and are now supplemented by light industry, including engineering and paper trades.

The district's more than 20 parishes include the towns of Alsager, Middlewich, and Sandbach. Middlewich owes its name to its central position among the "wich," or "wych," towns of Cheshire and was important in Roman times for salt, which is still produced in large quantities in the vicinity of Middlewich and Sandbach. Sandbach, the district seat of administration, is a centre for the manufacture of commercial motor vehicles.

The rural hinterland is rich dairy farming country, and market gardening is also important. There are attractive villages and fine buildings, including Little Moreton Hall, one of the finest black-and-white houses in England. The Jodrell Bank observatory's radio telescopes are situated in the north of the borough. Pop. (1981 prelim.) town, 23,834; (1982 est.) district, 80,600.

conglomerate, in petrology, lithified sedimentary rock consisting of rounded fragments greater than 2 millimetres (0.08 inch) in diameter. It is commonly contrasted with breccia (*q.v.*), which consists of angular fragments. Conglomerates are usually subdivided according to the average size of their constituent materials into pebble (fine), cobble (medium), and boulder (coarse).



Old Red Sandstone conglomerates, Devonian age, from the Ardennes, Belg.
By courtesy of Ernst ten Haaf

A brief treatment of conglomerates follows. For full treatment, *see* MACROPAEDIA: Minerals and Rocks.

Classification of conglomerates is based on the range of lithologies represented in pebbles, degree of size-sorting, and composition of matrix. Each of these criteria has genetic implications. There are two broad types of conglomerates: (1) those whose pebbles are generally of one lithology, well-sorted (*i.e.,* narrow size distribution), and matrix-poor; and (2) those with a heterogeneous pebble lithology, poorly sorted, and with abundant matrix. The degree of sorting indicates the method of deposition. Well-sorted conglomerates are produced by normal water currents, whereas the poorly-sorted varieties result from rapid deposition, as in the case of mudflows or subaqueous slides. Well-sorted conglomerates imply erosion and deposition over a long

time period with a loss of unstable minerals and a rock dominated by quartz or chert pebbles; the geologic environment of deposition is usually a widespread basal formation of overlapping marine units. The poorly sorted conglomerates have a matrix of clay or sand and, by analogy with sandstones, are termed graywacke conglomerates. The abundance of unstable minerals with poor sorting indicates rapid mechanical erosion and deposition, as in alluvial fans or in density currents (*i.e.*, highly turbid bottom currents) resulting from gravity flows. In contrast to well-sorted conglomerates, formations are usually thick and of limited spatial distribution. Deposition by ice either in glacial till or by ice rafting also produces poorly sorted conglomerates.

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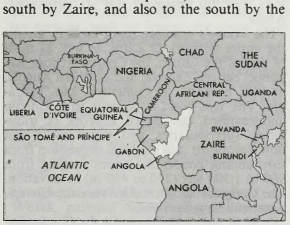
conglomerate, in business, corporation formed by the acquisition by one firm of several others, each of which is engaged in an activity generally unrelated to that of the original. The management of such a corporation may wish to diversify its field of operations for a number of reasons: making additional use of existing plant facilities, improving its marketing position with a broader range of products, or decreasing the inherent risk in depending on the demand for a single product. There may also be financial advantages to be gained from the reorganization of other companies.

Conglomerate mergers are a 20th-century phenomenon, with the greatest number occurring after World War II. The practice became widespread especially in the 1960s and the 1980s.

Congo, former name of Zaire (*q.v.*).

Congo, officially REPUBLIC OF THE CONGO, French RÉPUBLIQUE DU CONGO, country lying astride the Equator in west-central Africa, covering an area of 132,047 square miles (342,000 square km). The capital is Brazzaville. It is bordered to the west by Gabon, to the northwest by Cameroon, to the north by the Central African Republic, to the east and south by Zaire, and also to the south by the



Congo

Angolan enclave of Cabinda. To the west it has 100 miles (160 km) of coastline on the Atlantic Ocean. The population in 1990 was estimated to be 2,326,000.

A brief treatment of the Congo follows. For full treatment, *see* MACROPAEDIA: Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The Congo's Batéké and Bembe plateaus, running from east to west in the south-central part of the country, form the divide between Congo's two major river basins: the Congo (Zaire), draining the northern three-fourths of the country, and the Niari basin, draining most of the remaining land in the south and southwest. The Chaillu Massif, extending westward from the Batéké Plateau and reaching elevations between 1,600 and 2,300 feet (500 and 700 m), separates the Niari and Gabon's Ogooué River basin. The Congo basin displays only moderate relief, generally between 1,000 feet (305 m) at the Ubangi (Oubangui) and Congo rivers and 1,500 feet (460 m) northwestward toward Gabon, Cameroon, and the Central African Republic. The Niari valley is also characterized by gently sloping terrain before rising abruptly to the Chaillu Massif to its north.

Average annual rainfall for most of the Congo River basin exceeds 65 inches (1,650 mm), and its southwestern highlands receive more than 80 inches (2,030 mm). The Niari-Kouilou basin to the south is somewhat drier, receiving less than 50 inches (1,270 mm) annually; only the highland areas along the Congo-Niari divide receive more than 65 inches of rainfall. Annual average temperatures for most of the country range between 68° and 81° F (20° and 27° C); the Benguela Current along the southwest coast often produces cooler temperatures.

Much of the plain along the Ubangi and Congo rivers is swampy and seasonally flooded. The mangrove forests of the swampy lowlands merge northwestward into some of the country's most extensive rain forests. The northern reaches of the Niari basin also support tropical rain forests, while the Niari valley consists of savanna vegetation and fertile agricultural lands. The Niari-Kouilou basin's long southwestern coastal area opens onto the Atlantic Ocean. It contains sandy areas inland to the north and mangrove swamps along the coast to the south. Wildlife is varied; the forests support chimpanzee, gorilla, and a variety of monkeys; the savanna contains a number of antelope species, the jackal, and the cheetah; and the plateau species include the rhinoceros and the giraffe.

The Congo's petroleum deposits account for about 2 percent of Africa's total reserves; its natural gas reserves amount to about 1 percent of Africa's total. High grade iron-ore deposits (60–66 percent Fe) near the Cameroon border in the northwest are also known.

The people. Nearly half of the Congo's population belongs to one of the Kongo tribes, which include the Sundi, Kongo, Lali, Kougni, Bembe, Kamba, Dondo, Vili, and Yombe. The Teke are less numerous, as are the Ubangi people, which include the Makoua, Kouyou, Mboshi, Likouala, Ngala, and Bonga. The Sanga, or Gabonese Bantu, also are divided into various subgroups. The Binga Pygmies live in small bands. Most of the Europeans in the Congo are French. There are also small populations of foreign Africans, Portuguese, and Chinese. All the indigenous peoples speak various Bantu languages, and the Pygmies, scattered in bands across the country, have adopted the Bantu languages of their neighbours. French was adopted as the official language in order not to favour any one tribal language.

About half of the population practices traditional religions. Of the Christian community, about two-thirds are Roman Catholics; the remainder are largely Protestants, whose largest denomination is the Evangelical Church of the Congo. There are adherents to the Church of Jesus Christ on Earth by the Prophet Simon Kimbangu, the largest independent Christian church in Africa, and to several smaller independent churches, as well as a small Muslim community.

The Congo has a rapidly growing, relatively young population. More than 40 percent are under age 15. The birth and death rates are both high by world standards, though they are average for sub-Saharan Africa. With more than half of the population living in urban areas, the Congo is one of the most highly urbanized countries in sub-Saharan Africa. Life expectancy is low, at about 47 years for men and 50 years for women.

Economy. The Congo has a centrally planned, developing economy. Increasing dependence on petroleum production has resulted in uneven economic growth corresponding to increases and declines in international petroleum prices. The gross national product (GNP) is growing more rapidly than the population; the GNP per capita is above average for sub-Saharan Africa.

Agriculture employs more than one-half of the work force but accounts for only approximately 10 percent of the gross domestic product (GDP). The Congo is not self-sufficient in food production, and shortages in the past have necessitated large rice imports to supplement the staple crop of cassava. The county's most important export crops are sugarcane and tobacco, followed by cocoa, coffee, and palm products.

Forests cover more than one-half of the country's total land area. Their exploitation began at the coast and has penetrated inland along the Congo-Océan railway. Approximately three-fifths of the felled timber is processed locally.

The mining industry accounts for more than 90 percent of the country's exports. Crude petroleum production, largely financed by foreign companies, increased dramatically in the mid-1970s with the completion of a refinery at Pointe-Noire. Significant quantities of natural gas are produced, as well as smaller amounts of lead, zinc, gold, and copper.

Industry accounts for about 30 percent of the GDP and employs approximately one-tenth of the work force. The processing of agricultural and forest products dominates; other industries include construction, metal processing, and the manufacture of cement, textiles, shoes, and soap. Services account for about one-half of the GDP and employ one-third of the work force.

Economic planning in the Congo has taken the form of a series of five-year plans which have aimed at reducing the economy's dependence on oil exports by using petroleum income to develop infrastructure, rehabilitate other sectors of the economy, and make social investments in health and education. Since the early 1980s Congo's huge petroleum exports have resulted in a trade surplus. Major trading partners include France, Italy, the United States, and Germany. The Congo receives a considerable amount of foreign aid for development from both Western and communist countries.

The Congo is interior central Africa's door to the Atlantic Ocean, having all of the railway and much of the river transport system that links Chad and the Central African Republic to the coast. The ports of Brazzaville and Pointe-Noire, handling mainly international traffic, were nationalized in 1977.

Government and social conditions. One-party rule was officially ended in the Congo on Jan. 1, 1991, though the Congolese Labour Party (Parti Congolais du Travail, or PCT), formerly a strong Marxist-Leninist party exercising exclusive power, still wielded a major influence. This party and independent party candidates may run for the National Assembly, to which candidates are elected by universal adult suffrage.

The country's social welfare system covers all employed persons, providing benefits for work injury, maternity, disability, and old age. The system also offers special allowances to employees with one or more children under the age of 16 years.

The Congo has generally poor health conditions, which are caused largely by widespread undernourishment, unsanitary food processing, polluted water, an abundance of disease-bearing insects and vermin, and a shortage of medical personnel and hospital facilities.

A significant number of residents suffer from such major diseases as malaria, tuberculosis, and gonorrhea. The country's infant mortality rate, however, while still high by world standards, has improved greatly and in the late 20th century was the lowest in central Africa.

Education is free and compulsory for children between the ages of 6 and 16 years. Despite a shortage of trained teachers, the educational system has produced a literacy rate among school-age children of more than 90 percent, and, with more than 60 percent of all adults literate, the Congo has one of the highest literacy rates in Africa. The country's major institution of higher education is the Marien Ngouabi University at Brazzaville, which was founded in 1961 and achieved university status in 1971. The Congolese media are owned and operated by the government.

Cultural life. Precolonial artistic expression emphasized social and religious experience and took the form of ceremonial music, dance, sculpture, and oral folk literature. Christianity and colonialism had a great impact on artistic forms. The carving of ritual objects became commercialized, and music and dance altered as a result of the introduction of Western instruments and musical styles. The French language allowed for the transition from oral tradition to written literature. By the 1970s Congolese literature was dominated by the poet Gérald Félix Tchicaya U Tam'si and the writer Jean Malonga, whose writing embodied folk legends.

History. Artifacts dating from the Sangoan era (100,000 to 40,000 years ago) have been found in the Congo, but, perhaps because of the dense forest cover, settled agriculture did not emerge until late in the 1st millennium AD.

In precolonial days the most important kingdoms were the Loango, located along the Atlantic coast north of the Congo River; Kongo, in the far southwest; and Tio, on the plains north of the Malebo Pool. Kongo had its beginnings in the 1st millennium AD; the Loango was established by Kongo peoples known as the Vili, who reached the fullest extent of their power in the late 17th century largely as a result of the slave trade. The Tio kingdom grew from a group of small chiefdoms.

In 1482 the Portuguese Diogo Cam discovered the mouth of the Congo. The slave trade was carried on through the ports of Cabinda, Loango, and Mayumba. The *pomberos,* former Portuguese slaves, traveled far inland and returned with cargoes of slaves procured by the Teke, while the coastal chiefs levied dues in the form of guns and loincloths. The suppression of the slave trade in the 19th century hastened the collapse of the kingdoms.

The Italian-born French explorer Pierre Savorgnan de Brazza began his expeditions into central Africa in 1875. In 1880 he made a treaty with the Tio that placed their kingdom under French protection. He made a similar treaty with the Vili of Loango in 1883. Brazza's first treaty laid the groundwork for the establishment of the colony of French Congo (including present-day Gabon). In 1905 an administrative reorganization created the colony of Moyen- (Middle-) Congo within French Equatorial Africa.

Brazza was commissioner of the French Congo until 1898, when he was removed and the territory divided among concessionary companies. These companies exploited both human and natural resources and precipitated many uprisings. Public indignation against their abuses was extensive, and the French government attempted to reform the concessionary companies, but the abuses persisted until 1930.

Because Brazzaville was the capital of French Equatorial Africa as well as Moyen-Congo, Moyen-Congo received the largest share of French attention. Significantly, it was the only colony with a railroad and port.

In 1946 Moyen-Congo elected representatives to the French parliament and in 1958 voted to become an autonomous republic within the French Community. Full independence came two years later. Congo's first president, Fulbert Youlou, was ousted in 1963. A Marxist-oriented party, the Congolese Labour Party, gained strength in these years under President Alphonse Massamba-Débat, and in 1968 another coup, led by Major Marien Ngouabi, created the People's Republic of the Congo. Instability continued and Ngouabi was assassinated in 1977. A series of military rulers ensued—at first militantly socialist but later oriented toward social democracy. Opposition parties became legal in 1991.

Congo Belge (African history): *see* Belgian Congo.

Congo bush dog: *see* basenji.

Congo Canyon, large submarine canyon incised into the South Atlantic continental shelf and slope of western equatorial Africa. The head of the canyon lies 17 miles (28 km) inland, up the Congo Estuary, and has a depth of 70 feet (21 m). The canyon crosses the entire shelf with a westerly trend to the shelf edge 53 miles (85 km) offshore, continuing down the continental slope, curving to the right and ending at the base of the slope in a fan valley at a depth of 8,700 feet (2,650 m). The total length of the canyon to this point is about 175 miles (280 km). At an axial depth of about 6,000 feet (1,800 m), the walls of the V-shaped canyon are highest, 3,600 feet (1,100 m), and the canyon is about 9 miles (14 km) wide from rim to rim. The Congo Fan Valley is at least 135 miles (220 km) long and has relief diminishing down the fan, from 600 feet (180 m) to about 100 feet (30 m).

Congo Canyon is the conduit for sediments from the Congo River and the continental shelf en route to the deep-sea floor. After the sediments are transported to reach the canyon mouth, they are distributed over the fan by the fan valley, which probably migrates laterally with time.

congo eel, also called CONGO SNAKE (salamander): *see* amphiuma.

Congo Français (Africa): *see* French Congo.

Congo Free State, French ÉTAT INDÉPENDANT DU CONGO, former state in Africa that occupied almost all of the Congo (Zaire) River basin, coextensive with modern Zaire. It was created in the 1880s as the private holding of a group of European investors headed by Leopold II, king of the Belgians. The king's attention was drawn to the region during H.M. Stanley's exploration of the Congo River in 1874–77. In November of 1877 Leopold formed the Committee for Studies of the Upper Congo (Comité d'Études du Haut Congo, later renamed Association Internationale du Congo) to open up the African interior to European trade along the Congo River. Between 1879 and 1882, under the committee's auspices, Stanley established stations on the upper Congo and opened negotiations with local rulers. By 1884 the Association Internationale du Congo had signed treaties with 450 independent African entities and, on that basis, asserted its right to govern all the territory concerned as an independent state. At the Berlin West Africa Conference of 1884–85, its name became the Congo Free State, and European powers recognized Leopold as its sovereign.

Leopold extended his military control over the interior in the early 1890s. The Arab slave traders of the Lualaba River region succumbed in 1890, when their leader Tippu Tib left for Zanzibar. Katanga (now Shaba), rich in copper and other minerals, fell in 1891 after Leopold's troops shot the ruler, Msiri. Later rebellions were repressed. Transportation links to the interior were established with the construction (1890–98) of a railway to bypass the Congo River rapids below Malebo Pool; the upper course of the river and its tributaries were all navigable by steamboat.

The regime, under Leopold's unrestrained personal control, became notorious for the treatment of the inhabitants. Forced labour was used to gather wild rubber, palm oil, and ivory; lashings and the taking of hostages were techniques for encouraging villages to meet their rubber quotas. Belgians introduced mutilation as a common punishment even for minor offenses. Brutality was widespread in mines and on plantations. The population of the entire state is said to have declined from 20 or 30 million to 8 million. Finally, indignation among people in Britain and other parts of Europe rose to such a point that Leopold was forced to transfer his powers in the Congo to the Belgian government. In 1908 the Congo Free State was abolished and replaced by the Belgian Congo (*q.v.*), a colony controlled by the Belgian parliament.

Congo jute (plant): *see* urena.

Congo red, first of the synthetic dyestuffs of the direct type, that is, not requiring application of a mordant (a substance such as tannin or alum used to fix the colour to cotton fibres). Introduced in 1884, Congo red belongs to a group of azo dyes derived from benzidine. Congo red was formerly used to dye cotton but has been superseded by dyes more resistant to light and to washing. It is still used in histology to stain tissues for microscopic examination, and to serve as an acid-base indicator, since it turns red in the presence of alkalies and blue when exposed to acids.

Congo River, also called ZAIRE RIVER, river in west-central Africa, rising in Zambia as the Chambeshi River and flowing in an arc through Zaire, and along the Zaire-Congo border to the Atlantic Ocean. Its length is about 2,900 miles (4,700 km). Its drainage basin is about 1,425,000 square miles (3,700,000 square km), and its annual discharge is about 1,450,000 cubic feet per second (41,000 cubic m per second).

A brief treatment of the Congo River follows. For full treatment, *see* MACROPAEDIA: Africa.

The Congo's drainage basin takes in almost the entire territory of Zaire, as well as most of that of the Congo, the Central African Republic, eastern Zambia, and northern Angola, as well as parts of Cameroon and Tanzania. The vast basin is covered with a dense and ramified, fan-shaped network of tributaries, subtributaries, and small rivers that flow downward into a central depression from surrounding concentric slopes ranging from 900 to 1,500 feet (270 to 460 m) in elevation. The Congo's major tributaries are the Ubangi, Kwa, and Sangha rivers.

From its source to its mouth, the Congo consists of three contrasting regions—the upper Congo, characterized by confluences, lakes, and waterfalls or rapids; the middle Congo, with seven cataracts known by the name of Boyoma (Stanley) Falls; and the lower Congo, which divides into two branches forming a vast lacustrine area, called the Malebo (Stanley) Pool. The Congo has a regular flow which is fed by rains throughout the year. A dense evergreen forest is coextensive with the equatorial climate that prevails over a significant part of the Congo basin. The forest region is bordered by belts of savanna. The river has numerous species of fish. Among the reptiles, crocodiles are the most striking species. The Congo, navigable downstream from Stanley Falls, and its numerous tributaries form a system of navigable waterways about 10,000 miles (16,000 km) long, which has fostered

the economic development of inland areas. The hydroelectric potential of the Congo basin amounts to 132,000,000 kW, or one-sixth of the known world resources, though little development has yet taken place.

Congonhas, town, east-central Minas Gerais *estado* ("state"), Brazil, in the Brazilian Highlands, at 2,854 feet (870 m) above sea level. The settlement was made the seat of a municipality in 1938. Known as Congonhas do Campo before 1948, the town is a centre for the mining of iron, nickel, gold, and other minerals. The town is dominated by the great pilgrimage church of Bom Jesus (1773) and its chapels, which are set in 18th-century-style gardens. The main sanctuary is renowned for its impressive soapstone statues of the 12 Apostles, carved by Antônio Francisco Lisboa (commonly known as Aleijadinho). Thousands of visitors come to the town during the church's September festival. Congonhas is accessible from Ouro Prêto and via the Rio de Janeiro–Belo Horizonte highway. Pop. (1980 prelim.) 22,623.

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congregation, an assembly of persons, especially a body assembled for religious worship or habitually attending a particular church. The word occurs more than 350 times in the King James Version of the English Bible, but only one of these references is in the New Testament (Acts 13:43). As it is used in the Old Testament, congregation sometimes refers to the entire Israelite community, and at other times it means a gathering or assembly of people.

In the Roman Catholic church the word is used in several senses: (1) the congregations or committees of the Sacred College of Cardinals that form administrative departments, (2) the committees of bishops for the regulation of procedure at general councils, (3) branches of a religious order, following its general rule but forming separate groups, each with its special constitution and observances, (4) religious communities composed of persons who have taken simple, rather than solemn, vows, and (5) in France, religious associations of lay persons, male or female, for some pious, charitable, or educational purpose.

In Protestant churches a congregation usually means the assembly of worshipers gathered in a church at a particular service. But among English Nonconformists and American Protestants, it has been increasingly used to designate the members of a local church, often only the lay people of a local church, and it has become virtually synonymous with parish.

Congregational Church of England and Wales, national organization of Congregational churches, established in 1832 and known until 1965 as the Congregational Union of England and Wales. It developed from the activities of English Christians of the late 16th and 17th centuries who wished to separate from the Church of England and form independent churches. A group of these Separatists (Independents) left England for Holland and subsequently some of them, the Pilgrims, settled in Plymouth, Mass., in 1620. In England the Independents had their greatest influence during the time of the Commonwealth (1649–60), when Oliver Cromwell, an Independent, was lord protector.

The Independents were eventually called Congregationalists. They survived various periods of persecution and became an influential religious minority in England and Wales. They established several academies and colleges and were active in the ecumenical movement. Merger in 1972 with the Presbyterian Church formed the United Reformed Church of England and Wales. A minority of members refused to join the union.

Congregational Council for World Mission, English Congregational missions organization, formed in 1966 by merger of the Commonwealth Missionary Society and the London Missionary Society. The Commonwealth Missionary Society (originally the Colonial Missionary Society) was organized in 1836 to promote Congregationalism in the English-speaking colonies.

The London Missionary Society was founded in 1795 as a nondenominational organization dedicated to spreading the Christian faith in the non-European world. Its primary support, however, was always from the Congregationalists. The society sent missionaries to the South Pacific islands and to Africa, China, India, and Southeast Asia. Its most famous representative was David Livingstone, the explorer-missionary who proved that central Africa was accessible and who also exposed the slave trade.

Congregationalism, Christian movement that arose among Protestant churches in England in the late 16th and early 17th centuries, emphasizing the right and duty of each congregation to make its own decisions about its affairs, independent of any higher human authority. Although this principle of church government is upheld by several modern denominations (*e.g.*, most Baptists, Disciples of Christ), the designation Congregationalist is usually reserved for those churches that hold the congregational polity to be their primary distinguishing characteristic.

A brief treatment of Congregationalism follows. For full treatment, *see* MACROPAEDIA: Protestantism.

Congregationalism developed as one wing of the broader Puritan movement in western Christianity. The general goal of Puritanism was to carry on to completion the work of the Protestant Reformation in England. Congregationalists in particular were concerned to put into practice the Reformation doctrine of the priesthood of all believers. Although active before the English Civil Wars, Congregationalists (or Independents, as they were then more commonly known) gained prestige when Oliver Cromwell aligned himself with this cause. Their political influence peaked in the 1650s, declined precipitously after Cromwell's death in 1658, and was abolished with the Restoration of the crown in 1660. The accession of William and Mary in 1689 signaled a change of mood, and the Toleration Act, passed in the same year, marked the beginning of a process that would finally grant full religious toleration to the Congregationalists along with all other religious dissenters.

During the first half of the 18th century, Congregationalists in England did little more than hold their own. Their numbers were small, and their zeal had been exhausted in the struggle to achieve toleration. With the coming of the Evangelical Revival (*c.* 1750–1815) this situation changed. Through its association with the revival, Congregationalism gained a new vigour that was to increase throughout the 19th century. An important watershed was the formation in 1832 of the Congregational Union of England and Wales.

As Congregationalists consolidated their internal organization, they also forged a strong tie with the Liberal Party. The Liberal victory of 1906 is generally seen as the peak of Congregational influence in English society and politics. As the 20th century progressed, Congregationalists, along with almost all other church groups in England, declined both in numbers and strength. Nonetheless, Congregationalism provided many prominent leaders for the ecumenical movement. In 1972 the majority of English Congregationalists and Presbyterians united to form the new United Reform Church.

It was in the United States that Congregationalism achieved its greatest public influence and numerical strength. Through the so-called New England experiment, it became a major factor in determining the character of the new nation. Congregationalism was transplanted to America in two forms very early in the colonial period. The "Pilgrims" of Plymouth Colony were separatistic Congregationalists; that is, they felt that realization of their ideal of church government required separation from the Church of England. The neighbouring Puritans of Massachusetts Bay, on the other hand, were nonseparatists, holding that the national church was capable of being reformed according to their ideal. Differences between the two groups soon dissipated, however, in the face of a general decline in religious fervour.

The adoption in 1662 of the Half-Way Covenant relaxing requirements for church membership was a response to these developments. The widespread revivalistic movement of the 1730s and 1740s, known as the Great Awakening, also helped replenish the membership rolls of New England's churches, but simultaneously it revealed a new division within American Congregationalism. The Calvinism of the founding bodies was being replaced by an Arminian theology that put greater emphasis on human efforts in attaining salvation.

A general liberalizing of theological opinion continued in the Congregational Churches during the 19th century, with two results. First was the defection of many churches to Unitarianism. Second was Congregationalism's downplaying of the importance of conversion in Christian experience. The Kansas City Creed of 1913 is usually cited as the definitive statement of Congregationalism's break with its Calvinist past.

American Congregationalism has had a varied institutional history. During the first half of the 19th century, the Congregationalists participated in a Plan of Union with the Presbyterians. The National Council of Congregational Churches, formed in 1871, was enlarged in 1931 through an affiliation with the smaller General Convention of the Christian Churches. In 1961 a further merger was effected with the Evangelical and Reformed Church to create the United Church of Christ. The Congregational tradition is now preserved in original name and form in only two or three small associations of churches.

While Congregationalists do not constitute a large percentage of the Christian world population, Congregational churches can be found worldwide. Some of these churches (for example, those of Australia, New Zealand, South Africa, and Jamaica) trace their roots to English Congregationalism. Other Congregational churches, such as those in The Netherlands and Sweden, were self-originating.

Wherever they may be found, Congregationalists share certain characteristics. They embody the idea of a "gathered" church—a group of believers brought together not by territory but by a common style of life. As a rule, Congregationalists eschew binding creedal statements and view faith as a personal encounter with God. In Congregational worship the preached word is usually emphasized over the use of the sacraments. In common with most Protestant groups, Congregationalists accept only two sacraments, baptism and communion, or the Lord's Supper. Communion is celebrated once or twice a month and is now usually open to "all believers"; formerly, "closed" communion was the general practice. Baptism is not required for membership.

Congress, Library of, the library of the United States, the largest and one of the greatest of what may be considered national libraries. Founded in Washington, D.C., in 1800, the Library of Congress was at first housed in the Capitol. Destroyed in 1814



The Library of Congress, Washington, D.C., designed by the architectural firm Smithmeyer and Pelz, completed 1897

By courtesy of the Library of Congress, Washington, D.C.

when British troops burned the building, it was moved to permanent quarters in 1897. In addition to serving as a reference source for members of Congress and other officers of the government, the Library of Congress has become an outstanding institution among the learned institutions of the world, with magnificent collections of books, manuscripts, music, prints, and maps. It also provides lectures and concerts; serves as the national centre for service to the blind, issuing books in Braille and talking books; houses the National Union Catalog, a record of the volumes contained in 2,500 libraries; issues printed catalog cards for the use of subscribing libraries and institutions; and has developed a widely used system of classification.

Besides some 19,000,000 books (5,600 of which were printed before 1501) and more than 33,000,000 manuscripts, the Library of Congress contains the largest current collection of graphic materials in the United States and also contains microfilms, recordings, and motion pictures. In the 1970s, through deposits under the copyright law (free copies of all books copyrighted in the United States), exchanges with foreign governments and learned societies, and purchase, it was adding 1,000,000 pieces to its collections each year.

Congress Kingdom of Poland, also called CONGRESS POLAND, Polish KRÓLESTWO KONGRESOWE POLSKIE, or KONGRESÓWKA, Polish state created (May 3, 1815) by the Congress of Vienna as part of the political settlement at the end of the Napoleonic Wars. It was ruled by the tsars of Russia until its loss in World War I. The Kingdom of Poland comprised the bulk of the former Grand Duchy of Warsaw (49,217 square miles [127,470 square kilometres]) and was bordered on the north and west by the Prussian provinces of East Prussia, Poznan, and Silesia, on the south by the Austrian province of Galicia, and on the east by Russia. It was united with Russia through the person of the king (that is, the tsar of Russia was also the king of Poland), was guaranteed autonomy by the Congress, and was presented with a constitution (Nov. 27, 1815) by Tsar Alexander I that provided the kingdom with its own administration, Sejm (legislature), army, and broad civil liberties. After the Polish uprising of 1830–31, however, Tsar Nicholas I replaced the kingdom's constitution with the Organic Statute, which created a firmer union between the Congress Kingdom and the Russian Tsar and disbanded the Polish Sejm and army; he also imposed upon the Poles a military dictatorship. After a new rebellion in 1863, Tsar Alexander II transformed the Congress Kingdom into a province of the Russian Empire and subjected it to an intense Russification policy. Its name was changed to the Land of the Vistula, and its government was reorganized into a combined civil and military administration headed by a Russian governor general and completely staffed by Russian bureaucrats.

Congress of ———: *see under* substantive word or words (*e.g.*, Vienna, Congress of; Racial Equality, Congress of), except as below.

Congress of Industrial Organizations: *see* American Federation of Labor–Congress of Industrial Organizations.

Congress of the United States, the legislature of the United States of America, established under the Constitution of 1789 and separated structurally from the executive and judicial branches of government. It consists of two houses, the Senate (*q.v.*), in which each state, regardless of its size, is represented by two senators, and the House of Representatives (*see* Representatives, House of), to which members are elected on the basis of population. Among the express powers of Congress as defined in the Constitution are the power to lay and collect taxes, borrow money on the credit of the United States, regulate commerce, coin money, declare war, raise and support armies, and make all laws necessary for the execution of its powers.

Although the two chambers of Congress are separate, for the most part, they have an equal role in the enactment of legislation, and there are several aspects of the business of Congress that the Senate and the House of Representatives share and that require common action. Congress must assemble at least once a year and must agree on the date for convening and adjourning. The date for convening was set in the Constitution as the first Monday in December; however, in the Twentieth Amendment to the Constitution the date was changed to January 3. The date for adjournment is voted on by the House and the Senate.

Congress must also convene in a joint session to count the electoral votes for the president and vice-president. Although not required by the Constitution, joint sessions are also held when the president or some visiting dignitary addresses both houses.

Of common interest to both houses of Congress are also such matters as government printing, general accounting, and the congressional budget. Congress has established individual agencies to serve these specific interests. Other agencies, which are held directly responsible to Congress, include the Copyright Royalty Tribunal, the Botanic Garden, and the Library of Congress.

The term of Congress extends from each odd-numbered year to the next odd-numbered year. For its annual sessions, Congress developed the committee system to facilitate its consideration of the various items of business that arise. Each house of Congress has a number of standing (permanent) committees and select (special and temporary) committees. Together the two chambers of Congress form joint committees to consider subjects of common interest. Moreover, because no act of Congress is valid unless both houses approve an identical document, conference committees are formed to adjust disputed versions of legislation.

At the beginning of a session, the president delivers a State of the Union address, which describes in broad terms the legislative program that the president would like Congress to consider. Later, the president submits an annual budget message and the report on the economy prepared by the president's Council of Economic Advisors. Inasmuch as congressional committees require a period of time for preparing legislation before it is presented for general consideration, the legislative output of Congress may be rather small in the early weeks of a session. Legislation not enacted at the end of a session retains its status in the following session of the same two-year Congress.

In terms of legislation, the president may be considered a functioning part of the congressional process. The president is expected to keep Congress informed of the need for new legislation, and government departments and agencies are required to send Congress periodic reports of their activities. The president also submits certain types of treaties and nominations for the approval of the Senate. One of the most important legislative functions of the president, however, is that of signing or vetoing proposed legislation. The president's veto may be overridden by a two-thirds vote of each chamber of Congress; nevertheless, the influence of the president's potential power may extend to the procedures of Congress. The possibility that a bill may be vetoed gives the president some influence in determining what legislation Congress will consider initially and what amendments will be acceptable. In addition to these legal and constitutional powers, the president has influence as the leader of a political party; party policy both in Congress and among the electorate may be molded by the president.

Although the U.S. Supreme Court has no direct relations with Congress, the Supreme Court's implied power to invalidate legislation that violates the constitution is an even stronger restriction on the powers of Congress than the presidential veto. Supreme Court and federal court decisions on the constitutionality of legislation outline the constitutional framework within which Congress can act.

Congress is also affected by representative interest groups, though they are not part of the formal structure of Congress. Lobbyists play a significant role in testifying before congressional hearings and in mobilizing opinion on select issues.

Many of the activities of Congress are not directly concerned with enacting laws, but the ability of Congress to enact law is often the sanction that makes its other actions effective. The general legal theory under which Congress operates is that legal authority is delegated to the president or executive departments and agencies and that the latter, in turn, are legally responsible for their actions. Congress may review any actions performed by a delegated authority; and in some areas of delegated legislation, such as in proposals for governmental reorganization, Congress must indicate approval of specific plans before they go into effect. Congress may also retain the right to terminate legislation by joint action of both houses.

Congress exercises general legal control over the employment of government personnel. Political control may also be exercised, particularly through the Senate's power to advise and consent to nominations. Neither the Senate nor the House of Representatives has any direct constitutional power to nominate or otherwise select executive or judicial personnel (although in the unusual event that the electoral college fails to select a president and vice-president, the two houses, respectively, are expected to do so). Furthermore, Congress does not customarily remove officials. Congress, however, does have the power of impeachment. In such proceedings the impeachment is made by the House of Representatives, and the case is tried before the Senate—a vote of two-thirds of the senators present is required for conviction.

The power to levy and collect taxes and to appropriate funds allows Congress considerable authority in fiscal matters. Although the president has the initial responsibility for

determining the proposed level of appropriations, once estimates for the next fiscal year are submitted to Congress, a single budget bill is not enacted, but rather a number of appropriation bills for various departments and agencies are passed during the first six or seven months of a session.

In its nonlegislative capacity, Congress also has the power to initiate amendments to the Constitution, and it must determine whether the states should vote on a proposed amendment by state legislatures or by special state conventions. Finally, Congress has the right to investigate any subject that affects its powers. Congressional investigating committees may call witnesses and require them to produce information. These committees may also be given the power that persons who deliberately block the legislative process may be charged with contempt of Congress and may be issued warrants for their arrests.

Congress Party (India): *see* Indian National Congress.

Congressional Medal of Honor: *see* Honor, Medal of.

Congressional Quarterly, (*CQ*), in full CONGRESSIONAL QUARTERLY SERVICE, group of periodicals published in Washington, D.C., reporting the activities and politics of the U.S. Congress. It was established in 1945 by Henrietta and Nelson Poynter, editor and publisher of the St. Petersburg, Fla., *Times*. Over the next decade the original *Quarterly* evolved into a *Weekly Report* with a *Quarterly Index*, an annual *Almanac*, and a news service. *CQ* quickly became indispensable to the expanding press corps covering the growing Congressional establishment in the U.S. capital.

The *CQ Weekly Report* is mailed to subscribers every Saturday, covering the preceding week's actions, debates, and committee proceedings in carefully edited, concise form. The *CQ Almanac* is a compendium of legislation from each annual session of Congress and is published every spring. In addition, various special volumes and series are published from time to time, reviewing significant government activities and special problems, *e.g.*, the Watergate scandal. The firm also performs contract research and maintains a query service for subscribers, usually newspapers. *CQ* also publishes *Editorial Research Reports*, which provide background information on current issues. In addition to news media, *CQ*'s users include libraries, lobbyists, and many government—including Congressional—offices.

Congreve, Richard (b. Sept. 4, 1818, Leamington, Warwickshire, Eng.—d. July 5, 1899, London), Positivist philosopher, a disciple of Auguste Comte and founder of the Church of Humanity in London.

In 1878 he caused a schism among Positivists by repudiating the authority of Comte's successor, Pierre Laffitte. Afterward Congreve was especially concerned with the ceremonial elaboration of the Positivist religion. His Positivist writings include *The New Religion in Its Attitude Toward the Old* (1859), *Essays, Political, Social and Religious,* 3 vol. (1874–1900), *Human Catholicism* (1876–77), and translations from Comte. He also wrote some historical works (collected ed., *Historical Lectures,* 1900), a translation of Aristotle's *Politics* (1855), and occasional notes on current affairs, including pamphlets urging the British to evacuate Gibraltar and India.

Congreve, William (b. Jan. 24, 1670, Bardsey, near Leeds, Yorkshire, Eng.—d. Jan. 19, 1729, London), English Neoclassical dramatist who shaped the English comedy of manners through his brilliant comic dialogue, his satirical portrayal of fashionable society, and his ironic scrutiny of the affectations of his age. His major plays were *The Old Bachelour* (1693), *The Double-Dealer* (1693), *Love for Love* (1695), and *The Way of the World* (1700).



William Congreve, oil painting by Sir Godfrey Kneller, 1709; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. In 1674 Congreve's father was granted a commission in the army to join the garrison at Youghal, in Ireland. When he was transferred to Carrickfergus, Congreve, in 1681, was sent to school at Kilkenny, the Eton of Ireland. In April 1686 he entered Trinity College, Dublin (where he received his M.A. in 1696). He studied under the famous St. George Ashe, who also tutored his elder schoolfellow and ultimate lifelong friend Jonathan Swift. It was probably during the revolution of 1688 that the family moved to the Congreve home at Stretton in Staffordshire, Congreve's father being made estate agent to the earl of Cork in 1690. In 1691 he was entered as a law student at the Middle Temple. Never a serious reader in law, he published in 1692 under the pseudonym Cleophil a light but delightfully skillful near-parody of fashionable romance, possibly drafted when he was 17, *Incognita: or, Love and Duty reconcil'd.* He quickly became known among men of letters, had some verses printed in a miscellany of the same year, and became a protégé of John Dryden. In that year Dryden published his translation of the satires of Juvenal and Persius (dated 1693), in which Congreve collaborated, including also the complimentary "To Mr. Dryden."

Literary career. It was in March 1693 that he leaped into fame with the production at the Theatre Royal, Drury Lane, of *The Old Bachelour,* written, he said, in 1690 to amuse himself during convalescence. Warmly heralded by the ever-generous Dryden, who declared that he had never read so brilliant a first play, though it needed to be given "the fashionable Cutt of the Town," it was an enormous success, running for the then unprecedented length of a fortnight. But his next play, *The Double-Dealer,* played in November or December at Drury Lane, though far better and introduced, when printed, by some overpanegyrical lines from Dryden, did not meet with the same applause. *Love for Love,* his best acting play, almost repeated the success of his first. Performed in April 1695, it was the first production staged for the new theatre in Lincoln's Inn Fields, which was opened after protracted crises in the old Theatre Royal, complicated by quarrels among the actors, which had induced the lord chamberlain to issue a new license to run concurrently with that of the old patentees at Drury Lane. Congreve became one of the managers of the new theatre, promising to provide a new play every year.

In 1695 he began to write his more public occasional verse, such as his pastoral on the death of Queen Mary II and his "Pindarique Ode, Humbly Offer'd to the King on his taking Namure"; and John Dennis, then a young, unsoured critic, collecting his *Letters upon Several Occasions* (published 1696), extracted from Congreve his "Letter Concerning Humour in Comedy." By this time, Congreve's position among men of letters was so well established that he was considered worthy of one of those sinecure posts by which, in those happy days, men of power in government rewarded literary merit: he was made one of the five commissioners for licensing hackney coaches, though at a reduced salary of £100 per annum.

Though Congreve signally failed to carry out his promise of writing a play a year for the Lincoln's Inn theatre, he showed his good intentions by letting them stage *The Mourning Bride.* Improbable as it may seem to modern readers, this tragedy, produced early in 1697, swelled his reputation enormously and became his most popular play. No further dramatic work appeared until March 1700, when Congreve's masterpiece, *The Way of the World,* was produced—with a brilliant cast—at Lincoln's Inn Fields; though it is now his only frequently revived piece, it was a failure with the audience. This was Congreve's last attempt to write a play, though he did not entirely desert the theatre. He wrote librettos for two operas, and in 1704 he collaborated in translating Molière's *Monsieur de Pourceaugnac* for Lincoln's Inn Fields. In 1705 he associated himself for a short time with the playwright and architect Sir John Vanbrugh in the Queen's theatre, or Italian Opera house, writing an epilogue to its first production.

The rest of his life he passed quietly enough, being in easy circumstances thanks to his private income, the royalties on his plays, and his not very exacting posts in the civil service. In 1705 he was made a commissioner for wines, a post that he retained by virtue of Swift's good offices at the change of government in 1710 but which he relinquished in 1714 when he joined the customs service; his position was improved at the end of 1714 with the addition of the secretaryship of the island of Jamaica. He wrote a considerable number of poems, some of the light social variety, some soundly scholarly translations from Homer, Juvenal, Ovid, and Horace, and some Pindaric odes. The volume containing these odes also comprised his timely "Discourse on the Pindarique Ode" (1706), which brought some order to a form that had become wildly unrestrained since the days of the poet Abraham Cowley. Congreve's friendships were numerous, warm, and constant, as much with insignificant people, such as his early companions in Ireland, as with the literary figures of his time. No quarrels are attributed to him, except for a very brief one with Jacob Tonson, a publisher. Swift, whose friendship with him had begun in early days in Ireland, was unvarying in his affection; for John Gay, poet and author of *The Beggar's Opera,* he was the "unreproachful man"; Alexander Pope dedicated his Iliad to him; and Sir Richard Steele his edition of Joseph Addison's *The Drummer.* As to his relations with the other sex, his affection for Mrs. Anne Bracegirdle—who acted most of his female leads—is well known; they were always close friends, but whether the intimacy was of a deeper nature is undetermined. In his later years he was devotedly attached to the second duchess of Marlborough, and it is almost certain that he was the father of her second daughter, Lady Mary Godolphin, later duchess of Leeds. This would account for the large legacy, of almost all his fortune, which he left to the Duchess of Marlborough. He died after a carriage accident.

Assessment. Congreve's character was praised in Giles Jacob's *Poetical Register* (1719), where he is described as being "so far from being puff'd up with Vanity . . . that he abounds with Humility and good Nature. He does not shew so much the Poet as the Gentleman." The last phrase will serve as a comment on the notorious meeting with Voltaire, who in 1726 had come celebrity-seeking in England and wished to extract what he could from the great English writer of comedy. Congreve, failing, fatigued, attacked by gout, and half-blind, did not feel equal to discussing the minutiae of comic writing or a play he had written some 30 years earlier. He told Voltaire that he would be delighted to talk on general subjects, "on the footing of a gentleman" as he phrased it, but not on subjects of which he would be expected to display expert critical knowledge and affect the pundit.

Congreve is the outstanding writer of the English comedy of manners, markedly different in many respects from others of this period of the drama. Taking as its main theme the manners and behaviour of the class to which it was addressed, that is, the antipuritanical theatre audience drawn largely from the court, it dealt with imitators of French customs, conceited wits, and fantastics of all kinds; but its main theme was above all the sexual life led by a large number of courtiers, not to mention Charles II, with their philosophy of freedom and experimentation. Restoration comedy was, without exception, critical comedy, aiming to "cure excess," bringing "the sword of common sense" to bear upon the extravagant assumptions of the age. Where Congreve rises above other dramatists of his time is in both the delicacy of his feeling and the perfection of his phrasing.

The latter is strikingly exhibited in the opening speeches of *The Old Bachelour,* a play that no doubt appealed to the audiences because it handled with a new brilliance themes they were familiar with. If some of the repartee seems cheap and schoolboyish, that was the manner of the time. As Congreve progressed, his speeches became more modulated, more musical, but always sure in their cadence. "Every sentence is replete with sense and satire," William Hazlitt wrote, "conveyed in the most polished and pointed terms." As George Meredith stated, "He is at once precise and voluble . . . in this he is a classic, and is worthy of treading a measure with Molière." Congreve's most successful work is his last play, *The Way of the World,* which clearly proclaims what he has to say and is only marred by the artificial contrivances of the plot. Here he is doing more than holding up to ridicule the assumptions that governed the society of his time. He could not regard love merely as the gratification of lust or as a battle of the sexes, a matter of wit rather than of feeling. He was averse to "rationalizing" love. Congreve goes deeper than any of his contemporaries, has more feeling for the individual, and is far subtler. He was a sensitive craftsman, and nothing came from his hand that was not thoughtfully conceived and expertly contrived. Though not the equal of Molière, he was the nearest English approach to him.

MAJOR WORKS. *Plays* (dates are of first production, unless otherwise noted): *The Old Bachelour* (1693); *The Double-Dealer* (1693); *Love for Love* (1695); *The Mourning Bride* (1697); *The Way of the World* (1700); *The Judgment of Paris* (published 1701), a masque.

Poems: The Mourning Muse of Alexis (1695); *A Pindarique Ode, Humbly Offer'd to the King on His Taking Namure* (1695); *The Birth of the Muse* (1698); *A Hymn to Harmony* (1703); *The Tears of Amaryllis for Amyntas* (1703); *A Pindarique Ode, Offer'd to the Queen on the Victorious Progress of Her Majesty's Arms, Under the Conduct of the Duke of Marlborough* (1706), which includes "A Discourse on the Pindarique Ode."

Other works: Incognita: or, Love and Duty Reconcil'd (1692), a novel; *Amendments of Mr. Collier's False and Imperfect Citations* (1698); *An Impossible Thing* (1720), a tale.

Editions: The Complete Works of William Congreve, ed. by Montague Summers, 4 vol. (1923, reissued 1964), includes his letters and *Squire Trelooby* and stage histories of the plays. The plays are collected in *The Complete Plays of William Congreve,* ed. by Herbert Davis (1967); and *The Comedies of William Congreve,* ed. by Anthony G. Henderson (1982).

BIBLIOGRAPHY. By far the fullest and most accurate biography is that by John C. Hodges, *William Congreve, the Man* (1941, reissued 1966). Additional studies include Kathleen M. Lynch, *A Congreve Gallery* (1951, reissued 1967), a brief account containing an admirable bibliography; Maximillian E. Novak, *William Congreve* (1971); and Aubrey L. Williams, *An Approach to Congreve* (1979), setting his works in the context of 17th-century religious beliefs.

Congreve, Sir William, 2ND BARONET (b. May 20, 1772, London, Eng.—d. May 16, 1828, Toulouse, France), English artillery officer and inventor, best known for his military rocket, which was a great advance in black-powder rockets. It provided the impetus for an early wave of enthusiastic utilization of rockets for military purposes in Europe.

Congreve based his rockets on those used by the Indian prince Hyder Ali against the British in 1792 and 1799 at Seringapatam. In 1805 he built a rocket 40.5 inches (103 cm) long, with a stabilizing stick 16 feet (4.9 m) long and a range of 2,000 yards (1.8 km). Congreve's rockets were used to bombard Boulogne, Copenhagen, and Danzig in the Napoleonic Wars and in the British attack on Fort McHenry, near Baltimore, in 1814, which inspired Francis Scott Key to write in the "Star Spangled Banner" (now the U.S. national anthem): ". . . the rockets' red glare, the bombs bursting in air."

Congreve continued to improve his rockets' range and accuracy, leading many European countries to form rocket corps, usually attached to artillery units. The Congreve rockets were made obsolete by improved artillery and ordnance, but they continued to find uses for flares and ship rescue. Congreve is also usually considered the first modern inventor to propose plating warships with armour (1805) to protect against artillery fire. Upon the death of his father in 1814 (whose baronetcy he inherited), he became comptroller of the Royal Laboratory of Woolwich Arsenal. From 1818 until his death, Congreve was a member of Parliament for Plymouth, Devon.

Coni (Italy): *see* Cuneo.

Coniacian Stage, the third of six divisions in the Upper Cretaceous Series, representing rocks deposited on a global basis during the Coniacian Age (88.5 to 87.5 million years ago). The vicinity of the town of Cognac (from which the name Coniacian was derived) in western France serves as the classic type district for rocks of this age. However, no global stratotype section and point (GSSP) for the base of the Coniacian Stage—*i.e.,* worldwide standard for defining the stratigraphic boundary—has been approved. Conventionally, the base of the stage is defined by the first appearance of the ammonite biozone *Barroisiceras haberfellneri.* Also diagnostic is the planktonic foraminifera biozone *Whiteinella inornata.*

The Coniacian Stage is represented in England by part of the Upper Chalk and in the United States by part of the Niobrara Limestone (*q.v.*). Rocks of the Coniacian Stage overlie those of the Turonian Stage and underlie rocks of the Santonian Stage.

Conibear, Hiram Boardman (b. Sept. 5, 1871, Mineral, Ill., U.S.—d. Sept. 9, 1917, Seattle, Wash.), American trainer and rowing coach at the University of Washington (1907–17). He developed a distinctive style known as the American stroke (also called the Washington stroke and the Conibear stroke) that revolutionized college rowing and had an effect on the sport that lasted for 30 years.

Conibear was hired by the University of Washington as a trainer for the football and track teams because of his work in that field at the universities of Chicago, Illinois, and Montana and as head trainer for the Chicago White Sox baseball team. His knowledge of rowing was slight, but he assumed the responsibility of coaching the team and learned the sport through extensive reading, observation, and motion-study experiments with laboratory skeletons. His rowing style stressed physical training and was based on leg drive. He produced teams noted for their strength and stamina that won six California-Washington races in seven years. He was also interested in the design of racing boats and worked with the Pocock brothers of British Columbia (later of Seattle) in building competitive shells.

conic section, also called CONIC, in geometry, any curve produced by the intersection of a plane and a right circular cone. Depending on the angle of the plane relative to the cone, the intersection is a circle, an ellipse, a hyperbola, or a parabola.

Special (degenerate) cases of intersection are that of the plane passing through the apex and no other part of the cone, in which a single point is produced, and that of the plane passing through the apex intersecting the cone elsewhere, in which one or two intersecting lines are produced. Sections of other surfaces may also be conics—*e.g.,* those formed by planes passing through elliptical cones and parabolic cylinders.

Conics may be described as plane curves that are the paths (loci) of a point moving so that the ratio of its distance from a fixed point (the focus) to the distance from a fixed line (the directrix) is a constant, called the eccentricity of the curve. If the eccentricity is zero, the curve is a circle; if equal to one, a parabola; if less than one, an ellipse; and if greater than one, a hyperbola.

conidium, a type of asexual reproductive spore of fungi (division Mycota) usually produced at the tip or side of hyphae (filaments that make up the body of a typical fungus) or on special spore-producing structures called conidiophores. The spores detach when mature. They vary widely in shape, colour, and size, large ones being called macroconidia, small ones, microconidia. Conidia and conidiophores are used in the classification of the Fungi Imperfecti (form-class Deuteromycetes, *q.v.*), a group whose members do not ordinarily have sexual stages.

conifer, any member of the order Coniferales, woody plants that bear their seeds and pollen on separate, cone-shaped structures of hard or papery scales arranged in spirals or whorls around an axis. This arrangement of a naked, exposed seed is in contrast with the angiosperms, the seeds of which are surrounded by a maturing ovule. The conifers constitute the largest division of gymnospermous plants, with about 50 genera and more than 550 species. Most of them are evergreen, upright trees and shrubs, although some lose their leaves annually and others grow to less than 1 foot (30 cm) in height.

A brief treatment of conifers follows. For full treatment, *see* MACROPAEDIA: Gymnosperms.

Conifers grow throughout the world, except for Antarctica, and prefer temperate climate zones. Ten genera are common in both the Old and New Worlds—firs (*Abies*), incense cedars (*Calocedrus*), Lawson and Nootka cypresses (*Chamaecyparis*), cypresses (*Cupressus*), junipers (*Juniperus*), larches (*Larix*), pines (*Pi-*

nus), Douglas firs (*Pseudotsuga*), white and western red cedars (*Thuja*), and hemlocks (*Tsuga*). There are also coniferous genera that are limited in geographic distribution. For example, cedars (*Cedrus*) now grow naturally only in Eurasia and North Africa, plum yews (*Cephalotaxus*) from Korea to India, *Cryptomeria* in China and Japan, *Callitris* in Tasmania and Australia, and the dawn redwood (*Metasequoia*) in China. The podocarps (*Podocarpus* species) originated in Australia and New Zealand but have spread to Africa, East Asia, South America, Mexico, and the Caribbean.

Among the smallest conifers is *Dacrydium laxifolium* of New Zealand, which has been known to reach maturity while achieving a height of only 8 cm (3 inches). Many others creep or trail along the ground, but the tallest, the redwoods (*Sequoia sempervirens*) of California and Oregon in the United States, may grow to more than 110 m (360 feet) in height. The swamp cypress (*Taxodium distichum*) and some species of *Chamaecyparis* and *Cryptomeria* are supported by massive buttresses, and others have radiating roots. The oldest known plants are the bristlecone pines (*Pinus aristata*) of California and Nevada, one estimated to be almost 5,000 years old.

The conifers supply softwood timber used for general construction, mine timbers, fence posts, poles, boxes and crates, and other articles, as well as pulpwood for paper. Coniferous wood is also used as fuel and in the manufacture of cellulose products, plywood, and veneers. The trees are the source of resins, volatile oils, turpentine, tars, and pharmaceuticals.

The most valuable softwood tree of North America is the Douglas fir (*Pseudotsuga menziesii*), which grows from British Columbia, Canada, south to California in extensive forests that include a variety of other timber conifers (especially *Pinus* species). A few of these trees can send up new shoots from stumps after they are cut, but most conifers are unable to sprout after logging. A considerable extent of the forested areas of the Pacific Northwest, therefore, is managed and harvested on a continuous-yield basis, as are the coniferous forests of Finland, Norway, and Sweden.

In the Southern Hemisphere, conifers are scattered among hardwood forests or stand in isolated patches. The main sources of timber among them are the kauri (*Agathis australis*), rimu (*Dacrydium cupressinum*), several of the podocarps, and *Araucaria, Austrocedrus,* and *Fitzroya* species.

Coniferous trees are harmed by violent storms, fires, and human disturbances of the environment such as stream diversion, wasteful logging, and air pollution. Insects and fungi also present dangers, such as the white-pine blister rust in North America.

Conifers produce undifferentiated male and female reproductive cells (microsporocytes and megasporocytes, respectively) on conelike structures called strobili. The male cones (or microstrobili) and female cones (or megastrobili) are usually borne on the same tree, although some species produce the two types of cones on separate trees. Each cone consists of a number of scales arranged in a spiral or whorl around a central axis. In the male cones, each scale bears two pollen sacs on its undersurface. Megasporocytes and microsporocytes undergo meiosis to produce megaspores and microspores (or pollen grains), respectively. Megaspores are borne in ovules on the surfaces of the scales of the female cones. When the female cones spread their scales in spring, the megaspores are pollinated by pollen grains from the male cones that have been dispersed by the wind. After pollination, the microspores and megaspores further develop into male and female gametophytes, respectively. The latter contains the egg cell nuclei. The female gametophyte is fertilized, and its surrounding integument develops into a seed coat. The seeds may be shed soon after maturity, may remain inside the cones on the tree for several to many years, or, as in most conifers, may be shed at the end of the summer in which fertilization occurs.

Seeds dropped in fall lie dormant through the winter, with about 20 percent able to germinate the next spring. Only a small percentage of seedlings live through their first summer, most of them succumbing to drought, excessive heat, browsing animals, or insect and fungus attack.

Many coniferous seedlings develop a strong taproot that is retained throughout the life of the tree. Those that grow in waterlogged soil and others, however, send out lateral roots, and the taproot dies. All conifers develop branched, short roots that absorb nutrients.

Conifer leaves are specialized photosynthetic organs. The characteristic features of their structure minimize water loss. The stomates (pores that provide for gas exchange) are arranged in twos along either side of the single vein and are separated from direct contact with the dry air. A protective waxy cuticle makes the leaves waterproof. Although a variety of shapes do exist for conifers' leaves, they generally have a reduced surface area in order to minimize water loss. Especially in the pines, firs, and spruces, the leaves are long and stiff and are commonly referred to as needles. Cypresses, cedars, and others, however, have smaller, scalelike leaves attached along much of their length to the twig. *Phyllocladus* carries on photosynthesis in flattened branchlets, its true leaves falling soon after they appear. The leaves of most podocarps, of some *Araucaria* species, and of the plum yews and *Cunninghamia* are intermediate between scales and needles.

Conifers first appear in the geologic record toward the end of the Carboniferous Period (about 286 million years ago). The modern families of conifers began to appear in the Mesozoic Era (245 million to 66.4 million years ago). Members of the conifers were the dominant type of vegetation just before the advent of the angiosperms.

coniferous forest, vegetation composed primarily of cone-bearing, needle-leaved, or scale-leaved evergreen trees, found in regions of the world that have long winters and moderate to high annual precipitation. The northern Eurasian coniferous forest is called the taiga, or the boreal forest. Both terms are used to describe the entire circumpolar coniferous forest with its many lakes, bogs, and rivers. Coniferous forests also cover mountains in many parts of the world. Pines, spruces, firs, and larches are the dominant trees in coniferous forests. They are similar in shape and height and often form a nearly uniform stand with a layer of low shrubs or herbs beneath. Mosses, liverworts, and lichens cover the forest floor.

The light-coloured, usually acidic soils of coniferous forests are called podzols (podsols) and have a compacted humus layer, known as mor, which contains many fungi. These soils are low in mineral content, organic material, and number of invertebrate animals such as earthworms.

Mosquitoes, flies, and other insects are common inhabitants of the coniferous forest, but few cold-blooded vertebrates, such as snakes and frogs, are present because of the low temperatures. Birds include woodpeckers, crossbills, warblers, kinglets, nuthatches, waxwings, grouse, hawks, and owls. Prominent mammals include shrews, voles, squirrels, martens, moose, reindeer, and wolves.

Eurasian coniferous forest is dominated in the east by Siberian pine, Siberian fir, and Siberian and Dahurian larches. Scots pine and Norway spruce are the important species in western Europe.

North American coniferous forest is dominated throughout by white spruce, black spruce, and balsam fir, although lodgepole pine and alpine fir are important species in the western section.

A distinct subtype of the North American coniferous forest is the moist temperate coniferous forest, or coast forest, which is found along the west coast of North America eastward to the Rocky Mountains. This subtype is sometimes called temperate rain forest, although this term is properly applied only to broad-leaved evergreen forests of the Southern Hemisphere. Warm temperatures, high humidity, and often misty conditions encourage the development of a mossy, moisture-loving plant layer under the giant trees of Sitka spruce, western red cedar, western hemlock, Douglas fir, and coast redwood.

Other subtypes of coniferous forest occur at various elevations in the Rocky Mountains of North America, in Central America, and in eastern Asia. They are known as subalpine and montane forests and are dominated by combinations of pine, spruce, and fir species.

Coninxloo, Gillis van (b. Jan. 24, 1544, probably Antwerp, Flanders [now in Belgium]—buried Jan. 4, 1607, Amsterdam, Neth.), Flemish landscape painter whose works show the transition from Mannerist to early Baroque landscape.

Coninxloo studied under, among others, Pieter Coecke van Aelst, a painter of the Antwerp school of Mannerism. After a period of travel in France, he returned to Antwerp in 1570 and was made a member of the painters' guild. He left his home again in 1585 to escape religious persecution and stayed at Frankenthal in the Palatinate until 1595, when he settled in Amsterdam.

The development of Coninxloo's style is often described in three periods that somewhat correspond with his residence in Antwerp (1570–88), Frankenthal (1588–95), and Amsterdam (1595–1606). His earlier works are deliberately composed landscape fantasies reflecting the influence of the Italianate Flemish landscapist Paul Brill. Coninxloo's later landscapes are more naturalistic and are characterized by their blending of colour into a harmonious atmospheric tone.

conjoined twin: *see* Siamese twin.

conjugated system, in a covalent chemical compound, a group or chain of atoms bearing valence electrons that are not engaged in single-bond formation and that modify the behaviour of each other. If, for example, a carbonyl group (C:O) and a hydroxyl group (OH) are widely separated in a molecule, each has distinctive properties, but in combination they form the carboxyl group (COOH), which has an entirely different character. Similarly, isolated double bonds contribute no colour to a hydrocarbon, but, in a molecule containing a chain of alternating single and double bonds, intense coloration results from conjugation.

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conjugation, in biology, sexual process in which two lower organisms of the same species, such as bacteria, protozoans, and some algae and fungi, exchange nuclear material during a temporary union (*e.g.,* ciliated protozoans), completely transfer one organism's contents to the other organism (bacteria and some algae), or fuse together to form one organism (most bacteria and fungi and some algae). Within a given population of organisms, the various forms that may en-

gage in conjugation are known as mating types. The forms may or may not resemble each other in size, shape, or motility. They differ in some physiological or genetic characteristic and are distinguished by biologists through the use of symbols such as + and − or by letters of the alphabet if more than two forms occur.

conjunction, in astronomy, an apparent meeting or passing of two or more celestial bodies. The Moon is in conjunction with the Sun at the phase of New Moon, when it moves between the Earth and Sun and the side turned toward the Earth is dark. Inferior planets—those with orbits smaller than the Earth's (namely, Venus and Mercury)—have two kinds of conjunctions with the Sun. An inferior conjunction occurs when the planet passes approximately between Earth and Sun; if it passes exactly between them, moving across the Sun's face as seen from Earth, it is said to be in transit. A superior conjunction occurs when Earth and the other planet are on opposite sides of the Sun, but all three bodies are again nearly in a straight line. Superior planets, those having orbits larger than the Earth's, can have only superior conjunctions with the Sun. Conjunctions of planets with one another are considered of great importance in astrology. *See also* opposition.

conjunction, in logic, a type of connective that uses the word "and" to join together two propositions. *See* connective.

conjunctivitis, inflammation of the conjunctiva, the delicate mucous membrane that lines the eyelids and covers the front part of the white of the eye—the sclera. The inflammation may be caused by an infection or by a chemical burn or mechanical injury, or it may be part of an allergic reaction. Often both the conjunctiva and the cornea are inflamed, a condition called keratoconjunctivitis. (The cornea is the transparent part of the eyeball in front of the iris and the pupil.)

A variety of infectious agents can give rise to conjunctivitis. The microorganism *Chlamydia trachomatis* is responsible for trachoma, a disease in which the conjunctiva and cornea become scarred, leading to blindness. Trachoma is the most common cause of blindness in the world and is especially prevalent in the Middle East, Asia, and parts of Africa. Inclusion conjunctivitis, so called because of the small bodies that have been observed within ("included in") the infected cells, is also caused by *C. trachomatis*. This disease occurs primarily in newborns who become infected when passing through the birth canal. The viruses of smallpox, chicken pox, and measles also may invade the conjunctiva. Adenoviruses, a group of viruses whose disease-causing members may cause respiratory infections or may survive for long periods in lymphoid tissue (*e.g.,* in the tonsils), may attack the conjunctiva and cornea; the disease is called epidemic keratoconjunctivitis.

Bacterial conjunctivitis, also known as pinkeye, is a highly contagious disease of humans and of various domestic animals. The organisms most commonly responsible for bacterial conjunctivitis in humans are staphylococci; pneumococci (*Diplococcus pneumoniae* organisms); and *Haemophilus influenzae* organisms, which may invade the respiratory tract or the brain coverings. Gonococcal conjunctivitis, invasion of the conjunctivas by gonorrhea organisms, was once common among newborn infants, who became infected during delivery. This infection can cause blindness if not treated promptly. It is prevented by routine application of a drop of weak silver nitrate solution into each eye of an infant after delivery.

Conjunctivitis also may result from an allergic reaction. Phlyctenular keratoconjunctivitis, so called because of the presence of one or more phlyctenules—ulcerated, inflamed nodules—on the outer part of the cornea, is common among Eskimos. It usually occurs in association with malnutrition or tuberculosis and is thought to be an allergic response to bacteria. Vernal conjunctivitis, or vernal catarrh, is an allergic inflammation that tends to recur in the conjunctivas of susceptible children each year during the summer months and to depart with the coming of cold weather. There are two types of vernal conjunctivitis. In one, the lining of the upper eyelid is affected, with a characteristic red, pebbled appearance. Between the pebbly elevations there is a stringy white substance that has exuded from the mucous membrane. In the second type of vernal conjunctivitis the inflammation, manifested by separate yellowish-pink elevations, is in that part of the conjunctiva that is next to the cornea.

A severe form of conjunctivitis that may culminate in blindness occasionally accompanies erythema multiforme, an eruption on the skin and mucous membranes that sometimes occurs in association with a systemic infection, after drug poisoning or the injection of an antitoxin, or during pregnancy.

conjuring, also called PRESTIDIGITATION, or SLEIGHT OF HAND, the art of entertaining by pretended performance of supposedly impossible feats. The conjurer is basically an actor who, to perform his feats, combines psychology with manual dexterity and, frequently, with mechanical apparatus. The two most common terms used for the art, conjuring and magic, had in their earlier meanings association with supernatural powers and beings. By the European Middle Ages, however, conjuring had become a form of entertainment. In the 15th and 16th centuries strolling mountebanks and jongleurs exhibited their tricks at fairs, in the houses of noblemen, and in barns. The 18th century saw the rise of the conjurer as a stage performer with such notables as Giuseppe Pinetti, Filippo Torrini, Philip Breslaw, and Isaac Fawkes.

The 19th century witnessed a renaissance of conjuring with such magicians as Torino Bartolomeo Bosco, Philippe (Jacques André Noé Talon), Jean-Eugène Robert-Houdin, Henri Robin, John Henry Anderson, and Compars and Alexander Herrmann. In 1845 Robert-Houdin's Bijou Theatre opened in Paris, and as well as giving brilliant performances, he also was the first to write down the fundamental principles of magic and its psychology. Other books on conjuring were written by Angelo Lewis, Nevil Maskelyne, and David Devant.

The full-evening magic show developed during the first three decades of the 20th century. Noted conjurers included Howard Thurston, Harry Houdini, and Harry Blackstone. After a decline in public interest in conjuring during the 1950s and '60s, Doug Henning, Richard Ross, Mark Wilson, and others helped revive the art, often by presenting magic on television programs.

The art of conjuring depends only in part upon the quickness of the hand to deceive the eye. The magician must also keep in the mind the appearance of his movements, and his deftness must manifest precision of movement and exactness of rhythm. The conjurer uses apparatus of three types: (1) equipment that is exactly as it appears to the audience; (2) equipment that secretly has been prepared to aid the performance of the trick without altering its appearance; and (3) equipment that is hidden from sight and used without the knowledge of the audience.

Conklin, Edwin Grant (b. Nov. 24, 1863, Waldo, Ohio, U.S.—d. Nov. 21, 1952, Princeton, N.J.), American biologist noted for his studies of human evolution, who was a leading critic of society's response to advanced technology.

Conklin became professor of biology at Princeton University (1908), where he remained as independent lecturer and researcher after his retirement from the position in 1933. Experimenting in the field of invertebrate em-



Conklin, *c.* 1948
By courtesy of Princeton University Archives

bryology, he studied the egg cell, or ovum, and traced the formation of organs to their origins in the egg cell and embryo. Conklin also investigated the physical mechanism of cell division and became an authority on human evolution. As a widely respected scientist, he publicly pointed out the problems created by the impact of scientific discoveries on society and cautioned against maintaining archaic social attitudes in the face of a highly sophisticated technology. Conklin's statements, made directly after World War II, were dramatized by widespread anxiety over the possible employment of nuclear weapons in future wars. Among his scientific publications are *Heredity and Environment in the Development of Men* (1915–21), *Direction of Human Evolution* (1921), and *Problems of Organic Adaptation* (1921).

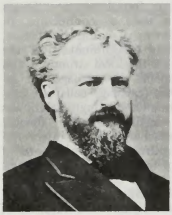
Conkling, Roscoe (b. Oct. 30, 1829, Albany, N.Y., U.S.—d. April 18, 1888, New York City), prominent U.S. Republican leader in the post-Civil War period. He was known for his support of severe Reconstruction measures toward the South and his insistence on the control of political patronage in his home state of New York.

Admitted to the bar in 1850, Conkling soon established a reputation as a lawyer, orator, and Whig Party leader. In 1858 he ran as a Republican and was elected to the U.S. House of Representatives, serving for six years. In 1867 he won a seat in the Senate, where he held office for 14 years.

In Congress, Conkling consistently upheld the administration of President Abraham Lincoln in his conduct of the Civil War (1861–65). He became a leader of the Radical Republicans, who advocated firm military supervision of the defeated Confederate states and broader rights for freedmen. In addition, he was an avid supporter of the Fourteenth (due process) Amendment to the Constitution (1868). Conkling influenced the administration of President Ulysses S. Grant (1869–77) in its overall policy toward the South.

To maintain a tight grip on the reins of political power in his home state, Conkling insisted on the need for senators to have personal control over all federal appointments within state boundaries. He thus vigorously resisted the efforts of the Republican president Rutherford B. Hayes (served 1877–81) to introduce civil-service reform legislation.

At the party convention of 1880 Conkling headed the so-called Stalwart faction supporting a third term for former president Grant. As a result of this movement, the convention was split and a compromise candidate, James A. Garfield, was nominated and elected. Conkling resigned from office (May 1881) in



Conkling

By courtesy of the Library of Congress, Washington, D.C.

a dispute with the new president over the patronage issue. He declined a nomination to the U.S. Supreme Court in 1882 and practiced law in New York City until his death.

Conn CÉTCHATHACH (Irish), English CONN OF THE HUNDRED BATTLES (fl. 2nd century AD), in Irish tradition, the first of a line of Irish kings that survived into the 11th century. He is said to have ruled a kingdom covering most of the northern half of the island.

Because Conn's exploits are recorded only in heroic sagas, some historians regard him as a poetical invention. Others point to the use of the Gaelic phrase *Leth Cuinn* ("Conn's Half") as proof that he was a historical figure who held sway over Ireland north of present Dublin. According to these scholars, his power was concentrated in Meath (in east-central Ireland) and Connaught. Evidently he failed to win the allegiance of southern Ireland, which was ruled by Eóghan (or Mog Nuadat) and called *Leth Moga* ("Mog's Half"). In Irish genealogy Conn is held to be the ancestor of Niall of the Nine Hostages (reigned 379–405), who founded the Uí Néill, the greatest dynasty in Irish history.

Connaraceae, family of dicotyledonous flowering plants within the order Rosales, and containing 25 genera of trees, shrubs, and shrubby, twining climbers distributed in tropical regions of the world. Except for a few species bearing separate male and female flowers, the flowers are bisexual and have 5 sepals and petals; either 5 or 10 male, pollen-producing structures (stamens); and either 1, 4, or usually 5 separate, one-chambered, female ovule-bearing structures (carpels) positioned above the attachment point of the other floral parts. The carpels have two ovules each, but only one carpel matures into a fruit and only one ovule becomes a seed, which often has a fleshy appendage (aril) attached. The fruit is a follicle, a dry capsulelike or podlike structure that splits open along a single seam.

Among the largest genera of the order are *Connarus* (130 species), *Rourea* (80 to 90 species), *Agelaea* (50 species), *Cnestis* (40 species), and *Byrsocarpus* (20 species). The genus *Jollydora,* with six species distributed in West Africa, produces flowers and fruits directly on the wood of the trunk and larger branches, a condition called cauliflory.

Economically, there are few plants of importance in the family. *Connarus guianensis* of Guyana is the source of one of the zebra woods of commerce. The fruits, seeds, or leaves of many other species are poisonous and are used, among other things, against wild dogs and coyotes in poisoned baits (*e.g., Rourea volubilis, R. glabra,* and *Cnestis polyphylla*). Others have properties that make them useful as folk medicines—*e.g.,* to induce vomiting (*Aglaea emetica* leaves, in Madagascar), as a dysentery treatment (*A. villosa* leaves, in West Africa), and as an agent against gonorrhea (*A. lamarckii* leaves, in Madagascar). The bark of *R. glabra,* when used in tanning, produces a bright purple colour in animal skins.

Connaught, also spelled CONNACHT, one of the five ancient kingdoms or provinces of Ireland, lying in the western and northwestern areas of the island. Its eastern boundary is the middle course of the River Shannon. Connaught is the poorest part of the Irish republic and comprises the modern counties of Mayo, Sligo, Leitrim, Galway, and Roscommon.

In the 4th century AD the ancient line of Connaught kings was displaced by the midland rulers, whose centre was at Tara. Two members of this Tara dynasty, Brion and Fiachra, founded septs, or clans, the Uí Briúin and the Uí Fiachrach, to which all the rulers of Connaught from the 5th to the 12th century belonged. Turloch (Toirdelbach) O'Connor (d. 1156) and his son Rory (Ruadri; d. 1198) were strong enough to be recognized as kings of Ireland, but the Anglo-Norman settlement of the mid-12th century disrupted their power. Rory's brother, Cathal Crovderg, was king of Connaught until his death in 1224, but in 1227 the English king Henry III granted Connaught to the Norman baron Richard de Burgh (or de Burgo). His descendants held the lordship of Connaught with the earldom of Ulster until the titles fell to the crown in 1461. The land of Connaught was thereafter controlled by two junior branches of the de Burghs, who ultimately became the Clanricarde and Mayo Burkes. Connaught was divided into shires in 1576. From the 17th century it and neighbouring County Clare were the only parts of Ireland where Roman Catholics were allowed to own most of the farmland. The result was that most of the province remained loyal to the English crown during the Tyrone uprising (1595–1603) and also remained the most Gaelic and Norman part of Ireland.

Connaught and Strathearn, Arthur William Patrick Albert, duke of (b. May 1, 1850, Buckingham Palace, London, Eng.—d. Jan. 16, 1942, Bagshot Park, Surrey), third son of Queen Victoria and Prince Consort Albert; he held various military appointments and served as governor-general of Canada.

Prince Arthur, his mother's favourite son, was created duke of Connaught and Strathearn in 1874. He entered the Royal Military Academy, Woolwich, in 1866 and did well in the army, becoming full general in 1893 and field marshal in 1902. He served in Egypt in 1882, commanding the 1st Guards Brigade at Tel el Kebir. He then went to India and held the Bombay command from 1886 to 1890.



Duke of Connaught, engraving, 1876

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Returning to England, the duke held various military appointments, notably commander in chief in Ireland (1900–04), inspector general to the forces (1904–07), and commander in chief in the Mediterranean (1907–09). As governor-general of Canada (1911–16) he aroused controversy by attempting to intervene in Canadian military affairs. Thereafter he presided over various state functions over the years and finally withdrew from public life in 1928.

In 1879 the duke had married Princess Louise Marguerite of Prussia, and their elder daughter, Margaret, married the crown prince of Sweden (later King Gustav VI Adolf) in 1905.

Conneaut, city, Ashtabula county, extreme northeastern Ohio, U.S. It lies along Lake Erie at the mouth of Conneaut Creek and is adjacent to the Pennsylvania border (east). A temporary settlement, Fort Independence, was made there by a group from the Connecticut Land Company led by Moses Cleaveland (1796). The harbour site was permanently settled in 1799 by Thomas Montgomery and Aaron Wright. Conneaut is now a port of entry and a major transshipment point; Lake Superior iron ore is received, and coal and steel are shipped. The city's industry is diversified, and there are railroad shops and yards and commercial fisheries. Conneaut's name was derived from *konyiat,* a Seneca Indian word variously interpreted as "large-mouth fish" or "place of late snows." The city has a notable historical railroad museum. Inc. village, 1834; city, 1902. Pop. (1994 est.) 13,212.

connectedness, in mathematics, fundamental topological property of sets that corresponds with the usual intuitive idea of having no breaks. It is of fundamental importance because it is one of the few properties of geometric figures that remains unchanged after homeomorphic transformations—that is, transformations in which the figure is deformed without tearing or folding. A point is called a limit point of a set in the Euclidean plane if there is no minimum distance from that point to members of the set; for example, the set of all numbers less than one has one as a limit point. If a point is removed from a curve, any remaining points on either side of the break will lie at a finite distance from the break and thus cannot be limit points of the other side.

Topologically, the concept of two sets' being separated means that neither set contains any limit points of the other set. If a single point is removed from a simple closed curve such as a circle or polygon, it remains connected; if any two points are removed it becomes separated. A figure-eight curve does not have this property because one point can be removed from each loop and the figure will remain connected. Whether or not a set remains connected after some of its points are removed is one of the principal ways of classifying figures in topology.

Connecticut, constituent state of the United States of America, situated in the New England region, northeastern U.S. It is on Long Island Sound and is bounded on the west by New York, on the north by Massachusetts, and on the east by Rhode Island. The capital is Hartford.

A brief treatment of Connecticut follows. For full treatment, *see* MACROPAEDIA: United States of America: *Connecticut.*

The original inhabitants of Connecticut were Algonquian-speaking Indians. Connecticut was colonized by English Puritans from the Massachusetts Bay Colony during the 1630s. The Connecticut River valley settlements of Hartford, Wethersfield, Windsor, and Saybrook were founded in 1635, and the settlement at New Haven dates from 1638. Connecticut remained an agricultural region until the early 19th century, when textile factories were established, and by 1850 employment in manufacturing outnumbered that in agriculture. The state remains a manufacturing centre.

Connecticut is the third smallest state in the United States. It is divided into three regions, of which the Western Upland (*i.e.,* the Berkshire Hills) contains the state's highest elevations, with a maximum of 2,380 feet (725 m)

in the northwest corner. The Central Lowland is a downfaulted block of land filled with sandstone and shale. There are many small ridges and broad river valleys. The third region, the Eastern Upland, like the Western, is hilly and drained by numerous rivers.

The climate is moderate, with January temperatures averaging about 26° F (−3° C) and summers between 70° and 75° F (21° and 24° C). Precipitation averages from 3 to 4 inches (75 to 100 mm) per month and is evenly distributed.

In the 19th century immigration to the state from southern and eastern Europe accelerated. From 1900 to 1970 Connecticut's population growth rate was above the national average, but in the 1980s it dropped significantly below that average and remained there in the following decade. Blacks comprise only 10 percent of the population. The state is heavily urban, but there is no single large city.

Agriculture is only a minor element in the economy, and the decline in the number of farms has been extreme. Dairy products are still important, and vegetables are grown for local consumption. The only important export crop is shade-grown tobacco, used mainly for wrappers in the manufacture of cigars. Oyster fishing and whaling, the latter now extinct, have been the only significant commercial fishing operations.

Mining operations, once important, have decreased significantly, and only sand, gravel, stone, feldspar, clay, and mica are still extracted. Originally, Connecticut was a forested region, but virtually all of the primeval forest has been cut, and the current woodland that covers nearly two-thirds of the state is mixed secondary forest.

Manufacturing is the foundation of the state's economy, employing about one-fifth of the workforce. Transportation equipment, especially helicopters, submarines, and aircraft engines, is a major category of production. Guns and ammunition are also produced.

New Haven is one of the largest ports in New England, and Stamford now houses the headquarters or home offices of some of the largest corporations in the United States. The U.S. Coast Guard Academy is located in New London. Highways and railways traverse Connecticut on the heavily traveled Boston–New York corridor. Interstate highways serve the densely settled coastal and Connecticut River valley regions. The state abounds with historical sites and memorials, and there are numerous state forests and state parks. Major cultural activities are often linked with drama; notable are the American Shakespeare Theatre in Stratford, the Long Wharf Theatre in New Haven, and the Yale School of Drama. Yale University, founded in 1701, is one of the nation's most famous universities. Area 5,018 square miles (12,997 square km). Pop. (1995 est.) 3,274,000.

Connecticut River, longest stream in New England, rising in the Connecticut lakes in northern New Hampshire, U.S. After flowing about 9 miles (14 km) through New Hampshire, it moves roughly southwestward and forms the border between New Hampshire and Vermont for about 238 miles (383 km). It then crosses Massachusetts and Connecticut to empty into Long Island Sound after a total course of 407 miles (655 km).

The river drains an area of 11,085 square miles (28,710 square km). Its 23 principal tributaries, which include the Passumpsic, White, Deerfield, and Farmington rivers (on the right) and the Ammonoosuc and Chicopee rivers (on the left), are mostly short, swift streams in narrow valleys dotted with small power dams, storage ponds, and factories. The Connecticut is one of the most completely developed rivers in the United States in terms of hydroelectric power. Following disastrous floods in 1936, a federal project involving 20 dams and reservoirs was begun. A dam at Wilder, Vt., has a reservoir 46 miles (74 km) long. The lower 60 miles (97 km) of the river are tidal. The name Connecticut supposedly comes from the Mahican Indian word meaning "the long river."

Connecticut wit (poet): *see* Hartford wit.

connective, also called SENTENTIAL CONNECTIVE, or PROPOSITIONAL CONNECTIVE, in logic, a word or group of words that joins two or more propositions together to form a connective proposition. Commonly used connectives include "but," "and," "or," "if . . . then," and "if and only if." The various types of logical connectives include conjunction ("and"), disjunction ("or"), negation ("not"), conditional ("if . . . then"), and biconditional ("if and only if"). In a conjunction, two or more propositions that are stated as true at the same time are joined by the connective "and," as in the statement "Life is short, *and* art is long." In a sentence such as "*If* the weather remains mild *and* there is no frost, *then* there will be a good harvest," the connective is "If . . . then." The premises and conclusion of a syllogism are also joined by connectives, as in "All men are mortal *and* no gods are mortal, *therefore* no men are gods."

connective tissue, in physiology, any tissue in the body that maintains the form of the body and its organs and provides cohesion and internal support. The term encompasses bone, ligaments, tendons, cartilage, and adipose tissue. Connective tissue consists of cells and one of three kinds of protein fibres embedded in an extracellular, largely carbohydrate amorphous matrix called ground substance.

A brief treatment of connective tissue follows. For full treatment, *see* MACROPAEDIA: Supportive and Connective Tissues.

For a depiction of many of the supportive and connective tissues of the human body, shown in relation to other parts of the gross anatomy, *see* the colour Trans-Vision in the PROPAEDIA: Part Four, Section 421.

All connective and supportive tissues originate from the same embryonic layer, the mesoderm. The major components of connective tissue are cells, extracellular fibres, and the ground substance. The amorphous ground substance varies in its physical consistency from a thin gel to a rigid structure, depending on its composition and function.

The cells most commonly found in connective tissue are either stationary (fibroblasts, macrophages, and adipose) or motile (mast cells, monocytes, lymphocytes, plasma cells, and eosinophils). The most abundant of these tissue cells is the fibroblast, which is principally responsible for the maintenance and repair of the extracellular fibres. Macrophages are cells that help to destroy bacteria. Adipose cells process and store nutrients and, where present in abundance, form the fatty tissue of the body. The motile cells help regulate the degree to which blood penetrates into tissue, the ability of blood to clot, and the means to fight disease and infection; they also assist in the healing of injuries.

There are three types of extracellular fibres: collagenous, elastic, and reticular fibres. Most abundant are the fibres composed of the protein collagen. The arrangement of the collagenous fibres provides them with great tensile strength. Reticular fibres form fine-meshed networks of support and connection around cells and tissues. Elastic fibres differ from collagenous fibres in structural arrangement and chemical composition. They are composed of the protein elastin and are highly extensible and resilient.

Loose connective tissue consists of a loosely woven matrix of collagenous, elastic, and reticular fibres. It is found between tissues and organs and is used as connection. In more specialized forms of connective tissue, one component may predominate over the others, depending on the local structural and metabolic requirements. In cartilage, for instance, chondrocytes (cartilage cells) are embedded in an abundance of tough, gelatinous ground substance. Cartilage is a firm, flexible support tissue found mainly in the intervertebral disks, nasal septum, larynx, and parts of the sternum and of the external, middle, and inner ear. Bone matrix contains additional mineral crystals of calcium phosphate, which is responsible for the rigidity and hardness of bone. Adipose tissue is loose connective tissue in which adipose (fat) cells make up the bulk of the tissue. Dense fibrous connective tissue contains closely packed bundles of collagen and fibroblasts but few elastic fibres and little ground substance. Fibrous tissues include tendons (connecting muscles to bones) and ligaments (connecting bone to bone).

There are two basic types of connective-tissue diseases, those that are genetically transferred and attack one of the elements of connective tissue (collagen, cells, or ground substance), often impeding normal growth, and those that are acquired (formerly called collagen diseases), having an inflammatory nature or causing irregularities in the body's immune system. The most frequent heritable connective tissue disease is Marfan's syndrome, which causes an excessive skeletal length in the extremities. Homocystinuria is similar to Marfan's syndrome but is usually accompanied by mental degeneration. Alkaptonuria is caused by an overabundance of homogentisic acid due to the inability to synthesize the enzyme that breaks this substance down. It produces a blackening of tissue and a brittleness of cartilage and intervertebral disks. Mucopolysaccharidoses are diseases of the ground substance.

Acquired connective-tissue diseases usually involve inflammation of the joints, serous membranes, and small blood vessels. Many also affect the internal organs. Rheumatoid arthritis is a chronic disorder in which the soft tissue in the joint becomes inflamed, damaging joint cartilage and causing deformities. Women are affected about three times as frequently as men. Systemic lupus erythematosus (SLE) is also chronic, involving inflammation of the skin, joints, kidneys, nervous system, and serous membranes. It may attack one or more of the aforementioned locations, and it may affect other organs. SLE most often afflicts people in their 20s, 30s, and 40s. Its severity ranges from mild to fatal.

Progressive systemic sclerosis, or scleroderma, is an inflammation of the fibrous tissue, causing a thickening of the skin and deterioration of the joints, muscles, and internal organs. Women contract the disease twice as often as men. Polymyositis involves the inflammation of the musculature, causing debilitation, atrophy, and contracture. The heart is sometimes afflicted, as are the esophagus and larynx muscles.

Sjögren's syndrome, or sicca syndrome, is the decrease of tear and saliva secretion, causing dryness of the eyes and mouth. It may involve other mucous membranes. Rheumatic fever follows a group A streptococcal infection, attacking the joints and, in its most dangerous form, the heart. Amyloidosis is an abnormal buildup of amyloid in connective tissue.

Osteoarthritis is the degeneration of joint cartilage. Especially vulnerable to this disease are weight-bearing joints. When the cartilage deteriorates, the bones usually enlarge, protruding out of the joint articulation, causing joint damage and pain. Relapsing polychondritis is the inflammation of cartilages, particularly those of the ear and nose, resulting in deformities. The most severe form of the disease afflicts the windpipe, frequently causing

recurring pneumonia and blockage of the air passages.

Connelly, Cornelia (Augusta), *née* PEACOCK (b. Jan. 15, 1809, Philadelphia—d. April 18, 1879, St. Leonards, Sussex, Eng.), abbess who founded the Society of the Holy Child Jesus and became the subject of an acrimonious ecclesiastical controversy.

Brought up as an Episcopalian, she married (1831) an Episcopalian clergyman, Pierce Connelly. They converted to Roman Catholicism by 1836. In 1840 Connelly decided to become a priest, and Cornelia, by then a mother of four, was encouraged to become a nun. They separated in 1844, Cornelia and the children moving into the Sacred Heart Convent of Trinità dei Monti, Rome. Pierce Connelly was ordained the next year.

In 1846 Bishop Nicholas Wiseman invited Cornelia to England to found an order for teaching English girls. The first house was opened in Derby, Derbyshire, and in 1847 she took religious vows and was installed as first superior of the Society of the Holy Child Jesus. When she refused to allow Pierce Connelly to take any part in the new congregation, he filed suit in the English courts for restitution of conjugal rights.

Pierce Connelly failed to win his case. He left the Catholic Church and began a campaign of vilification of Mother Cornelia and the church that lasted until his death, in 1883. The consequent notoriety tended to obscure interest in Mother Cornelia's work and virtues until the 20th century; she was proposed for beatification in 1959.

Connelly, Marc, byname of MARCUS COOK CONNELLY (b. Dec. 13, 1890, McKeesport, Pa., U.S.—d. Dec. 21, 1980, New York City), American playwright, journalist, teacher, actor, and director, best-known for *Green Pastures* (a folk version of the Old Testament dramatized through the lives of blacks of the southern United States) and for the comedies that he wrote with George S. Kaufman.

Connelly's parents were touring actors who, a year before he was born, settled down in McKeesport to manage a hotel frequented by actors. After the death of his father, Connelly attended Trinity Hall, a boarding school in Washington, Pa., from 1902 to 1907. His family's financial troubles ended his education. He worked as a reporter in Pittsburgh until 1917, when he joined the *Morning Telegraph* in New York City, covering theatrical news. He then began his collaboration with Kaufman, who worked for the drama section of *The New York Times*. Their first successful play, *Dulcy* (1921), written as a vehicle for the actress Lynn Fontanne, was followed by *To the Ladies* (1922), a vehicle for Helen Hayes. *Beggar on Horseback* (1924), in the style of German Expressionist drama, depicts the threat to art from a society dominated by bourgeois values.

While they collaborated in writing a satire on Hollywood, *Merton of the Movies* (1922), and two musicals, *Helen of Troy, New York* (1923) and *Be Yourself* (1924), Connelly and Kaufman were members of the Round Table of the Algonquin Hotel, a circle of New York City's theatre people and writers. Connelly described this phase of his career in *Voices Offstage: A Book of Memoirs* (1968).

Green Pastures, based on Roark Bradford's book *Ol' Man Adam an' His Chillun,* was first performed in 1930 and was extremely popular both on the stage and in its motion-picture version (1936), but when it was revived in 1951 it was criticized for perpetuating unacceptable stereotypes of blacks.

Connelly's last Broadway success, *The Farmer Takes a Wife* (1934), written with Frank Elser, was a comedy about life along the Erie Canal in the 19th century; a film version of it was made in 1935. From 1946 to 1950 he taught playwriting at Yale University. His early plays *Dulcy* and *Beggar on Horseback* were revived on the New York City stage in the 1970s. His novel *A Souvenir from Qam* was published in 1965.

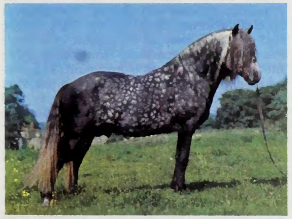
Connemara, region of County Galway, Ireland, west of Galway city and Lakes Corrib and Mask. It is an ice-scoured, rock-strewn country, mostly covered with peat bog. Between the town of Galway and Kilkieran Bay, more than 20 miles (30 km) to the west, the



The Twelve Bens (peaks) and the Ballynahinch River, Connemara, County Galway
Colour Library International

land rises gradually from the coastal lowland northward to more than 1,100 feet (335 m); this area is traditionally called Iar ("West") Connaught. The largest of the many islands in the bay, Lettermore, Gorumna, and Lettermullan, are linked with the mainland by road. True Connemara begins west of Kilkieran Bay and has a varied coastline and many islands, peat bogs, and lakes. It is known for its austerely grand scenery, Connemara ponies, and tweeds. North of the Clifden–Galway road are the sharp-peaked quartzite ranges of the Twelve Bens and Maumturks, with many summits of more than 2,000 feet (610 m). The population of the economically poor region is concentrated in a narrow coastal belt in which the cultivable land was built up from sand and from seaweed and other manures, with the fields protected by high stone walls. Clifden, the region's only town, was the terminus of a light railway from 1895 to 1935 and was once a small port. Roundstone is a small village and seaside resort. Pop. (1981) 19,519.

Connemara, breed of pony native to the Connemara area of Ireland, used as general riding ponies for adults and children and as jumpers and show ponies. Docile, hardy, and surefooted, they have compact bodies and range from 13.2 to 15 hands (about 54 to 60 inches, or 137 to 152 cm) tall. Most colours are



Connemara pony
Sally Anne Thompson—EB Inc.

found. Thoroughbred and other blood lines have been introduced to modify the breed. In the United States, Connemaras are registered with the American Connemara Pony Society.

Conner, Mount, most easterly of central Australia's giant tors, or monoliths, which include Ayers Rock (called Uluru by the region's Aborigines) and the Olga Rocks rising above the desert plain southeast of Lake Amadeus in southwestern Northern Territory. Mount Conner is flat-topped and horseshoe-shaped and reaches to 2,500 feet (760 m) above sea level; its lower 500 feet (150 m) are covered by a talus (scree) slope, while the highest 300 feet (90 m) are sheer cliffs. The conglomerate and quartzite formation measures 2 miles (3 km) by ¾ mile (1.2 km), with sandstone and limestone ridges extending for 1½ miles (2.5 km) from the base. It was visited in 1873 by William Gosse, a government surveyor, who named it for a South Australian politician, M.L. Conner. The region's Aborigines, who call the mountain Artilla, believe it to be the home of icemen who create cold weather.

Connersville, city, seat (1819) of Fayette county, east-central Indiana, U.S., on Whitewater River, 57 miles (92 km) east of Indianapolis. A fur-trading post was established on the site in 1808 by John Conner, a former guide and interpreter for General William Henry Harrison, governor of Indiana Territory. An early shipping point on the Whitewater Canal, Connersville once was the place of manufacture for the Auburn, Cord, and Duesenberg cars. The city now has industries that produce household appliances, air conditioners, blowers, and building supplies and is a marketing centre for a corn- (maize-) and hog-raising area. The Reynolds Museum of Science and History is in the city. The Mary Gray Bird Sanctuary of the Indiana Audubon Society and Whitewater State Park are nearby. Inc. 1870. Pop. (1990) 15,550.

Connolly, Cyril (Vernon) (b. Sept. 10, 1903, Coventry, Warwickshire, Eng.—d. Nov. 26, 1974, London), English critic, novelist, and man of letters, founder and editor of *Horizon,* a magazine of contemporary literature that was a major influence in Britain in its time (1939–50). As a critic he was personal and eclectic rather than systematic, but his idiosyncratic views were perceptive and conveyed with wit and grace.

The son of an army major, he was educated at Eton College and then at Balliol College, Oxford. In 1927 he began a career of literary journalism as a contributor to the *New Statesman, The Sunday Times, Observer,* and other periodicals. His only novel, *The Rock Pool,* about the headlong decline of a young Englishman in a Riviera art colony, appeared in 1936. His most noted books are his collections of essays, *Enemies of Promise* (1938), which contains an autobiographical section, and *The Condemned Playground* (1945); and an assemblage of introspective jottings, *The Unquiet Grave* (1944). *Previous Convictions: Selected Writings of a Decade* was published in 1963, and *The Evening Colonnade,* a collection of essays, in 1975.

Connolly, James (b. June 5, 1868, Edinburgh—d. May 12, 1916, Dublin), first major Marxist union leader in Ireland, who was decisive in bringing about the Easter Rising (April 24–29, 1916) in Dublin against British rule.

In 1896, soon after his arrival in Dublin, Connolly helped found the Irish Socialist Republican Party. From 1903 to 1910 he lived in New York City; while in the United States, he helped to organize the Industrial Workers of the World (IWW; "Wobblies"). At Clonmel, County Tipperary, in 1912, he and James Larkin founded the Irish Labour Party. He was Larkin's chief assistant in organizing the Irish National Transport and General Workers' Union, which conducted sympathy strikes in support of other labour disputes. In 1913 the Dublin industrialists instituted a lockout against members of the union and caused the resulting labour demonstrations to be brutally suppressed. At that time Connolly became

commander of an irregular Citizen Army. On the outbreak of World War I (August 1914), he replaced Larkin (who was in the United States) as head of the union. Asserting that peace could be secured only through the fall of the capitalist states, he committed the Irish labour movement to opposing the Allied war effort.



James Connolly, drawing by Sean O'Sullivan, 1936; in the National Museum of Ireland, Dublin

By courtesy of the National Museum of Ireland, Dublin

Connolly's reckless desire for an immediate revolt in Dublin threatened to interfere with the plan of the Irish Republican Brotherhood for an insurrection on Easter Sunday, April 23, 1916. The plan miscarried at the last moment and might have been dropped entirely if not for Connolly's insistence that some attempt be made, however hopeless. He and the poet Joseph Plunkett plotted the final details of the rising. On Easter Monday the revolutionaries captured the General Post Office, Dublin, where the Irish Republic was proclaimed. After the rising had been crushed with extreme violence, Connolly, severely wounded and suffering from gangrene, was propped up in a chair and shot by a British firing squad.

Connolly, Maureen Catherine, byname LITTLE MO (b. Sept. 17, 1934, San Diego, Calif., U.S.—d. June 21, 1969, Dallas, Texas), American tennis player who was the first woman to win the grand slam of tennis: the British (Wimbledon), U.S., Australian, and French singles championships in one year (1953).

Connolly began playing tennis on the municipal courts in San Diego, Calif., at the age of 10 and at 14 became the youngest winner of the National Girls' Tournament. She won her first National Women's title in 1951.

In July 1954 her career was terminated by a horseback-riding accident that severely injured her right leg. After announcing her retirement from competition, she became a tennis instructor.

Connor, Ralph, pseudonym of CHARLES WILLIAM GORDON (b. Sept. 13, 1860, Indian Lands, Glengarry county, Ont., Can.—d. Oct. 31, 1937, Winnipeg, Man.), Canadian Presbyterian minister and writer of numerous popular novels that combine religious messages, wholesome sentiment, and adventure.

Ordained in 1890, Gordon became a missionary to mining and lumber camps in the Canadian Rocky Mountains, and from this experience and memories of his Glengarry childhood derived the major background for his fiction. His first books, the missionary adventure tales *Black Rock* (1898) and its sequel, *The Sky Pilot* (1899), met with phenomenal success. His highest literary achievements are considered to be the books dealing with the pioneer traditions of his Ontario boyhood: *The Man from Glengarry* (1901) and *Glengarry School Days* (1902).

Connors, Jimmy, byname of JAMES SCOTT CONNORS (b. Sept. 2, 1952, East St. Louis, Ill., U.S.), American tennis player who established himself as a leading competitor in the 1970s.

Connors learned to play tennis from his mother at an early age, and when he was eight years old he competed in the U.S. boys' championship. A former student at the University of California at Los Angeles, he joined team tennis in 1972. In 1974 he won three of the Big Four tournaments (U.S., Australian, and Wimbledon) but was barred from the fourth, the French Open. He sued the Association of Tennis Professionals, alleging that they illegally excluded him from the French event, but dropped his lawsuit after his loss to Arthur Ashe for the 1975 Wimbledon championship. He won the U.S. singles titles in 1976 and 1978 against Björn Borg and in 1982 and 1983 against Ivan Lendl. Connors also won the indoor championship five times (1973–75, 1978, and 1979), the Wimbledon and U.S. doubles (with Ilie Nastase in 1975), and the 1982 Wimbledon singles.

Conoco: *see* Continental Oil Company.

conodont, minute toothlike fossil composed of the mineral apatite (calcium phosphate); conodonts are among the most frequently occurring fossils in marine sedimentary rocks of Paleozoic age. Between 0.2 mm (0.008 inch) and 6 mm in length, they are known as microfossils and come from rocks ranging in age from the Cambrian Period to the Triassic Period. They are thus the remains of animals that lived during the interval of time from 570 to 208 million years ago and that are believed to have been small marine invertebrates living in the open oceans and coastal waters throughout the tropical and temperate realms. Only recently has the conodont-bearing animal been found, preserved in fine-grained rock from North America. Conodont shapes are commonly described as either simple cones (like sharp teeth), bar types (a thin bent shaft with needlelike cusps or fangs along one edge), blade types (flattened rows of cones of ranging size), or platform types (like blades, with broad flanges on each side making a small ledge or platform around the blade). Well over 1,000 different species or shapes of conodonts are now known.

Some conodonts exist in two forms, "right" and "left." They are known to have occurred in bilaterally symmetrical pair assemblages in the animal, like teeth but more delicate and fragile. The few assemblages discovered so far appear to contain as many as nine different species, or forms, of conodonts. Bars, blades, and platforms may all be present in a single assemblage or apparatus. How single cones fitted into assemblages is uncertain. The conodont apparatus seems to have been placed at the entrance to the gut and to have assisted in food-particle movement. The relationship of this little animal (30–40 mm long) to the known wormlike animal groups is still debatable, and no exactly compatible creature is known to exist today.

Conodonts are very useful fossils in the identification and correlation of strata, as they evolved rapidly, changing many details of their shapes as geologic time passed. Each successive group of strata thus may be characterized by distinctive conodont assemblages or faunas. Moreover, conodonts are very widespread, and identical or similar species occur in many parts of the world. Black shales and limestones are especially rich in conodonts, but other sedimentary rock types may also be productive. In some parts of the world assemblages of conodonts, regarded as those of animals living out in the open ocean, can be distinguished from others thought to belong to inshore communities.

The oldest conodonts are from Lower Cambrian rocks; they are largely single cones. Compound types appeared in the Ordovician Period, and by Silurian time there were many different species of cones, bars, and blade types. The greatest abundance and diversity of conodont shape was in the Devonian Period, wherein more than 50 species and subspecies of the conodont *Palmatolepis* are known to have existed. Other platform types were also common. After this time they began to decline in variety and abundance. By Permian time the conodont animals had almost died out, but they made something of a recovery in the Triassic. By the end of that period they became extinct.

Conodonts are most commonly obtained by dissolving the limestones in which they occur in 15 percent acetic acid. In this acid they are insoluble and are collected in the residue, which is then washed, dried, and put into a heavy liquid such as bromoform through which the conodonts sink (the common acid-insoluble mineral grains float). The conodonts are studied under high magnification by using a binocular microscope. Work on these fossils is now carried out in many countries. Originally discovered in Russia in the middle of the 19th century, they were recognized as being very useful in rock dating and correlation in the United States and Germany about 100 years later. Perhaps the most detailed correlations by means of these microfaunas have been made in the Devonian System of rocks. Thick continuous sequences of limestones in which they occur have been especially studied in North America, Europe, and Morocco, and the succession of conodonts there serve as reference standards. The conodonts obtained from similar rocks elsewhere can then be compared with these, and correlations can be made. Strata distinguished by special conodont assemblages are termed zones. There are 10 generally recognized conodont zones in the Ordovician, 12 zones in the Silurian, 30 in the Devonian, 12 in the Carboniferous, 8 in the Permian, and 22 in the Triassic. Refinements and variations of these zonal schemes are made from time to time as knowledge increases.

The extinction of the conodont animal remains an unsolved mystery. It does not seem to have coincided with a particular geologic event, nor were there extinctions of other groups of marine creatures at the same time. Records of conodonts from younger strata have all proved to be of fossils derived from older rocks and reburied at the later date.

Conon (d. *c.* 390 BC), Athenian admiral notable for his overwhelming victory over the Spartan fleet off Cnidus (the southwestern extremity of modern Turkey) in 394 and his restoration the following year of the long walls and fortifications of Athens' port, the Piraeus. The walls had been destroyed by the Spartans after their victory in the Peloponnesian War (431–404).

Conon was admiral in each of the three years 407–405. In 406 he was defeated by the Spartans and blockaded in Mytilene. He was rescued following the Athenian victory at Arginusae (August 406). But, upon the defeat of Athens' fleet at Aegospotami (405), he fled to Cyprus. On the outbreak of the war between Sparta and the Persians (400), Conon obtained joint command, with Pharnabazus, of a Persian fleet. It was in this capacity that he triumphed six years later at Cnidus. Imprisoned by the Persians when he was on an embassy from Athens to the Persian court to counteract the intrigues of Sparta, Conon probably died in Cyprus.

Conon (d. Sept. 21, 687, Rome [Italy]), pope from 686 to 687.

Probably the son of a Thracian soldier, he

was educated in Sicily and ordained priest in Rome. He was elected to succeed John V and was consecrated on October 21. Elderly and in poor health, he died 11 months later and was buried in St. Peter's.

Conon OF SAMOS (fl. *c.* 245 BC, Alexandria), mathematician and astronomer whose work on conic sections (curves of the intersections of a right circular cone with a plane) served as the basis for the fourth book of the *Conics* of Apollonius of Perga (*c.* 262–190 BC).

From his observations in Italy and Sicily, Conon compiled the *parapegma*, a calendar of meteorological forecasts and of the risings and settings of the stars. He settled in Alexandria, where he served as court astronomer to Ptolemy III Euergetes I (reigned 246–221). When Berenice II, the consort of Ptolemy III, dedicated her hair as an offering in a temple of Aphrodite and the offering disappeared, Conon claimed he could see where it had been placed among the stars in the region of the constellations Boötes, Leo, and Virgo. He named this constellation Coma Berenices ("Berenice's Hair"), thus immortalizing Berenice and further securing his court position.

Conon became a lifelong friend of Archimedes while the latter was studying in Alexandria and later sent him many of his mathematical findings. According to Pappus of Alexandria (fl. *c.* AD 320), Conon discovered the Spiral of Archimedes, a curve that Archimedes used extensively in some of his mathematical investigations.

Conon's works included *De astrologia* ("On Astronomy"), in seven books, which contain the Chaldean observations of solar eclipses, and *Pros Thrasydaion* ("In Reply to Thrasydaeus"), concerning the intersection points of conics with other conics and with circles. None of his works survives.

Conopophagidae, gnateater (or antpipit) family of small, plump-bodied birds of Central and South America. The two genera (*Conopophaga* and *Corythopsis*) were separated from the antbird family (Formicariidae) in 1882 and raised to family rank. Research in the late 1960s, however, led to its dissolution; the *Conopophaga* were then returned to the Formicariidae, and the *Corythopsis* were assigned to the family of New World flycatchers (Tyrannidae).

Conoy, also called PISCATAWAY, an Algonkian-speaking Indian tribe related to the Delawareand the Nanticoke; they lived between the Potomac River and the western shore of Chesapeake Bay in what is now Maryland. Early accounts suggest that their subsistence was based mainly on hunting the abundant game and fowl of the area, using bows and arrows and spears, and that they lived in oval-shaped dwellings.

Harassed by the Susquehanna in the 17th century, the rapidly decreasing Conoy retreated up the Potomac and into Pennsylvania. They gradually migrated up the Susquehanna River, and in 1765 the 150 members of the tribe, dependent on the Iroquois, had reached southern New York. They moved west with the Mahican and the Delaware, becoming part of these tribes.

conquest, in traditional international law, the acquisition of territory by the victorious state in a war, at the expense of the defeated state. An effective conquest takes place when physical appropriation of territory (*see* annexation) is followed by "subjugation" (legal process of transferring title).

Conquest is associated with the old principle that sovereign states may resort to war at their discretion and, by military victory, achieve territorial and other gains that will be recognized as having legal validity. This doctrine of conquest and its derivative rules have been challenged in the 20th century by the development of the principle that aggressive war is contrary to international law. This change may be traced through the covenant of the League of Nations, the Kellogg–Briand Pact of 1928, the charters and judgments of the international military tribunals created at the end of World War II to try war criminals of the Axis powers, the Charter of the United Nations, and numerous other multipartite treaties, declarations, and resolutions. The logical corollary to the outlawry of aggressive war is the denial of legal recognition to the fruits of such war; this implication is contained in the Stimson Doctrine, enunciated by the U.S. secretary of state Henry L. Stimson in January 1932. It was subsequently affirmed by the assembly of the League of Nations and by several conferences of the American republics. The Draft Declaration on Rights and Duties of States, formulated in 1949 by the International Law Commission of the United Nations, contained (in Article XI) the rule that states are obligated not to recognize territorial acquisitions achieved by aggressive war.

Conquest has thus been outlawed, but nations often ignore this principle in practice.

conquistador (Spanish: "conqueror"), plural CONQUISTADORES, or CONQUISTADORS, any one of the leaders in the Spanish conquest of America, especially of Mexico and Peru, in the 16th century.

An expedition against Aztec Mexico was led by Hernán Cortés, who set up a base camp at Veracruz in 1519 to prepare for an advance inland. Cortés marched inland with about 400 men and secured an alliance with the independent city of Tlaxcala, with whose aid he conquered the Aztec capital of Tenochtitlán (now Mexico City). Between 1522 and 1524, Michoacán and the Pacific coastal regions were conquered, and in 1524, expeditions led by Pedro de Alvarado and Cristóbal de Olid, respectively, were sent to Mayan Guatemala and the Bay of Honduras.

The conquest of Inca Peru was led by Francisco Pizarro and Diego de Almagro, adventurers from Spain who had originally settled in Panama. Pizarro departed for Peru in 1531 with 180 men and 37 horses. Taking advantage of a civil war among the natives, Pizarro captured the reigning Inca ruler, Atahualpa, and, when Almagro arrived from Panama, conquered the capital city of Cuzco in November 1533. Pizarro founded a new capital, Lima, in 1535. Meanwhile, Alvarado arrived from Guatemala with intent to capture Quito, but he was persuaded to sell his army and ships to Almagro and Pizarro. Later a quarrel between Almagro and Pizarro erupted in 1538 into a civil war, which Pizarro won. Pizarro himself was murdered in 1541.

Spanish dominion was extended by a number of expeditions from Peru, including one by Sebastián de Belalcázar to the present Colombia, whose rule he had to share with Gonzalo Jiménez de Quesada, who had marched inland from the Caribbean coast. Pedro de Valdivia explored Chile, founding the city of Santiago in 1541. The conquistadores, given more to fighting and the search for gold than to governance, were quickly replaced by administrators and settlers from Spain.

Conrad, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:
German ..... Konrad
Italian ..... Corrado

GERMANY/HOLY ROMAN EMPIRE

•Conrad I (d. Dec. 23, 918), German king from 911 to 918 and member of the powerful Franconian dynasty known as the Conradines.

Duke of Franconia, Conrad was elected German king on Nov. 10, 911, at Forchheim, after the death of Louis the Child, the last of the East Frankish Carolingians. It is not clear whether Conrad was supported by all the German nobles east of the Rhine or only by the Franks and Saxons. Between the East and West Frankish kingdoms, the Lotharingian



Conrad I, seal, 10th century; in the Bayerisches National Museum, Munich

By courtesy of the Bayerisches National Museum, Munich. photograph, Foto Marburg

nobles turned to the West Frankish Carolingian, Charles III. In 913 Conrad married Kunigunde, a member of the Alaholfing family of Swabia. His reign was a bitter and bloody struggle to uphold the traditions of Carolingian kingship against the growing power of the Saxon, Bavarian, and Swabian dukes. His attempt to mobilize the episcopate in this cause at the synod of Hohenaltheim (916) could not compensate for the failure of his military campaigns. Conrad was in fact unable to establish his family as the new royal house in the East Frankish kingdom, and shortly before his death he is reported to have proposed his opponent, the Liudolfing Henry of Saxony, as his successor.

•Conrad II (b. *c.* 990—d. June 4, 1039, Utrecht, Ger., Holy Roman Empire), German king (1024–39) and Holy Roman emperor (1027–39), founder of the Salian dynasty. During his reign, he proved that the German monarchy had become a viable institution. Since the survival of the monarchy was no longer primarily dependent on a compact between sovereign and territorial nobles, it was henceforth invulnerable to prolonged rebellion on their part.

Conrad was the son of Count Henry of Speyer, who had been passed over in his inheritances in favour of a younger brother. Henry was descended, through the marriage of his great-grandfather Conrad the Red to a daughter of Emperor Otto, from the Saxon house. Left poor, Conrad was brought up by the Bishop of Worms and did not receive much of a formal education; but, conscious of the deprivations suffered by him and his father, he matured early. Prudent and firm, he often displayed great chivalry as well as a strong sense of justice, and he was determined to gain the status that fortune had denied him. In 1016 he married Gisela, the widowed duchess of Swabia and a descendant of Charlemagne. Conrad, however, was distantly related to Gisela. When strict canonists took exception to the marriage, Emperor Henry II, who was jealous of the growth of Conrad's personal influence, used their findings as an excuse for forcing Conrad into temporary exile. The two men later became reconciled, and, by the time Henry II died, in 1024, Conrad presented himself to the electoral assembly of the princes at Kamba on the Rhine as a candidate for the succession. After prolonged debates, the majority voted for him, and he was crowned king in Mainz on Sept. 8, 1024.

Intelligent and genial, Conrad was also fortunate. Soon after his election, even the minority opposition was persuaded to pay their homage. Early in the following year, the sudden death of Bolesław I the Brave of Poland,

a tributary to the German monarchy who had styled himself an independent king, spared Conrad the necessity of military interference. In Germany a rebellion fomented by nobles and relatives of Conrad was joined by many lay princes of Lombardy; and, although the Italian bishops paid homage at a court in Constance in June 1025, the lay princes sought to elect William of Aquitaine as antiking. But, when the King of France refused his support, the rebellion collapsed. Early in 1026, Conrad was able to go to Milan, where Archbishop Ariberto crowned him king of Italy. After brief fighting, Conrad overcame the opposition of some towns and nobles and managed to reach Rome, where he was crowned emperor by Pope John XIX on Easter 1027. When a renewed rebellion in Germany forced him to return, he subdued the rebels and imposed severe penalties on them, not sparing members of his own family.

Conrad not only showed strength and incorruptible justice in maintaining his power but also displayed enterprise in legislation. He formally confirmed the popular legal traditions of Saxony and issued a new set of feudal constitutions for Lombardy. On Easter Sunday 1028, at an imperial court in Aachen, he had his son Henry elected and anointed king. In 1036 Henry was married to Kunigunde, the daughter of King Canute of England. Eventually, he became inseparable from his father and acted as his chief counsellor. Thus, the succession was virtually assured, and the future of the new house looked bright.

In the meantime, Conrad had been compelled, after all, to campaign against Poland in 1028. After severe fighting, Mieszko—Bolesław's son and heir—was forced to make peace and surrender lands that Conrad's predecessor had lost. Even so, Conrad had to continue to campaign in the east, and in 1035 he subdued the heathen Liutitians.

Although occupied intermittently in the east, Conrad was able to gain political triumphs in the west. Earlier, the childless king Rudolf of Burgundy had offered the succession to his crown to Emperor Henry II, who, however, died before Rudolf. Thus, when Rudolf died in 1032, he left his kingdom to Conrad over the opposition of the Burgundian princes, who two years later, on Aug. 1, 1034, paid homage to Conrad at Zürich.

Although Conrad's relations with his son remained close, King Henry at times showed independent initiative. He once concluded a separate peace with King Stephen of Hungary and on another occasion gave his oath to Duke Adalbero of Carinthia never to side against him. Thus, when Conrad fell out with Adalbero in 1035, Henry's oath severely strained relations between father and son. Conrad managed to overcome his son's partisanship only by humbling himself before him. In the end, Conrad's determination prevailed, and Adalbero was duly punished.

In 1036 Conrad appeared for a second time in Italy, where he proceeded with equal vigour against his old ally, Archbishop Aribert of Milan. Italy was rent by dissensions between the great princes, who, together with their vassals—the *capitanei*—had suppressed both knights and the burghers of the cities, the *valvassores.* Conrad upheld the rights of the *valvassores,* and, when Aribert, claiming to be the peer of the emperor, rejected Conrad's legislative interference, Conrad had him arrested. Aribert managed to escape, however, and succeeded in raising a rebellion in Milan. Through luck and skillful diplomacy, Conrad succeeded in isolating Aribert from his Lombard supporters as well as from his friends in Lorraine. Conrad was thus able to proceed in 1038 to southern Italy, where he installed friendly princes in Salerno and Anversa and appointed the German Richer as abbot of Monte Cassino.

On his return to Germany the same year along the Adriatic coast, his army succumbed to a midsummer epidemic in which both his daughter-in-law and his stepson died. Conrad himself reached Germany safely and held several important courts in Solothurn (where his son Henry was invested with the kingdom of Burgundy), in Strassburg, and in Goslar. He fell ill during the following year (1039) and died. (P.Mu.)

BIBLIOGRAPHY. There is no biography of Conrad II. The only useful treatment in English is G. Barraclough, *The Origins of Modern Germany,* 2nd rev. ed., ch. 3–4 (1947). For important revision due to modern research, see T. Schieffer, "Heinrich II und Konrad II," *Deutsches Archiv,* 8:384–437 (1951). An authoritative summary by M.L. Bulst-Thiele may be found in B. Gebhardt, *Handbuch der deutschen Geschichte,* 9th ed., vol. 1, pp. 299–307 (1970).

• **Conrad** (b. Feb. 12, 1074—d. July 27, 1101, Florence), duke of Lower Lorraine (1076–89), eldest son of the emperor Henry IV, who had him crowned king of the Germans in 1087 in an attempt to confirm the imperial succession in the Salian line. During Henry's struggles with the papacy, however, Conrad turned against his father, joined the papal party, and was crowned king of Italy (1093). In return for fealty, Pope Urban II promised him the imperial crown (1095). Conrad never succeeded in developing a sizable following, was deposed by his father in favour of his brother Henry V (1099), and died two years later, discredited as a rebel son.

• **Conrad III** (b. 1093—d. Feb. 15, 1152, Bamberg, Ger., Holy Roman Empire), German king from 1138 to 1152, the first king of the Hohenstaufen family.



Conrad III, seal, 12th century; in the Bayerisches National Museum, Munich

By courtesy of the Bayerisches National Museum, Munich, photograph, Foto Marburg

The son of Frederick I, duke of Swabia, and grandson of Emperor Henry IV, Conrad was appointed duke of Franconia by his uncle, Emperor Henry V, in 1115. In 1116, with his elder brother Frederick II, duke of Swabia, he was left by Henry as regent of Germany. When the Emperor died in 1125 the electors, rejecting the hereditary principle, chose Lothair, duke of Saxony, to succeed him. By the end of the year Frederick and Conrad were in revolt; on Dec. 18, 1127, Conrad was elected antiking at Nürnberg and in June 1128 was crowned king of Italy at Monza. Returning to Germany in 1132, he fought Lothair until 1135, when he submitted, was pardoned, and recovered his estates.

After Lothair died (December 1137), the electors meeting at Coblenz chose Conrad as his successor (March 7, 1138) in the presence of the papal legate. Crowned at Aix-la-Chapelle six days later, he was acknowledged at Bamberg by several of the South German princes. Henry the Proud, duke of Bavaria and Saxony, the son-in-law and heir of Lothair, refused his allegiance, and war broke out in Bavaria and Saxony. Henry died in October 1139, and Conrad defeated Henry's brother Welf at Weinsberg in December 1140; peace with the Welf family followed at Frankfurt in May 1142. In spite of this peace the rivalry of the Welfs and the Hohenstaufen dominated German history for the rest of the century.

The solitary success amid the general disorder in the empire was Conrad's expedition into Bohemia in 1142, where he restored his brother-in-law Vladislav II as prince. An attempt to perform the same service for another brother-in-law, the Polish prince Władysław, failed. There was great disorder in Saxony, Bavaria, and Burgundy.

In December 1146 Conrad took the cross, secured the election and coronation of his young son Henry as his successor, appointed Henry I, archbishop of Mainz, as his son's guardian, and, in the autumn of 1147, set out for Palestine on the Second Crusade. He left Palestine in September 1148 and passed the winter at Constantinople, where he consolidated an alliance with the Byzantine emperor Manuel Comnenus for an attack on Roger II, king of Sicily, who had won considerable authority on the mainland and refused to recognize the German king. Later the news that Roger had allied himself with Louis VII of France and with Welf of Bavaria forced Conrad to hurry back to Germany. Unable to visit Rome, he never received the imperial crown. He designated as his successor his nephew Frederick III, duke of Swabia, afterward the emperor Frederick I Barbarossa.

• **Conrad IV** (b. April 25, 1228, Andria, Italy—d. May 21, 1254, Lavello), German king from 1237 and king of Sicily from 1251.

The son of Emperor Frederick II and his second wife, Isabella (Yolande) de Brienne, Conrad was heir to the Kingdom of Jerusalem through his mother; he was also invested by his father as duke of Swabia in 1235. At Vienna in February 1237 he was elected king of the Romans in place of his half-brother, Henry VII, who had rebelled against the Emperor in 1235. After Pope Gregory IX excommunicated Frederick II in 1239, Conrad was opposed by a growing papal party in Germany, led by the Archbishops Siegfried of Mainz and Conrad of Cologne. In 1245 Pope Innocent IV declared both Conrad and his father deposed and proclaimed a crusade against them. On Aug. 5, 1246, Conrad was defeated near Frankfurt by the antiking Henry Raspe. He continued to be supported, however, by the towns and by Otto II of Bavaria, whose daughter Isabella he married on Sept. 1, 1246. On Dec. 13, 1250, Frederick II died. Troubles in Sicily and the rising strength of the papal party in Germany under Henry Raspe's successor, William of Holland, forced Conrad to abandon Germany for Sicily late



Conrad IV, seal, 14th century; in the Bayerisches National Museum, Munich

By courtesy of the Bayerisches National Museum, Munich, photograph, Foto Marburg

in 1251, when he took the title of king of Sicily. Conrad's position in Sicily was secured by his capture of Naples in October 1253, but his efforts to reach an understanding with the papacy failed.

• **Conrad V:** *see* Conradin.

LORRAINE

• **Conrad,** also called CONRAD THE RED, German KONRAD DER ROTE (d. Aug. 10, 955, near Augsburg, Ger.), duke of Lotharingia (Lorraine) from 944 to 953 and ancestor of the Salian dynasty of German kings.

Conrad belonged to a family of Franconian counts with rich lands in the country around Speyer and Worms. After helping King (later Emperor) Otto I suppress a rebellion of his vassals (937–939), he was given the duchy of Lotharingia (944) and Otto's daughter Liudgard in marriage. Later he fell out with the king and joined Otto's son Liudolf of Swabia in a rebellion (953–954). Forced to submit, Conrad lost his duchy but not his lands in Franconia or his vassals. Later reunited with the king, he fought and was killed in the Battle of Lechfeld, when the largest Hungarian army to invade German lands was destroyed. His services seem to have been decisive in securing this victory for Otto.

SICILY

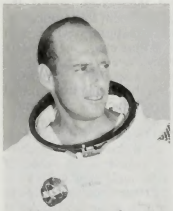
• **Conrad:** *see* Conrad IV (Germany/Holy Roman Empire).

Conrad OF MARBURG: *see* Konrad von Marburg.

Conrad THE RED: *see* Conrad *under* Conrad (Lorraine).

Conrad THE YOUNGER: *see* Conradin.

Conrad, Charles, Jr. (b. June 2, 1930, Philadelphia), American astronaut, copilot on the Gemini 5 spaceflight (1965), command



Charles Conrad, Jr., 1969

By courtesy of the National Aeronautics and Space Administration

pilot of Gemini 11, spacecraft commander of the Apollo 12 flight to the Moon, and commander of the Skylab 2 mission.

Conrad enlisted in the U.S. Navy in 1953 and became a test pilot and flight instructor. In 1962 he was chosen as a member of the second group of astronauts. With command pilot L. Gordon Cooper, Jr., he took part in several new experiments during the Gemini 5 flight, which established a new manned-spaceflight record of 190 hours 56 minutes.

Manned by Conrad and Richard F. Gordon, Jr., Gemini 11 was launched on Sept. 12, 1966, and docked with an Agena target vehicle on the first orbit. The craft then attained a record manned orbit of 850 miles (1,370 km) altitude.

On Nov. 14, 1969, Conrad joined Gordon and Alan L. Bean on the Apollo 12 flight to the Moon. The success of the flight was characterized by the pinpoint landing (November 19) of the Lunar Module only 600 feet (183 m) from the unmanned Surveyor 3 craft, which had landed in April 1967. The total time spent on the lunar surface was 31 hours 31 minutes; Apollo 12 completed its return trip to Earth on November 24.

On the Skylab 2 mission (May 25–June 22, 1973) Conrad, Joseph P. Kerwin, and Paul J. Weitz docked their Apollo spacecraft with the orbiting Skylab, which had sustained damage during its launch on May 14. They made repairs to keep Skylab from overheating and to ensure a power supply sufficient to allow them to complete most of their assigned experimental work.

Conrad resigned from the Navy and the space program in 1974, taking executive positions, first with the American Television and Communications Corporation of Denver, Colo., and in 1978 with the McDonnell-Douglas Corporation in Long Beach, Calif.

Consult the INDEX *first*

Conrad, Frank (b. May 4, 1874, Pittsburgh—d. Dec. 11, 1941, Miami), American electrical engineer whose interest in radiotelephony led to the establishment of the first commercial radio station.

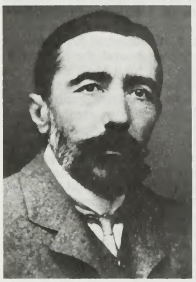
Conrad had little formal schooling when he joined Westinghouse Electrical and Manufacturing Company, Pittsburgh, as a 16-year-old apprentice in 1890. Nevertheless, he rose to the position of assistant chief engineer by 1921. He established an amateur radio station in his home in Wilkinsburg, Pa., as a hobby in 1919, broadcasting music and entertainment to local listeners. After a local department store advertised wireless sets to receive Conrad's transmissions, Westinghouse officials and Conrad realized the commercial potential of radio. They applied for a license for station KDKA, which, on Nov. 2, 1920, inaugurated commercial broadcasting by transmitting the results of the Harding–Cox presidential election.

Conrad's research at Westinghouse included shortwave radio experiments, which led to the eventual radio relay of network broadcasts, and work on radio transmitting equipment. He held more than 200 patents for such inventions as the round watt-hour electric meter, which measures the consumption of electric energy and has become a common home installation; electric clocks; automobile starting, lighting, and ignition devices; and the pantograph trolley for electric trains.

Conrad, Joseph, original name JÓZEF TEODOR KONRAD KORZENIOWSKI (b. Dec. 3, 1857, Berdichev, Pol., Russian Empire [now Berdychiv, Ukraine]—d. Aug. 3, 1924, Canterbury, Kent, Eng.), Polish-born English novelist and short-story writer, whose works include the novels *Lord Jim* (1900), *Nostromo* (1904), and *The Secret Agent* (1907) and the short story "Heart of Darkness" (1902). During his lifetime Conrad was admired for the richness of his prose and his renderings of dangerous life at sea and in exotic places. But his initial reputation as a masterful teller of colourful adventures of the sea masked his fascination with the individual when faced with nature's invariable unconcern, man's frequent malevolence, and his inner battles with good and evil. To Conrad, the sea meant above all the tragedy of loneliness. A writer of complex skill and striking insight, but above all of an intensely personal vision, he has been increasingly regarded as one of the greatest English novelists.

Conrad's father, Apollo Nałęcz Korzeniowski, a poet and an ardent Polish patriot, was one of the organizers of the committee that went on in 1863 to direct the Polish insurrection against Russian rule. He was arrested in late 1861 and was sent into exile at Vologda in northern Russia. His wife and four-year-old son followed him there, and the harsh climate hastened his wife's death from tuberculosis in 1865. In *A Personal Record* Conrad relates that his first introduction to the English language was at the age of eight, when his father was translating the works of Shakespeare and Victor Hugo in order to support the household. In those solitary years with his father he read the works of Sir Walter Scott, James Fenimore Cooper, Charles Dickens, and William Makepeace Thackeray in Polish and French. Apollo was ill with tuberculosis and died in Cracow in 1869. Responsibility for the boy was assumed by his maternal uncle, Tadeusz Bobrowski, a lawyer, who provided his nephew with advice, admonition, financial help, and love. He sent Conrad to school at Cracow and then to Switzerland, but the boy was bored by school and yearned to go to sea. In 1874 Conrad left for Marseille with the intention of going to sea.

Bobrowski made him an allowance of 2,000 francs a year and put him in touch with a merchant named Delestang, in whose ships Conrad sailed in the French merchant service. His first voyage, on the *Mont-Blanc* to Martinique, was as a passenger; on her next voyage



Joseph Conrad, 1904

By courtesy of the Beinecke Rare Book and Manuscript Library, Yale University

he sailed as an apprentice. In July 1876 he again sailed to the West Indies, as a steward on the *Saint-Antoine.* On this voyage Conrad seems to have taken part in some unlawful enterprise, probably gunrunning, and to have sailed along the coast of Venezuela, memories of which were to find a place in *Nostromo.* The first mate of the vessel, a Corsican named Dominic Cervoni, was the model for the hero of that novel and was to play a picturesque role in Conrad's life and work.

Conrad became heavily enmeshed in debt upon returning to Marseille and apparently unsuccessfully attempted to commit suicide. As a sailor in the French merchant navy he was liable to conscription when he came of age, so after his recovery he signed on in April 1878 as a deckhand on a British freighter bound for Constantinople with a cargo of coal. After the return journey his ship landed him at Lowestoft, Eng., in June 1878. It was Conrad's first English landfall, and he spoke only a few words of the language of which he was to become a recognized master. Conrad remained in England, and in the following October he shipped as an ordinary seaman aboard a wool clipper on the London–Sydney run.

Conrad was to serve 16 years in the British merchant navy. In June 1880 he passed his examination as second mate, and in April 1881 he joined the *Palestine,* a bark of 425 tons. This move proved to be an important event in his life; it took him to the Far East for the first time, and it was also a continuously troubled voyage, which provided him with literary material that he would use later. Beset by gales, accidentally rammed by a steamer, and deserted by a sizable portion of her crew, the *Palestine* nevertheless had made it as far as the

East Indies when her cargo of coal caught fire and the crew had to take to the lifeboats; Conrad's initial landing in the East, on an island off Sumatra, took place only after a 13½-hour voyage in an open boat. In 1898 Conrad was to publish his account of his experiences on the *Palestine,* with only slight alterations, as the short story "Youth," a remarkable tale of a young officer's first command.

He returned to London by passenger steamer, and in September 1883 he shipped as mate on the *Riversdale,* leaving her at Madras to join the *Narcissus* at Bombay. This voyage gave him material for his novel *The Nigger of the "Narcissus,"* the story of an egocentric black sailor's deterioration and death aboard ship. At about this time Conrad began writing his earliest known letters in the English language. In between subsequent voyages Conrad studied for his first mate's certificate, and in 1886 two notable events occurred: he became a British subject in August, and three months later he obtained his master mariner's certificate.

In February 1887 he sailed as first mate on the *Highland Forest,* bound for Semarang, Java. Her captain was John McWhirr, whom he later immortalized under the same name as the heroic, unimaginative captain of the steamer *Nan Shan* in *Typhoon.* He then joined the *Vidar,* a locally owned steamship trading among the islands of the southeast Asian archipelago. During the five or six voyages he made in four and a half months, Conrad was discovering and exploring the world he was to re-create in his first novels, *Almayer's Folly, An Outcast of the Islands,* and *Lord Jim,* as well as several short stories.

After leaving the *Vidar* Conrad unexpectedly obtained his first command, on the *Otago,* sailing from Bangkok, an experience out of which he was to make his stories "The Shadow-Line" and "Falk." He took over the *Otago* in unpropitious circumstances. The captain Conrad replaced had died at sea, and by the time the ship reached Singapore, a voyage of 800 miles (1,300 km) that took three weeks because of lack of wind, the whole ship's company, except Conrad and the cook, was down with fever. Conrad then discovered to his dismay that his predecessor had sold almost all the ship's supply of quinine.

Back in London in the summer of 1889, Conrad took rooms near the Thames and, while waiting for a command, began to write *Almayer's Folly.* The task was interrupted by the strangest and probably the most important of his adventures. As a child in Poland, he had stuck his finger on the centre of the map of Africa and said, "When I grow up I shall go there." In 1889 the Congo Free State was four years old as a political entity and already notorious as a sphere of imperialistic exploitation. Conrad's childhood dream took positive shape in the ambition to command a Congo River steamboat. Using what influence he could, he went to Brussels and secured an appointment. What he saw, did, and felt in the Congo are largely recorded in "Heart of Darkness," his most famous, finest, and most enigmatic story, the title of which signifies not only the heart of Africa, the dark continent, but also the heart of evil—everything that is corrupt, nihilistic, malign—and perhaps the heart of man. The story is central to Conrad's work and vision, and it is difficult not to think of his Congo experiences as traumatic. He may have exaggerated when he said, "Before the Congo I was a mere animal," but in a real sense the dying Kurtz's cry, "The horror! The horror!" was Conrad's. He suffered psychological, spiritual, even metaphysical shock in the Congo, and his physical health was also damaged; for the rest of his life, he was racked by recurrent fever and gout.

Conrad was in the Congo for four months, returning to England in January 1891. He made several more voyages as a first mate, but by 1894, when his guardian Tadeusz Bobrowski died, his sea life was over. In the spring of 1894 Conrad sent *Almayer's Folly* to the London publisher Fisher Unwin, and the book was published in April 1895. It was as the author of this novel that Conrad adopted the name by which he is known: he had learned from long experience that the name Korzeniowski was impossible on British lips.

Unwin's manuscript reader, the critic Edward Garnett, urged Conrad to begin a second novel, and so *Almayer's Folly* was followed in 1896 by *An Outcast of the Islands,* which repeats the theme of a foolish and blindly superficial character meeting the tragic consequences of his own failings in a tropical region far from the company of his fellow Europeans. These two novels provoked a misunderstanding of Conrad's talents and purpose which dogged him the rest of his life. Set in the Malayan archipelago, they caused him to be labeled a writer of exotic tales, a reputation which a series of novels and short stories about the sea—*The Nigger of the "Narcissus"* (1897), *Lord Jim* (1900), *Youth* (1902), *Typhoon* (1903), and others—seemed only to confirm. But words of his own about the *"Narcissus"* give the real reason for his choice of settings: "the problem . . . is not a problem of the sea, it is merely a problem that has risen on board a ship where the conditions of complete isolation from all land entanglements make it stand out with a particular force and colouring." This is equally true of his other works; the latter part of *Lord Jim* takes place in a jungle village not because the emotional and moral problems that interest Conrad are those peculiar to jungle villages, but because there Jim's feelings of guilt, responsibility, and insecurity—feelings common to mankind—work themselves out with a logic and inevitability that are enforced by his isolation. It is this purpose, rather than a taste for the outlandish, that distinguishes Conrad's work from that of many novelists of the 19th and early 20th centuries. They, for the most part, were concerned to widen the scope of the novel, to act, in Balzac's phrase, as the natural historians of society; Conrad instead aimed at the isolation and concentration of tragedy.

In 1895 Conrad married the 22-year-old Jessie George, by whom he had two sons. He thereafter resided mainly in the southeast corner of England, where his life as an author was plagued by poor health, near poverty, and difficulties of temperament. It was not until 1910, after he had written what are now considered his finest novels—*Lord Jim* (1900), *Nostromo* (1904), *The Secret Agent* (1907), and *Under Western Eyes* (1911), the last being three novels of political intrigue and romance—that his financial situation became relatively secure. He was awarded a Civil List pension of £100, and the American collector John Quinn began to buy his manuscripts—for what now seem ludicrously low prices. His novel *Chance* was successfully serialized in the *New York Herald* in 1912, and his novel *Victory,* published in 1915, was no less successful. Though hampered by rheumatism, Conrad continued to write for the remaining years of his life. In April 1924 he refused an offer of knighthood from Prime Minister Ramsay MacDonald, and he died shortly thereafter.

In his own time Conrad was praised for his power to depict life at sea and in the tropics and for his works' qualities of "romance"—a word used basically to denote his power of using an elaborate prose style to cast a film of illusory splendour over somewhat sordid events. His reputation diminished after his death, and a revival of interest in his work later directed attention to different qualities and to different books than his contemporaries had emphasized.

An account of the themes of some of these books should indicate where modern critics lay emphasis. *Nostromo* (1904), a story of revolution, politics, and financial manipulation in a South American republic, centres, for all its close-packed incidents, upon one idea—the corruption of the characters by the ambitions that they set before themselves, ambitions concerned with silver, which forms the republic's wealth and which is the central symbol around which the novel is organized. The ambitions range from simple greed to idealistic desires for reform and justice. All lead to moral disaster, and the nobler the ambition the greater its possessor's self-disgust as he realizes his plight.

"Heart of Darkness," which follows closely the actual events of Conrad's Congo journey, tells of the narrator's fascination by a mysterious white man, Kurtz, who, by his eloquence and hypnotic personality, dominates the brutal tribesmen around him. Full of contempt for the greedy traders who exploit the natives, the narrator cannot deny the power of this figure of evil who calls forth from him something approaching reluctant loyalty. *The Secret Agent* (1907), a sustained essay in the ironic and one of Conrad's finest works, deals with the equivocal world of anarchists, police, politicians, and *agents provocateurs* in London. *Victory* describes the unsuccessful attempts of a detached, nihilistic observer of life to protect himself and his hapless female companion from the murderous machinations of a trio of rogues on an isolated island.

Conrad's view of life is indeed deeply pessimistic. In every idealism are the seeds of corruption, and the most honourable men find their unquestioned standards totally inadequate to defend themselves against the assaults of evil. It is significant that Conrad repeats again and again situations in which such men are obliged to admit emotional kinship with those whom they have expected only to despise. This well-nigh despairing vision gains much of its force from the feeling that Conrad accepted it reluctantly, rather than with morbid enjoyment.

Conrad's influence on later novelists has been profound both because of his masterly technical innovations and because of the vision of humanity expressed through them. He is the novelist of man in extreme situations. "Those who read me," he wrote in his preface to *A Personal Record,* "know my conviction that the world, the temporal world, rests on a few very simple ideas; so simple that they must be as old as the hills. It rests, notably, among others, on the idea of Fidelity." For Conrad fidelity is the barrier man erects against nothingness, against corruption, against the evil that is all about him, insidious, waiting to engulf him, and that in some sense is within him unacknowledged. But what happens when fidelity is submerged, the barrier broken down, and the evil without is acknowledged by the evil within? At his greatest, that is Conrad's theme.

MAJOR WORKS. *Novels. Almayer's Folly* (1895); *An Outcast of the Islands* (1896); *The Nigger of the "Narcissus"* (1897); *Lord Jim* (1900); with F.M. Hueffer (Ford), *The Inheritors* (1901) and *Romance* (1903); *Nostromo* (1904); *The Secret Agent* (1907); *Under Western Eyes* (1911); *Chance* (1913); *Victory* (1915); *The Shadow-Line: A Confession* (1917); *The Arrow of Gold* (1919); *The Rescue* (1920); *The Rover* (1923); with F.M. Ford, *The Nature of a Crime* (1924).

Short stories. Tales of Unrest (1898); *Youth: A Narrative, and Two Other Stories.* "Heart of Darkness" and "The End of the Tether" (1902); *Typhoon and Other Stories* (1903); *A Set of Six* (1908); *Twixt Land and Sea* (1912); *Within the Tides* (1915); *Tales of Hearsay* (1925).

Other works. The Mirror of the Sea. Memories and Impressions (1906); *Some Reminiscences* (1912; U.S. title, *A Personal Record,* 1912); *Notes on My Books* (1921); *Last Essays* (1926).

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Conrad von Hötzendorf, Franz (Xaver Josef), Graf (Count) (b. Nov. 11, 1852, Penzing, Austria—d. Aug. 25, 1925, Mergentheim, Ger.), an outstanding military strategist and one of the most influential conservative propagandists of Austria-Hungary, who planned the Habsburg monarchy's campaigns during World War I.

Advancing rapidly in the Austro-Hungarian army, Conrad became chief of staff in 1906 on the recommendation of the heir to the throne, Archduke Francis Ferdinand, whose military views he shared. A staunch conservative, Con-



Conrad von Hötzendorf

By courtesy of the Bild-Archiv, Österreichische Nationalbibliothek, Vienna

rad distrusted the expansionist tendencies of both Serbia and Austria's ally Italy, advocating preventive wars against both. His vociferously aggressive stance toward Italy in 1911 caused his temporary dismissal, but he returned to head the General Staff in 1912. He devised two plans for an eventual war in the East: if Russia remained neutral, he would throw preponderant forces against Serbia; but, if Russia became involved, Austria would concentrate its strength on that front.

Upon Russia's entry into World War I, most Austrian troops faced that enemy. As a result, Conrad's invasion of Serbia failed; that country was not finally subdued until the end of 1915, and then only with German aid. His offensives on the Russian front also were repulsed; although his strategy was sound, he lacked a sufficiently large army to defeat Russia. Only German intervention saved Austria from disaster. The Austro-German offensive of 1915, planned by Conrad, succeeded, but by this time the Austrian army had become increasingly subordinated to the German General Staff and had virtually lost its independence. His Italian offensive of 1916 also came close to success, but troop withdrawals to the threatened Russian front again cost him victory. When the new emperor, Charles I, took over command in 1916, he dismissed the strong-willed Conrad, who commanded an army group on the Italian front until the summer of 1918.

Retiring after the war, Conrad wrote his memoirs, *Mein Anfang 1878–82* (1925; "My Beginnings 1878–82") and *Aus meiner Dienstzeit 1906–18*, 5 vol. (1921–25; "My Service 1906–18"). A gifted but unlucky soldier, Conrad failed mainly because he advocated ruthless military solutions, ignoring both the human factors and the political realities before World War I.

Conradin, also called CONRAD V, OF CONRAD THE YOUNGER, German KONRADIN, OF KONRAD V, OF KONRAD DER JÜNGERE (b. March 25, 1252, Wolfstein, Swabia [Germany]—d. Oct. 29, 1268, Naples [Italy]), the last of the German Hohenstaufen dynasty, duke of Swabia, king of the Romans, and claimant to the throne of Sicily. The leading hope of the antipapal Italian Ghibellines, he led an expedition into Italy in 1267 in an unsuccessful attempt to regain Sicily from Charles of Anjou.

Son of the emperor Conrad IV and grandson of the emperor Frederick II, Conradin claimed inheritance of the Kingdom of Sicily and the kingship of Jerusalem. His uncle Manfred, an illegitimate son of Frederick II, however, usurped the Sicilian throne in 1258. Conradin contented himself with regaining what remained of the duchy of Swabia.

When Manfred fell in the Battle of Benevento (1266) against Charles of Anjou, on whom his French compatriot Pope Clement IV had just bestowed the Kingdom of Sicily, the beleaguered Ghibellines invited Conradin into Italy to recapture Sicily from Charles. On entering Italy with a sizable force in September 1267, he was enthusiastically greeted by the Italians. After sweeping through the Ghibelline cities of Verona, Pavia, Pisa, and Siena, he triumphantly entered Rome in July 1268, although he had been excommunicated by the pope.

In the belief that victory had already been won, he set out for Sicily, having in an excess of optimism divided its lands among his followers. Charles, however, unexpectedly defeated Conradin's forces at Tagliacozza on August 23. Conradin fled first to Rome, where the pro-papist Welfs, who had gained power, did not make him welcome, and then to Astura, whence he hoped to sail to Sicily. Arrested and delivered to Charles, he was tried before Charles's jury at Naples, which condemned him to death for treason to the church and to the king. He was beheaded in the public marketplace.

Conrail: *see* Consolidated Rail Corporation.

Conrart, Valentin (b. 1603, Paris, Fr.—d. Sept. 23, 1675, Paris), man of letters and authority on grammar and style, known as the practical inaugurator of Classicism in French literature through his leading role in the founding of the Académie Française.

The son of a Huguenot merchant from Valenciennes, Conrart was brought up in pious austerity and was never taught Latin or Greek, although he learned Italian and Spanish as soon as he was free of his father's tutelage. He bought himself an appointment as king's counselor-secretary in 1627, introduced himself into literary society, and began to build up a great library.

From around 1629, writers met every week in Conrart's house. This meeting was the nucleus of the Académie Française, which was formed in 1634–35, with Conrart himself appropriately nominated as its permanent secretary. Thereafter he made himself the "tyrant" of the French language, correcting the spelling, grammar, and word order in the manuscripts and printers' proofs of the works of many writers whose creative or imaginative genius was greater than his own.

Of Conrart's original writings, the only ones that have proved to be of lasting interest are his honest records of events in Paris during the Fronde (the insurrections against the government of Cardinal Mazarin), together with a few extended notes on miscellaneous persons of historical or literary significance. Conrart's voluminous files, which are preserved in the Bibliothèque de l'Arsenal in Paris, provide valuable information for students of the period.

Consult the INDEX *first*

Conroy, Jack, byname of JOHN WESLEY CONROY, pseudonym TIM BRENNAN, OF JOHN NORCROSS (b. Dec. 5, 1899, near Moberly, Mo., U.S.—d. Feb. 28, 1990, Moberly, Mo.), leftist American writer best known for his contributions to "proletarian literature," fiction and nonfiction about the life of American workers during the early decades of the 20th century.

Conroy, who was born in a coal camp, was a migratory worker in the 1920s. He first became known in 1933 with his critically acclaimed novel *The Disinherited.* This largely autobiographical book depicts the coming of age of a coal miner's son during the Great Depression. From 1931 to 1941 Conroy edited successively the magazines *Rebel Poet, Anvil,* and *New Anvil.* He included works by Erskine Caldwell, Langston Hughes, and William Carlos Williams, among others. Conroy later edited, with Curt Johnson, a collection of these pieces, *Writers in Revolt: The Anvil Anthology* (1973).

In 1938 Conroy moved to Chicago and, at Nelson Algren's suggestion, began to work on the Writers' Project of the Works Progress Administration. With Arna Bontemps, Conroy wrote a juvenile book, *The Fast-Sooner Hound* (1942), and *They Seek a City* (1945), a history of black migration and settlement with biographical data on important black figures. A revised and expanded version of the latter book, *Anyplace But Here* (1966), added background on contemporary events such as the Watts riots.

Conroy also cowrote other juvenile books, lectured on folklore, taught creative writing, edited folklore collections, and edited various encyclopaedias. In 1966 he retired to his hometown. A collection of his works entitled *The Jack Conroy Reader* was published in 1980.

Consalvi, Ercole (b. June 8, 1757, Rome—d. Jan. 24, 1824, Anzio, Papal States), Italian cardinal and statesman, who played the



Consalvi, detail of a portrait by Sir Thomas Lawrence, 1819; in the Royal Collection, Windsor Castle, England

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leading role in Vatican politics during the first quarter of the 19th century; he sought a modus vivendi between the new principles of the French Revolution and the traditions of the papacy.

Having entered the papal government service in 1783, Consalvi rose to become auditor of the Rota, a tribunal of the Curia, in 1792. Imprisoned and then exiled during the French occupation of Rome in 1798, he became secretary of the conclave that was to elect a new pope in Venice under Austrian protection (November 1799). His friend Cardinal Chiaramonti was elected pope as Pius VII (March 1800). Appointed cardinal and secretary of state by Pius, Consalvi introduced internal reforms in the papal government designed to protect the temporal authority of the pope.

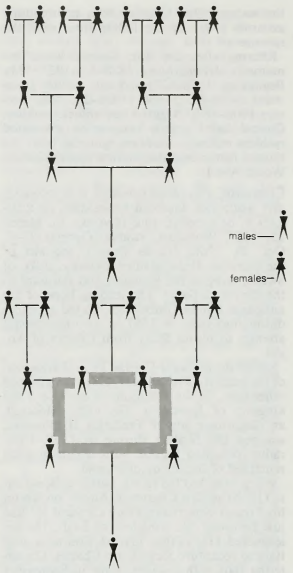
Recognizing the importance of an accord with France under Napoleon Bonaparte, he went to Paris to negotiate a concordat (1801), which established a new relationship between church and state with extensive concessions by the French. In 1806 Napoleon, who considered Consalvi a dangerous enemy, forced his resignation as secretary of state. After imprisoning the Pope, Napoleon exiled Consalvi (1810–13). Consalvi nonetheless remained a leader of the opposition to Napoleon.

At the Congress of Vienna (1814–15), Consalvi, as the Vatican's representative, succeeded in the face of great difficulty in obtaining the restitution of most of the Papal States in Italy. As secretary of state again, he was wary of Austrian designs against the papal holdings. In 1816 he promoted Pius VII's *motu proprio,* or personal proclamation, which aimed at a general reorganization of the government of the Papal States. Inspired by a spirit of tolerance and conciliation toward those who had previously been considered enemies of the church, this act reflects Consalvi's constant desire to adapt the restored papal government to the times. Although these moderate measures displeased the radicals as well as the reactionaries, Consalvi reached a number of accords with secular governments between 1817 and 1823. When Pius VII died in 1823, the conservatives triumphed by electing Leo XII pope, a major defeat for Consalvi. He was removed from office and died shortly thereafter.

consanguinity, kinship characterized by the sharing of common ancestors. The word is derived from the Latin *consanguineus,* "of common blood," which implied that Roman individuals were of the same father and thus shared in the right to his inheritance.

Kin are of two basic kinds: consanguineous (sharing common ancestors) and affinal (the kinsmen of one's spouse). In some societies other pairs of individuals also treat each other as relatives—for example, the wives of a pair of brothers, relatives by adoption, and persons such as godparents who have special kinlike relationships (fictive kin). Consanguineous kinship is a universal type; it includes those with common ancestors and it excludes individuals who lack ancestors in common.

In the modern sense, consanguinity is a genetic concept. From the biological point of view the term itself is unsuitable (as are the terms mixed blood and good blood) because the genetic contributions of ancestors do not flow to their descendants as blood, but through the genes contained in the chromosomes in the cell nuclei. The chromosomes are made up of nucleic acids (DNA, or deoxyribonucleic acid) and proteins. The DNA is the part of the chromosome that carries the genes and is coded in specific ways to produce and control protein synthesis; parts of each parent's coded message are transmitted to the offspring. Besides genetic determinants carried in the DNA, there are other biological influences of parents on offspring, such as the environment in the mother's womb; indeed, there is even cultural inheritance through learning, which in turn influences nutritional and other habits and hence affects growth and development. In genetics, consanguinity affects the probabilities of specific genotypes—the combinations of genetic characteristics. Consanguinity results in inheritance, from common ancestors of both parents, of their transmissible capacities to synthesize and control nucleic acids and proteins, the essential substances of all organisms.



(Above) Absence of inbreeding: horizontal lines connect mates, vertical lines connect parents with their child; (below) an inbreeding loop: horizontal bar at top of loop connects brother and sister, all other lines and bars as above

Consanguineous relatives are said to be of various degrees, according to the likelihood of their sharing genetic potentialities from the common ancestors. Thus, pairs of brothers and sisters (siblings) have all the same ancestors, whereas pairs of first cousins (cousins german) who are not otherwise related share only one-half of their ancestors. A child inherits only about one-half of the coded information from each parent; hence a pair of brothers or sisters have about half of their chromosomal constitution in common (the doubt about the exact fraction is due to the chance element in transmission of material during meiosis, the cell division that produces sperm and egg, each possessing a haploid number of chromosomes).

Genetically the degree of consanguinity of siblings is thus the same as that between a parent and child, and both may be called consanguineous in the first degree. An aunt or uncle shares with his niece or nephew about half the chance of common inheritance of a pair of siblings, and aunts and uncles may be called consanguineous kin of the "second degree." First cousins may be called consanguineous of the "third degree."

Legal systems of designating degrees of consanguineous kin exist in Roman law, common law, and canon law. None of these systems depends on the genetic facts, however, and they have no place in a classification of the biological relationships between individuals.

A great-grandparent and great-grandchild are genetically related to the same degree as a pair of first cousins. The grandparent is a linear kinsman, however, whereas the cousin is a collateral one. In genetics the degree of consanguinity is the sole factor of significance, but in social relations in various societies important considerations of collateral versus lineal types of relationship as well as age, birth order, and other factors may determine social behaviour. In fact, consanguineous kin of various degrees and even nonconsanguineous kin may be called by the same name and treated similarly by custom or law (the term uncle, for instance, may be applied to a granduncle or to the husband of an aunt).

One of the two main applications of data on consanguinity is with respect to the probability that two individuals of a known degree of consanguinity with another individual will share the traits of that person. This probability depends upon the mode of inheritance and on the degree of penetrance or expressivity of genetic factors. The mode of inheritance may, for example, be dominant or recessive. A pair of genes in the same relative positions in a set of two chromosomes in the cell nucleus (these genes are called alleles) are for two alternative traits, such as greenness and yellowness in peas; both alleles may be for one of the traits, or they may differ, so that one allele is for one trait and one for the other. The trait that appears—is "expressed"—in an individual, when the pair of alleles differ, is the dominant trait and the inheritance is dominant; if a trait does not appear unless both alleles are for that trait, it is recessive. Another mode of inheritance is sex-linked inheritance. Genes for hemophilia, for example, are present in both males and females, but the disease tends to affect only males. The degree of penetrance is the frequency with which any trait or effect is shown in a group or population that has the gene corresponding to that trait. Expressivity is the degree to which traits are shown in an individual.

Another significant application of data on consanguinity is the measurement of inbreeding by the degree of consanguinity between two parents. The coefficient of inbreeding (F) is used. This is the probability that two alleles will be identical and derived from the same forebear. The application of this principle is most easily demonstrated by example. If brother and sister marry, the offspring would have one chance in four of inheriting a pair of identical alleles from the grandparent. With each further degree of consanguinity the likelihood is halved, so that the likelihood in the child of a mating between aunt and nephew would be 1 in 8, and in a child of first cousins, 1 in 16.

In construction of pedigrees, if horizontal lines are used to connect symbols of siblings and mates and vertical lines to connect parents with their offspring, all inbreeding is represented by one or more loops (see the Figure), each of which involves consanguinity. The coefficient of inbreeding for the individual is the sum of that calculated for all the loops that include the individual's parents. The inbreeding coefficient of a population is the average F of its members. The highest values of F are found in small populations whose members marry one another over many generations. Such groups are called isolates. Thus, the Samaritans, who remained a small but distinctive group since before the time of Christ, are considerably inbred. In the United States some religious groups also live in agricultural colonies as isolates (for instance, the Amish and Hutterites).

In genetics an allele that is carried at the

same position in both of a pair of chromosomes is called homozygous. An allele may be rare in the general population, but, if the parent possesses it, it is transmitted from parent to child with the same probability as a common one. Therefore the chance of receiving a rare allele in the chromosomes derived from both mother and father—that is, the chance of being homozygous for that allele—is greatest in the offspring of consanguineous mating. In theory, since repeated mutations are rare, homozygosity of even common alleles may be ascribed to distant consanguinity.

Mendel's classical experiments with peas and much subsequent work show that when an allele is present in double dose (homozygous), the effects may be very different from those when it is inherited only from one parent (heterozygous). In medical genetics there are many proteins, especially enzymes, that are produced in adequate amounts if either chromosome carries the appropriate allele. Absence of the gene in both of a pair of alleles produces a deficiency in the protein it determines. The rare diseases and anomalies of this kind are relatively less rare in the offspring of consanguineous unions. In fact, in 1902, within two years after the rediscovery of Mendel's laws, the high frequency of consanguinity in the parents of individuals with three inborn errors of metabolism was used as evidence of recessive Mendelian inheritance in man. One of the defects noted was albinism, a condition in which the skin is pink and the hair white, the eyes lack pigment, and the subjects are uncomfortable in bright sunlight and usually squint. Such adverse genetic effects in the offspring of consanguineous unions is appreciable only in rare hereditary diseases; the rarer the occurrence, the more frequently the parents are found to be consanguineous. A large proportion of offspring of consanguineous mating of the first degree die or have serious defects by six months of age. In the offspring of first-cousin marriages and in other instances of similar or lesser consanguinity, few deleterious effects have been observed. Furthermore, because rarity is a factor in this effect, the overall influence of inbreeding in the general population is very limited. The modest socioeconomic differences between the kinds of people who mate with consanguineous kin and those who do not may account for some of the increase in disease and mortality that has been ascribed to consanguinity.

From the social, as opposed to the individual, point of view, close inbreeding does not increase the number of deaths from recessive disease; it merely precipitates these so-called genetic deaths in earlier generations. In heterozygous form, with no adverse influence on the individual who carries them, such alleles contain the possibility of future deaths from recessive disease; and death for infant offspring of consanguineous parents reduces that possibility for the next generation. The principle of deliberate inbreeding is used with domestic animals to eliminate such covert recessive alleles from the stock. Nevertheless, there seem to be problems of health from very highly inbred "pure" lines, and heterozygosity in some alleles seems to be advantageous. Many species, including man, have been established by episodes of isolation and inbreeding interspersed with outbreeding; they apparently thrive in this way.

All human societies have some incest taboos. These are rules and laws that prohibit marriage or sexual relations, or both, between certain kinds of kin. The kinds of kin always include some consanguineous classes, and one theory of the establishment of incest laws is folk knowledge of undesirable inbreeding effects in offspring of such unions. Incest taboos are not uniform restrictions to a particular grade, however, and often extend to nonconsanguineous relations. Thus, in traditional Chinese society a man may marry his mother's brother's daughter, for instance, but he may not marry any person with his own surname. Other theories of the origin of incest, therefore, include analysis of its effects on stability of the family as an economic and educational unit and ascribe the definition of incest in various societies to social and psychological motives.

conscience, a personal sense of the moral content of one's own conduct, intentions, or character with regard to a feeling of obligation to do right or be good. Conscience, usually informed by acculturation and instruction, is thus generally understood to give intuitively authoritative judgments regarding the moral quality of single actions.

Historically, almost every culture has recognized the existence of such a faculty. Ancient Egyptians, for example, were urged not to transgress against the dictates of the heart, for one "must stand in fear of departing from its guidance." In some belief systems, conscience is regarded as the voice of God and therefore a completely reliable guide of conduct: among the Hindus it is considered "the invisible God who dwells within us." Among Western religious groups, the Society of Friends (or Quakers) places particular emphasis on the role of conscience in apprehending and responding through conduct to the "Inner Light" of God.

Outside the context of religion, philosophers, social scientists, and psychologists have sought to understand conscience in both its individual and universal aspects. The view that holds conscience to be an innate, intuitive faculty determining the perception of right and wrong is called intuitionism. The view that holds conscience to be a cumulative and subjective inference from past experience giving direction to future conduct is called empiricism. The behavioral scientist, on the other hand, may view the conscience as a set of learned responses to particular social stimuli. Another explanation of conscience was put forth in the 20th century by Sigmund Freud in his postulation of the superego. According to Freud, the superego is a major element of personality that is formed by the child's incorporation of moral values through parental approval or punishment. The resulting internalized set of prohibitions, condemnations, and inhibitions is that part of the superego known as conscience.

Conscience, Hendrik (b. Dec. 3, 1812, Antwerp—d. Sept. 10, 1883, Brussels), Belgian romantic novelist who so dominated the birth and development of the Flemish novel that it was said he "taught his people to read."

Conscience's father was French, his mother, Flemish. After his mother's death (1820),



Conscience, oil painting on wood by Henri de Pondt, in the Musée Communal des Beaux-Arts, Kortrijk, Belg.
A.C.L., Brussels

when he and his father went to live outside the town walls, the boy discovered nature, which was to remain a constant solace and which inspired him to write the remarkable *Enige bladzijden uit het boek der natuur* (1846; "A Few Pages from the Book of Nature"). After spending several years as an assistant teacher, he enlisted in the army in 1831. He soon fell under the spell of the Campine, a quiet region of pinewoods and heather. About this time he was introduced to French romanticism and began to write French verse. (In those days Flemish was considered too vulgar to be a literary medium.) Demobilized in 1836, he entered the literary and artistic life of Antwerp. He was fascinated by his country's past and wrote in Flemish *In't wonderjaar* (1837; "In the Year of Miracles"), a series of 16th-century historical scenes. With *De leeuw van Vlaanderen* (1838; *The Lion of Flanders*, 1853–57)—the epic of the revolt of the Flemish municipalities against France, and the victory of the Flemish militia at the Battle of the Golden Spurs (1302)—he became not only the creator of the Flemish novel but the author of one of the outstanding historical novels of European romanticism.

Conscience, supporting himself by working as a clerk and a gardener's helper and taking an active part in local politics, after 1840 turned more and more to an idyllic realism and wrote novels and tales about urban and rural life. These works, which have been attacked by some critics for their sentimentality, often try to point a moral. They include *Wat een moeder lijden kan* (1844; "What a Mother Can Suffer"); *Houten Clara* (1850; "Wooden Clara"); *De arme edelman* (1851; "The Poor Gentleman"); as well as the village idylls *Blinde Rosa* (1850); *De Loteling* (1850; *The Conscript*, 1864); and *Rikke-tikke-tak* (first published serially, 1845; as a book, 1851; Eng. trans., *Ricketicketack*, 1856). At the same time his historical novels (*e.g., Jacob van Artevelde;* 1849) took a more definite shape. He was at the height of his genius, and his works became widely known through translations. In 1856 he became district commissioner at Kortrijk and in 1868, curator of the Wiertz Museum in Brussels. But his spendthrift manner of life and the burdens of an expensive household caused him to write prolifically, sometimes to the detriment of his style. Among the many books of this last period are *Het Goudland* (1862; "The Land of Gold"), the first Flemish adventure novel, and *De Kerels van Vlaanderen* (1871), a historical novel. The publication of his 100th book in 1881 led to unprecedented demonstrations in Brussels, and in 1883 a statue was set up in his honour in Antwerp.

Conscience was the most important figure in the literary and national Flemish renaissance in the 19th century. His narrative art, his imagination, his lifelike portrayal of people and events, and his rich sensibility compensate for the impurities of his language and his restricted means of expression.

conscientious objector, one who opposes bearing arms or who objects to any type of military training and service. Some conscientious objectors refuse to submit to any of the procedures of compulsory conscription. Although all objectors take their position on the basis of conscience, they may have varying religious, philosophical, or political reasons for their beliefs.

Conscientious objection to military service has existed in some form since the beginning of the Christian era and has, for the most part, been associated with religious scruples against military activities. It developed as a doctrine of the Mennonites in various parts of Europe in the 16th century, of the Society of Friends in England in the 17th century, and of the Church of the Brethren and of the Dukhobors in Russia in the 18th century.

Throughout history, governments have been generally unsympathetic toward individual conscientious objectors; their refusal to undertake military service has been treated like any

other breach of law. There have, however, been times when certain pacifistic religious sects have been exempted. During the 19th century, Prussia exempted the Mennonites from military service in return for a military tax, and until 1874 they were exempted in Russia. Such exceptions were unusual, however.

The relatively liberal policy of the United States began in colonial Pennsylvania, whose government was controlled until 1756 by Quaker pacifists. Since the American Civil War and the enactment of the first U.S. conscript law, some form of alternative service has been granted to those unwilling to bear arms. Under the conscript laws of 1940, conscientious objector status, including some form of service unrelated to and not controlled by the military, was granted, but solely on the basis of membership in a recognized pacifistic religious sect. Objections of a philosophical, political, or personal moral nature were not considered valid reasons for refusing military service.

In Great Britain a noncombatant corps was established during World War I, but many conscientious objectors refused to belong to it. During World War II, three types of exemption could be granted: (1) unconditional; (2) conditional on the undertaking of specified civil work; (3) exemption only from combatant duties. Conscription in Great Britain ended in 1960, and in 1968 recruits were allowed discharge as conscientious objectors within six months from the date of their entry into the military.

Until the 1960s neither France nor Belgium had legal provision for conscientious objectors, although for some years in both countries growing public opinion—fortified in France by the unpopularity of the Algerian War of Independence—had forced limited recognition administratively. A French law of 1963 finally gave legal recognition to religious and philosophical objectors, providing both noncombatant and alternative civilian service with a term of service twice that of the military term. Belgium enacted a similar law in 1964, recognizing objection to all military service on religious, philosophical, and moral grounds.

Scandinavian countries recognize all types of objectors and provide both noncombatant and civilian service. In Norway and Sweden civil defense is compulsory, with no legal recognition of objection to that type of service. A Swedish law of 1966 provided complete exemption from compulsory service for Jehovah's Witnesses. In The Netherlands, religious and moral objectors are recognized. During the period of German partition (1949–90), the Federal Republic (West Germany) recognized all types of objectors, providing noncombatant service and alternative civilian service, while after 1964 East Germany provided noncombatant military services for conscientious objectors.

consciousness, a psychological condition defined by the English philosopher John Locke as "the perception of what passes in a man's own mind."

Early views. In the early 19th century the concept was variously considered. Some philosophers regarded it as a kind of substance, or "mental stuff," quite different from the material substance of the physical world. Others thought of it as an attribute characterized by sensation and voluntary movement, which separated animals and men from lower forms of life and also described the difference between the normal waking state of animals and men and their condition when asleep, in a coma, or under anesthesia (the latter condition was described as unconsciousness). Other descriptions included an analysis of consciousness as a form of relationship or act of the mind toward objects in nature, and a view that consciousness was a continuous field or stream of essentially mental "sense data," roughly similar to the "ideas" of earlier empirical philosophers.

The method employed by most early writers in observing consciousness was introspection—looking within one's own mind to discover the laws of its operation. The limitations of the method became apparent when it was found that because of differing preconceptions, trained observers in the laboratory often could not agree on fundamental observations.

The behaviourist view. The failure of introspection to reveal consistent laws led to the rejection of all mental states as proper subjects of scientific study. In behaviourist psychology, derived primarily from work of the American psychologist John B. Watson in the early 1900s, the concept of consciousness was irrelevant to the objective investigation of human behaviour and was doctrinally ignored in research. Neobehaviourists, however, adopted a more liberal posture toward mentalistic states such as consciousness.

Neurophysiological mechanisms. That consciousness depends on the function of the brain has been known from ancient times. Although detailed understanding of the neural mechanisms of consciousness has not been achieved, correlations between states of consciousness and functions of the brain are possible. Levels of consciousness in terms of levels of alertness or responsiveness are correlated with patterns of electrical activity of the brain (brain waves) recorded by an electroencephalograph. During wide-awake consciousness the pattern of brain waves consists of rapid irregular waves of low amplitude or voltage. In contrast, during sleep, when consciousness can be said to be minimal, the brain waves are much slower and of greater amplitude, often coming in periodic bursts of slow waxing and waning amplitude.

Both behavioral levels of consciousness and the correlated patterns of electrical activity are related to the function of a part of the brainstem called the reticular formation. Electrical stimulation of the ascending reticular systems arouses a sleeping cat to alert consciousness and simultaneously activates its brain waves to the waking pattern.

It was once supposed that the neurophysiological mechanisms subserving consciousness and the higher mental processes must reside in the cortex. It is more likely, however, that the cortex serves the more specialized functions of integrating patterns of sensory experience and organizing motor patterns and that the ascending reticular system represents the neural structures most critically related to consciousness. The brainstem reticular formation should not, however, be called the seat of consciousness. It represents an integrative focus, functioning through its widespread interconnections with the cortex and other regions of the brain. *See also* introspection; unconscious.

consciousness, stream of, narrative technique in nondramatic fiction intended to render the flow of myriad impressions—visual, auditory, physical, associative, and subliminal—that impinge on the consciousness of an individual and form part of his awareness along with the trend of his rational thoughts. The term was first used by the psychologist William James in *The Principles of Psychology* (1890). As the psychological novel developed in the 20th century, some writers attempted to capture the total flow of their characters' consciousness, rather than limit themselves to rational thoughts. To represent the full richness, speed, and subtlety of the mind at work, the writer incorporates snatches of incoherent thought, ungrammatical constructions, and free association of ideas, images, and words at the pre-speech level.

The stream-of-consciousness novel commonly uses the narrative techniques of interior monologue (*q.v.*). Probably the most famous example is James Joyce's *Ulysses* (1922), a complex evocation of the inner states of the characters Leopold and Molly Bloom and Stephen Daedalus. Other notable examples include *Leutnant Gustl* (1901) by Arthur Schnitzler, an early use of stream of consciousness to re-create the atmosphere of pre-World War I Vienna; and William Faulkner's *The Sound and the Fury* (1929), which records the fragmentary and impressionistic responses in the minds of three members of the Compson family to events that are immediately being experienced or events that are being remembered.

conscription, also called DRAFT, compulsory enrollment for service in a country's armed forces. It has existed at least from the time of the Egyptian Old Kingdom (27th century BC), but there have been few instances—ancient or modern—of universal conscription (calling all those physically capable between certain ages). The usual form—even during total war—has been selective service.

Modified forms of conscription were used by Prussia, Switzerland, Russia, and other European countries during the 17th and 18th centuries. The first comprehensive nationwide system was instituted by the French Republic in the wars following the French Revolution and was institutionalized by Napoleon after he became emperor in 1803. After his defeat in 1815 it was discontinued, then reinstituted a few years later, but with restrictions.

Between 1807 and 1813 Prussia had developed a conscript system that became the model for the nations of Europe. The Prussians bypassed Napoleon's imposition of limitations on the size of their army by calling up the permitted number of men (42,000), training them rigorously for a few months, and then releasing the majority and calling up a new complement. They were thus able to build up a powerful reserve of trained men without openly defying Napoleon. After the Napoleonic era Prussia continued to employ this system, so that by the time of the Franco-German War (1870–71) it had a mass army of conscripts reinforced with large reserve units, in contrast to France's smaller standing professional army.

After its defeat in 1871, France returned in earnest to conscription. In 1872 universal military service was reintroduced, but the law covering it did not apply equally to all. In general, people of comfortable means could discharge their military obligation in one year of volunteer service, while many professionals—doctors, clergymen, and some government workers—were granted total exemption. As in Germany, the overall effect was to cause the standing forces to be manned by members of the lower classes, while the better placed in society dominated the reserves.

During the 19th century the conscript system of recruiting troops became common throughout Europe, even in Russia, where there was a crude form of conscription bordering on impressment. Men unlucky enough to be seized went off for a lifetime of service. By 1860 the term was reduced to 15 years, but the conscripts often never saw their families again, and the Russian Army under the tsars remained an army of conscripted peasants beaten into submission by a draconian system of discipline. Initially (1918) the army of the newly formed Soviet Socialist government consisted of volunteers who were required to enlist for three months. Under this system the size of the army dwindled to only 306,000 men. Conscription was reinstituted, and by 1920, during the height of the Civil War, the Soviet armed forces had reached a peak of 5,500,000. In the 1920s all able-bodied male members of the proletariat were required to

register, and 30 to 40 percent of them were summoned into military service. The U.S.S.R. thus continued to depend on conscription to fill out its large military forces, and at the time of the German–Soviet Nonaggression Pact (1939) it enlarged its reserve capabilities by adopting universal military training.

Germany during the interwar period was forbidden by the Versailles Treaty to keep a military force of more than 100,000 men, but after Adolf Hitler came to power in 1933 he defied this restriction through the Military Service Law of 1935, which introduced universal military service. Under this law, every boy at age 18 joined a labour service corps for six months, and he entered a two-year term in the military at age 19. After the two years he was transferred to the active reserves until he was 35.

In the United States conscription had been applied during the Civil War (1861–65) by both North and South. It was, however, primarily effective as a stimulus for volunteering and was abandoned when the war was over, not to be revived until World War I. During the succeeding period Great Britain and the United States were the only major Western powers not to adopt compulsory military service during peacetime. Traditionally, small volunteer armies were maintained in these countries. Moreover, in Britain, which was essentially a sea power, the Navy took priority. Yet in World War I both countries adopted conscription, Great Britain in 1916 and the United States in 1917. Both countries abandoned conscription at the end of the war but reverted to it when World War II threatened; Britain introduced it in May 1939 (the first peacetime conscription in that country's history) and the United States in 1940.

In 1873 Japan had abandoned its hereditary militarism for a conscript system. In spite of its elitist samurai tradition, Japan accepted the spirit behind the mass army more fully than the nations of Europe. Conscription was selective rather than universal and produced about 150,000 new men for training each year. Called for a two-year term, the conscripts were made to feel that the army belonged to the nation and that it was an honour to enter it. When a man completed his two years of service, he entered the reserves. By the eve of World War II, most officers came from the middle classes rather than the samurai class and so had an affinity with the enlisted men. All in all, the conscript army during this time was a living symbol of equality to the Japanese, and they served in and supported it with near-fanatical devotion.

The coming of the thermonuclear era after World War II shook, but did not displace, the theory of mass armies, and only a few major powers dispensed with some sort of compulsory service. The most conspicuous example of this was Japan, which was completely demilitarized in the years after World War II and which eventually re-created its armed forces on a small scale and on a volunteer basis. Another special case was Britain, which continued its peacetime conscription until 1960, when it was replaced by voluntary enlistment and the idea of a mass army was virtually abandoned. Canada followed the same pattern.

After 1948 Israel required both men and women to serve the new state's armed forces, as did the People's Republic of China after 1949. China initially gave a few months' basic military training to all young people, but the many millions of persons who became available each year proved too vast a number to train thoroughly. China eventually settled down to conscription on a highly selective basis. West Germany, which was demilitarized after World War II, reestablished conscription in 1956 on a selective basis. The Soviet Union retained an especially rigorous system of universal conscription, with a minimum of two years of service at age 18, preceded by part-time military training in school and periodic refresher training afterward. When active service ended, the conscript was placed in the active reserve until he was 35. Switzerland, with its citizen army, remained a notable example of universal conscription; all able-bodied men aged 20 underwent an initial training of four months, followed by eight periods of three weeks' training until age 33, when they went into the reserves. In the United States, although peacetime conscription on a selective basis was ended in 1973 as part of a program to establish an all-volunteer military service, registration for a future draft if needed was reinstituted in 1980.

Conseil de l'Entente (French: "Entente Council"), French West African organization founded in 1959 and designed to promote the economic development of the region by raising funds, guaranteeing loans, and encouraging trade and investment. It operates through the Mutual Aid and Loan Guarantee Fund headquartered in Abidjan, Côte d'Ivoire (Ivory Coast). The original member-states were Dahomey (now Benin), Côte d'Ivoire, Niger, and Upper Volta (now Burkina Faso); Togo joined in 1966.

Conseil d'État (French: "Council of State"), highest court in France for issues and cases involving public administration. Its origin dates back to 1302, though it was extensively reorganized under Napoleon and was given further powers in 1872. It has long had the responsibility of deciding or advising on state issues and legislative measures submitted to it by the sovereign or, later, by the president, the cabinet, or the parliament. It is the court in which French citizens may bring claims against the administration, though usually since 1953 such claims originate in the regional administrative tribunals of first instance, and appeals are taken to the Conseil d'État. Institutions imitative of the French Conseil d'État have been established in many other countries, such as Belgium, Greece, Italy, Lebanon, Spain, Turkey, and Egypt.

consejo real (Spanish: "royal council"), medieval Spanish advisory council consisting of nobles and church prelates. John I of Castile formally determined the first council's structure in 1386, adding four members, usually lawyers, to the former eight-member group. John II separated the council into a governmental advisory and a juridical body. During the reign of the Catholic monarchs (1479–1516) the council consisted of a prelate, three nobles, and eight or nine lawyers. The nobles lost their voting power, and the poorer and more dependent lawyers became the voting majority. The council served at this time as merely a bureaucratic body for the execution of royal policy. Three other councils were also created: those of the Inquisition, of the Orders of Knighthood, and of the Hermandad. By 1630 all legislation had to be approved by the council's juridical and advisory bodies.

During the Bourbon dynasty, in the 18th and 19th centuries, the powers of the *consejo real* were curbed, and members became known as ministers of the state, of grace and justice, of war and finance, of the navy, and of the Indies. The name of *consejo real* was abandoned, and Spain's modern ministries evolved.

Conselheiro Lafaiete, city, southeastern Minas Gerais state, Brazil. It lies in the highlands at 3,054 feet (931 m) above sea level. Formerly known as Lueluz, the settlement was made the seat of a municipality in 1790 and given city status in 1886. Agriculture (cassava, potatoes, corn [maize], *feijão* [beans]) and livestock raising are important economic activities. Also important are the rebuilding of locomotives and the construction of railroad cars. Mining, particularly the extraction of manganese, has developed in the area. The city has a television station. Conselheiro Lafaiete is accessible by railroad and highway from Belo Horizonte, the state capital (86 miles [139 km] north), and from Rio de Janeiro. Pop. (1980 prelim.) 66,262.

conservation, planned management of a natural resource or the total environment of a particular ecosystem to prevent exploitation, pollution, destruction, or neglect and to ensure the future use of the resource.

A brief treatment of conservation follows. For full treatment, *see* MACROPAEDIA: Conservation of Natural Resources.

The primary necessities for maintaining life—food, water, air, and a source of heat—have been available to humans for thousands of years. Since the 19th century, however, increased population pressures and the demand of industrialized societies for recreational space and luxuries beyond basic needs have created a strain on the Earth's natural resources. Wise use and careful management can assure that game and fish supplies are not depleted and that forests, grasslands, and other ecosystems are not unduly disturbed or destroyed.

History of conservation. Early humans had scant need to practice conservation measures. Their numbers were too small and their technology too limited to do any major harm to the environment. Ancient civilizations, however, did develop certain conservation practices, often for religious, cultural, or pragmatic reasons and sometimes as an aim in itself. With the advent of the Renaissance, and more important, the Industrial Revolution, human populations dramatically increased, as did mankind's technological ability to permanently alter much of the world's surface and destroy wildlife past the capacity of nature to regenerate itself.

Conservation efforts existed as early as the 17th century to protect European forests in the face of increasing demands for wood for fuel and building uses. But it was in the newly settled or colonized regions in the 19th century that the greatest harm to the environment came about. In Africa and Australia millions of animals died from indiscriminate hunting. On the North American continent, huge herds of wildlife vanished, and species that were not hunted to extinction were dramatically reduced in number. Logging and fires devastated forests, while overgrazing destroyed grasslands. Newly settled areas that were the most ravaged were the first to receive conservation management, and by 1872 the first national park in the United States was designated—the Yellowstone region in Wyoming. National parks were designated throughout the world by the 1920s.

New problems appeared after World War II with the use of pesticides, such as DDT, that increased crop production but harmed the environment. Pollution became a major health hazard as industrial plants spewed toxic wastes into the air and water. International agencies monitored pollution levels, but the power to change existing conditions generally remained at the national level.

Management of natural resources. Natural resources are classified as either renewable or nonrenewable. Living resources—animals and plants—can reproduce or renew themselves; minerals and fuels cannot. Yet renewable resources must be "mined" judiciously so that their numbers remain stable and the ecosystem in which they operate remains healthy. Solar energy, air, and water are considered renewable; and solar energy is virtually inexhaustible. Fossil fuels (coal and petroleum) and nuclear fuels are classed as nonrenewable. They are slow to form and are destroyed by use. Minerals are also nonrenewable, but some, such as iron, are plentiful, and others,

such as aluminum, can be recycled on an economical basis.

Soil formation and erosion are naturally occurring processes. The process of soil erosion becomes an environmental problem only when it is accelerated by harmful agricultural practices and poor soil management. The fertility of the land can be maintained by crop rotation and by adding natural or chemical fertilizer. The preservation of uncultivated land protects watershed areas that support forests and animal life and yield clean, fresh water.

Human life is dependent on water, and the protection of water supplies from pollutants is essential. Treatment plants remove organic wastes and chemicals from water that has been used by humans. Air pollution has also become a serious problem. Limiting the discharge of pollutants from fossil-fuel combustion and other industrial processes is the most effective way of ensuring clean air. Fuel and mineral resources are finite and must be extracted in ways that afford the least waste through the use of reformed mining practices that do not destroy the countryside.

Although protecting uncultivated land from poachers and loggers can sometimes be difficult, natural parks and nature preserves are maintained on a wide scale in some countries. These preserves protect endangered species and afford natural laboratories for research. Fisheries as well as wildlife parks help increase natural productivity. Nations legislate to protect forests and animals or to ensure clean air and water.

National resources are not inexhaustible. Water pollution has produced foul-smelling, algae-filled lakes; and land pollution has disfigured the landscape with old cars, bottles, and plastic containers. It is generally agreed that these conditions can be reversed by a cooperative effort of government, business, and private citizens. Exploitation for short-term financial gains ignores long-term (and sometimes irreplaceable) losses. The judicious use of natural resources by humanity is necessary to conserve the environment for the future.

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conservation law, also called LAW OF CONSERVATION, any of several principles applied in physics that state that certain physical properties (*i.e.,* measurable quantities) do not change in the course of time within an isolated physical system. In classical physics, laws of this type govern mass, energy, momentum, and electric charge. In particle physics, other conservation laws apply to properties of subatomic particles that are invariant during interactions. Each such law signifies that nature remains constant with the passage of time. An important function of conservation laws is that they make it possible to predict the macroscopic behaviour of a system without having to consider the microscopic details of the course of a physical process or chemical reaction.

Conservation of mass implies that matter can be neither created nor destroyed—*i.e.,* processes that change the physical or chemical properties of substances within an isolated system (such as conversion of a solid to a gas) leave the total mass unchanged. The special theory of relativity, however, has shown that mass and energy are equivalent, although interconversions of mass and energy are too small to be detectable except in cases involving subatomic particles or speeds comparable to that of light. In these situations, conservation of mass may be considered to be a special case of the more general law of conservation of mass-energy.

Conservation of energy implies that energy can be neither created nor destroyed, although it can be changed from one form (mechanical, kinetic, chemical, etc.) into another. In an isolated system, the sum of all forms of energy therefore remains constant. For example, a falling body has a constant amount of energy, but the form of the energy changes from potential to kinetic. Again, if relativity is applicable, the more general law of conservation of mass-energy holds.

Linear momentum is conserved in a system containing a number of moving bodies; that is to say, the total momentum (a vector quantity) of the system remains constant. Since momentum is conserved, its components in any direction will also be conserved. Application of the law of conservation of momentum is important in the solution of collision problems. The operation of rockets exemplifies the conservation of momentum: the increased forward momentum of the rocket is equal but opposite in sign to the momentum of the ejected exhaust gases. Conservation of angular momentum of rotating bodies is analogous to the conservation of linear momentum.

Conservation of charge states that the total amount of electric charge in a system does not change with time. A capacitor, for example, becomes charged with equal amounts of opposite charge on its two plates. At a subatomic level, charged particles can be created, but always in pairs with positive and negative charge so that the total amount of charge always remains constant.

In particle physics, other conservation laws apply to certain properties of nuclear particles, such as baryon number, lepton number, and strangeness. Such laws apply in addition to those of mass, energy, and momentum encountered in everyday life and may be thought of as analogous to the conservation of electric charge. *See also* symmetry.

conservation of ——— : *see under* substantive word (*e.g.,* energy, conservation of).

conservatism, the creed of those who believe in the value of conserving the present political, social, and economic order as much as possible. More precisely, it is the tendency to take one's bearings from those traditions and institutions that have proved themselves through the test of time and experience, and to want to introduce changes in them only gradually and infrequently. The term conservatism is also used to name the philosophical doctrines used to justify this tendency. Hence, conservatism is not so much a political proposal as an attitude toward political proposals.

A brief treatment of conservatism follows. For full treatment, *see* MACROPAEDIA: Socio-economic Doctrines and Reform Movements, Modern.

A conservative believes, first of all, that a society is a very complex organism, involving myriad interrelated elements that contribute to its well-being, often in unpredictable ways. This organism has evolved slowly, usually over centuries of trial and error. Continuity is thus an important conservative value. Every proposed change in society, or more particularly in its government, should therefore be evaluated not against some abstract and independent standard of right but as to how well it can be incorporated into the complex governmental organism with a minimum of undesirable side effects. The conservative seeks to reawaken the distinction between theory and practice, for a compelling theoretical idea may be ineffective and even dangerous in practice. A ruler, the conservative feels, should therefore be suspicious of too much artifice and philosophy in the practical affairs of state and must let himself be guided by precedent and by what has worked in the past. A conservative thinker typically expresses his insights into political principles in works and speeches of the moment, designed for a particular practical purpose, rather than in abstract theoretical tracts. Conservatives tend to abhor the petitions, proclamations, and declarations of rights to which liberals are prone.

A few practical programs are generally associated with this organicist view of the state. Conservatives tend to hold a strong respect for historically important institutions, such as the church, the family, and private property. Temperamentally, conservatives tend to be opposed to sudden change and innovation, and they are prone to accept the imperfections of human beings as a matter of fact, rather than to hope for or count on their future perfection.

The father of modern conservatism (although he never used the term conservatism) was the British parliamentarian Edmund Burke. Burke's ideas developed as a result of his reaction to the French Revolution of 1789. In his *Reflections on the Revolution in France* (1790), Burke attacked the French activists, to whom he referred as "theorists," "metaphysicians," and "speculationists," for their preoccupation with theory and with ideas. These preoccupations, combined with their tendency to judge political programs against abstract notions such as "right," led them to underestimate the complexity of government and to think that far-reaching changes could easily be attained. Burke did not deny in principle the rights asserted by the revolutionaries—"they are metaphysically true"—but he did deny that it was wise to use them as a framework for constructing a government—"they are morally and politically false." The rights of people are best guaranteed by the well-being of the state, he held, and the well-being of the state depends upon the wisdom of its rulers. Burke sought the foundation of government not in the rights of human beings, although he did not deny them, but in the government's function of providing for wants and needs. It was this idea, that governments should act mainly out of practical rather than theoretical considerations, that underlay his great political stances: his opposition to the French Revolution, his support of the Irish Roman Catholics, and his support of the American colonists. If a British right existed in those disputes, he asserted, that did not necessarily mean that it was wise to exercise it.

Great Britain was the birthplace of modern conservatism, just as it was the birthplace of modern liberalism. It has also maintained the strongest modern conservative political party. The British Conservative Party appeared in the 1830s as the direct descendent of the Tory party, although it had a much wider electoral base, extending beyond landowners and clergymen to all social classes. Benjamin Disraeli did much to turn it into a cohesive political force. Winston Churchill led a coalition during World War II in which the Conservatives predominated. Since then, it has either governed or held the role of chief opposition party. The other great 20th-century conservative parties include the Christian Democrats of Germany and Italy, the Liberal Democrats of Japan, and the Republicans of the United States.

In France the main philosophical spokesman for conservatism during the 19th century was Joseph de Maistre, although he, like Burke, never used the word. While Burke accepted in principle the validity of certain liberal ideals but thought it often unwise to be guided by them, de Maistre denied the ideals themselves. He became the chief apologist for the ancien régime. Burke was by far the more original thinker and the more influential, and even later French conservatives, such as Alexis de Tocqueville, drew more from Burke than from de Maistre. Prince Metternich of Austria embodied European conservatism in the post-Napoleonic period, and the great German

conservative spokesmen were the historians Friedrich Karl von Savigny and Leopold von Ranke.

In America, Federalists such as John Adams, Alexander Hamilton, James Madison, and John Jay were guided by conservative principles akin to those of Burke. But American political movements did not finally divide into conservative and progressive factions until about the time of the election of Andrew Jackson in 1828. American conservative movements tended to be more centrist than their European continental counterparts until after World War II, when they became strident opponents of international communism.

Conservative Baptist Association of America, association of independent, autonomous Baptist churches in the United States, organized May 17, 1947, in Atlantic City, N.J. The founders originally organized the Fundamentalist Fellowship in 1920 but remained within the American (then Northern) Baptist Convention. Disputes over interpretation of Scripture and theology, as well as fundamentalist objections to sending liberal missionaries to foreign countries, caused the Fellowship to separate from the Convention and set up the Conservative Baptist Association. It does not consider itself a denomination, although it functions essentially as one. Headquarters are in Wheaton, Ill.

conservative force, in physics, any force, such as the gravitational force between the Earth and another mass, whose work is determined only by the final displacement of the object acted upon. The total work done by a conservative force is independent of the path resulting in a given displacement and is equal to zero when the path is a closed loop. Stored energy, or potential energy, can be defined only for conservative forces. Nonconservative forces, such as friction, that depend on other factors, such as velocity, are dissipative, and no potential energy can be defined for them.

Conservative Judaism, religious movement that seeks to conserve essential elements of traditional Judaism but allows for modernization of religious practices in a less radical sense than that espoused by Reform Judaism.

Zacharias Frankel (1801–75), whose ideology inspired early Conservative ideas, broke with extremists after a series of Reform conferences in Germany (1844–46). Holding fast to the notion that the Jewish religion is inextricably bound up with Jewish culture and a national identity, he refused to abandon religious customs and traditions as nonessentials.

Frankel felt that historical studies could bring to light those elements of the Written and Oral Law that were merely contemporary expressions of more abiding religious truths. These, then, could be reinterpreted to fit the context of modern life. Frankel's view of Judaism initiated a trend toward historical scholarship that has marked the movement ever since. It emphasizes the sacredness of the Law as a living force applicable to all generations.

Following Orthodoxy, Conservatives insist on the sacredness of the Sabbath, which is to be observed, as far as possible, in a world that more commonly holds public worship on Sunday. Dietary laws are respected and observed, but with modifications when necessary. Starting in 1985, Conservative Judaism drew farther away from Orthodoxy by ordaining women rabbis.

Many Conservatives, stressing Jewish nationalism as inseparable from the moral and intellectual culture of the Jewish people, encourage the study of Hebrew and support the secular Zionist movement.

One of the striking features of Conservative Judaism has been the quality of its scholarly spokesmen, who, despite different opinions, have found a common bond by maintaining continuity with the past. These differences make Conservative Judaism a theological coalition rather than a homogeneous expression of beliefs and practices. These differences also explain why it is all but impossible to enunciate a distinct theology of the movement. Conservative rituals show a like diversity, ranging from Orthodoxy to Reform.

The Conservative movement has been especially successful in the United States and is represented by the United Synagogue of America. The Rabbinical Assembly, Conservative Judaism's official body, is located at the Jewish Theological Seminary, in New York City, which educates future rabbis for the Conservative movement.

Conservative Party (Canada): *see* Progressive Conservative Party of Canada.

Conservative Party, formally NATIONAL UNION OF CONSERVATIVE AND UNIONIST ASSOCIATIONS, byname TORIES, in Great Britain, a right-of-centre political party. It and the Labour Party have dominated British political life for most of the 20th century.

The party is the heir, and in some measure the continuation, of the old Tory Party, members of which began forming "conservative associations" after Britain's 1832 (electoral) Reform Act. The name Conservative was first used as a description of the party by John Wilson Croker writing in the *Quarterly Review* of Jan. 1, 1830. The first Conservative government was formed by Sir Robert Peel, whose program, set out in the Tamworth Manifesto (1834), stressed the timely reform of abuses, the importance of law and order and of the police, an orderly system of taxation, and the importance both of landed interests and of trade and industry.

Prospects of an extended period of Conservative rule disappeared in 1846 when the party split over the repeal of the Corn Laws, and, from that time until the formation of the Liberal-Conservative coalition government in 1915, political power alternated between the Conservatives and the Liberals. The party was reorganized by Benjamin Disraeli, prime minister for a few months in 1868 and from 1874 to 1880. Disraeli established a Conservative Central Office (1870), which merged with other elements of the party organization, resulting in greater unity and strength. At the same time, his policy of "Tory democracy," with its emphasis on social reform, combined with a strong, activist imperial and foreign policy, made a permanent impress on Conservative principles and programs.

The party was further strengthened in 1886, when it allied with the Liberal Unionists, a faction of the Liberal Party that opposed the policy of Home Rule in Ireland put forward by the Liberal leader W.E. Gladstone. Thus reinforced, the Conservatives held office for all but 3 of the next 20 years, first under the leadership of Lord Salisbury and then of Arthur Balfour. In 1906, however, a split over tariff policy caused them to lose the election in a disastrous landslide; they did not regain power until they joined H.H. Asquith's wartime coalition in May 1915.

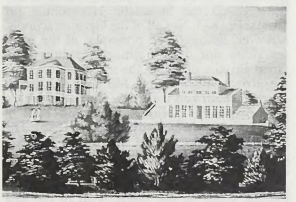
In 1922 the Conservatives withdrew from the coalition and won a comfortable majority. They remained in office throughout the interwar period except for brief interludes in 1924 and 1929–31, when Labour gained power with the support of the Liberals. The leading Conservative figures in this interwar period were Stanley Baldwin and then Neville Chamberlain. The wartime coalition government of Winston Churchill was dominated by Conservatives, but in 1945 they received a stunning defeat at the hands of Labour, which had long since replaced the Liberals as the country's second major party. The Conservative Party returned to power in 1951, increasing its majorities in the elections of 1955 and 1959. Its leaders during this period were Churchill, Sir Anthony Eden, and Harold Macmillan. After 1964 the Conservatives held power alternately with Labour.

In 1975 the party right wing, disgruntled by traditional Conservatives' reluctance to dismantle social-welfare programs enacted by Labour, made Margaret Thatcher party leader. When the Conservatives won the general election in 1979, she became the first woman in Europe to head an elected national government. She immediately began her program of tightening the money supply and returning nationalized industries to the private sector. In 1983 the Conservatives won a huge parliamentary majority over an opposition split between the Labour Party and the Social Democratic–Liberal Alliance. Under Thatcher's leadership, the Conservatives won the 1987 election as well, and, though Thatcher resigned from office in 1990, the Conservatives were able to maintain themselves in power under John Major, her successor as party leader and prime minister, in the 1992 elections.

Three elements—the National Union of Conservative and Unionist Associations, the Central Office, and the Parliamentary Party—form the backbone of the party organization. At the local level, the party is organized into constituency associations, whose executive committees have the important function of selecting and screening a prospective parliamentary candidate for the constituency. The local associations are organized into the National Union of Conservative and Unionist Associations, the Central Council of which is made up of the party leader, other prominent Conservatives, and representatives from the local constituency associations. The Central Office, whose chief officers are appointed by the party leader, has the primary task of guiding the work of the party throughout the country. Within Parliament, Conservative members are organized into a group known as the 1922 Committee (so called because it first met in 1922).

By the late 20th century, the Conservative Party's most important guiding principle was its faith in private enterprise and the private ownership of property as the best means of developing national wealth. The party draws its greatest strength from the upper and upper-middle classes, with the support of landowners, businessmen, corporate managers, and the upper ranks of the professions. Less than 20 percent of the party's membership comes from the working class, though it nevertheless enjoys the electoral support of 30 percent of that group. The party is strongest in rural and nonindustrial areas and in suburban constituencies.

conservatory, in architecture, building in which tender plants are protected and displayed, usually attached to and directly entered from a dwelling. It was not until the 19th century that a conservatory was distinguished from a greenhouse (*q.v.*), also a building in



Conservatory (right) at Lemon Hill Mansion on the Schuylkill River, oil on canvas by J.A. Woodside, 1807; in the collection of the Historical Society of Pennsylvania, Philadelphia

By courtesy of the Historical Society of Pennsylvania, Philadelphia

which tender plants are cultivated but sited in the working area of the garden.

The conservatory was a direct descendant of the orangery (*q.v.*), and, like the orangery, it became a decorative architectural feature proclaiming the status of its owner. Its great period was represented by the Palm House at Kew Gardens, near London, and by Joseph Paxton's Crystal Palace, designed for the Great Exhibition of 1851 in London and modelled on a conservatory he had designed earlier.

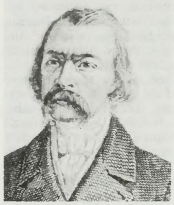
conservatory, in music, institution for education in musical performance and composition. The term and institution derive from the Italian *conservatorio*, which in the Renaissance period and earlier denoted a type of orphanage often attached to a hospital (hence the term *ospedale* also applied to such institutions). The foundlings (*conservati*) were given musical instruction at state expense; Naples was the centre for boys and Venice for girls. The *conservatori* were thus the first secular institutions equipped for training in practical music (the choir schools of the Middle Ages were attached to churches, and music in medieval universities was a theoretical subject comparable to mathematics). Institutions such as the Ospedale della Pietà (founded 1346, Venice) and the Conservatorio dei Poveri di Gesù Cristo (founded 1589, Naples) either trained or had as faculty members most of the leading composers of 17th- and 18th-century Italian opera.

The first secular school of music for students at large was established in Paris. Founded in 1784, it was reorganized and renamed the Conservatoire National de Musique et d'Art Dramatique in 1795 by the National Convention (the Revolutionary regime of 1792–95) as a result of the efforts of the bandmaster Bernard Sarrette. Its chief purpose was to train musicians to participate in public concerts, fêtes, and celebrations organized by the republic. A state subsidy was granted, admission was by competitive examination, and tuition was free. Later the curriculum was enlarged to include all branches of composition, instrumental and vocal technique, and acting (enabling students to train for the various Parisian opera houses and theatres). Eventually the institution's political aim was abandoned. Although many famous pupils later revolted against the Conservatoire's academic severities, it became the acknowledged centre of musical practice and erudition. It was renamed the Conservatoire National Supérieur de Musique in 1957.

Throughout the 19th century the French model was copied, with modifications, in Europe and in the U.S. Conservatories were founded in Milan (1807), Naples (1808), Prague (1811; the first such institution in central Europe), and Vienna (the Akademie, founded in 1817 by the Gesellschaft der Musikfreunde [Society of Friends of Music]). The composers Felix Mendelssohn and Robert Schumann founded the Leipzig Conservatory (now called the Staatliche Hochschule für Musik) in 1843. Not all of the German schools, however, followed the principles of the Conservatoire nor did all similar institutions in Great Britain, of which the most notable were the Royal Academy of Music (1822; royal charter, 1830) and the Royal College of Music (first called the National Training-School of Music; founded 1882, royal charter 1883). The Royal Irish Academy of Music was founded in 1848 and the Royal Scottish Academy of Music and Drama in 1890.

Such institutions began to appear in the United States in the 1860s. Two of the first were those at Oberlin, Ohio (1865), and the Peabody Conservatory of Music, Baltimore, founded 1857 (first classes held in 1868). The New England Conservatory of Music and the Boston Conservatory of Music (both in Boston) followed in 1867 and the National Conservatory of Music in New York City in 1885. Other important institutions of music in the United States are the Eastman School of Music at Rochester, N.Y. (1919), and the Curtis Institute of Music, Philadelphia (1924). The Institute of Musical Art (1905) and the Juilliard Graduate School (1924) were united in 1926 to form the Juilliard School of Music, in New York City; this institution became the Juilliard School in 1968. Canadian conservatories include that at Toronto (1886). Australia has the Adelaide Conservatorium (1898).

Considérant, Victor-Prosper (b. Oct. 12, 1808, Salins, Fr.—d. Dec. 27, 1893, Paris), French Socialist who, after the death of



Considérant, detail of an engraving by A. Lacauchie and J. Rebel, middle of the 19th century

H. Roger-Viollet

Charles Fourier in 1837, became the acknowledged leader of Fourierist Utopianism and took charge of *La Phalange*, its theoretical organ.

Educated at the École Polytechnique in Paris, Considérant entered the French army as an engineer and rose to the rank of captain. He resigned his commission in 1831 to devote himself to advancing Fourierism.

After the revolution of 1848, Considérant was elected to the Constituent Assembly. In 1849, however, his political activity made it necessary for him to leave France. He settled in Brussels and visited the United States on several occasions. On his second visit to the U.S., he founded, near Dallas, Texas, the short-lived communistic colony of La Réunion (1855–57). He returned to Paris in 1869.

Among Considérant's books, his *Destinée sociale* (1834–38) is considered the most important work of the Fourierist school.

consideration, in contract law, an inducement given to enter into a contract that is sufficient to render the promise enforceable in the courts. The technical requirement is either a detriment incurred by the person making the promise or a benefit received by the other person. Thus, the person seeking to enforce the promise must have paid, or bound himself to pay, money, parted with goods, spent time in labour, or foregone some profit or legal right. In a contract for the sale of goods, the money paid is the consideration for the vendor, and the property sold is the consideration for the purchaser.

This definition, however, leaves unanswered the question of what is sufficient consideration. During certain periods of history, nominal consideration was held to be sufficient—even a cent or a peppercorn. Gradually, the courts came to require that the consideration be valuable, although not necessarily equal in value to what is received. The courts have had to decide specifically whether acts of forbearance on the faith of a promise, the giving of a counterpromise, money payments, preexisting duties to the promisor, preexisting duties to third parties, moral obligations, love and affection, surrender of another legal claim, or performance of a legal duty were sufficient, and the answer has varied considerably over time.

The doctrine that a consideration is necessary if a contract is to be enforceable has a number of functions in the law of contracts. In addition to providing evidence that a contract exists, consideration also has the cautionary function of guarding the promisor against ill-considered action; the deterrent function of discouraging transactions of questionable utility; and a channelling function of enabling interested persons to distinguish particular types of transactions.

Although the doctrine of consideration is unique to common law, these functions are also performed in other modern systems of law.

consistory (from Latin *consistorium*, "assembly place"), a gathering of ecclesiastical persons for the purpose of administering justice or transacting business, particularly meetings of the Sacred College of Cardinals with the pope as president. From the 11th century, when the institution of the cardinalate became more important, the Sacred College of Cardinals, assembled in regular meetings called consistories, became the normal counsellors of the popes. In the course of time more complicated business came to be assigned to various commissions of cardinals, and with the formal organization of the congregations, or offices, of the Roman Curia by Sixtus V (1585–90), the active function of the consistories diminished. In modern times consistories are largely ceremonial. The limited matters they deal with have already been arranged by the pope himself or by the Consistorial Congregation, and the request for the opinion of the cardinals is a formality. Thus, consistories—of which there are three kinds (secret, semipublic, and public)—have become a form of solemn promulgation of certain special papal acts, such as creating cardinals, conferring the hat on newly created cardinals, making appointments to dioceses, accepting resignations, and issuing annual policy summaries on the state of the church.

In the Church of England the consistory court is the bishop's court for administering church law in his diocese. In some Presbyterian churches the consistory court is the lowest court, consisting of the minister and elders of the congregation.

consol, long-range radio-navigation system by means of which ships and aircraft can determine their position. A consol radio transmitter operating at 250 to 350 kilohertz radiates a rotating pattern divided into lobes. Alternate lobes are modulated with Morse-code dots and dashes, so that as the pattern rotates, a receiver at a distant point will first hear dots, then a continuous tone (midway between the lobes), and then dashes. By properly interpreting this sequence and referring to a special chart, the operator can determine the bearing of the consol transmitter; a similar fix on another consol transmitter gives the location of the receiver. A rough approximation of bearing (within 10° to 15°) may be necessary, as by a radio compass. No special receiver is required with this system.

Consol bearings are accurate to within 1° or 2°, sometimes at distances of more than 1,000 miles (1,600 kilometres). The disadvantage of the system is in the relatively long time (more than one minute) required to take bearings on two stations for a fix. Consol is the British name for the system, which was originated (under the name of *Sonne*) by the Germans during World War II. A similar U.S. system is called consolan.

console, in architecture, type of bracket or corbel, particularly one with a scroll-shaped profile: usually an ogee or double-ogee curve terminating in volutes above and below. A

console projects about one-half its height or less to support a windowhead, cornice, shelf, or sculpture. The difference between a console and other varieties of bracket has more to do with where it is used than its appearance, though in general a cantilever or modillion is supposed to project farther than a console in proportion to its height.

In Greece, consoles with only slight projection were employed to support door cornices. This sort of console is properly called an ancon, or ancone. The Temple of Concord, Rome (7 BC–AD 10), provides the earliest example of a scrolled console used to support a cornice.

console, in furniture, a type of side table placed against a wall and normally fixed to it, requiring legs or other decorative support only at the front. Because it was viewed only from the front or sides, the back was left undecorated; the top was often of marble. In 17th-century Italy the console table was a major manifestation of the fashion of furniture made for display. Many examples of this period were carved and were, in fact, pieces of sculpture as much as furniture. An opulent group of consoles was made in 1675–78 for the Palazzo Colonna in Rome; supports for the tops were commonly carved as human figures, eagles, tumbling putti (cupids), flamboyant foliage, and dolphins, and they often were gilded.

The French continued the fashion for grand consoles during the reign of Louis XIV, reducing the front support to a pair of inward-curving legs joined by a stretcher. Many of these consoles were made in pairs and looked particularly fine when topped by matching mirrors. They were one of the most successful expressions of the Rococo style, which, after developing in France, became popular in England and other parts of Europe. During the classical revival in the last quarter of the 18th century, mahogany and satinwood consoles with decoration painted in pale colours were introduced in England.

Consolidated Rail Corporation, byname CONRAIL, publicly owned American railroad company established by the federal government under the Regional Rail Reorganization Act of 1973 to take over six bankrupt northeastern railroads. Conrail commenced operations on April 1, 1976, with major portions of the Central Railroad Company of New Jersey, Erie Lackawanna Railway Company, Lehigh & Hudson River Railway Company, Lehigh Valley Railroad Company, Penn Central Transportation Company, and Reading Company. In 1987 the government put its stock up for sale to the public.

Conrail carries freight traffic in the northeastern and midwestern states. Its tracks extend from the Atlantic Ocean to St. Louis and from the Ohio River north to Canada. All passenger traffic was turned over to Amtrak or to regional transportation authorities in 1983.

Conrail was set up to be an independent profit-making corporation though in its early years, even with the aid of federal loans, it lost more than the bankrupt lines had lost before consolidation. Stockholders in the roads taken over received Conrail stock in exchange. By 1983 the corporation had become profitable. The system operates in 15 states over some 12,000 miles (about 19,000 km).

consonance, in prosody, the repetition of end or medial consonants. As a poetic device, it is often combined with assonance (the repetition of stressed vowel sounds within words with different end consonants) and alliteration (the repetition of initial consonant sounds). Consonance is also occasionally used as an off-rhyme, but it is most commonly found as an internal sound effect, as in Shakespeare's song, "The ousel co*ck* so bla*ck* of hue," or "The curfew to*ll*s the kne*ll* of parting day," from Gray's "Elegy Written in a Country Church Yard."

consonance and dissonance, in music, the impression of stability and repose (consonance) in relation to the impression of tension or clash (dissonance) experienced by a listener when certain combinations of tones or notes are sounded together. In certain musical styles, movement to and from consonance and dissonance gives shape and a sense of direction, for example, through increases and decreases in harmonic tension.

Perception of individual chords and intervals as consonant or dissonant has varied through the centuries, as well as with individual composers. Before about 1300 the interval of the third (as C to E) was heard as dissonant and in theory, if not in practice, remained an "imperfect" consonance well into modern times. The interval of the second, on the other hand, dissonant by definition in the Western art tradition, appears to have no such connotations for Istrian folk singers. By and large, however, concepts of consonance and dissonance have remained fairly constant and can be discussed in terms of the physics of musical sound.

Intervals can be described as ratios of the frequency of vibration of one sound wave to that of another: the octave a–a′, for example, has the ratio of 220 to 440 cycles per second, which equals 1:2 (all octaves have the ratio 1:2, whatever their particular frequencies). Relatively consonant intervals, such as the octave, have frequency ratios using small numbers (*e.g.*, 1:2). The more dissonant major seventh interval (*e.g.*, C–B) has the ratio 8:15, which uses larger numbers. Thus, the subjective gradation from consonance to dissonance corresponds to a gradation of sound-frequency ratios from simple ratios to more complex ones.

consonant, any speech sound, such as that represented by *t, g, f,* or *z,* that is characterized by an articulation with a closure or narrowing of the vocal tract such that a complete or partial blockage of the flow of air is produced. Consonants are usually classified according to place of articulation (the location of the stricture made in the vocal tract, such as dental, bilabial, or velar), the manner of articulation (the way in which the obstruction of the airflow is accomplished, as in stops, fricatives, approximants, trills, taps, and laterals), and the presence or absence of voicing, nasalization, aspiration, or other phonation. For example, the sound for *s* is described as a voiceless alveolar fricative; the sound for *m* is a voiced bilabial nasal stop. Additional classificatory information may indicate whether the airstream powering the production of the consonant is from the lungs (the pulmonary airstream mechanism) or some other airstream mechanism and whether the flow of air is ingressive or egressive. The production of consonants may also involve secondary articulations—that is, articulations additional to the place and manner of articulation defining the primary stricture in the vocal tract.

consort, in music, instrumental ensemble popular in England during the 16th and 17th centuries. The word consort was also used to indicate the music itself and the performance.

Though the authenticity of such terms is doubtful, some researchers have suggested that there were "whole" consorts, in which all the instruments were of one family (typically, stringed or wind instruments), and "broken" consorts, with different families of instruments. (Others suggest that *whole* means "complete," or "full," and that *broken* means "disordered.") Broken consorts of treble and bass viols, lute, pandora, cittern, and bass recorder were popular in about 1600.

conspiracy, in common law, an agreement between two or more persons to commit an unlawful act or to accomplish a lawful end by unlawful means. Conspiracy is perhaps the most amorphous area in Anglo-American criminal law. Its terms are vaguer and more elastic than any conception of conspiracy to be found in the continental European codes or their imitators. In most civil-law countries, the punishment of agreements to commit offenses, irrespective of whether the criminal purpose was attempted or executed, is largely confined to political offenses against the state. In some U.S. states, statutory law limits the conspiracy offense to that of furthering criminal objectives.

Generally, there is no particular form that the agreement must take to constitute conspiracy. Although many statutes now require an overt act as proof of an agreement to commit a felony, conspiracy is still largely inferred from circumstantial evidence. Thus, individual conspirators need not even know of the existence or the identity of all the other conspirators. Two persons may be found to have conspired with each other simply by making separate agreements with a third party.

Once a person has entered into an agreement, it is very difficult to limit the scope of his liability for the acts of others included in the conspiracy. Courts and statutes increasingly emphasize that proof of an agreement must be related to a specific crime. Often, however, conspiratorial organizations conduct a business rather than commit a single offense; for example, a "chain conspiracy" involves several transactions all directed to a common unlawful objective. The courts differ as to what extent a party at one end of the chain should be liable for the acts of the parties at the other end. Also, in a "hub conspiracy," a single man, or "hub," such as a "fence" for stolen goods, makes separate illegal transactions with persons who have no knowledge of the others involved.

In support of such reasoning, it is argued, first, that conspiracies are an especial threat to society because of the greater power that lies in numbers and the pooling of talents. It is also said that the formation of a group impedes detection, because evidence of the conspiracy is limited to the conspirators themselves, whose reluctance to testify in court increases with the size of the group. Finally, it is speculated that the very act of agreement crystallizes and hardens the purposes of persons who alone might be less resolute.

Others argue that the Anglo-American concept of conspiracy is too elastic to prevent injustice. No continental country permits conviction for conspiracy if the aim of the agreement is itself legal.

It is common in the United States to punish a conspiracy to commit an offense more harshly than the commission of the offense itself, but there has been a growing trend, as in the state of Illinois, to follow the continental European example of making the punishment for conspiracy the same as or less than that for the offense itself. Also, instead of adding the punishment for conspiracy to that for the separate crime, Illinois requires that punishment be given for one offense or the other but not both. The harshness of the traditional rule was mitigated by the doctrine that if one of the necessary parties to a conspiracy could not be convicted, the other party could not be convicted either. In some jurisdictions this doctrine has been dropped so that a party may be guilty of conspiracy regardless of the status of his partner.

Conspiracies that relate to political offenses and to economic warfare between businesses and between management and labour are usually regulated by statute. The concept of conspiracy itself, however, is often limited by the vagueness of its common-law background.

constable, officer of state in western European countries from medieval times and also of certain executive legal officials in Great Britain and the United States. The title *comes stabuli* is found in the Roman and particularly in the Eastern Roman, or Byzantine, Empire from the 5th century AD as that of the head of the stables at the imperial court. The Franks borrowed the title, and under the Merovingian and Carolingian kings of western Europe the *comes stabuli* was in charge of the royal stud, with the marshal (*marescallus*) as his subordinate officer. In the 11th century the constable (*connétable*) of France became one of the five great officers of state, with limited powers of jurisdiction and with command of the cavalry. The constable's military duties and judicial powers increased until, by the mid-14th century, he held supreme military command of the army. After the treason of the constable Charles de Bourbon (1523), however, the kings distrusted the power of the office, and for many years in the 16th century it was allowed to remain vacant. It was eliminated in 1627, after the death of François de Bonne, Duke de Lesdiguières, but was revived by Napoleon I, who appointed his brother Louis Bonaparte grand constable. It was finally abolished upon the restoration of the Bourbons.

In England the office of constable, which was similar to that of the pre-Conquest *staller*, was in existence during Henry I's reign (1100–35). The principal duty of the constable and marshal was the command of the army. The Court of the Constable and Marshal, also known as the Court of Chivalry, came into existence at least as early as the reign of Edward I (1272–1307). Lord high constables are now appointed only for coronations.

Officers with important military commands and in control of garrisons and castles were also known as constables—*e.g.*, the constables of Windsor, Dover, Caernarvon (Caernarfon), Conway, Harlech, and Flint castles and of the Tower of London. Sometimes the appointment was coupled with that of conservator (later justice) of the peace, who assisted the sheriff in enforcing the law. This gave rise to constables' exercising civil jurisdiction. Under the Statute of Winchester (1285), the civil and military organizations were linked.

A chief or high constable in every local area (hundred or franchise) was responsible for suppressing riots and violent crimes and for arming the militia to enable him to do so. Under him were petty constables in each tithing, or village. The high and petty, or parish, constables remained the executive legal officers in counties until the County Police Acts of 1839 and 1840 allowed certain justices to establish a paid police force. In Scotland bodies of high constables, formed to carry out such municipal duties as curbing riots, still exist at Edinburgh, Leith, Perth, and Holyroodhouse, the last named being prominent on state occasions. In the rural districts of the United States the constable had the same status as in England before the act of 1842 but during the 20th century gradually lost most of his power in criminal matters to the uniformed police, being thereafter chiefly concerned with the issuing of writs, processes, and election notices.

To make the best use of the Britannica, consult the INDEX *first*

Constable, Archibald (b. Feb. 24, 1774, Carnbee, Fife, Scot.—d. July 21, 1827, Edinburgh), the most gifted bookseller-publisher of Edinburgh's Augustan Age and, for a decade, owner of the *Encyclopædia Britannica.*

At the age of 14 Constable was apprenticed for six years to an Edinburgh bookseller, Peter



Archibald Constable, detail of a portrait by an unknown artist after a painting by Sir Henry Raeburn
BBC Hulton Picture Library

Hill, before he left to open his own bookstore. He soon began to publish theological and political pamphlets, and in 1802 Sydney Smith and Francis Jeffrey chose him as publisher of their brilliant *Edinburgh Review.*

From 1805 to 1808 and after 1814 Constable was a publisher of most of Sir Walter Scott's works, but he soon focused his attention on acquisition of the *Encyclopædia Britannica.* By 1814 he was sole proprietor and set about creating the sixth edition (1820–23). Constable also conceived the six-volume supplement to the fourth, fifth, and sixth editions. In his enthusiasm and liberality with his authors, Constable overextended his resources, and in 1826 Constable and Company went bankrupt.

Constable, John (b. June 11, 1776, East Bergholt, Suffolk, Eng.—d. March 31, 1837, London), painter who, with J.M.W. Turner, dominated English landscape painting in the 19th century. He is famous for his precise and loving paintings of the English countryside (*e.g.*, "The Hay-Wain," 1821), which he sketched constantly from nature. After about 1828, he experimented with a freer and more colourful manner of painting (*e.g.*, in "Hadleigh Castle," 1829). He was elected to the Royal Academy in 1829.

Early days. Constable's birthplace was, and remains, a small village, standing on a ridge a short distance from the River Stour, which separates Suffolk from Essex. The Stour valley in this region is rich in wheat, pasturelands, and fine trees and was known in the late



John Constable, self-portrait, detail of a drawing in pencil and watercolour; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

18th century for its efficient agriculture and its natural beauty. The men of Suffolk felt a jealous patriotism for their own county, and Constable remained at heart a Suffolk man, although he constantly crossed the bridge over the River Stour at Flatford into Essex.

The artist's father, Golding Constable, was a wealthy man who owned mills at Flatford and Dedham, on the Suffolk and Essex banks of the Stour, respectively. His business consisted of grinding wheat raised in the local fields and shipping it around the coast of East Anglia to the London market. The Stour had been made into a canal, navigable beyond these mills, and the grain was transported on its waters in broad, flat-bottomed barges. The fact that Constable was born into the midst of the practical realities of country life has a direct bearing on his career and is reflected throughout his painting. He showed intellectual promise as a child and was brought up for the church; when this idea was abandoned, he was trained to enter his father's business. By this time he had already conceived an enthusiasm for painting. This interest was fostered by his friendship with an amateur painter, John Dunthorne, a local plumber and glazier, and was further encouraged by the landscape painter Sir George Beaumont, a patron of the arts. Constable's determination to make painting his profession was sealed by his acceptance as a probationer in the Royal Academy Schools in 1799, when he was 23.

Artistic development. At this time his performance did not reveal any marked promise; his execution was laboured and his drawing from life weakly academic. But he already had a clear mental image of the type of pictures he wanted to paint and worked doggedly to overcome his technical defects. Seven or eight years after he had started his formal training, he discovered how to embody his idea of the English countryside in a manner both more realistic and more spirited than his predecessors. There were some modest successes to record in this period of self-training. He exhibited at the Royal Academy shows annually from 1802, with one single exception in 1804. He went on two of the sketching expeditions that it was then the practice for landscape painters to undertake, going to the Peak District, Derbyshire, in 1801 and the Lake District in 1806. He painted portraits of the Suffolk and Essex farmers and their wives and in 1805 attempted an altarpiece of "Christ Blessing the Children," in the manner of the American expatriate painter Benjamin West. When he took stock of his progress after his return from the Lake District, however, he realized that he had been attempting too wide a range of subject and style, thus dissipating his energies. He then determined to concentrate on the scenes that had delighted him as a boy: the village lanes, the fields and meadows running down to the Stour, the slow progress of barges drawn by tow horses, the bustle of vessels passing the locks at Flatford or Dedham.

In the years 1809 to 1816 he established his mastery and evolved his individual manner; but these were years of personal stress. He was obliged to live much of each year in London, where his professional associates were to be found and where he could participate in exhibitions. Constable was uneasy at these enforced absences from the countryside, in which he felt most at home, and tried to pay yearly visits to Suffolk. The assiduity with which he studied the landscape on these visits is shown by two pocket sketchbooks, one of 1813 and one of 1814, which are still intact. These contain between them more than 200 small sketches made in a limited area around his home village and reflect most aspects of the summer life of the fields and the river.

Deeper than the strain of exile from these scenes was the unhappy progress of his courtship of Maria Bicknell, with whom he had fallen in love in 1809 but whose grandfather, the elderly and tyrannical rector of East Bergholt, opposed her marriage to an impecunious artist. Nevertheless, Constable stuck to his purpose with a tenacity equal to that which he displayed in his art, and, in her unaggressive way, Maria was just as determined. A further anxiety for Constable came from the failing health of his parents; his mother died in 1815 and his father the following year. He was genuinely devoted to them and spent prolonged periods at home during their ill-

nesses. His father's death in 1816 provided a sufficient measure of economic independence for him to marry Maria Bicknell and to settle into the domestic life that was a prerequisite for his calm development and the full maturing of his art.

Once he had married, on Oct. 2, 1816, and had established himself and his wife in a London home, Constable set to work to show what he could achieve in his art. He was 40 years old and had painted a handful of accomplished pictures, which were original but on a small scale. These included "Dedham Vale: Morning" (1811; Sir Richard Proby Collection, Elton Hall, Huntingdonshire); "Boatbuilding near Flatford Mill" (1815; Victoria and Albert Museum, London); "The Stour Valley and Dedham Village" (1815; Museum of Fine Arts, Boston). These paintings were still products of the years of preparation, however. Most significant was the large number of small oil sketches and drawings that were to form the basis of his future and more ambitious painting. These sketches, of which he made a considerable number after 1808, were painted in the open air in front of the subject. They are most frequently in oils on paper about 12 inches wide, and they record the form of the landscape, the colours that predominate, and also the more evanescent qualities of atmosphere and the reflection of light on particular details. The sketches are now recognized to be among Constable's most individual achievements and to have been unique at the time they were painted. To the artist, however, they were means to an end. His main ambition was to embody his concept of the Suffolk countryside in a series of larger canvases monumental enough to make an impression in the annual summer exhibitions of the Royal Academy. The first attempt was the "Flatford Mill on the River Stour" which he exhibited in 1817. It shows a reach of the river running up to the mill, in which Golding Constable had lived until within two years of Constable's birth, bordered by a meadow that has just been scythed.

Mature works. This work was succeeded by a series of six paintings that are now among his best known and most highly regarded works. In order of exhibition they are "The White Horse"; "Stratford Mill"; "The Hay-Wain"; "View on the Stour near Dedham"; "The Lock"; "The Leaping Horse." These six canvases portray scenes on the River Stour that were easily within the compass of Constable's childhood walks; between the most easterly, "The Hay-Wain," and the most westerly, "Stratford Mill," there is hardly more than two miles distance in a direct line. To this unity of place is joined a unity of subject matter. With the exception of "The Hay-Wain," all show barges being manoeuvred along the canals. The appearance in these works of the fruits of Constable's deep, unprecedented study of the formation of clouds, the colour of meadows and trees, and the effect of light glistening on leaves and water enables them to communicate the concrete actuality of these everyday-life country scenes, as well as the feeling they evoked in him.

This series of Stour scenes was interrupted in 1823, when Constable's chief exhibit was a view of "Salisbury Cathedral from the Bishop's Grounds," which was intended to be a record of an architectural monument, transmuted into the artist's own idiom by framing the spire between overarching trees, by emphasizing the play of light and shade on the Gothic stonework, and by setting the whole under a sky in which rain is impending. This romantic treatment did not please the Bishop but was admired by the Bishop's nephew and Constable's old friend, Archdeacon John Fisher, who had already shown his faith in the artist by buying "The White Horse" at the exhibition of 1819.

A revealing correspondence between Constable and Bishop Fisher—who commissioned the painting of the Salisbury Cathedral—has been preserved. In it the painter gives his most intimate thoughts on his art without concealment or false modesty. There was much he could be satisfied with at this time. He was aware that he had achieved in his art a great deal of what he had set out to do. In addition, his work had deeply impressed the painters of the French Romantic school. Théodore Géricault had admired "The Hay-Wain" on its first exhibition in 1821; and when this work (along with the "View on the Stour near Dedham") was shown at the Paris Salon in 1824, it not only created a sensation but inspired Eugène Delacroix to repaint parts of his "Massacre at Chios." In England recognition was slower in coming. Although Constable had been made an Associate of the Royal Academy in 1819, full membership was delayed for 10 years.

Meanwhile the presence, from 1819, of Hampstead scenes and, from 1824, of Brighton scenes among his repertoire of subjects indicates a deepening shadow over his domestic happiness. Mrs. Constable had long been delicate, and Constable took houses in these places in search of purer air. Her death from consumption in 1828, at the age of 41, was a loss from which he never fully recovered, though he bestirred himself into activity for the sake of his seven children, in whom he delighted. His financial situation had been eased by a large legacy from his father-in-law, but from this time an increased restlessness is to be found in his paintings. "Hadleigh Castle" and "Salisbury Cathedral from the Meadows" show his growing recourse to broken accents of colour, sombre tones, and stormy skies. It was in 1829 also that he began his preparations for the publication of *English Landscape Scenery,* a selection of mezzotints executed by David Lucas from Constable's paintings and sketches in which the same dramatic qualities of light and shade are translated into a black-and-white medium. The admiration of his friend, the American-born artist C.R. Leslie, prompted the writing of the *Memoirs of the Life of John Constable, R.A.* This biography was first published in 1843 and still remains an indispensable source of information on Constable.

In the 1820s the use of colour by Constable's great contemporary and rival in landscape painting, J.M.W. Turner, was becoming bolder and even more uninhibited. This may have contributed to the greater readiness for change that we see in Constable's late works. His "Waterloo Bridge from Whitehall Stairs" is a monumental record of the opening ceremonial, painted in a high key of colour. His use of watercolour became more frequent, and in 1834, after he had been seriously ill, he sent no oils at all to the Royal Academy, depending for his principal exhibit on a large and remarkable watercolour, "Old Sarum" (Victoria and Albert Museum, London). A visit to Arundel in the same summer imbued him with enthusiasm for a new type of countryside dominated by steep wooded slopes.

In 1836 Constable sent "The Cenotaph at Coleorton" to the Royal Academy exhibition. It was the last painting he showed in his lifetime. When he died, the painting on which he had been working the day before, "Arundel Mill and Castle" (Toledo Museum of Art, Toledo, Ohio), was sufficiently completed to be shown posthumously at the next Academy exhibition. At his death his reputation was limited, but those who admired his work did so intensely. This admiration grew slowly throughout the 19th century, becoming more widespread as his sketches became available and their freshness and spontaneity were recognized. In 1843 his first biographer, C.R. Leslie, wrote that he was "the most genuine painter of English landscape," and that is a judgment now almost universally reaffirmed.

(G.R.)

MAJOR WORKS. "Malvern Hall, Warwickshire" (1809?; Tate Gallery, London); "Boatbuilding near Flatford Mill" (1815; Victoria and Albert Museum, London); "Wivenhoe Park, Essex" (1816; National Gallery of Art, Washington, D.C.); "Flatford Mill on the River Stour" (1817; Tate Gallery); "The White Horse" (1819; Frick Collection, New York City); "Dedham Lock and Mill" (1820; Victoria and Albert Museum); "Stratford Mill" (1820; Sir Reginald and Lady Macdonald-Buchanan Collection, Cottesbrooke Hall, Northamptonshire); "The Hay-Wain" (1821; National Gallery, London); "View on the Stour near Dedham" (1822; Huntington Library and Art Gallery, San Marino, Calif.); "Salisbury Cathedral from the Bishop's Grounds" (1823; Victoria and Albert Museum); "The Lock" (1824; private collection, England); "The Leaping Horse" (1825; Royal Academy of Arts, London); "The Cornfield" (1826; National Gallery, London); "Chain Pier, Brighton" (1827; Tate Gallery); "Dedham Vale" (1828; National Gallery of Scotland, Edinburgh); "Hampstead Heath: Branch Hill Pond" (1828; Victoria and Albert Museum); "Hadleigh Castle" (1829; Paul Mellon Collection, Virginia); "Salisbury Cathedral from the Meadows" (1831; Lord Ashton of Hyde Collection, Moreton-in-Marsh, Gloucestershire); "The Grove (or Admiral's House) at Hampstead" (1832; National Gallery, London); "Waterloo Bridge from Whitehall Stairs" (1832; private collection, England); "A Cottage at East Bergholt" (*c.* 1835; Lady Lever Art Gallery, Port Sunlight, Cheshire); "The Cenotaph at Coleorton" (1836; Tate Gallery); "Stoke-by-Nayland" (after 1830; Art Institute, Chicago).

Pencil and oil sketches exist for many paintings, and the largest collection of these is in the Victoria and Albert Museum. This includes the full-scale sketches for "The Hay-Wain" (1821) and "The Leaping Horse" (1825); among the 92 oil sketches painted on a small scale in the open air two of the best known are "Barges on the Stour" and "Flatford Lock and Mill" (both *c.* 1810).

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Constance, German KONSTANZE, Italian COSTANZA (b. 1154—d. Nov. 27, 1198, Palermo), queen of Sicily (1194–98) and Holy Roman empress-consort (1191–97), whose marriage to a Hohenstaufen gave that German dynasty a claim to the throne of Sicily and whose political skill preserved the throne for her son.

The daughter of King Roger II of Sicily, Constance married the future emperor Henry VI in 1186 and was crowned with him in Rome in 1191. On the death of her nephew William II (1189), she claimed the Sicilian throne. The Sicilians, however, supported Tancred of Lecce, her natural nephew, who waged war against her and actually held her prisoner. The death of Tancred (1194) allowed Henry and Constance to take the throne of Sicily.

When Henry died in 1197, Constance consolidated her power in the kingdom, secured the protection of Pope Innocent III, and succeeded in having her son, the future emperor Frederick II, crowned king in April 1198.

Constance (Germany): *see* Konstanz.

Constance, Council of (1414–18), 16th ecumenical council of the Roman Catholic Church. Following the election of two rival popes (Gregory XII in Rome and Benedict XIII in Avignon) in 1378 and the attempt at the Council of Pisa in 1409 to resolve the Western Schism by the election of a new pope, the church found itself with three popes in-

stead of one. Under pressure from the Holy Roman emperor Sigismund, John XXIII, the successor of the Pisa pope, summoned a council at Constance principally to reunite Christendom but also to examine the teachings of John Wycliffe and Jan Hus and to reform the church.

Political rivalries so divided the large number of council delegates that a revolutionary system of voting was adopted, whereby each of the four power blocs (Italy, England, Germany, and France) was granted a single vote; later the cardinals were given a vote as a group, and still later Spain was empowered to vote. John XXIII, after being threatened with an investigation of his life, promised to resign if his rivals would do the same. Shortly after, however, he fled from Constance, hoping that this act would deprive the council of its power and lead to its dissolution. The emperor insisted that the council continue, and it issued the decree *Sacrosancta,* affirming that a general council of the church is superior to the pope. It further decreed that frequent councils are essential for the proper government of the church. John XXIII was then captured and deposed; Gregory XII agreed to abdicate provided he was permitted officially to convoke the council and so assert the legitimacy of his own line of popes, to which the council agreed; Benedict XIII, who refused to resign, was also deposed. In November 1417 the council elected Oddone Colonna, who became pope as Martin V, and the Great Schism was effectively healed. The authenticity of the decree *Sacrosancta* has been a matter of great dispute among scholars.

The council condemned 45 propositions of Wycliffe and 30 of Hus, who was declared an obstinate heretic, delivered to the secular power, and burned at the stake. Furthermore, the council adopted seven reform decrees, and Martin V concluded concordats on other points, chiefly methods of taxation, with the various nations. To the council's failure to effect stronger reforms, however, the Protestant Reformation has in large part been attributed.

Constance, Lake, also called LAKE OF CONSTANCE, Constance also spelled KONSTANZ, German BODENSEE, Latin LACUS BRIGANTINUS, lake bordering Switzerland, Germany, and Austria and occupying an old glacier basin at an elevation of 1,299 feet (396 m). It has an area of 209 square miles (541 square km) and is about 40 miles (65 km) long and up to 8 miles (13 km) wide, with an average depth of 295 feet (90 m) and a maximum depth of 827 feet (252 m). It has about 125 miles (200 km) of shoreline. In the west, near Konstanz (Constance), it is divided by the Bodan mountain ridge into two parts: the Unter Lake (south) and the Überlinger Lake (north). The lake's main body southeast of Konstanz is called the Ober Lake. The lake forms part of the course of the Rhine River, which enters it in the southeast near Bregenz and leaves it at the west via the Unter Lake. The island of Mainau is north of Konstanz in the Überlinger Lake, and the island of Reichenau is west of the city in the Unter Lake. Konstanz itself is a "political island," for it is the only part of Germany on the lake's southwestern shore; it is entirely surrounded by Swiss territory, except on the northeast where it fronts on the lake.

The name Bodensee probably derives from the Carolingian imperial palatinate of Bodman at the northwest end of the Überlinger Lake. By the Middle Ages, the lake was a major traffic centre as the meeting place of roads from all directions. There are remains of Neolithic lake dwellings in the area.

The lake stores and reflects heat, contributing to the unusually sunny and mild climate along its shores. The fertile slopes along its shores support fruit-growing and wine production, and there is fishing for lake trout and salmon. Spectacular Alpine scenery combines with the mild climate to make the lake a popular resort area. The major lakeside cities are Konstanz, Lindau, and Friedrichshafen, Ger.; Bregenz, Austria; and Kreuzlingen, Switz.

constancy phenomenon (psychology): *see* perceptual constancy.

Constans I, original name FLAVIUS JULIUS CONSTANS (b. *c.* 323—d. 350, Gaul), Roman emperor from 337 to 350.

The fourth or fifth son of Constantine the Great (reigned 306–337), Constans was proclaimed caesar by his father in 333. When Constantine died in 337, Constans and his two brothers, Constantius II and Constantine II, each adopted the title of augustus and divided the empire among themselves. Constans took control of Italy, Africa, and Illyricum (in the northwestern Balkans). In 340 Constantine II—ruler of Spain, Gaul, and Britain—invaded northern Italy but was defeated and killed by Constans' army at Aquileia. This victory gave Constans, who at the time of the battle was at Naissus, control over the entire western half of the empire. He defended his realm successfully against the Franks in 341 and two years later visited Britain. In 350 he was overthrown and killed in Gaul by the usurper Magnus Magnentius.

An ardent orthodox Christian, Constans was known as a vigorous opponent of Arianism (a doctrine that affirmed the created, finite nature of Christ) and paganism.

Constans II POGONATUS (b. 630, Constantinople [now Istanbul]—d. Sept. 15, 668, Syracuse, Sicily), Byzantine (Eastern Roman) emperor whose reign saw the loss of Byzantium's southern and eastern provinces to the Arabs.

The son of the emperor Constantine III, Constans came to the throne in 641, at the age of 11, after his father's death; during his minority the regency was under the control of the Senate of Constantinople. The Muslim Arabs seized Egypt from Byzantium in the second year of his reign and invaded Armenia in 647. In 655 he fought them at sea off the coast of Asia Minor; his fleet was routed, and he escaped death only through the heroism of one of his soldiers. The murder of the caliph 'Uthmān ibn 'Affān in June 656 touched off a civil war among the Arabs that prevented them from attacking Constantinople, and in 659 Constans was able to secure a nonaggression treaty with the Arab governor of Syria.

Constans' internal policy was marked by an attempt to force unity on the church, after theological disputes had divided the empire; in 648 he issued an edict, the Typos, forbidding argument about the controversial question of the divine and human natures of Christ. Pope Martin I condemned the Typos, and Constans, holding to the old conception of a single Roman Empire comprising East and West, had the pope arrested and exiled in 653. The following year he made his son Constantine coemperor, excluding his brother Theodosius from the succession and ordering his murder in 660.

Detested as a fratricide by his subjects in Constantinople, Constans in 663 left the capital and traveled westward, passing through northern Italy to Rome and then settling at Syracuse in Sicily. His plans to make the city a permanent capital and a strategic centre for the defense of the West against the Arabs were cut short by his assassination.

constant, a number, value, or object that has a fixed magnitude, physically or abstractly, as a part of a specific operation or discussion. In mathematics the term refers to a quantity (often represented by a symbol—*e.g.,* π, the ratio of a circle's circumference to its diameter) that does not change in a certain discussion or operation, or to a variable that can assume only one value. In logic it is a term with an invariant denotation (any symbol with a fixed designation, such as a connective or quantifier).

For discussion of physical constants, *see* physical constant.

Constant, Benjamin, in full HENRI-BENJAMIN CONSTANT DE REBECQUE (b. Oct. 25, 1767, Lausanne, Switz.—d. Dec. 8, 1830, Paris), Franco-Swiss novelist and political writer, the author of *Adolphe* (1816), a forerunner of the modern psychological novel.



Constant, detail of an oil painting by Hercule des Roches, *c.* 1830; in the Musée Carnavalet, Paris
J.E. Bulloz

The son of a Swiss officer in the Dutch service, whose family was of French origin, he studied at Erlangen, Ger., briefly at the University of Oxford, and at Edinburgh. In 1787 he formed, in Paris, his first liaison, with Madame de Charrière, 27 years his senior. His republican opinions in no way suited him to the office of chamberlain to the duke of Brunswick, which he held for several years. In 1794 he chose the side of the French Revolution, abandoning his office and divorcing his wife, a lady of the court. Madame de Staël had much to do with his decision. Their tumultuous and passionate relationship lasted until 1806. After the coup d'état of 18 Brumaire (1799), he was nominated to the tribunate; but he quickly became, like Madame de Staël, an opponent of the Bonapartist regime and, expelled from the tribunate in 1802, followed her into exile the year after. Thereafter he spent his time either at Madame de Staël's salon at Coppet, near Geneva, or in Germany, chiefly at Weimar, where he met Goethe and Friedrich Schiller. Constant was the associate of the brothers Friedrich and August von Schlegel, the pioneers of the Romantic idea, and with them he inspired Madame de Staël's book *De l'Allemagne* ("On Germany").

During his exile, Constant worked on his *De la religion considérée dans sa source, ses formes et ses développements,* 5 vol. (1824–31; "On Religion Considered in Its Source, Its Forms, and Its Developments), a historical analysis of religious feeling. In it he revealed his inner self, as he also did in his intimate diaries, which for long remained unknown; in his correspondence, particularly with his cousin Rosalie; and, not least, in *Adolphe,* the barely disguised account of his break with Madame de Staël in 1806. Written in a lucid and classical style, this novel describes in minute analytical detail a young man's passion for a woman older than himself. Nearly 150 years after the publication of *Adolphe,* another of Constant's autobiographical novels, *Cécile,* dealing with events between 1793 and 1808, was discovered. Constant's *Journaux intimes* ("Intimate Journals") were first published in their entirety in 1952, adding to the autobiographical picture of Constant provided by his *Cahier Rouge* (1907; *The Red Notebook*).

In 1808 Constant secretly married Charlotte von Hardenberg. But his intellectual relationship with Madame de Staël and the group at Coppet remained unbroken. As a liberal

he was disappointed by the restoration of the Bourbon monarchy, and he reconciled himself with the Napoleonic empire of the Hundred Days under the influence of Madame Récamier, the other great love of his life. On his return to Paris after a short exile, Constant became one of the leaders of liberal journalism. He was elected a deputy in 1819. After the revolution of July 1830, he was appointed president of the council of state but died the same year.

Constant's complete works were published in 1957, and the first edition of *Cécile* appeared in 1951, with an English translation the next year.

constant of ———: *see under* substantive word (*e.g.*, aberration, constant of).

Constanţa, *judeţ* (county), southeastern Romania, bounded by Bulgaria on the south. The Black Sea lies to the east, and the northward-draining Danube River delimits the county's western border. Constanţa *judeţ*, consisting mostly of lowlands, contains several lakes. Constanţa (*q.v.*) city, Romania's principal seaport, is the county seat. Agricultural activities include livestock raising and cereal and vineyard cultivation. Manufactured products of Constanţa and other towns in the county include machinery, metal products, building materials, textiles, and paper. Archaeological museums, containing artifacts from the Neolithic period and from Greek and Roman occupations, are located in Eforie Sud and Mangalia. Mangalia was built on the ruins of an ancient Greek city that was founded in the 6th century BC. A 15th-century Turkish mosque and an ancient tomb (4th century AD) are situated in Mangalia. Three churches, built one on top of another, and underground passages with 10th-century Cyrillic inscriptions were discovered in Murfatlar. The town also has a horticultural and viticultural research station. A Byzantine city (10th century) was excavated on an island in the Danube River near Ostrov. Adamclisi town is known for the Tropaeum Trajani monument that was built by the Romans after their victory over Scythia Minor (2nd century AD). Eforie Nord resort, one of several Black Sea resorts in the county, is situated on a red granite and limestone cliff and has an outdoor theatre. A marine biological station (1926) is located in Agigea. Highway and railway connections extend from Constanţa city in various directions, and an airport is located in Mihail Kogălniceanu. Area 2,724 square miles (7,055 square km). Pop. (1992 prelim.) 748,000.

Constanţa, city, capital of Constanţa *judeţ* (county), southeastern Romania, on the Black Sea. Situated about 125 miles (200 km) east of Bucharest, it is the country's principal seaport. Since 1960 a coastal conurbation stretching from Năvodari to Mangalia, including the principal Black Sea resort, Mamaia (5 miles [8 km] north), has been administered from Constanţa.

The first record of a settlement is at the ancient city of Tomis, founded in the 7th century BC by Greek settlers from Miletus in Anatolia. The Romans annexed the region—known to them as Scythia Minor—in the 1st century BC; and in the 4th century AD Tomis was reconstructed by Constantine the Great and renamed Constantiana. It was the place of exile of the Roman poet Ovid in AD 9–17. Between the 6th century and the Turkish conquest in the early 15th century, the entire region was subject to invasions by the Goths, Huns, Avars, Gepidae, and others; under the Turks, Constanţa (called Köstence, or Köstendje) declined to a village of 2,000. Its modern development as an industrial and trading centre dates from the return of the region to Romania in 1878.

Constanţa is a centre of art and culture, with several museums and theatres. The archaeological museum has an important collection, and among Roman remains is a large mosaic tile floor. The port and dock facilities are modern and are connected by pipeline from the oil fields around Ploieşti. A busy Black Sea port, Constanţa has regular services to Ukraine, Russia, Turkey, and other nearby countries and to ports on the Mediterranean. Industrial products include pulp and paper and prefabricated concrete. It is also a food-processing centre. Pop. (1992 prelim.) 350,476.



Square in Constanţa, Romania, with a statue of the Roman poet Ovid
Kurt Scholz—Shostal

Constantia, city of ancient Cyprus better known as Salamis (*q.v.*).

Constantia, residential area, Western Cape province, South Africa, near Cape Town. It is located in Constantia Valley, famous since the 18th century for wines produced on both government and private farms. The Groot Constantia homestead there was built about 1685 by Governor Simon van der Stel and named for his wife, Constance; a fine example of Cape Dutch architecture, it has been restored and serves as a museum of antique Cape stinkwood furniture. Pop. (1985) 25,749.



The Groot Constantia homestead, Constantia, S.Af.
Shostal

Constantine, name of rulers grouped below by country or papacy and indicated by the symbol •.

Foreign-language equivalents:

Greek	Constantinos, or Konstantinos
Latin	Constantinus

BYZANTINE EMPIRE

• **Constantine I–II:** *see* Constantine I–II (Roman Empire).

• **Constantine III,** also called HERACLIUS CONSTANTINE (b. May 3, 612—d. May 24, 641), Byzantine emperor from February to May 641. He was coemperor with his father, Heraclius, from 613 and with his brother Heraclonas from 638. During his reign, court intrigues nearly led to civil war, which was prevented by his death. It was rumoured that he was poisoned by order of his stepmother, but he probably died of tuberculosis.

• **Constantine IV** (d. 685), Byzantine emperor from 668 to 685. He was the eldest son of Constans II.

Constantine withstood a four-year Arab siege of Constantinople (674–678), greatly enhancing Byzantine prestige and indeed marking a turning point in European history. In the Balkans, however, he could not prevent the Bulgars from crossing the Danube River and establishing their kingdom in the district where their name still survives. He had to recognize their kingdom and pay them annual tribute. Constantine summoned the sixth ecumenical Council of Constantinople (680–681), which condemned monothelitism and recognized the orthodox christological doctrine as laid down by the Council of Chalcedon (451).

• **Constantine V** COPRONYMUS (b. 718, Constantinople, Byzantine Empire [now Istanbul, Turkey]—d. Sept. 14, 775 [what is now Bulgaria]), Byzantine emperor from 741 to 775, son of Leo III the Isaurian.

Constantine was made coruler of the empire with his father in 720. Most of his life before and after his accession as sole ruler was spent in largely successful military campaigns against Arabs and Bulgars who threatened the empire. Because the empire's resources were thus engaged, the Lombards were able to take the exarchate of Ravenna in Italy (751), thus ending Byzantine influence in north and central Italy and indirectly fostering the historic alliance between the papacy and the Franks. Constantine was a strong Iconoclast (one opposed to the veneration of religious images) and was remembered by contemporaries for his persecution of monks who opposed his iconoclastic position. His military achievements won him great popularity, nonetheless, and were appreciated by later historians. He died in the Balkans while on a campaign against the Bulgarian kingdom.

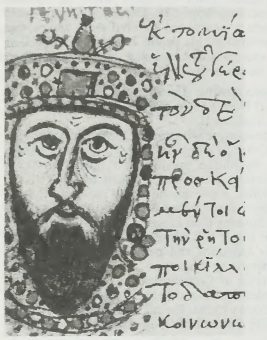
• **Constantine VI** (b. 770—d. after Aug. 15, 797), Byzantine emperor from 780 to 797, grandson of Constantine V.

At 10 years of age Constantine succeeded his father, Leo IV, under the guardianship of his mother, Irene. It was during her regency that the seventh ecumenical Council of Nicaea (787) reestablished the veneration of icons. When Constantine came of age, Irene attempted to retain supreme power; but in 790 the army proclaimed Constantine VI as sole ruler, and she was arrested. Constantine foolishly pardoned her in 792 and again accepted her as coruler. In 796 Constantine roused public opinion by divorcing his wife in order to marry his mistress, Theodote. Irene cleverly utilized this situation and in August 797 had Constantine deposed and blinded. He was the last of the Isaurian dynasty. *See also* Irene (752–803).

• **Constantine VII Porphyrogenitus,** also called CONSTANTINE VII FLAVIUS PORPHYROGENITUS (b. September 905, Constantinople [now Istanbul, Tur.]—d. Nov. 9, 959), Byzantine emperor from 913 to 959. His writings are one of the best sources of information on the Byzantine Empire and neighbouring areas. His *De administrando imperio* treated the Slavic and Turkic peoples, and the *De ceremoniis aulae Byzantinae,* his longest book, described the elaborate ceremonies that made

the Byzantine emperors priestly symbols of the state.

Constantine's surname, Porphyrogenitus (that is, born in the Purple Chamber of the



Constantine VII, manuscript illumination in the Biblioteca Estense, Modena, Italy

By courtesy of the Biblioteca Estense, Modena, Italy; photograph, Roncaglia

Imperial Palace in Constantinople, as befitted legitimate children of reigning emperors), pointedly answers the doubts expressed about the legitimacy of his birth in 905, which slowed down his career and contributed to his shyness. His mother was Zoë Carbonopsina, the mistress of his father, Leo VI, who married her shortly after Constantine was born, against the bitter opposition of the patriarch Nicholas Mysticus. It was Leo's fourth marriage, and the Greek church normally forbade a widower to remarry more than once. As the infant was Leo's only male offspring, he had to be accepted and, in 911, was proclaimed coemperor. But, on the death of his father in 912, the succession fell to his uncle Alexander, whose death the next year cleared the way for seven-year-old Constantine. The patriarch Nicholas, who became regent, found it expedient to appease the powerful tsar Simeon I of Bulgaria—who had severely defeated the Byzantine armies and coveted the Byzantine imperial crown—by promising that the child emperor would marry Simeon's daughter. A palace revolt foiled the scheme, which looked like a betrayal of Byzantium to the Bulgarians. It was only after several years that a combination of diplomacy and successful defense of Constantinople succeeded in inducing Simeon to settle for recognition as emperor of the Bulgarians only. The strategist of this success, Admiral Romanus Lecapenus, rewarded himself by having Constantine marry his daughter (919) and crown him coemperor (920). Gradually Constantine lost most of his power to Lecapenus and to his sons.

It is not surprising that the young emperor slipped into a pattern of noninvolvement in government. His mother had been relegated to a convent. His father-in-law relieved him of the burdensome tasks of politics and war and shouldered them masterfully but treated him with deference and left him a full share of the prestige and income belonging to the crown. From his father, Constantine had apparently inherited a passion for learning and writing; he worked full-time at it until he was almost 40, when he became sole emperor. Nor did he change tastes thereafter. *De thematibus,* probably his earliest book, is mainly a compilation of older sources on the origins and development of the provinces of the empire. An apologetic biography of his grandfather Basil I, which he appended to an anonymous chronicle known as *Theophanes Continuatus,* stressed the glory of the founder of his dynasty. *De administrando imperio,* a handbook of foreign politics, is perhaps his most valuable work, a storehouse of information on Slavic and Turkic peoples about whom little else is known except through archaeology.

Yet, the longest book and the one that tells the most about the Byzantine mentality (and most particularly the mind of the writer) is *De ceremoniis aulae Byzantinae,* basically a minute description of the elaborate ceremonial and processions that made the emperor a hieratic symbol of the state and strove to impress foreigners with his grandeur. There is no doubt that it helped Byzantium in its relations with the northern "barbarians" and even with western Europe. A monument to Byzantine patriotism, the book bears traces of the spoken vernacular that crept into the stilted Greek of more academic writers. The more voluminous, encyclopaedic works compiled under Constantine's directions are not worth describing, but he exhibited notable zeal in recruiting teachers and students for the "university" of Constantinople, inviting them to court and preferring them for public offices. He signed legislation and is said to have dabbled in various fine and mechanical arts.

Late in 944 the sons of Romanus Lecapenus, impatient to succeed to power, had their father deported; but the populace of the capital, fearing only that the Porphyrogenitus emperor might be included in the purge accompanying the seizure of power, rioted until Constantine appeared at a window of the palace. This show of loyalty emboldened him to banish Romanus' sons in January 945; he then ruled alone until his death in 959. He appointed to the highest army commands four members of the Phocas family, which had been in disgrace under Romanus Lecapenus, but took no further reprisals, except for an incidental remark, in *De ceremoniis,* that Romanus Lecapenus was neither an aristocrat nor a cultured man. That he did not depart from the admiral's basic policy—at home, maintaining a delicate balance among civil and military officers, landed aristocrats, and peasant soldiers; abroad, friendship with the Rus, peace with the Bulgarians, a limited commitment in Italy, and a resolute offensive against the Muslims—may be ascribed to statesmanship as well as to timidity. The policy continued to be effective. (R.S.L.)

BIBLIOGRAPHY. Arnold Toynbee, *Constantine Porphyrogenitus and His World* (1973), provides biographical information on the emperor, examines his writings, and surveys at length the history of Byzantium from the 6th to the 10th century.

• **Constantine VIII** (b. *c.* 960—d. Nov. 11, 1028), Byzantine emperor, coemperor with his brother Basil II from 976 to 1025 and sole ruler from 1025 to 1028. He was a pleasure-loving man who allowed the administration to fall into the hands of others. He had no male heir, and on his deathbed he arranged that his second daughter, Zoe, should succeed him and marry the eparch of Constantinople, Romanus III Argyrus.

• **Constantine IX** MONOMACHUS (b. *c.* 980—d. Jan. 11, 1055), Byzantine emperor from 1042 to 1055.

Constantine owed his elevation to Zoe, the empress of the Macedonian dynasty, who took him as her third husband. Constantine belonged to the civil party, the opponents of the military magnates, and he neglected the defenses of the empire and reduced the army. He spent extravagant sums on luxuries and magnificent buildings and seriously debased the coinage. Rebellions broke out at home and abroad; the Normans were overrunning the Byzantine possessions in south Italy; the Pechenegs (Patzinaks) crossed the Danube River and attacked Thrace and Macedonia; and the Seljuq Turks made their appearance on the Armenian frontier, which was directly exposed to attack, as the Armenian kingdom of Ani lapsed to Constantinople during this reign.

Constantine attempted to ally with the papacy against the Normans, but relations between the churches of Rome and Constantinople deteriorated. In 1054 the visit of the papal legates resulted in schism. Though he was not outstanding for his statesmanship, it was under his auspices that the University of Constantinople was reorganized, with an efflorescence of learning and letters.

• **Constantine X** DUCAS (d. May 1067), Byzantine emperor from 1059 to 1067, successor to Isaac I Comnenus.

Constantine's accession was a triumph for the civil aristocracy and was unfortunate in that he proved an incapable emperor. He reduced the army and neglected the frontier defenses at a time when the Seljuq Turks were pressing into the eastern provinces; and the sultan Alp Arslan overran Armenia (1064–65) and attacked Caesarea (1067). In 1064 the Hungarians occupied Belgrade, and the Pechenegs (Patzinaks) and Uzes (Kumans) crossed the Danube River and ravaged the Balkan provinces, penetrating into Greece. In Italy the Normans were rapidly conquering the last remnants of the Byzantine possessions.

• **Constantine (XI)** LASCARIS (d. 1205?), titular Byzantine emperor, 1204–05. While the Latin crusaders were besieging Constantinople in April 1204, the emperor Alexius V slipped away into exile, and Constantine, one of the city's leading defenders, was proclaimed emperor in the Cathedral of St. Sophia. Quickly, however, the city fell, and Constantine and other refugees fled to Nicaea, where they set up a rival empire. After his death he was succeeded by his brother, Theodore I Lascaris.

• **Constantine XI (or XII)** PALAEOLOGUS (b. Feb. 9, 1404, Constantinople [now Istanbul, Tur.]—d. May 29, 1453, Constantinople), the last Byzantine emperor (1449–53), killed in the final defense of Constantinople against the Ottoman Turks.

Constantine was the fourth son of the emperor Manuel II and his Serbian wife, Helen, of the dynasty of Dragas in Macedonia. He spent his early career with his brothers Theodore and Thomas governing the Byzantine despotate of the Morea (Peloponnese) and completing its recovery from the Franks.

When his brother John VIII Palaeologus died childless in 1448, he was proclaimed emperor at Mistra (January 1449). He was a man of courage and energy, but he succeeded to a *damnosa hereditas* ("ruinous inheritance"). Mohammed II, who became Ottoman sultan in 1451, directed all his resources to the capture of Constantinople. Constantine did everything within his power to organize the defense of the city and to enlist the support of the West by acknowledging the obedience of the Greek church to Rome, but in vain. He was killed fighting at the city walls when the Turks finally broke through.

GREECE

• **Constantine I** (b. Aug. 2, 1868, Athens, Greece—d. Jan. 11, 1923, Palermo, Italy), king of Greece from 1913 to 1917 and from 1920 to 1922. His neutralist, but essentially pro-German, attitude during World War I caused the Western Allies and his Greek opponents to depose him in 1917, and, having lent himself to Greece's disastrous Anatolian policy after his restoration, he again lost his throne in 1922.

The eldest son of King George I of the Hellenes, Constantine received his higher education in Germany. Although the troops under his command were defeated in the Greco-

Turkish War of 1897, and he, as commander in chief of the army (after 1900), failed to unite Crete with Greece in 1909. Constantine restored his reputation during the Balkan Wars of 1912–13 and succeeded his father to the throne on March 6, 1913. The brother-in-law of the German emperor William II, he was determined to keep Greece neutral after the outbreak of World War I, whereas Prime Minister Eleuthérios Venizélos backed the Allied cause. The Allied occupation of Salonika (October 1915), Venizélos' formation of a separate pro-Allied government (October 1916), and an Allied demand for his abdication finally forced Constantine to turn power over to his second son, Alexander, on June 12, 1917, without, however, renouncing his titular right. On Alexander's death and Venizélos' fall from power (1920), Constantine was recalled from exile by a plebiscite. He had to pursue Venizélos' anti-Turkish policies, which led to catastrophic war in Anatolia in 1922. A military revolt cost him his throne for the second time, and he abdicated on Sept. 27, 1922, in favour of his eldest son, who became King George II.

• **Constantine II** (b. June 2, 1940, Psikhikó, near Athens), king of Greece from 1964 to 1974.

After spending World War II in exile in South Africa, Constantine returned to Greece in 1946. When his father became King Paul I in 1947, Constantine became crown prince and succeeded to the throne upon his father's death on March 6, 1964. Fearing leftist infiltration of the army, he dismissed Premier Georgios Papandreou in July 1965 and appointed interim premiers until April 21, 1967, when a military coup forestalled the election he was planning for May of that year. Attempting a counter-coup from northern Greece on Dec. 13, 1967, he had few sympathizers and almost immediately fled to Rome with his family. The military regime retained control of the monarchy and appointed a regent in Constantine's place, granting the king a free return if he so desired.

On June 1, 1973, the military regime ruling Greece proclaimed a republic and abolished the Greek monarchy. A referendum on July 29, 1973, confirmed these actions. After the election of a civilian government in November 1974, another referendum on the monarchy was conducted on December 8. The monarchy was rejected, and Constantine, who had protested the vote of 1973, accepted the result.

Papacy

• **Constantine** (b. Syria—d. April 9, 715, Rome), pope from 708 to 715.

Constantine upheld Roman supremacy against the insubordination of Felix, archbishop of Ravenna. He received as a pilgrim King Cenred of Mercia, who became a monk at Rome (709). Constantine strongly objected to the canons, several of which opposed Roman customs, established by the largely eastern Trullan (or Quinisext) Council assembled under the Byzantine emperor Justinian II in 691. He was flatteringly received by Justinian, who summoned him to Constantinople in 710, probably to obtain his ratification of the Trullan Council.

After the emperor's murder (711), Constantine condemned Justinian's usurper and successor, Philippicus Bardanes, for being a Monothelite (*i.e.,* follower of the heresy maintaining that Christ had only one will). But Constantine was saved from further trouble when the Byzantine emperor Anastasius II deposed Philippicus and restored orthodoxy in 713.

• **Constantine (II)** (b. Nepi?, Italy, fl. 8th century—d. Rome?), antipope from 767 to 768.

He was a soldier and—through the support of his brother Toto, duke of the bishopric of Nepi near Rome—was elected pope on July 5, 767, to succeed St. Paul I. Constantine's opponents, led by Christopher, the powerful chief of the notaries, fled to the Lombards. Constantine, failing to win support from the Carolingian king Pepin III the Short or from the Franks, was deposed the next year by a Lombard army. His deposition was canonically ratified by a council of Italian and Frankish bishops. After 769 no more was heard of him. His brief reign revealed how the Holy See was then coveted by temporal rulers.

Roman Empire

• **Constantine I,** byname CONSTANTINE THE GREAT, Latin in full FLAVIUS VALERIUS CONSTANTINUS (b. Feb. 27, after AD 280?, Naissus, Moesia [now Niš, Yugos.]—d. May 22, 337, Ancyrona, near Nicomedia, Bithynia [now İzmit, Tur.]), the first Roman emperor attested to have become a Christian.

A brief account of the life and works of Constantine I follows. For a full biography, *see* MACROPAEDIA: Constantine the Great.

Constantine's youth was spent at the court of Diocletian. He became first Western emperor (AD 312) after a complex series of civil wars, and then sole emperor (324). Throughout his life Constantine ascribed his success to his conversion to Christianity. He was personally committed to Christianity by 313, when he issued the Edict of Milan extending toleration to Christians. He addressed the Council of Nicaea (325), which met to resolve a theological dispute. He rebuilt and enlarged Constantinople (formerly Byzantium), making it his permanent capital, probably as a memorial to his final military victories, and that city continued in this capacity for more than a millennium. His conversion influenced the relations of church and state for centuries to come. Believing that he was God's chosen servant, he regarded himself as responsible to God for the good government of his church. Formerly a minority sect, Christianity became the official religion of the empire and was stimulated by the imperial patronage of Constantine and his sons. The church so grew in wealth and numbers that its position could not be shaken by the apostate emperor Julian. Constantine is revered as a saint in the Orthodox church.

• **Constantine II** (b. February 317, Arelate, Viennensis [now Arles, Fr.]—d. 340), Roman emperor from 337 to 340.

The second son of Constantine the Great (ruled 306–337), he was given the title of caesar by his father on March 1, 317. When Constantine the Great died in 337, Constantine II and his brothers, Constans and Constantius II, each adopted the title augustus and divided the empire among themselves. Constantine II became ruler of Britain, Gaul, and Spain. He soon claimed Italy and Africa from Constans and, early in 340, unexpectedly invaded Italy. Penetrating to Aquileia, Constantine was met by the vanguard of the army of Constans and was killed in the ensuing battle.

• **Constantine,** Latin in full FLAVIUS CLAUDIUS CONSTANTINUS (d. September 411, Arelate, Viennensis [now Arles, Fr.]), usurping Roman emperor who was recognized as coruler by the Western emperor Flavius Honorius in 409.

Proclaimed emperor by his army in Britain in 407, Constantine crossed to the European continent with a force of British troops; by the end of the year he controlled eastern Gaul. An army dispatched by Honorius laid siege to him in Valentia (modern Valence, Fr.) but soon withdrew. Constantine then established himself at Arelate. Joined by Roman legions from Spain, he appointed his son Constans as caesar (junior emperor) and sent him to suppress a revolt led by relatives of Honorius. After the fall (408) of Honorius' general Stilicho, the effective ruler of the Western empire, Constantine threatened to invade Italy. Honorius was forced to recognize him as joint emperor in 409. Two years later Constantine entered Italy, but he was driven back to Arelate and besieged by Honorius' generals. He surrendered and was executed.

• **Constantine III–XI:** *see* Constantine III–XI (Byzantine Empire).

Scotland

• **Constantine I** (d. 877, Inverdovat, Scot.), king of Scotland or Alba, the united kingdom of the Picts and Scots (862–877), who succeeded his uncle Donald I.

Constantine's reign was occupied with conflicts with the Norsemen. Olaf the White, the Danish king of Dublin, laid waste the country of the Picts and Britons year after year; in the south the Danish leader Halfdan devastated Northumberland and Galloway. Constantine was slain at a battle at Inverdovat in Fife, at the hands of another band of northern marauders. His heir was his brother Aed, who was killed by the Scots after a year and was succeeded by a nephew, Eochaid.

• **Constantine II** (d. 952), one of the greatest of early Scottish kings, his long reign (900–943) being proof of his power during a period of dynastic conflicts and foreign invasions.

During the first part of his reign the kingdom was still beset by the Norsemen. In his third year they wasted Dunkeld and all of Alba. They were repulsed, however, in Strathearn the following year. In his eighth year Rognwald, the Danish king of Dublin, with earls Ottir and Oswle Crakaban, ravaged Dunblane. Six years later the same leaders were defeated on the Tyne by Constantine in a battle whose site and incidents are told in conflicting stories; it appears certain, however, that Constantine saved his dominions from further serious attacks by the Vikings.

In spite of his wars, Constantine found time in the early part of his reign for two important reforms, one ecclesiastical and the other civil. In his sixth year (906) he established the Scottish church, which the Pictish kings had earlier suppressed. Two years later, on the death of Donald, king of the Britons of Strathclyde, Constantine procured the election of his own brother Donald to that kingdom.

He had now to meet a more formidable foe, the West Saxons, whose kings were steadily moving northward. In league with other northern kings, Constantine was decisively defeated at the Battle of Brunanburh (937) by King Athelstan. The slaughter was devastating. A son of Constantine was slain, as were four kings and seven earls. Constantine himself escaped to Scotland, where in old age he resigned the crown for the tonsure and became abbot of the Culdees of St. Andrews. He was succeeded by a cousin, Malcolm I.

• **Constantine III** (d. 907), king of the Scots (995–997), who succeeded to the crown after the murder of his cousin, Kenneth II, son of Malcolm I. After a brief reign of two years he was himself killed, perhaps by an illegitimate son (named Kenneth) of Malcolm I or by his successor, Kenneth III.

Constantine, also called (after 1981) QACENTINA, Arabic BLAD EL-HAWA, Phoenician CIRTA, city, northeast Algeria. A natural fortress, the city occupies a rocky, diamond-shaped plateau that is surrounded, except at the southwest, by a precipitous gorge through the eastern side of which flows the Rhumel River. The plateau is 2,130 feet (650 m) above sea level and from 500 to 1,000 feet (150 to 300 m) above the riverbed in the gorge. The

cliffs of the gorge, at its narrowest, are 15 feet (4.5 m) apart and at its greatest width are about 1,200 feet (365 m) apart. The gorge is crossed at the northeast angle of the city by the el-Kantara Bridge, a modern 420-foot (130-metre) structure built on the site of earlier bridges. North and south of the city are, respectively, a suspension bridge and a viaduct.



El-Kantara Bridge across the gorge at Constantine, Alg.
H.K. Bruske—Artstreet

Caves in the walls of the Rhumel Gorge give evidence of prehistoric settlement. By the 3rd century BC, as Cirta, or Kirtha (from the Phoenician word for "city"), the ancient Constantine was one of the most important towns of Numidia and the residence of the kings of the Massyli. Under Micipsa (2nd century BC) it reached the height of its prosperity and was able to furnish an army of 10,000 cavalry and 20,000 infantry. Cirta received a Roman settlement during Julius Caesar's reign and later served as head of a confederation of four Roman colonies on the North African coast. In the war of the Roman emperor Maxentius against Alexander, the Numidian usurper, the city was razed, and on its restoration in AD 313, it was renamed for its patron, Constantine the Great. It remained uncaptured during the Vandal invasion of Africa but fell to the Arabs (7th century).

During the 12th century it stayed prosperous despite periodic looting, and its commerce was extensive enough to attract merchants from Pisa, Genoa, and Venice. Although it was frequently taken and then lost by the Turks, it became the seat of a bey who was subordinate to the dey of Algiers. Salah Bey, who ruled Constantine from 1770 to 1792, greatly embellished the city and was responsible for the construction of most of its existing Muslim buildings. Since his death in 1792, the women of the locality wear a black haik (a tentlike garment) in mourning, instead of the white haik regularly worn in the rest of Algeria. In 1826 Constantine asserted its independence of the dey of Algiers. In 1836 the French made an unsuccessful attempt to storm the city and suffered heavy losses, but the following year they were able to take it with another assault. In World War II, during the 1942–43 Allied campaign in North Africa, Constantine and the nearby city of Sétif were important command bases.

Constantine is walled, the existing walled medieval fortifications having been largely constructed of Roman masonry material. The rue Didouche Moutad, which follows the downward slope of the plateau (northeast–southwest), divides the city into two parts. To the west are the Casbah (the old citadel) with sections dating from Roman times, the Souk el-Ghezel mosque (converted for a time into the Notre-Dame des Sept-Douleurs Cathedral by the French), the Moorish-style palace of Ahmad Bey (1830–35; now in military use), and administrative and commercial buildings. The straight streets and wide squares of the western sector reflect French influence. The east and southeast sector provides a striking contrast, with its tortuous lanes and Islāmic architecture, including the 18th-century mosques of Salah Bey and Sidi Lakhdar. In this sector each trade has its special quarter, with entire streets devoted to one craft. The University of Constantine was founded in 1969; other institutions include the Museum of Cirta and the Municipal Library.

Suburbs have developed to the southwest of the city on the "isthmus" leading to the surrounding countryside. Newer developments are to the east across the Rhumel Gorge. The city also has an international airport.

Apart from a factory making tractors and diesel engines, industry is chiefly confined to leather goods and woolen fabrics. A considerable trade in agricultural products, especially in grain, is carried out with the Hauts (high) Plateaux and the arid south. Pop. (1987 prelim.) mun., 449,602.

Constantine, VELIKY KNYAZ ("Grand Prince," or "Duke"). Russian in full KONSTANTIN PAVLOVICH (b. May 8 [April 27, Old Style], 1779, Tsarskoe Selo, Russia—d. June 27 [June 15], 1831, Vitebsk), son of the Russian emperor Paul I (reigned 1796–1801), younger brother of Alexander I (reigned 1801–25) and elder brother of Nicholas I (reigned 1825–55); he was the virtual ruler of the Congress Kingdom of Poland (1815–30).

Educated by a Swiss tutor under the supervision of his grandmother, the empress Catherine II the Great (reigned 1762–96), Constantine participated in General A.V. Suvorov's campaign in Italy against Napoleon Bonaparte (1799). He was present at the Russo-Austrian defeat at Austerlitz (Dec. 2, 1805),



Constantine, engraving, after a painting by H. Benner
Novosti Press Agency

which forced the Austrians to conclude a separate peace with France, and took part in the Russian campaigns of 1807, 1812, 1813, and 1814 against Napoleon.

After the Congress of Vienna (1815) set up the constitutional Kingdom of Poland with the emperor of Russia as its king, Alexander appointed Constantine commander in chief of Poland's armed forces with the powers of viceroy (November 1815). Although Constantine organized the Polish army, he failed to win its support, and he also alienated the Parliament and the general populace with his harsh rule. He nevertheless sympathized with the Poles' desire for autonomy. After his morganatic marriage to a Polish countess, Joanna Grudzińska, May 24 (May 12, Old Style), 1820, he renounced all of his claims to the Russian throne (January 1822).

When Alexander I died (Dec. 1 [Nov. 19], 1825), however, there was confusion over his successor. On the day that the guards were to swear allegiance to Constantine's younger brother Nicholas (Dec. 26 [Dec. 14], 1825), a group of revolutionaries, including many officers (later known as the Dekabrists, or Decembrists), convinced the soldiers to call for "Constantine and Constitution" in an attempt to start a rebellion.

Though Constantine had played no part in the rising, which was swiftly suppressed, differences soon arose between him and Nicholas because Constantine insisted that the Polish army and bureaucracy were loyal to the Russian Empire despite the large role Poles had played in the Decembrist conspiracy. Later, the two brothers also disagreed over Nicholas' foreign policy; because of Constantine's opposition, the Polish army did not participate in the Russo-Turkish War of 1828–29.

Constantine was convinced that the Polish army was loyal, and so he was taken completely by surprise when a Polish insurrection broke out in Warsaw in November 1830. Because of his utter failure to grasp the situation, the Polish army passed over to the side of the rebels, and as the revolution wore on, Constantine showed himself as incompetent as he was lacking in judgment. He did not live to see the uprising suppressed, for he died of cholera in June 1831.

Constantine THE AFRICAN, Latin CONSTANTINUS AFRICANUS (b. *c.* 1020, Carthage or Sicily—d. 1087, monastery of Monte Cassino, near Cassino, Principality of Benevento [now in Italy]), medieval medical scholar who initiated the translation of Arabic medical works into Latin, a development that profoundly influenced Western thought.

Constantine possessed an excellent knowledge of Greek, Latin, Arabic, and several Oriental languages acquired during his extensive travels in Syria, India, Ethiopia, Egypt, and Persia. He studied at the University of Salerno, Europe's first organized medical school, and entered Monte Cassino, the monastery founded by St. Benedict in 529. At the monastery he translated 37 books from Arabic into Latin, including two treatises by Isaac Israeli, or Isaac the Jew, the Western caliphate's greatest physician. Constantine's most important accomplishment was his introduction to the West of Islām's extensive knowledge of Greek medicine, represented principally by his *Pantechne* ("The Total Art"), which was an abbreviated version of the *Kitāb al-malikī* ("The Royal Book") by the 10th-century Persian physician 'Alī ibn al-'Abbās, or Haly Abbas. Constantine also translated Arabic editions of works by the Greek physicians Hippocrates and Galen. These translations were the first works that gave the West a view of Greek medicine as a whole.

Constantine's translations spread through Europe with extraordinary rapidity, and they had an immense influence on the ages that followed. Although more accurate, polished translations were available soon after Constantine died, his work was studied by European scholars until the 16th century.

Constantine THE GREAT: *see* Constantine I *under* Constantine (Roman Empire).

Constantine, Arch of (AD 312), one of three surviving ancient Roman triumphal arches in Rome. Erected hastily to celebrate Constantine's victory over Maxentius, it incorporates sculptures from many earlier buildings, including part of a battle frieze and figures of prisoners from the Forum of Trajan, a series of Hadrianic roundels, and a set of eight Aurelian panels.

Constantine, Donation of, Latin DONATIO CONSTANTINI, a document that discusses the supposed grant by the emperor Constantine the Great to Pope Sylvester I (314–335) and his successors of spiritual supremacy over the other great patriarchates and over all matters of faith and worship, as well as of temporal dominion over Rome and the entire Western Empire. It was claimed that the gift was motivated by Constantine's supposed gratitude to Sylvester for miraculously healing his leprosy and converting him to Christianity. Now universally admitted to be a forgery, it was regarded as genuine by both friends and ene-

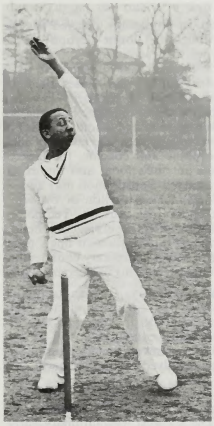
mies of the papal claims to power throughout the European Middle Ages.

It was composed from various sources, especially the apocryphal *Vita S. Silvestri* ("Life of Saint Sylvester"). In the 9th century it was included in the collection known as the False Decretals, and two centuries later it was incorporated in Gratian's *Decretum* by one of his pupils. The earliest certain appeal to it by a pope was made in 1054 by Leo IX in a letter to Michael Cerularius, the patriarch of Constantinople. From that time forward it was increasingly employed by popes and canonists in support of the papal claims, and from the 12th century onward it became a weapon of the spiritual powers against the temporal. Although the validity of the document was sometimes questioned, its genuineness was first critically assailed during the Renaissance. In 1440 Lorenzo Valla proved that it was false and began a controversy that lasted until the end of the 18th century.

Various interpretations of this forgery have been developed by scholars. It is generally agreed that it was written between 750 and 800. Some believe that it was written in Rome, but others believe it was composed in the Frankish empire. The evidence of its Roman origin is mainly internal. Evidence for a Frankish origin is based on the facts that the earliest manuscript (in the Bibliothèque Nationale, Paris) containing it appears to have been written there and that the earliest quotations from it are by Ado of Vienne, Hincmar of Reims, and Aeneas of Paris, all Frankish authors.

Constantine, Learie (Nicholas), Baron Constantine of Maraval and Nelson (b. Sept. 21, 1901, Diego Martin, Trinidad—d. July 1, 1971, London, Eng.), Trinidadian professional cricketer and government official.

Constantine's play at Lord's Cricket Ground, London, in June 1928 first made British audiences aware of the high quality of West Indian



Learie Constantine, 1950
BBC Hulton Picture Library

cricket. In the same year, he became the first West Indian player in England to achieve the double of 1,000 runs and 100 wickets in a single season. He was a powerful hitter and one of the greatest fielders of all time.

A solicitor's clerk as a young man, Constantine was called to the Trinidadian bar in 1955 and the next year was appointed minister of works and transport in Trinidad. From 1962 (when Trinidad and Tobago became an independent nation within the Commonwealth) until 1964, he served in London as his country's high commissioner. In 1966 he became a member of the British national Race Relations Board, and from 1968 he was rector of the University of St. Andrews (Fife) and a governor (director) of the British Broadcasting Corporation. He wrote several books on cricket and one book, *Colour Bar* (1954), on the race problem. Knighted in 1962, he was created a life peer in 1969.

Constantine-Silvanus, also called Constantine of Mananali (d. *c.* 684), probable founder of the Middle Eastern sect of Paulicians, a group of Christian dualists.

Constantine-Silvanus is said to have come from Mananali (Mananalis), near Samosata, Syria. In assuming the additional name of Silvanus, he intended to honour a companion of St. Paul; this duality of names was imitated by subsequent Paulician leaders. Becoming a noted teacher, he founded, during the reign (641–668) of the Byzantine emperor Constans II, a Paulician community at Kibossa, near Colonia, Armenia, and directed it until his death. He died by stoning after his arrest by soldiers sent by the emperor Constantine IV (reigned 668–685) to suppress heresy. The leader of this force, Symeon-Titus, became a convert to Paulicianism and was himself martyred (690).

Insisting that the New Testament (as he interpreted it) should be the only written source of religious guidance, Constantine-Silvanus left no known writings.

Constantinople (Turkey): *see* Istanbul.

Constantinople, Council of (381), the second ecumenical council of the Christian church, summoned by the emperor Theodosius I and meeting in Constantinople. Doctrinally, it promulgated what became known to the church as the Nicene Creed; it also declared finally the Trinitarian doctrine of the equality of the Holy Spirit with the Father and the Son. Among the council's canons was one giving the bishop of Constantinople precedence of honour over all other bishops except the bishop of Rome, "because Constantinople is the New Rome."

Though only eastern bishops had been summoned (about 150 in all), the Greeks claimed this council to be ecumenical. Pope Damasus I in Rome appears to have accepted the creed but not the canons, at least not the canon upon the precedence of Constantinople. (Rome indeed accepted the precedence of Constantinople, next to Rome, only during the life of the Latin Empire of Constantinople, created in the 13th century during the Fourth Crusade.) In both East and West, nevertheless, the council came to be regarded as ecumenical.

Constantinople, Council of (553), the fifth ecumenical council of the Christian church, meeting under the presidency of Eutychius, patriarch of Constantinople. Pope Vigilius of Rome, who had been summoned to Constantinople, opposed the council and took sanctuary in a church from May to December, but he at last yielded and formally ratified the verdicts of the council on Feb. 23, 554.

The 14 anathemas issued by the council rejected Nestorianism by insisting yet further upon the unity of the person of Christ in his two natures, divine and human. The only other important act of the council was to ratify an earlier condemnation of Origen.

The Western church, devoted as it was to the acts of the Council of Chalcedon, could not bring itself to accept the decrees of the council of 553, even though the pope had accepted them. In Africa, imperial troops were able to force acceptance. North Italian bishops refused their allegiance to the see of Rome and found support in France and Spain. The opposition hung on in northern Italy until the end of the 7th century. By then the coming of Islām into the eastern Mediterranean and Africa voided possibilities of compromise.

Constantinople, Council of (680), the sixth ecumenical council of the Christian church, summoned by the emperor Constantine IV and meeting at Constantinople.

Some eastern Christians, forbidden to talk of the concept of one nature of Christ, thought to enforce the unity of the person of Christ by talking of one will (*thelema*) and one operation (*energeia*) from the two natures. Persons holding this view were called Monothelites. Sergius, patriarch of Constantinople, and Honorius I, pope of Rome, appear to have embraced the Monothelite doctrine. The council of 680 condemned the Monothelites, among them Honorius, and asserted two wills and two operations. "Each nature with the communion of the other willed and wrought that which was proper to itself."

Constantinople, Council of (869–870), a council of the Christian church, meeting in Constantinople. The Roman church eventually recognized it as the eighth ecumenical council, but the Eastern church for the most part denied its ecumenicity and continues to recognize only the first seven ecumenical councils.

The council confirmed a Roman sentence of excommunication against Photius, patriarch of Constantinople, bringing to a head the so-called Photian Schism. (Photius was later reinstated in 879–880.) The council's canon (number 22) that prohibited lay interference in episcopal elections assumed great importance in the Western church's Investiture Controversy between church and state in the 11th and early 12th centuries.

Constantinople Agreement (March 18, 1915), secret World War I agreement between Russia, Britain, and France for the postwar partition of the Ottoman Empire. It promised to satisfy Russia's long-standing designs on the Turkish Straits by giving Russia Constantinople (Istanbul), together with a portion of the hinterland on either coast in Thrace and Asia Minor. Constantinople, however, was to be a free port. In return, Russia consented to British and French plans for territories or for spheres of influence in new Muslim states in the Middle Eastern parts of the Ottoman Empire. This first of a series of secret treaties on the "Turkish question" was never carried out because the Dardanelles campaign failed and because, when the British navy finally did reach Istanbul in 1918, Russia had become an enemy of the Allies.

Constantinus (Latin personal name): *see under* Constantine.

Constantinus Africanus: *see* Constantine the African.

Constantinus, Flavius Valerius: *see* Constantine I *under* Constantine (Roman Empire).

Constantius, name of Roman emperors, grouped below chronologically and indicated by the symbol •.

• **Constantius I** Chlorus ("The Pale"), original name Flavius Valerius Constantius (d. summer 306, Eboracum, Britain [now York, North Yorkshire, Eng.]), Roman emperor and father of Constantine I the Great. As a member of a four-man ruling body (tetrarchy) created by the emperor Diocletian, Constantius held the title caesar from 293 to 305 and caesar augustus in 305–306.

Of Illyrian descent, Constantius had a distinguished military career before serving as governor of Dalmatia (in modern Croatia). In 289 he renounced his wife, Helena, mother of Constantine, and married Theodora, the

stepdaughter of the emperor Maximian. Four years later Constantius was adopted by Maximian and made his caesar. The two men, together with Diocletian and his caesar, Galerius, formed the tetrarchy.



Constantius I Chlorus, marble bust; in the Capitoline Museum, Rome
Alinari—Art Resource

Constantius was assigned to rule Gaul and ordered to subdue Marcus Aurelius Carausius, a usurper in Britain. In 293 he captured Carausius' mainland base, Gesoriacum (modern Boulogne, Fr.). Three years later he invaded Britain and defeated and killed Allectus, who had murdered Carausius and succeeded him in power. Constantius then set about restoring frontier defenses. He took strong measures to eliminate Frankish and Saxon piracy, and in 298 he triumphed over the Alemanni in Gaul. His enforcement of Diocletian's edicts (303) against the Christians was deliberately lax; he demolished some churches but did not execute believers. When Diocletian and Maximian abdicated on May 1, 305, Constantius became the senior emperor in the West. He died the following year, and his troops proclaimed Constantine emperor.

• **Constantius II,** original name FLAVIUS JULIUS CONSTANTIUS (b. Aug. 7, 317, Sirmium, Savia [now Sremska Mitrovica, Yugos.]—d. Nov. 3, 361, Mopsucrenae, Honorias [now in Turkey]), Roman emperor from 337 to 361, who at first shared power with his two brothers, Constantine II (d. 340) and Constans I (d. 350), but who was sole ruler from 353 to 361.

The third son of Constantine I the Great and Fausta, Constantius served under his father as caesar from 323 to 337. When Constantine died on May 22, 337, the troops massacred many of his relatives, allegedly at Constantius' instigation. Constantius then divided the empire with his brothers, taking the eastern provinces (Thrace, Macedonia, Greece, Asia, and Egypt) for himself. Between 338 and 350 he was engaged in inconclusive but extremely bloody warfare with the Persian king Shāpūr II.

In 350 Constantius returned to Europe to confront two usurpers. Vetranio, commander of the Danube forces, had taken power in Illyricum (now western Yugoslavia); the rest of Europe was seized by the barbarian officer Magnentius, who in 350 executed Constans, the ruler in the West. At Naissus (modern Niš, Yugos.), Constantius persuaded Vetranio to abdicate, and in 351 he crushed Magnentius at Mursa (modern Osijek, Yugos.). During this struggle Constantius appointed his cousin, Gallus Caesar, administrator of the East. But Caesar proved to be a despotic ruler, and in 354 Constantius recalled him and had him executed. After campaigning against the Sarmatian, Suebi, and Quadi tribes on the Danube in 357–358, Constantius returned east to fight Shāpūr, who had renewed his attacks on the eastern frontier (359). In 361 Constantius was recalled to the West by the revolt of Julian, his caesar in Gaul, but became ill on the way and died.

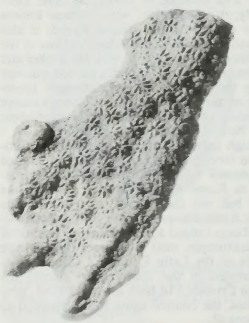
As an advocate of Arian Christianity, Constantius passed laws against paganism and exiled many Roman Catholic bishops. He drove the influential anti-Arian bishop of Alexandria, Athanasius, into hiding in 356.

• **Constantius III** (b. Dalmatia [now in Croatia]—d. Sept. 2, 421, Ravenna [Italy]), Roman emperor in 421.

Constantius came from Naissus (modern Niš, Yugos.) in the province of Moesia. In 411, as *magister militum* ("master of the soldiers") under the western Roman emperor Flavius Honorius (reigned 393–423), Constantius helped to overthrow the usurping emperor Constantine (Flavius Claudius Constantinus) at Arelate (modern Arles, Fr.). He drove the Visigoths from southern Gaul into Spain in 415 but later recalled the tribe and settled it in southwestern Gaul. In 417 he married the emperor's half sister Galla Placidia. Appointed coemperor of the West by Honorius, with the title augustus, on Feb. 8, 421, Constantius died without having been recognized by the eastern emperor, Theodosius II. Constantius' son by Placidia ruled the West as the emperor Valentinian III from 425 to 455.

Constantius, Flavius Claudius: *see* Gallus Caesar.

Constellaria, genus of extinct bryozoans (small colonial animals that produce a skeletal framework of calcium carbonate) especially characteristic of Ordovician marine rocks (505 to 438 million years old). The structure of *Constellaria* is branching and generally flattened front to back with prominent bumps. *Constellaria* sometimes is found in sedimentary rocks or the shells of other animals.



Constellaria florida, collected from the Maysville Formation, Cincinnati, Ohio
By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

constellation, in astronomy, any of certain groupings of stars that were imagined—at least by those who named them—to form conspicuous configurations of objects or creatures in the sky. Constellations are useful in tracking artificial satellites and in assisting astronomers and navigators to locate certain stars.

From the earliest times the star groups known as constellations, the smaller groups (parts of constellations) known as asterisms, and, also, individual stars have received names connoting some meteorological phenomena or symbolizing religious or mythological beliefs. At one time it was held that the constellation names and myths were of Greek origin; this view has now been disproved, and an examination of the Hellenic myths associated with the stars and star groups in the light of the records revealed by the deciphering of Euphratean cuneiforms leads to the conclusion that in many, if not all, cases the Greek myth has a Euphratean parallel. It is thus probable that the Greek constellation system and the cognate legends are primarily of Semitic or even pre-Semitic origin and that they came to the Greeks through the Phoenicians. Thales, the earliest Greek astronomer of any note, was of Phoenician descent, and, according to Callimachus, he taught the Greeks many astronomical observations. But his writings are lost, as is also the case with those of Phocus the Samian and the history of astronomy by Eudemos of Rhodes, the pupil of Aristotle; hence, there is a paucity of present-day knowledge of Thales' astronomical learning.

The earliest Greek work that purported to treat the constellations as constellations, of which there is certain knowledge, is the *Phainomena* of Eudoxus of Cnidus. The original is lost, but a versification by Aratus, a poet at the court of Antigonus II Gonatas, king of Macedonia, is extant, as is a commentary by Hipparchus.

Three hundred years after Hipparchus, the Alexandrian astronomer Ptolemy adopted a very similar scheme in his uranometria, which appears in the seventh and eighth books of his *Almagest,* the catalog being styled the "accepted version." The names and orientation of the 48 constellations therein adopted are, with but few exceptions, identical with those used at the present time.

The majority of the remaining 40 constellations that are now accepted were added by European astronomers in the 17th and 18th centuries. In the 20th century the delineation of precise boundaries for all the 88 constellations was undertaken by a committee of the International Astronomical Union. By 1930 it was possible to assign any star to a constellation.

constipation, in physiology, delayed passage of waste through the lower portion of the large intestine, with sometimes the ultimate discharge of relatively dry, hardened feces from the anus. Among the causes cited for the disorder are lack of regularity in one's eating habits, spasms of the large intestine, an infectious disease such as typhoid, diseases of the central nervous system, the taking of such drugs as morphine and codeine, the lack of sufficient bulk in one's food, and the excessive use of laxatives. Constipation may also be caused by intestinal obstruction or by weakness of the abdominal muscles. Temporary constipation most often occurs in conjunction with a change or interruption in one's usual activities, as in travel, temporary confinement to bed, or a change in eating or sleeping habits.

Constituent Assembly, Russian UCHREDITELNOYE SOBRANIYE, popularly elected body that convened in 1918 in Petrograd (St. Petersburg) to write a constitution and form a government for postrevolutionary Russia. The assembly was dissolved by the Bolshevik government.

The election of the Constituent Assembly was held on Nov. 25, 1917 (November 12, Old Style). The Socialist Revolutionary Party, though only receiving a plurality of the vote (40 percent), won a majority of the seats. The Bolsheviks received a little less than 25 percent of the vote. Other parties won only a small number of delegates.

The Bolsheviks and their allies, the Left Socialist Revolutionaries, argued that this mandate was not valid and that the Soviets (where they were in control) more accurately reflected the public will.

When the Constituent Assembly convened on Jan. 18, 1918 (January 5, Old Style), it rejected the Bolsheviks' demand that it recog-

nize the authority of the Soviet government. The Bolshevik delegates (and the Left Socialist Revolutionaries as well) walked out. The next day, troops loyal to the Soviet government dispersed representatives of the non-Bolshevik parties, and the government officially dissolved the Assembly.

Consult the INDEX *first*

constitution, the body of doctrines and practices that form the fundamental organizing principle of a political state. In some states, such as the United States, the constitution is a specific written document; in others, such as the United Kingdom, it is a collection of documents, statutes, and traditional practices that are generally accepted as governing political matters. States that have written constitutions may also have a body of traditional or customary practices that may or may not be considered to be of constitutional standing. Virtually every state claims to have a constitution, but not every government conducts itself in a consistently constitutional manner.

A brief treatment of constitutions follows. For full treatment, *see* MACROPAEDIA: Constitution and Constitutional Government; Constitutional Law.

The idea of a constitution was first elaborated by Aristotle in his classification of governments as monarchies, tyrannies, aristocracies, oligarchies, democracies, and so on. For Aristotle, the best form of government—the best constitution—was that which combined elements of monarchy, aristocracy, and democracy in such a way that the citizens of every class were enabled to enjoy their respective privileges and encouraged to exercise their respective responsibilities in the interest of the whole.

In the Rome of the Stoic philosophers, government was viewed as organized and conducted under the rule of a universal reason and thus as reflecting a kind of universal constitution. This universalism was taken over by medieval Christian thinkers, who held that God's rule over the universe was the type of the justly constituted earthly state, a monarchy.

The modern idea of a constitution began to emerge after the Reformation, particularly in the works of Thomas Hobbes, John Locke, and Jean-Jacques Rousseau, who developed the notion of the social contract. In the social-contract view, a people agree among themselves to give up a portion of the absolute freedom that characterizes the pre-social "state of nature" in return for the security that an acknowledged sovereign government can provide. It was Locke's work particularly, on the division of rights between those assigned to the government and those retained by individuals and on the division of powers within the government, that influenced the late 18th-century authors of the American Declaration of Independence, the U.S. Constitution, and the French Declaration of the Rights of Man and the Citizen.

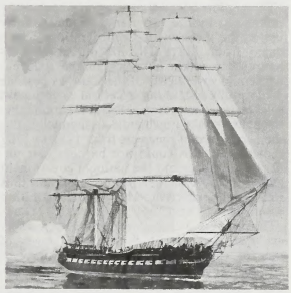
A constitution, to be worthy of the name, must contain provisions for certain political attributes: stability, both of form and of procedure; yet, on the other hand, adaptability to the social, economic, technological, and other changes that are inevitable in the life of a state; accountability of those in power to some other organ of the state, such as an electorate; representation of the governed within the government; openness in the conduct of government; and division of power among distinct branches of government. Constitutional government is thus limited government, and it is a chief function of a constitution to serve as the standard of legitimacy by which governments may be judged.

In its wider sense, the term constitution means the whole scheme whereby a country is governed; and this includes much else besides law. The constitutional lawyer must constantly keep glancing backward into constitutional history; he must also keep his eye on current political practice and the day-to-day working of political institutions. In its narrower sense, "constitution" means the leading legal rules, usually collected into some document that comes to be almost venerated as "The Constitution." But no country's constitution can ever be compressed within the compass of one document, and even where the attempt has been made, it is necessary to consider the extralegal rules, customs, and conventions that grow up around the formal document.

Written constitutions. In most Western countries the constitution, using the term in the narrower sense, is a scheme of government that has been deliberately adopted by the people; examples are the Constitution of the United States, drawn up in 1787 and ratified in 1789 and still in essentials unchanged; the constitution of the Weimar Republic or that of the Federal Republic of Germany, brought into force in 1949; and the constitutions that France has had since the Revolution. The constitution in these countries is the basis of public law; it is usually enacted or adopted with special formalities; special processes are devised for its amendment (and sometimes safeguards are inserted to ensure that certain provisions are unalterable); and constitutional law comes to enjoy a special preeminence. In this type of constitution the courts often have a special function—if some act of the legislature exceeds the powers conferred by the constitution, the courts must declare it to be unconstitutional and so null and void. For this reason, appointments to the bench are sometimes matters of more than purely legal interest. Pres. Franklin D. Roosevelt inherited a Supreme Court that was not sympathetic to his views; his subsequent proposal to enlarge the Court (with nominees who favoured the New Deal) drew widespread complaints of packing the bench. (It should be noted, however, that the constitutional review of legislation by the U.S. Supreme Court is a prime example of a traditional practice that, while it is of constitutional standing, is not mentioned in the written constitution of the state.) Since World War II the decisions of the constitutional court in the Federal Republic of Germany have been issues of major political importance.

The English constitution. In England there is no one document or fundamental body of law that can be described as a "constitution" in the sense that has been discussed above. The absence of any such document or of any distinction between public and private law has led to the suggestion (perhaps first made by Alexis de Tocqueville) that there is in England no constitution. Certainly the English constitution has no existence apart from the ordinary law; it is indeed part of that very law. Magna Carta, the Petition of Right act, the Habeas Corpus Act, the Bill of Rights, and the Act of Settlement are the leading enactments; but they are in no sense a constitutional code; and, without a host of judicial decisions, scores of other statutes of much less importance, and a mass of custom and convention, these statutes would be unworkable. The sources of English constitutional law are diffuse—statutes, judicial precedent, textbooks, lawbooks, the writings of historians and political theorists, the biographies and autobiographies of statesmen, the columns of every serious newspaper, the volumes of *Hansard,* the minutiae of every type of government record and publication. This is what is meant by saying the English constitution is "unwritten": it is not formally enacted; its rules have to be sought out in a dozen fields, not in any one code. Similarly, it is flexible, and here the contrast is with a rigid constitution. There are no special safeguards for constitutional rules; constitutional law can be changed, amended, or abolished just like any rule of private law; there is no field in which Parliament is forbidden to legislate; there are no fundamental or unalterable ideologies and no procedures to prescribe delay or extra processes for constitutional change. Thus an act passed through all its stages in both houses and received the royal assent all in one day (May 22, 1940); it is true that the nation was gravely menaced at the time, but the measure, the Emergency Powers (Defense) Act, 1940, required persons to place "themselves, their services and their property at the disposal of His Majesty." Earlier, in December 1936, the Abdication Act had the same rapid passage into law; it is doubtful if the institutions of any written constitution would permit of such far-reaching changes with so little formality and fuss. Moreover, since Parliament is fully sovereign, it is not open to the courts to declare that an act of Parliament is unconstitutional or void; all the courts can do is to interpret acts and enforce them (though it must be added that the process of interpretation can produce results contrary to the purpose of the act). In *Lee* v. *Bude and Torrington Junction Railway Co.* (1871), a great judge said: "I would observe, as to these Acts of Parliaments, that they are the law of the land, and we do not sit here as a court of appeal from Parliament."

Constitution, byname "OLD IRONSIDES," warship renowned in American history. One of the first frigates built for the U.S. Navy, it was launched in Boston in 1797. Its overall



USS "Constitution" escaping from the British fleet off the coast of New Jersey, July 18, 1812; detail of a painting by F.C. Muller

By courtesy of the U.S. Navy

length was 204 feet (62 metres), displacement 2,200 tons, and gun range 1,200 yards (1,100 metres). The bolts fastening its timbers and copper sheathing on the bottom were made by Paul Revere. Rated as a 44-gun frigate, it ordinarily carried more than 50 guns and a crew of more than 450. Original cost of the vessel exceeded $300,000, including guns and equipment.

In the successful war against the Tripoli pirates (1801–05), the "Constitution" was Commo. Edward Preble's flagship, and the treaty of peace was signed aboard it. During the War of 1812 it achieved an enduring place in American naval tradition. On Aug. 19, 1812, commanded by Capt. Isaac Hull, it won a brilliant victory over the British frigate "Guerrière." Tradition has it that during this encounter the American sailors, on seeing British shot failing to penetrate the oak sides of their ship, dubbed it "Old Ironsides." Several other victories added to its fame.

When in 1828 it was condemned as unsea-

worthy and recommended for breaking up, Oliver Wendell Holmes's poem "Old Ironsides" aroused public sentiment, and the ship was preserved. After a restoration (1927–31), it called at 90 U.S. ports on both coasts and was visited by more than 4,500,000 people. It is permanently berthed in Boston and is open to the public, and it remains on the list of commissioned vessels of the U.S. Navy.

Constitution Act 1982 (Canadian history): *see* Canada Act.

Constitution of the United States of America, the fundamental law of the U.S. federal system of government and a landmark document of the Western world. It is the oldest written national constitution in operation. The Constitution defines the principal organs of government and their jurisdictions and the basic rights of citizens.

The Constitution was written during the summer of 1787 at a convention of 55 delegates who met in Philadelphia, ostensibly to amend the Articles of Confederation, the country's first written constitution. The new Constitution was submitted for ratification to the 13 states on Sept. 28, 1787, and after the ninth state had ratified it in June 1788, Congress set March 4, 1789, as the date for the new government to commence proceedings (the first elections under the Constitution were held late in 1788). Because ratification in many states hinged on the promised addition of a Bill of Rights, Congress proposed 12 amendments in September 1789; 10 were ratified by the states, and their adoption was certified on Dec. 15, 1791.

The authors of the Constitution were heavily influenced by the experience of the country under the Articles of Confederation, which dated from 1781. This document had attempted to retain as much of the independence and sovereignty of the states as possible while also establishing a central government to carry out important national functions that the states could not handle individually. But the experience of the years from 1781 to 1787 showed that this could not be done, for under this arrangement the national government lacked many essential powers and was thus weak and ineffective. The new Constitution would remedy this.

The framers of the Constitution were especially concerned with limiting the power of the government and securing the liberty of citizens. The separation of the legislative, executive, and judicial branches of government, the checks and balances of each against the others, and the explicit guarantees of individual liberty were all designed to strike a balance between authority and liberty—the central purpose of U.S. constitutional law.

The Constitution organizes concisely the basic U.S. political institutions. The main text comprises seven articles. Article I vests all legislative powers in the Congress—the House of Representatives and the Senate. Among those powers are the right to levy taxes, borrow money, regulate interstate commerce, provide for military forces, declare war, and determine member seating and rules of procedure. The House initiates impeachment proceedings, and the Senate adjudicates them.

Article II vests executive power in the president. The president's formal responsibilities include those of chief executive, commander in chief of the armed forces, and treaty maker (two-thirds of the Senate must concur). The powers of appointment of the president are vast but are subject to the "advice and consent" (majority approval) of the Senate (Article II, section 2). The informal responsibilities of the president have grown to embrace political leadership, including proposing legislation to Congress.

Article III places judicial power in the hands of the courts. The Constitution is interpreted by the courts, and the Supreme Court of the United States is the final court of appeal from the state and lower federal courts. The power of U.S. courts to rule on the constitutionality of laws is known as judicial review. Few courts in the world have that extraordinary power, which is not explicitly mentioned in the Constitution. The definitive assertion of judicial review was made by Chief Justice John Marshall in *Marbury* v. *Madison* (1803; *q.v.*).

Beyond the body of judicial rulings interpreting it, the Constitution acquires meaning in a broader sense at the hands of all who use it. Congress on innumerable occasions has given new scope to the document through statutes, such as those creating executive departments, the federal courts, territories, and states, or controlling succession to the presidency, or setting up the executive budget system. The chief executive has also contributed to constitutional interpretation, as in the development of the executive agreement as an instrument of foreign policy. Practices outside the letter of the Constitution based on custom and usage are often recognized as elements on the constitutional level. An example is the system of political parties, presidential nomination procedures, and election campaigns in the United States. The presidential cabinet is largely a constitutional "convention" based on custom, and the actual operation of the electoral college system is also such a convention.

Article IV deals, in part, with relations among the states and privileges of the citizens of the states, Article V with amendment procedure, discussed hereafter, and Article VI with public debts and the supremacy of the Constitution. Article VII gives ratification terms.

Under the Constitution, the national government has only those constitutional powers that are delegated to it; the states, unless otherwise restricted, possess all the remaining powers of government (Tenth Amendment). Thus, national powers are enumerated, state powers are not. The state powers are often called residual powers.

Although the national government is limited to its enumerated powers, Article VI cites the Constitution as "the supreme Law of the Land; . . . any Thing in the Constitution or Laws of any State to the Contrary notwithstanding." The "elastic" clause of the Constitution (Article I, section 8) states that Congress shall have the authority "To make all Laws which shall be necessary and proper for carrying into Execution" the various powers vested in the national government by the Constitution. It follows that, in addition to the specified powers, Congress possesses implied powers, a proposition definitively established by Chief Justice Marshall in *McCulloch* v. *Maryland* (1819; *q.v.*).

Early in U.S. history, competing concepts of federal supremacy and states' rights were brought into sharp focus in questions about commercial regulation The commerce clause (Article I, section 8) simply authorizes Congress "To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes." From *Gibbons* v. *Ogden* (1824) on, the Supreme Court has broadly interpreted Congress' regulatory power under the commerce clause as new methods of interstate transportation and communication have come into use. States may not regulate any aspect of interstate commerce that Congress has preempted.

The federal government is obliged by many constitutional provisions to respect an individual citizen's basic rights. Some civil rights were specified in the original document, notably in the provisions guaranteeing the writ of habeas corpus and forbidding bills of attainder and ex post facto laws (Article I, section 9). It also guaranteed trial by jury in criminal cases (Article III, section 2). But the most significant limitations to government's power over the individual were added in 1791 in the Bill of Rights. The First Amendment guarantees the rights of conscience, such as freedom of religion, speech, and the press, and the right of peaceful assembly and petition. Other guarantees in the Bill of Rights include fair procedure for persons accused of crime, such as protection against unreasonable search and seizure and against compulsory self-incrimination and excessive bail, a speedy and public trial by a local, impartial jury before an impartial judge, and representation by counsel. Rights of private property are also guaranteed.

For protection of such rights against state action, the citizen originally had to look to each state constitution. An important new federal limitation on the states was added to the Constitution of the United States with the ratification, in 1868, of the Fourteenth Amendment. It forbids any state to deny to any person "life, liberty, or property, without due process of law" or to "deny to any person within its jurisdiction the equal protection of its laws." Interpretation by the Supreme Court gave these two clauses increased meaning.

The due process clause of the Fourteenth Amendment has been held to include the liberties of religion, speech, and press that the First Amendment protects against violation by the federal government. Similarly, certain guarantees of a fair trial, such as the defendant's right to an impartial judge and the assistance of counsel, have also been judicially absorbed into the Fourteenth Amendment.

The other great limitation on the states in the Fourteenth Amendment—that no state shall deny the equal protection of its laws—has a long and important history in U.S. constitutional law. The Supreme Court applied the equal protection clause on May 17, 1954, when it ruled that states that segregated white and black children in the public schools violated the Constitution (*Brown* v. *Board of Education of Topeka*).

Under Article V, amendments to the Constitution may be proposed by a two-thirds vote of both houses of Congress or by a convention called by Congress on the application of the legislatures of two-thirds of the states. All subsequent amendments have been initiated by Congress. Amendments that have been proposed by Congress must be ratified by three-fourths of the state legislatures or by conventions in as many states. Congress decides which method will be used and sets the time limit for ratification.

Twenty-seven amendments have been added to the Constitution since 1789. In addition to the first 10—the Bill of Rights of 1791 was adopted as a single unit—far-reaching amendments include the Thirteenth (1865), abolishing slavery, the Fourteenth (1868), discussed previously, and the Fifteenth (1870), guaranteeing the right to vote regardless of race. The Seventeenth (1913) provides for direct election of U.S. Senators and the Nineteenth (1920) for woman suffrage. The Twenty-second (1951) limits the presidency to two terms. The Twenty-sixth (1971) granted suffrage to citizens 18 and older.

constitution theory, also called CONSTRUCTION THEORY, in the philosophy of Logical Positivism, the view that certain concepts—in particular, scientific ones—are in the last analysis defined by other concepts that express relations between experiences.

Constitution theory was fully articulated by Rudolf Carnap, a philosopher of language and of science, in *Logische Aufbau der Welt* (1928; *The Logical Structure of the World: Pseudoproblems in Philosophy,* 1967). A scientific concept, such as "atom" or "gene," is said to be "reduced" when every sentence containing the concept can be transformed into sentences containing concepts that refer only to experiences—which thus constitute the scientific

Constitution of the United States [1787]

We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defence, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

Article I

Section 1—All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Section 2—[1] The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

[2] No person shall be a Representative who shall not have attained to the Age of twenty five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

[3] [Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons.]* The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The Number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode-Island and Providence Plantations one, Connecticut five, New-York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

[4] When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

[5] The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

Section 3—[1] The Senate of the United States shall be composed of two Senators from each State, [chosen by the Legislature thereof,]† for six Years; and each Senator shall have one Vote.

[2] Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and of the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; [and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies].‡

[3] No Person shall be a Senator who shall not have attained to the Age of thirty Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

[4] The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

[5] The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

[6] The Senate shall have the sole Power to try all Impeachments. When sitting for that Purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: And no Person shall be convicted without the Concurrence of two thirds of the Members present.

[7] Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor, Trust or Profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment, according to Law.

Section 4—[1] The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

[2] The Congress shall assemble at least once in every Year, and such Meeting shall [be on the first Monday in December,]§ unless they shall by Law appoint a different Day.

Section 5—[1] Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

[2] Each House may determine the Rules of its Proceedings, punish its Members for disorderly Behaviour, and, with the Concurrence of two thirds, expel a Member.

[3] Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

[4] Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

Section 6—[1] The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of the Peace, be privileged from Arrest during their Attendance at the Session of their respective Houses, and in going to and returning from the same; and for any Speech or Debate in either House, they shall not be questioned in any other Place.

[2] No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been encreased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

Section 7—[1] All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

[2] Every Bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a Law. But in all such Cases the Votes of both Houses shall be determined by yeas and Nays, and the Names of the Persons

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Note—This text of the Constitution follows the engrossed copy signed by General Washington and the deputies from 12 states. The superior number preceding the paragraphs designates the number of the clause; it was not in the original.

*The part included in brackets was changed by section 2 of the 14th amendment.

†The part included in brackets was changed by section 1 of the 17th amendment.

‡The part included in brackets was changed by clause 2 of the 17th amendment.

§The part included in brackets was changed by section 2 of the 20th amendment.

voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten Days (Sundays excepted) after it shall have been presented to him, the Same shall be a Law, in like Manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a Law.

[3] Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of Adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

Section 8—[1] The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States;

[2] To borrow Money on the credit of the United States;

[3] To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes;

[4] To establish an uniform Rule of Naturalization, and uniform Laws on the subject of Bankruptcies throughout the United States;

[5] To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures;

[6] To provide for the Punishment of counterfeiting the Securities and current Coin of the United States;

[7] To establish Post Offices and post Roads;

[8] To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

[9] To constitute Tribunals inferior to the supreme Court;

[10] To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations;

[11] To declare War, grant Letters of Marque and Reprisal, and make Rules concerning Captures on Land and Water;

[12] To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years;

[13] To provide and maintain a Navy;

[14] To make Rules for the Government and Regulation of the land and naval Forces;

[15] To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions;

[16] To provide for organizing, arming, and disciplining, the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress;

[17] To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings;—And

[18] To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.

Section 9—[1] The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

[2] The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

[3] No Bill of Attainder or ex post facto Law shall be passed.

[4] No Capitation, or other direct, Tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken.*

[5] No Tax or Duty shall be laid on Articles exported from any State.

[6] No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.

[7] No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.

[8] No Title of Nobility shall be granted by the United States: And no Person holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or Title, of any kind whatever, from any King, Prince, or foreign State.

Section 10—[1] No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law, or Law impairing the Obligation of Contracts, or grant any Title of Nobility.

[2] No State shall, without the Consent of the Congress, lay any Imposts or Duties on Imports or Exports, except what may be absolutely necessary for executing it's inspection Laws: and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to the Revision and Controul of the Congress.

[3] No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of delay.

Article II

Section 1—[1] The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected, as follows

[2] Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

[The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be the President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like Manner chuse the President. But in chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a

*See also the 16th amendment.

Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall chuse from them by Ballot the Vice President.]*

[3] The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

[4] No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty five Years, and been fourteen Years a Resident within the United States.

[5] In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office,† the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President, and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

[6] The President shall, at stated Times, receive for his Services, a Compensation, which shall neither be encreased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

[7] Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation:—"I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States, and will to the best of my Ability, preserve, protect and defend the Constitution of the United States."

Section 2—[1] The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have Power to grant Reprieves and Pardons for Offences against the United States, except in Cases of Impeachment.

[2] He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law: but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President alone, in the Courts of Law, or in the Heads of Departments.

[3] The President shall have Power to fill up all Vacancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

Section 3—He shall from time to time give to the Congress Information of the State of the Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that the Laws be faithfully executed, and shall Commission all the Officers of the United States.

Section 4— The President, Vice President and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

Article III

Section 1— The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behaviour, and shall, at stated Times, receive for their Services, a Compensation, which shall not be diminished during their Continuance in Office.

Section 2—[1] The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and Treaties made, or which shall be made, under their Authority;—to all Cases affecting Ambassadors, other public Ministers and Consuls;—to all Cases of admiralty and maritime Jurisdiction;—to Controversies to which the United States shall be a Party;—to Controversies between two or more States;—between a State and Citizens of another State;‡—between Citizens of different States,—between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens or Subjects.

[2] In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned, the supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such Regulations as the Congress shall make.

[3] The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the said Crimes shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

Section 3—[1] Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

[2] The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood, or Forfeiture except during the Life of the Person attainted.

Article IV

Section 1— Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and the Effect thereof.

Section 2—[1] The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

[2] A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State, shall on Demand of the executive Authority of the State from which he fled, be delivered up, to be removed to the State having Jurisdiction of the Crime.

[3] [No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in Consequence of any Law or Regulation therein, be discharged from such Service or Labour, but shall be delivered up on Claim of the Party to whom such Service or Labour may be due.]§

Section 3—[1] New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

[2] The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

Section 4— The United States shall guarantee to every State in this Union a Republican Form of Government, and shall pro-

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*This paragraph has been superseded by the 12th amendment.

†This provision has been affected by the 25th amendment.

‡This clause has been affected by the 11th amendment.

§This paragraph has been superseded by the 13th amendment.

tect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

Article V

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislatures of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either Case, shall be valid to all Intents and Purposes, as Part of this Constitution, when ratified by the Legislatures of three fourths of the several States, or by Conventions in three fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided [that no Amendment which may be made prior to the Year One thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and]* that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

Article VI

[1] All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

[2] This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.

[3] The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution; but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

Article VII

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

Done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of our Lord one thousand seven hundred and Eighty seven and of the Independence of the United States of America the Twelfth IN WITNESS whereof We have hereunto subscribed our Names,

GO WASHINGTON—
Presid. and deputy from Virginia*

New Hampshire
John Langdon
Nicholas Gilman

Massachusetts
Nathaniel Gorham
Rufus King

Connecticut
Wm. Saml. Johnson
Roger Sherman

New York
Alexander Hamilton

New Jersey
Wil: Livingston
David Brearley
Wm. Paterson
Jona: Dayton

Pennsylvania
B Franklin
Thomas Mifflin
Rob[t] Morris
Geo. Clymer
Thos. FitzSimons
Jared Ingersoll
James Wilson
Gouv Morris

Delaware
Geo: Read
Gunning Bedford jun
John Dickinson
Richard Bassett
Jaco: Broom

Maryland
James McHenry
Dan of S[t] Thos. Jenifer
Dan[l] Carroll

Virginia
John Blair—
James Madison Jr.

North Carolina
Wm. Blount
Rich'd Dobbs Spaight
Hu Williamson

South Carolina
J. Rutledge
Charles Cotesworth Pinckney
Charles Pinckney
Pierce Butler

Georgia
William Few
Abr Baldwin

Attest:
William Jackson, *Secretary*

*Obsolete.

Articles in addition to, and amendment of, The Constitution of the United States of America, proposed by Congress, and ratified by the legislatures of the several states pursuant to the fifth article of the original Constitution.

The first 10 amendments to the Constitution were proposed by the Congress on Sept. 25, 1789. They were ratified by the following states, and the notifications of the ratification by the governors thereof were successively communicated by the President to the Congress: New Jersey, Nov. 20, 1789; Maryland, Dec. 19, 1789; North Carolina, Dec. 22, 1789; South Carolina, Jan. 19, 1790; New Hampshire, Jan. 25, 1790; Delaware, Jan. 28, 1790; New York, Feb. 4, 1790; Pennsylvania, March 10, 1790; Rhode Island, June 7, 1790; Vermont, Nov. 3, 1791; and Virginia, Dec. 15, 1791. Ratification was completed on Dec. 15, 1791.

The amendments were subsequently ratified by Massachusetts, March 2, 1939; Georgia, March 18, 1939; and Connecticut, April 19, 1939.

Two other amendments were concurrently proposed in 1789. One failed of ratification. The other (Amendment XXVII) was not ratified until May 7, 1992, when the Michigan legislature gave it the required number of state approvals.

Amendment [I]*

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

Amendment [II]

A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

Amendment [III]

No Soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law.

Amendment [IV]

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Amendment [V]

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

Amendment [VI]

In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining Witnesses in his favor, and to have the assistance of counsel for his defence.

Amendment [VII]

In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any Court of the United States, than according to the rules of the common law.

Amendment [VIII]

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

Amendment [IX]

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

Amendment [X]

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

Amendment [XI] [1795]

The Judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by Citizens of another State, or by Citizens or Subjects of any Foreign State.

Amendment [XII] [1804]

The electors shall meet in their respective states and vote by ballot for President and Vice President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate;—The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted;—The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of Electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. [And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as President, as in the case of the death or other constitutional disability of the President.]† The person having the greatest number of votes as Vice President, shall be the Vice President, if such number be a majority of the whole number of Electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice President of the United States.

Amendment XIII [1865]

Section 1—Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Section 2—Congress shall have power to enforce this article by appropriate legislation.

Amendment XIV [1868]

Section 1—All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive

*Only Amendments XIII, XIV, XV, and XVI had numbers assigned to them at the time of ratification.

†The part included in brackets has been superseded by section 3 of Amendment XX.

any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

Section 2—Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, Representatives in Congress, the Executive and Judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age,* and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Section 3—No person shall be a Senator or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House, remove such disability.

Section 4—The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claims shall be held illegal and void.

Section 5—The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

Amendment XV [1870]

Section 1—The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude.

Section 2—The Congress shall have power to enforce this article by appropriate legislation.

Amendment XVI [1913]

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.

Amendment [XVII] [1913]

The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislatures.

When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: *Provided,* That the legislature of any State may empower the executive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct.

This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution.

Amendment [XVIII] [1919]†

Section 1—After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

Section 2—The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

Section 3—This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

Amendment [XIX] [1920]

The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.

Congress shall have power to enforce this article by appropriate legislation.

Amendment [XX] [1933]

Section 1—The terms of the President and Vice President shall end at noon on the 20th day of January, and the terms of Senators and Representatives at noon on the 3d day of January, of the years in which such terms would have ended if this article had not been ratified; and the terms of their successors shall then begin.

Section 2—The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the 3d day of January, unless they shall by law appoint a different day.

Section 3—‡If, at the time fixed for the beginning of the term of the President, the President elect shall have died, the Vice President elect shall become President. If a President shall not have been chosen before the time fixed for the beginning of his term, or if the President elect shall have failed to qualify, then the Vice President elect shall act as President until a President shall have qualified; and the Congress may by law provide for the case wherein neither a President elect nor a Vice President elect shall have qualified, declaring who shall then act as President, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a President or Vice President shall have qualified.

Section 4—The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a President whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a Vice President whenever the right of choice shall have devolved upon them.

Section 5—Sections 1 and 2 shall take effect on the 15th day of October following the ratification of this article.

Section 6—This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of three-fourths of the several States within seven years from the date of its submission.

Amendment [XXI] [1933]

Section 1—The eighteenth article of amendment to the Constitution of the United States is hereby repealed.

Section 2—The transportation or importation into any State, Territory, or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

Section 3—This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by conventions in the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

Amendment [XXII] [1951]

Section 1—No person shall be elected to the office of the President more than twice, and no person who has held the office

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*See Amendment XXVI.

†Repealed by section 1 of Amendment XXI.

‡*See* Amendment XXV.

of President, or acted as President, for more than two years of a term to which some other person was elected President shall be elected to the office of the President more than once. But this Article shall not apply to any person holding the office of President when this Article was proposed by the Congress, and shall not prevent any person who may be holding the office of President, or acting as President, during the term within which this Article becomes operative from holding the office of President or acting as President during the remainder of such term.

Section 2—This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of three-fourths of the several States within seven years from the date of its submission to the States by the Congress.

Amendment [XXIII] [1961]

Section 1—The District constituting the seat of Government of the United States shall appoint in such manner as the Congress may direct:

A number of electors of President and Vice President equal to the whole number of Senators and Representatives in Congress to which the District would be entitled if it were a State, but in no event more than the least populous State; they shall be in addition to those appointed by the States, but they shall be considered, for the purposes of the election of President and Vice President, to be electors appointed by a State; and they shall meet in the District and perform such duties as provided by the twelfth article of amendment.

Section 2—The Congress shall have power to enforce this article by appropriate legislation.

Amendment [XXIV] [1964]

Section 1—The right of citizens of the United States to vote in any primary or other election for President or Vice President, for electors for President or Vice President, or for Senator or Representative in Congress, shall not be denied or abridged by the United States or any State by reason of failure to pay any poll tax or other tax.

Section 2—The Congress shall have power to enforce this article by appropriate legislation.

Amendment [XXV] [1967]

Section 1—In case of the removal of the President from office or of his death or resignation, the Vice President shall become President.

Section 2—Whenever there is a vacancy in the office of the Vice President, the President shall nominate a Vice President who shall take office upon confirmation by a majority vote of both Houses of Congress.

Section 3—Whenever the President transmits to the President pro tempore of the Senate and the Speaker of the House of Representatives his written declaration that he is unable to discharge the powers and duties of his office, and until he transmits to them a written declaration to the contrary, such powers and duties shall be discharged by the Vice President as Acting President.

Section 4—Whenever the Vice President and a majority of either the principal officers of the executive departments or of such other body as Congress may by law provide, transmit to the President pro tempore of the Senate and the Speaker of the House of Representatives their written declaration that the President is unable to discharge the powers and duties of his office, the Vice President shall immediately assume the powers and duties of the office as Acting President.

Thereafter, when the President transmits to the President pro tempore of the Senate and the Speaker of the House of Representatives his written declaration that no inability exists, he shall resume the powers and duties of his office unless the Vice President and a majority of either the principal officers of the executive department or of such other body as Congress may by law provide, transmit within four days to the President pro tempore of the Senate and the Speaker of the House of Representatives their written declaration that the President is unable to discharge the powers and duties of his office. Thereupon Congress shall decide the issue, assembling within forty-eight hours for that purpose if not in session. If the Congress, within twenty-one days after receipt of the latter written declaration, or, if Congress is not in session, within twenty-one days after Congress is required to assemble, determines by two-thirds vote of both Houses that the President is unable to discharge the powers and duties of his office, the Vice President shall continue to discharge the same as Acting President; otherwise, the President shall resume the powers and duties of his office.

Amendment [XXVI] [1971]

Section 1—The right of citizens of the United States, who are eighteen years of age or older, to vote shall not be denied or abridged by the United States or by any State on account of age.

Section 2—The Congress shall have power to enforce this article by appropriate legislation.

Amendment [XXVII] [1992]

No law, varying the compensation for the services of the Senators and Representatives, shall take effect, until an election of Representatives shall have intervened.

concept. Such constitutions, or constitutional definitions, consist of a hierarchy, with undefined, individual, private experiential concepts at the ground level and concepts of increasing complexity at higher levels; and the resulting constitution system is to be expressed in the language of modern symbolic logic. The doctrine was radically revised in Carnap's later work.

Constitution theory had been adumbrated before the *Aufbau,* first by Ernst Mach, an Austrian phenomenalist, in *Die Analyse der Empfindungen und des Verhältnis des Physischen zum psychischen* (5th ed., 1906; *Contribution to the Analysis of Sensations*) and later by Bertrand Russell in *Our Knowledge of the External World* (1914).

Constitutional Act, also called CANADA BILL (1791), in Canadian history, the act of the British Parliament that repealed certain portions of the Quebec Act (*q.v.*) of 1774, under which the province of Quebec had previously been governed, and provided a new constitution for the two provinces called Lower Canada (the future Quebec) and Upper Canada (the future Ontario) into which the territory was divided.

After the American Revolution (1776–83), Loyalist settlers entered Quebec, bringing with them a desire for democratic institutions and for English civil law; the British merchants in the cities of Quebec and Montreal were also clamouring for some kind of legislative assembly. Change was certainly necessary, and the act was passed by the British Parliament on June 10, 1791, and proclaimed to take effect on Dec. 26, 1791. The new legislatures, the first in this part of Canada, met in each province in 1792.

The act aimed to reproduce the general principles of the British constitution. There was to be a governor or lieutenant governor in each province representing the crown, advised by an executive council; and there was to be a legislative council appointed for life by the governor, as well as an elected legislative assembly. The legislative authority of governor, council, and assembly was defined generously as a power to make laws "for the peace, welfare and good government" of the provinces provided that these laws were not repugnant to the act. However, bills might be disallowed by the crown in England. To the Parliament of Great Britain was reserved the right to control navigation and to regulate the external commerce of the provinces.

Two special provisions of the act showed the fear of egalitarian principles. One provided for the appropriation of crown lands (one-eighth of all future grants) "for the support and maintenance of a Protestant clergy." This portion of the act went into effect, with unhappy nationalistic consequences to Canadian politics. The other provision sought to establish a landed aristocracy with the hereditary right of being summoned to the legislative council of each province. This feudal idea remained a dead letter, being wholly unsuitable to local conditions.

Constitutional Convention (1787), in U.S. history, convention that drew up the Constitution of the United States. Stimulated by severe economic troubles, which produced radical political movements such as Shays's Rebellion, and urged on by a demand for a stronger central government, the convention met in the Pennsylvania State House in Philadelphia (May 25–Sept. 17, 1787), ostensibly to amend the Articles of Confederation. All the states except Rhode Island responded to an invitation issued by the Annapolis Convention of 1786 to send delegates. Of the 74 deputies chosen by the state legislatures, only 55 took part in the proceedings; of these, 39 signed the

Constitution. The delegates included many of the leading figures of the period. Among them were George Washington, who was elected to preside, James Madison, Benjamin Franklin, James Wilson, John Rutledge, Charles Pinckney, Oliver Ellsworth, and Gouverneur Morris.

Discarding the idea of amending the Articles of Confederation, the assembly set about drawing up a new scheme of government but found itself divided, delegates from small states (those without claims to unoccupied western lands) opposing those from large states over the apportionment of representation. Edmund Randolph offered a plan known as the Virginia, or large state, plan, which provided for a bicameral legislature with representation of each state based on its population or wealth. William Paterson proposed the New Jersey, or small state, plan, which provided for equal representation in Congress. Neither the large nor the small states would yield. Oliver Ellsworth and Roger Sherman, among others, in what is sometimes called the Connecticut, or Great, Compromise, proposed a bicameral legislature with proportional representation in the lower house and equal representation of the states in the upper house. All revenue measures would originate in the lower house. That compromise was approved July 16.

The matter of counting slaves in the population for figuring representation was settled by a compromise agreement that three-fifths of the slaves should be counted as population in apportioning representation and should also be counted as property in assessing taxes. Controversy over the abolition of the importation of slaves ended with the agreement that importation should not be forbidden before 1808. The powers of the federal executive and judiciary were enumerated, and the Constitution was itself declared to be the "supreme law of the land." The convention's work was approved by a majority of the states the following year.

Constitutional Democratic Party (Russia): *see* Kadet.

Constitutional Union Party, U.S. political party that sought in the pre-Civil War election of 1860 to rally support for the Union and the Constitution without regard to sectional issues. Formed in 1859 by former Whigs and members of the Know-Nothing Party, the party nominated John Bell for president and Edward Everett for vice president. In attempting to ignore the slavery issue, its platform particularly appealed to border states, in which the party won 39 electoral votes. A by-product of the same ideological and sectional antipathies that had led to the formation of the Republican Party in 1856 and the splitting of the Democratic Party in 1860, the Constitutional Union Party was a short-lived vehicle for moderates that collapsed by the start of the Civil War. It succeeded only in helping to disperse the 1860 vote sufficiently to ensure the election of the Republican candidate, Abraham Lincoln.

constitutiones principum, enactments or legislation issued by the ancient Roman emperors. The chief forms of imperial legislation were (1) *edicta,* or proclamations, which the emperor, like other magistrates, might issue, (2) *mandata,* or instructions to subordinates, especially provincial governors, (3) *rescripta,* written answers to officials or others who consulted the emperor, in particular on a point of law, and (4) *decreta,* or decisions of the emperor sitting as a judge.

construction, the erection or assembly of large structures. The term construction is to a significant degree synonymous with building, but in common usage it most often is applied to such major works as buildings, ships, aircraft, and public works such as roads, dams, and bridges.

Construction is treated in a number of articles in the MACROPAEDIA. For the history and principal treatments of the major types of construction, *see* Building Construction; Engineering; Public Works; Industries, Manufacturing. For descriptions of some of the chief materials used in construction, *see* Forestry and Wood Production; Industrial Glass and Ceramics; Industries, Extraction and Processing.

For a description of the place of construction in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Seven, Divisions II and III.

construction theory (logical positivism): *see* constitution theory.

Constructivism, Russian KONSTRUKTIVIZM, Russian artistic and architectural movement that was first influenced by Cubism and Futurism and is generally considered to have been initiated in 1913 with the "painting reliefs"—abstract geometric constructions—of Vladimir Tatlin. The expatriate Russian sculptors Antoine Pevsner and Naum Gabo joined Tatlin and his followers in Moscow, and upon publication of their jointly written *Realist Manifesto* in 1920 they became the spokesmen of the movement. It is from the manifesto that the name Constructivism was derived; one of the directives that it contained was "to construct" art. Because of their admiration for machines and technology, functionalism, and modern industrial materials such as plastic, steel, and glass, members of the movement were also called artist-engineers.



"Column," mixed media (plastic, wood, and metal) Constructivist sculpture by Naum Gabo, 1923; in the Solomon R. Guggenheim Museum, New York City

By courtesy of The Solomon R. Guggenheim Museum, New York City

Other important figures associated with Constructivism were Alexander Rodchenko and El Lissitzky. Soviet opposition to the Constructivists' aesthetic radicalism resulted in the group's dispersion. Tatlin and Rodchenko remained in the Soviet Union, but Gabo and Pevsner went first to Germany and then to Paris, where they influenced the Abstract-Creation group with Constructivist theory, and later in the 1930s Gabo spread Constructivism to England and in the 1940s to the United States. Lissitzky's combination of Constructivism and Suprematism influenced the de Stijl artists and architects whom he met in Berlin, as well as the Hungarian László Moholy-Nagy, who was a professor at the Bauhaus. In both Dessau and Chicago, where because of Nazi interference the New Bauhaus was established in 1937, Moholy-Nagy disseminated Constructivist principles. *See also* Bauhaus; Stijl, de; Suprematism.

consubstantiation, doctrine of the Eucharist affirming that Christ's body and blood substantially coexist with the consecrated bread and wine. The term is unofficially and inaccurately used to describe the Lutheran doctrine of the Real Presence; namely, that the body and blood of Christ are present to the communicant "in, with, and under" the elements of bread and wine. Consubstantiation differs radically from the Roman Catholic doctrine of transubstantiation, which asserts that the total substance of bread and wine are changed into the substance of the body and blood of Christ at the moment of consecration in such a way that only the appearances of the original elements remain.

Consult the INDEX *first*

consul, Latin CONSUL, plural CONSULES, in ancient Rome, either of the two highest of the ordinary magistracies in the ancient Roman Republic. After the fall of the kings (*c.* 509 BC) the consulship preserved regal power in a qualified form. Absolute authority was expressed in the consul's *imperium* (*q.v.*), but its arbitrary exercise was limited: the consuls, nominated by the Senate and elected by the people in the Comitia Centuriata (a popular assembly), held office for only a year, and each consul had power of veto over the other's decisions. After the establishment of other magistracies, especially the censorship and tribuneship, consular authority was further limited. Consuls, however, were in a very real sense the heads of state. They commanded the army, convened and presided over the Senate and the popular assemblies and executed their decrees, and represented the state in foreign affairs. They retained important prerogatives in administration and in criminal law, and their office was invested with the *sella curulis* (a special chair of office) and an escort of 12 lictors. After 367 BC at least one of the consuls had to be a plebeian, though in practice the consulship was usually limited to wealthy and noble families with distinguished records of public service. When their terms expired, consuls generally were appointed to serve as governors of provinces. These could be and often were profitable sinecures; in the late years of the republic, provincial governors used their unlimited powers to enrich themselves at every turn. Although the office of consulship remained after the collapse of the republic (27 BC), it had lost most of its former power. The appointment of consuls passed from the hands of the people to the state; later yet it fell to the emperor to name consuls. *See also* censor; tribune.

consul, in foreign service, a public officer who is commissioned by a state to reside in a foreign country for the purpose of fostering the commercial affairs of its citizens in that foreign country and performing such routine functions as issuing visas and renewing passports. A consul, as such, does not enjoy the status of a diplomat and cannot enter on his official duties until permission has been granted to him by the authorities of the state to which his nomination has been communicated. This permission, or exequatur, may be revoked at any time at the discretion of the government of the country in which he resides.

The modern office of consul is derived from that of certain magistrates in the cities of medieval Italy, Provence, and Languedoc charged with the settlement of trade disputes. With the growth of trade, it early became convenient to appoint agents with similar powers in foreign

parts, and these often, though not invariably, were styled consuls.

It was not until the beginning of the 19th century that the system developed universally. The French system, under which the consular service had been long established as part of the general civil service, was gradually adopted by other nations.

Consular officials are generally ranked, in descending order of importance, as consul general, consul, vice consul, or honorary consul. Few countries can afford the cost of career officers at every consular post, and the corps of career officials is therefore supplemented by honorary officers, usually residents engaged in trade, who are citizens either of the country that nominates them or of that in which they reside.

Consuls do not enjoy diplomatic immunity but are to some extent exempt from the jurisdiction of the receiving state. The archives, for example, all other official documents and papers kept in a consulate, and all correspondence between the consul and his government are inviolable. Consuls are also often exempt from all kinds of rates and taxes and from personal taxes. The precise extent of such consular privileges is usually established in bilateral and multilateral agreements known as consular conventions. Many of these have been superseded by the Convention on Consular Relations (Vienna, 1963).

Consulate of the Sea, Book of the, Catalan LLIBRE DEL CONSOLAT DE MAR, a celebrated collection of Mediterranean maritime customs and ordinances in the Catalan language, published in 1494. The title is derived from the commercial judges of the maritime cities on the Mediterranean coast, who were known as consuls. The book contains a code of procedure issued by the kings of Aragon for the guidance of the consular courts, as well as a collection of ancient customs of the sea. Also included is a body of ordinances for the regulation of warships.

consumer credit, short- and intermediate-term loans used to finance the purchase of commodities or services for personal consumption or to refinance debts incurred for such purposes. The loans may be supplied by lenders in the form of cash loans or by sellers in the form of sales credit.

Consumer credit in industrialized countries has grown rapidly as more and more people have come to receive regular income in the form of fixed wages and salaries and as mass markets for durable consumer goods have become established.

Consumer loans fall into two broad categories: installment loans, repaid in two or more payments; and noninstallment loans, repaid in a lump sum. Installment loans include (1) automobile loans, (2) loans for other consumer goods, (3) home repair and modernization loans, (4) personal loans, and (5) credit-card purchases. The most common noninstallment loans are single-payment loans by financial institutions, charge accounts of retail stores, and service credit extended by doctors, hospitals, and utility companies.

Finance charges on consumer loans generally run higher than the interest costs of business loans although the way costs are quoted may disguise the actual charges. This led the U.S. Congress to pass the Truth-in-Lending Act, which took effect in July 1969. An important provision requires lenders to state the effective finance charge in terms of an annual percentage rate, as a measure of the relative cost of credit in percentage terms, so borrowers may compare finance charges stated in different terms.

consumer good, in economics, any tangible commodity produced and subsequently purchased to satisfy the current wants and perceived needs of the buyer. Consumer goods are divided into two categories, durable goods and nondurable goods. Consumer durable goods possess a significant life span, often three years or more, although some authorities accept one year or more. The consumption of a durable good is spread over its life span (a characteristic of capital goods), and this tends to produce a series of services, in the form of maintenance of the durable good. The length of consumption and the maintenance of durable goods are similar to those of capital goods and this sometimes makes the dividing line between the two hazy. The longevity and often higher cost of durable goods usually causes consumers to postpone expenditures on them, causing durables to be the more volatile component of consumption. Common examples of consumer durable goods are automobiles, furniture, household appliances, and mobile homes.

Consumer nondurable goods are purchased for immediate or almost immediate consumption and have a life span ranging from minutes to three years. Common examples of nondurable goods are food, beverages, clothing, shoes, and gasoline.

consumer price index, measure of living costs based on changes in retail prices. Such indexes are generally based on a survey of a sample of the population in question to determine which goods and services compose the typical "market basket." These goods and services are then priced periodically, and their prices are combined in proportion to the relative importance of the goods. This set of prices is compared with the initial set of prices (collected in the base year) to determine the percentage increase or decrease. Consumer price indexes are widely used to measure changes in the cost of maintaining a given standard of living. Such indexes are available for more than 100 countries (as in the United Nations' *Monthly Bulletin of Statistics*) and are usually prepared by the country's ministry of labour or central statistical office. The indexes of the various countries differ widely in coverage and methods, but there are some general characteristics that can be described.

The population group covered almost always includes families of wage and salary earners, but the indexes vary in the extent to which they include single individuals and other occupational groups such as the self-employed or professionals. The U.S. index, for example, includes only wage and salary earners, whether living alone or with families, whereas the United Kingdom index covers all households except those headed by a person with income in excess of a stated amount and those with at least three-quarters of their total income derived from pensions. Sometimes special indexes are prepared for particular groups in the population, such as the indexes for pensioners in the United Kingdom.

It is quite common for the indexes to refer only to urban areas, and some are restricted to a limited number of cities (*e.g.,* six state capitals in Australia) or even to the capital city alone (*e.g.,* Mexico City). Some indexes are, of course, broader in coverage; the Japanese index, for example, includes all households, urban or rural, except one-person households and those headed by farmers or fishermen. These limitations in the coverage of the indexes are often overlooked. For broad analytical uses such as measuring changes in the national welfare, a comprehensive index is needed that covers the whole population, including persons living in rural areas, single persons, and high-income families in urban areas.

In most countries the consumer price indexes, usually published monthly, include indexes for major categories of expenditures such as food, clothing, rent, and so forth. Sometimes they include more detailed categories (such as dairy products) and even individual items (such as milk). This depends partly on the number of products for which prices are gathered. In countries that can afford more extensive price collection and that need it because of the diversity of products purchased by their consumers, the number of items covered is usually between 250 and 450; but in smaller countries or poorer ones, the number is often between 100 and 150, and in a few countries even less than 50.

The formula. The most common formula used in calculating consumer price indexes is a weighted arithmetic mean of price relatives. The price relatives described earlier are weighted according to the amounts consumers spend on each product; the resulting figures are summed for all commodities and divided by the sum of the base year expenditures for the same collection of commodities.

The expenditure weights reflect the relative importance of each item in the expenditures of the population group covered by the index. This information is usually obtained from a survey of a sample of the covered families, in which data are gathered about the expenditures upon each commodity and service. The weights need to be revised from time to time as new products appear and as spending habits change. The main obstacle to frequent weight revision is the cost of the family expenditure surveys, although modern sampling methods have made it possible to obtain reliable results with smaller numbers of observations than were used in the early days of consumer price indexes. In some countries, however, family expenditure surveys are conducted continuously, as they are in the annual surveys in the United Kingdom or the monthly surveys based on overlapping panels of households in Japan.

Conceptual difficulties. A fundamental difficulty in existing consumer or retail price indexes is that they are defined in terms that are not really appropriate for the uses to which they are put. The official compiling agencies describe them as measures of the change in price of a fixed basket of goods and services. This seems clear enough, but difficulties arise as soon as the index is put to use. One may wish, for example, to ascertain whether an urban family with an income of $20,000 in 1985 was better off than a similar family with an income of $8,000 in 1965. One may find that the consumer price index rose so much that, despite an increase in money income, the family was slightly worse off. Although this is a fair illustration of the way the indexes are generally employed, the underlying reasoning is defective. In the first place, the implicit assumption is that the family bought exactly the same goods in 1985 as in 1965. Even if all goods in the market were identical at the two dates (no new products and no quality change), the family would not necessarily purchase the same items; it could logically be expected to substitute goods that had smaller-than-average price increases for goods that had larger-than-average price increases. As a result of these shifts, the family might actually prefer the new bundle of goods at the new prices to the old bundle at the old prices. An index that takes into account the subjective preferences of consumers is called a constant-utility index, since it measures not the change in price of a constant bundle of goods but the change over time in the costs of purchasing bundles of goods that yield a constant level of utility or satisfaction. Even this formulation is not completely rigorous because the utilities or satisfaction obtained by a given individual from a given bundle of goods will vary over time as his tastes change. All that an index can do in strict theory is to measure differences in the money incomes required at different price structures to make

a given individual with given preferences indifferent as to the price structures.

Conceptually, there is little doubt that the constant-utility index is superior for virtually all of the analytical purposes for which indexes are used, but there are great difficulties in constructing one that would command wide support and confidence. Some authorities believe that the present indexes could be improved if the physical units were selected so as to represent the characteristics or utilities really sought by buyers. They hold, for example, that it would be more appropriate to compare the costs of an appendectomy or of an obstetrical delivery than the costs of an office visit to a doctor or eight hours of nursing care.

To make the best use of the Britannica, consult the INDEX *first*

consumerism, movement or policies aimed at regulating the products, services, methods, and standards of manufacturers, sellers, and advertisers in the interests of the buyer. Such regulation may be institutional, statutory, or embodied in a voluntary code accepted by a particular industry, or it may result more indirectly from the influence of consumer organizations.

Consumer protection organizations in one form or another are scattered throughout the world, from the industrial nations to the Third World countries. Governments often establish formal regulatory agencies to insure consumer protection. For example, in the United States, the Federal Trade Commission (FTC), established in 1914, is authorized to prevent deceptive practices in commerce and to regulate the package labelling of consumer products: the Food and Drug Administration (FDA), established as the Food, Drug, and Insecticide Administration in the Agriculture Department in 1927, administers consumer protection of foods, cosmetics, and other substances; and the National Highway Traffic Administration, established in 1970, is concerned with all aspects of automobile safety. At least one government division or office dealing with consumer affairs has been set up in each of the 50 states. The foremost individual consumer advocate has been Ralph Nader, who criticized the safety engineering of U.S. automobiles in the book *Unsafe at Any Speed* (1965).

The International Organization of Consumers Unions (IOCU) registers a worldwide membership, with some members—especially in Asia—operating only in a single city, whereas other members, such as the Consumers' Association of Canada, maintain nationwide networks of organizations.

The law has long provided certain safeguards to buyers. Among these safeguards (exemplified in England's Sale of Goods Act of 1893) is the one that states that whenever a buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required, thus relying on the seller's skill or judgment, there is an implied condition that the goods sold shall be reasonably fit for such a purpose.

Other early legislation dealt mainly with adulteration of food and drugs. This was true, for example, of the Adulteration of Food and Drugs Act of 1872 (England) and similar, cumulative measures of 1848, 1890, and 1906 in the United States. The scope of such acts has been enlarged from time to time to include, for example, goods such as electrical products and automobiles, which could endanger the safety of the consumer if certain standards are not met. The provisions of such legislation are necessarily complex and vary from country to country, as well as, in the United States, from state to state. Various nonstatutory controls, such as standards laid down by national-standards institutions, also interact with statutory controls. In the following survey both the statutory and non-statutory aspects of this subject are considered together.

Controls on manufacturing and design. Of all industries, food and drugs are the most controlled by legislation. Other products in general are controlled by standards institutions, which lay down basic minimum standards for many different kinds of products. Legislative controls applying to food and drug manufacturers prohibit them from adding or removing anything from the product they sell that would make it injurious to health. Although this might appear to afford absolute protection for the consumer, manufacturers sometimes unwittingly add ingredients that are subsequently found to be harmful—*e.g.,* cyclamates, which were used for some years as an artificial sweetener. The frequency of such occurrences will clearly depend on the rigour of the standards of the official testing agencies concerned and the stringency with which such standards are applied.

For nonfood products, legislation is less easily devised and far less easily enforced. Most countries, nevertheless, have developed minimum applicable standards. National-standards institutions were, in many instances, set up more for the benefit of manufacturers than for that of the ordinary, domestic consumer. In addition, government bodies were often formed to better control government purchasing. In the United States, for example, the General Services Administration laid down specifications and quality standards that had to be satisfied before the federal government would buy supplies. Other standards bodies, such as the British Standards Institute, started in 1901, were set up for the convenience of manufacturers so that one manufacturer's goods could be used in conjunction with another's, as in the standardization of electrical fittings.

By the 1950s, standards organizations had become far more aware of the needs of the ordinary consumer, but their legal status, for the most part, remained unaltered. Most recommendations are devised with the cooperation of industry, government departments, and consumers. The standards themselves are not usually legally enforceable but remain voluntary. They usually do not reflect the quality of the product as a whole but deal only with a specific aspect of it. The mark of a standards institution, for example, may well indicate that a hair dryer is sufficiently insulated against electrical-shock hazards, but not that it dries hair satisfactorily.

Although the standards institutions have assisted in raising the quality of many consumer products, their grip is weak. Most standards result from decisions of committees in which manufacturers usually have the final say. The recommended standard is thus more often a reflection of the industry's conscience than of the standard that would be required to provide satisfaction for the consumer. The standards laid down by manufacturers for a product can be so low that the consumer benefits little, if at all. Further, almost all standards refer to the safety of a product and not to its efficiency; and, with only a few exceptions, the recommendations of standards agencies are voluntary. The decision whether to adopt the standard is up to the company that markets the product, and such a decision necessarily involves an assessment of possible costs and returns. It is unfortunate that, in many countries, the selling power of the standards symbol is less substantial than that of a good promotion campaign. Consumers, it would appear, are not sufficiently aware of the presence and significance of these symbols, perhaps because they tend to be little publicized by the manufacturers.

Apart from the formulation of standards, testing by various bodies occasionally results in the redesigning of certain products. Such testing has been most apparent in the automobile industry, in which cars have been recalled by their manufacturers so that alterations and improvements could be made.

Controls on advertising. Of all the criticisms levelled at manufacturers, those against their advertising probably have been the most vociferous. Advertising is necessarily vulnerable to these attacks: it is experienced by everybody, its products are on show for a long time, and its purposes are materialistic. Although the major purpose of company advertising, which is to attract members of the public toward buying a particular product, is fairly straightforward, the methods employed in this process have become increasingly complex. As business has become more competitive, so has the advertising that sells its products. Coupled with this increased competition has been the development of more powerful media—the most important of these being television.

From the consumer's point of view, the basic criticism of advertising is that it leads him to purchase goods that he has no wish to purchase by presenting misleading and untruthful statements or by creating wants, needs, and desires in his mind that might not otherwise exist. In the first instance it is accepted that the consumer, of his own volition, has a need that is filled by the description of the advertised product (but not necessarily by the product itself), whereas in the second the need is artificial and is stimulated entirely by the media.

From an economic viewpoint, critics of advertising point to the enormous amount of money involved—money that, they state, does not benefit the consumer although he is compelled to pay it. A second criticism is that advertising restricts competition because only large companies can afford expensive, nationwide campaigns, thus limiting freedom of entry of new firms into an established market.

A definitive answer to these questions is obviously impossible. Regarding the first, it might be fair to say that economic growth and the creation of wealth might come about far more slowly without the aid of advertising. The development of national rather than regional brands—and the economies of scale implicit in this development—might be retarded. For all its drawbacks, advertising informs the consumer and enables him to make not only a choice between products but also a choice between the stores at which he can buy those products. For the manufacturer it justifies a heavy investment in capital and manpower in that it assures (to some degree at least) the quick development of sales.

Regarding the second major criticism—that advertising encourages the concentration of industry—there is no doubt that this is true. But not everyone agrees that industrial concentration necessarily acts against the interests of the consumer, particularly in the absence of outright monopolies or cartels. In some countries, such as the United States and Great Britain, anti-trust or monopoly laws act to restrain the more flagrant abuses of industrial power. Other countries, especially some in western Europe, have established monopolies boards, which monitor or oversee activities of large corporations in the field of takeovers and mergers.

The advertising industry has for many years been aware of the various criticisms and has accepted the need for some control over advertising methods in addition to the provisions of statutory regulations that exist in many countries. The country with the most stringent advertising standards is usually thought to be Great Britain, where, for example, all advertising on independent radio and television is controlled by the Independent Broadcasting Authority (IBA), the commercial counterpart

to the British Broadcasting Corporation. The IBA lays down controls on advertising, banning the use, for instance, of subliminal advertising (methods by which the listener or viewer might be influenced without his becoming aware of it) and of advertising that plays on fear and on the minds of the superstitious.

The IBA has a further list of unacceptable products and services. Advertising is not allowed, for example, on behalf of cigarettes or betting, and political or religious advertising is prohibited. Other regulations involve methods of reproduction, the wording and advertising of guarantees, and the enforcement of prices and other offers; furthermore, special conditions exist in specific cases—the listening or viewing child, the employment of children in advertisements, and the advertising of certain products such as medicines and drugs and also financial services. Advertising time is sold by production companies appointed by the IBA, but advertisers may not sponsor programs.

The general character of governmental and private controls over the claims and methods of advertisers may be said to be one of considerable laxity. It seems likely that this situation will be changed not so much by the introduction of more stringent codes as by challenges to particular advertisers by consumer interest groups within the framework of existing legislation regarding truth in advertising.

Labelling standards. Labelling can be used either to inform or to deceive the consumer, and manufacturers, in their sales efforts, are often tempted by the latter expedient. Minimum standards of labelling exist for some products, but, as with controls on manufacturing quality, legislation tends to concentrate on food and drugs. Usually, every container carries a statement of contents, but, apart from food and drugs, content identification is not usually required. If it is provided, however, it must not misrepresent. In general, this means that labelling, when it is present at all, tends to be accurate.

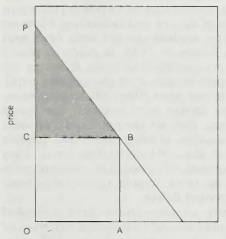
Consumer movements and official bodies have, in many countries, seen the need for better systems of product labelling. Of methods proposed, one of the best may be the Varudeklarationsnämnden (Quality Labelling Board) system adopted by Sweden, which is financed by the Swedish government in conjunction with various national business and consumer organizations. In this system, labels must describe the most important characteristics of the product and must do so in words that by any standards are explicit, many being more than 200 words long. Price labels are of further importance to the consumer. With the advent of self-service shopping, the need for goods to be priced correctly is essential. Vendors, however, are under no legal obligation to indicate prices, and a major criticism by consumer groups has been that, even when prices are indicated, it is often difficult to make price comparisons because of the lack of standardization of the weights or volumes of packages in which a product is sold.

Controls on sales methods. Generalizations cannot be made concerning statutory controls on sales methods because they vary from place to place. Sales practices have been controlled for over a century; early regulations were largely concerned with peddlers and hawkers. Legal progress has, in general, imposed a stricter control of selling methods to reduce the incidence of deception.

Particularly difficult to control is door-to-door selling, a method that for many years has drawn criticism from the general public, even though the majority of door-to-door salesmen are fair and reputable tradesmen. Vacuum cleaners, floor polishers, sewing machines, and encyclopaedias have been sold by this method, some by salesmen who have exploited the purchasers' vulnerability. Salesmen's tactics often go far beyond the common foot-in-the-door technique. To persuade people to enter into a heavy financial commitment, salesmen have been known to misstate the terms of payment or the trade-in allowance, to conceal figures on the order form or agreement, and to resort to other deceptive practices. Some countries have outlawed such deceptions. In Sweden a Door-to-Door Selling Act leaves buyers free to withdraw from contracts signed in their own homes and at exhibition stands within a period of seven days. A similar law in Britain specifies a period of four days. Some U.S. states likewise provide statutory protection. The Swedish legislation is part of a package designed to help the consumer and includes an Undesirable Terms of Trading Act (for monitoring standard contracts) and further legislation regarding credit sales and hire purchase, legal aid, holiday travel, and foodstuffs.

Another technique used in direct sales is that of switch selling. The salesman attracts his victims by placing an advertisement offering a domestic article at a remarkably low price; this is known as the "bait." Inquirers are personally visited by a salesman, who, from the outset, makes no attempt to sell them the product advertised. Having convinced the inquirer that the model is not worth buying, the salesman goes on to offer the customer another model that he happens to have with him at, of course, a higher price. Although this and similar methods often are in violation of statutes governing the sale of goods, enforcement is difficult. Extra protection is provided by legislation in some countries, and, in others, non-statutory regulations protect the consumer.

consumer's surplus, in economics, difference between the price a consumer pays for an item and the price he would be willing to pay rather than do without it. As first developed by J. Dupuit, French civil engineer and economist, in 1844 and popularized by British



Consumer's surplus

From P.A. Samuelson, *Economics*, 8th ed. (Copyright © 1970); used with permission of McGraw-Hill Book Co.

economist Alfred Marshall, the concept depended on the assumption that degrees of consumer satisfaction (utility) are measurable. Because the utility yielded by each additional unit of a commodity usually decreases as the quantity purchased increases and because the commodity's price reflects only the utility of the last unit purchased rather than the utility of all units, total utility exceeds total market value. A telephone call that costs only twenty cents, for example, is often worth much more than that to the caller. According to Marshall, this excess utility, or consumer's surplus, is a measure of the surplus benefits an individual derives from his environment.

If the marginal utility of money is assumed to be constant for consumers of all income levels and money is accepted as a measure of utility, the consumer's surplus can be shown as the shaded area under the consumer's demand curve in the figure. If the consumer purchases OA of the commodity at a price of AB or OC, the total market value, or amount he pays, is OABC, but the total utility is OABP. The differences between them are the shaded area BCP, the consumer's surplus.

The concept fell into disrepute among 20th-century economists because of the realization that the utility derived from one item is not independent of the availability and price of other items and because of the difficulties in the assumption that degrees of utility are measurable.

The concept is still retained by economists, in spite of the difficulties of measurement, to refer to the benefits accruing to the modern consumer from his ability to buy mass-produced goods at low prices. It is used in the fields of welfare economics and taxation.

consumption, in economics, the final using up of goods and services, *i.e.*, excluding the use of intermediate products in the production of other goods. Purchases of plant and machinery by business organizations are regarded as investment and are not counted as consumption, while purchases of durable goods by private individuals are counted as consumption by economic statisticians.

A brief treatment of consumption follows. For full treatment, *see* MACROPAEDIA: Economic Theory.

In developed countries consumption as defined above accounts for about three quarters of the gross national products. Public authorities account for 15–20 percent of consumption, representing defense spending, social payments, salaries of civil servants, and current expenditures of state enterprises. The distribution of private expenditure among food, durable goods, and nondurable goods shows a remarkable similarity among developed countries with similar economic standards. A trend common to all countries is that as the standard of living goes up the proportion of expenditure on food declines and that on durable or luxury goods goes up. This is because food consumption is relatively inelastic; that is, once a level of sufficiency is attained, expenditures on food tend to increase more slowly than increases in income. Another contributing factor in industrializing nations is the lower prices for durable goods resulting from mass production and technical progress, enabling a larger proportion of consumers to afford them. Although completely reliable data for the less developed countries is not available, incomplete statistics suggest that food expenditure accounts for nearly twice the proportion seen in developed countries and absorbs up to 75 percent of household budgets, leaving little excess for purchases of consumer durables. In some rural areas, food expenditure accounts for a very small proportion, reflecting the subsistence nature of the local economy.

The classical economic theory explaining consumer behaviour is built on the notion of marginal utility. According to this notion, a consumer obtains a given amount of satisfaction (utility) from the purchase of a product, but the incremental satisfaction gained from additional purchases of the same product decreases as his supply increases. Consumers are assumed to be rational and therefore to allocate their expenditures in such a way as to maximize the total satisfaction obtained from all purchases. According to this simple economic model, incomes and prices are the two major determinants of consumption. Although in a complex modern society other factors such as social pressures, fashion trends, habit, etc., play a role, it is still true that price and income are the chief considerations.

Methods of calculating income and price elasticity of products have been developed by economists to explain variations in consumer

demand for goods and services. Products for which demand increases more than proportionately for a given increase in income (luxury items, for example) are defined as being income-elastic, and those for which demand increases less than proportionately (food, as previously noted) as income-inelastic. Similarly, price elasticity measures the responsiveness of demand to price changes; if the change in demand is less than proportional to the change in price, demand for the product is regarded as inelastic, and if it is more than proportional, elastic. Income elasticity quantifies the observation that expenditure on food declines as a proportion of income as income rises; in developed countries the income elasticity of common food items is around 0.3. Consumer durables and luxuries have income elasticities of greater than 1.0.

Basic products with easily available substitutes are usually price elastic, and a given rise in price triggers a more than proportional decline in demand. Scarce products or those with few substitutes (*e.g.*, gasoline for cars) are price inelastic, and demand falls less than proportionally for a given increase in price. Such rational behaviour obviously functions best in an environment where there is sufficient information on the price and performance of goods. Most consumer goods are too complex for direct comparisons to be made by consumers. Such difficulties have given rise to consumers' organizations in many developed countries that compare prices and quality of many consumer products for the benefit of their subscribers (*see* consumerism).

Exceptions to rational consumer behaviour abound. A common one is the phenomenon of "conspicuous consumption," noted when the extremely high price of a product creates a prestige value leading to a much higher demand than the simple price–demand relation would predict.

consumption function, in economics, relationship between consumer spending and the various factors determining it. At the household or family level, these factors may include income, wealth, the price level, expectations about future income, age, education, and family size. One household will spend a larger or smaller proportion of its income than another, depending on these factors.

Theoretically, knowledge of the consumption functions of all households in the economy should enable government officials to predict the consequences of changes in taxation or government spending. The difficulty lies in predicting the behaviour of consumers.

It is necessary both to know the factors that affect consumer-expenditure patterns and to be able to measure them. Even if consumption were assumed to be a simple function of income, it would be necessary to select a particular income concept. For example, if one takes disposable income in the current period, one might expect the proportion of income spent on consumption to be lower for higher income groups.

It is doubtful, though, whether consumption varies according to the absolute level of current income. One alternative view is that the consumption expenditure of a household depends not so much on its current level of income as on the consumption expenditures of other households considered as peers. In other views, consumption-expenditure levels are proportionately related to the household's concept of its lifetime, or permanent, income—that is, each family has a long-range view of what its average income will be over its lifetime and adjusts its consumption expenditure to this, rather than to its actual income. Income in any given year may be above or below this projected lifetime average, with the result that consumption may not appear to be a constant proportion of income. This view is consistent with spending patterns in which people go into debt early in life in establishing a household and save during their middle years to enable them to maintain a certain consumption level during retirement.

consumption tax, levy paid directly or indirectly by the consumer, such as excise, sales, use, some property taxes, and tariffs. Because the rates of consumption taxes are generally proportional to the level of consumption expenditure, and upper-income groups consume a smaller percentage of their incomes than do lower-income groups, they are usually both more deflationary and more regressive with respect to income than are income taxes. Because consumption tends to be more stable than income, it may be argued that they provide a more dependable source of revenue.

Consus, ancient Italian deity, cult partner of Ops. His name was derived from *condere* ("to store away"), and he was probably god of the storage bin. He had a temple on the Aventine. In later times, Consus sank to the level of a secondary deity whose character was rather abstract. On his festival days, in August and December, horses and mules were crowned with garlands and were given rest from work. In August the *flamen Quirinalis* (the priest of the god Quirinus) offered sacrifice, and the *pontifices* presided at horse and chariot races (in which mules took the place of horses).

contact lens, thin, artificial lens worn on the surface of the eye to correct refractive defects of vision. The first contact lens, made of glass, was developed by Adolf Fick in 1887 to correct irregular astigmatism. The early lenses, however, were uncomfortable and could not be worn for long. Until the development of optical instruments that could measure the curvature of the cornea (the transparent surface of the eye that covers the iris and the pupil), the contact lens was made by taking an impression of the eye and fashioning a lens on a mold. The modern contact lens, developed by Kevin Tuohy in 1948, is made of plastic and rests on a cushion of tears. It covers the cornea approximately over the iris and pupil.

Contact lenses most effectively neutralize visual defects arising from irregular curvatures of the cornea; they are the preferred treatment for some varieties of astigmatism and aphakia (absence of the eye's crystalline lens). They also are cosmetically appealing substitutes for eyeglasses to treat myopia (near-sightedness) and other visual defects.

Hard-plastic contact lenses have a limited wearing time because of potential irritation of the cornea and may require a period of adaptation when first worn. Both front and back surfaces of the hard contact lens are spherically curved, altering refractive properties by changing the shape of the tear film on the eye's surface, which conforms to the curve of the rear surface of the contact lens, and by a difference in curvature between the two surfaces of the lens itself.

In the 1970s, larger "soft" lenses, made from a water-absorbing plastic gel for greater flexibility, were introduced, and in the 1980s extended-wear soft lenses, which can be worn without removal for several weeks at a time, were introduced. Soft contact lenses are usually more comfortable because they allow oxygen to penetrate to the eye's surface; their large size makes them more difficult to lose than the hard lenses. Their delicacy, however, makes them more subject to damage, and they require more careful maintenance. They are also less effective than hard lenses in treating astigmatism, because they reflect the corneal curvature more closely. In the late 1970s gas-permeable hard lenses (which allowed more oxygen to reach the eye, thus easing some of the relative discomfort) were also developed.

Contact lenses have particular advantages in treating certain defects that can be corrected only partially by prescription eyeglasses; for example, contact lenses avoid the distortion of size that occurs with thick corrective lenses.

contact process, modern industrial method of producing sulfuric acid; it has largely replaced the chamber, or lead-chamber, process. Sulfur dioxide and oxygen, passed over a hot catalyst, unite to form sulfur trioxide, which in turn combines with water to make sulfuric acid.

Contact-process plants are of two types. The simpler type, the sulfur-burning contact plants, use sulfur as the raw material. Molten sulfur is burned to form sulfur dioxide, which is cooled, then oxidized, usually in the presence of pellets of porous siliceous material impregnated with vanadium pentoxide and a potassium compound, to form sulfur trioxide at moderately high temperatures.

The other type of contact-process plant produces sulfur dioxide from low-grade, sulfur-bearing materials, such as pyrite. Cooling of the gas is necessary to remove impurities and to condense and remove part of the water vapour, which would dilute the acid product. The sulfur dioxide gas is then dried with concentrated sulfuric acid. As a result of its purification, the gas in this process is cold, instead of hot as in sulfur-burning plants, and must be heated to the temperature at which the catalyst begins to function.

contagious bovine typhus: *see* rinderpest.

containerization, method of transporting freight by placing it in large containers. Containerization is an important cargo-moving technique developed in the 20th century. Road-and-rail containers, sealed boxes of standard sizes, were used early in the century; but it was not until the 1960s that containerization became a major element in ocean shipping, made possible by new ships specifically designed for container carrying. Large and fast, container ships carry containers above deck as well as below; and their cargoes are easily loaded and unloaded, making possible more frequent trips and minimum lost time in port. Port facilities for rapid handling of containers are necessarily complex and expensive and usually justified only if there is large cargo traffic flowing both ways. A container may leave a factory by truck and be transferred to a railroad car, thence to a ship, and, finally, to a barge; such transfers of an uncontainerized cargo would add substantially to cost.

containment, strategic foreign policy pursued by the United States in the late 1940s and the early 1950s in order to check the expansionist policy of the Soviet Union. In an anonymous article in the July 1947 issue of *Foreign Affairs,* George F. Kennan, diplomat and U.S. State Department adviser on Soviet affairs, suggested a "long-term, patient but firm and vigilant containment of Russian expansive tendencies" in the hope that the regime would mellow or collapse. The Truman Doctrine of 1947, with its guarantee of immediate economic and military aid to Greece and Turkey, was an initial application of the policy of containment.

Contarini FAMILY, distinguished Venetian family, one of the 12 that elected the first doge in 697 and later gave Venice eight doges and many other eminent citizens.

The first of the family to be invested doge was Domenico, during whose reign (1043–70) Dalmatia was subjugated and the rebuilding of St. Mark's Church was begun. Andrea, doge from 1368 to 1382, ended the war with Genoa by defeating its fleet at Chioggia; he was the first to melt down his plate and mortgage his property for the benefit of the state. Gasparo (1483–1542) was a cardinal and diplomatist; as papal legate to the diet of Regensburg

(1541) he favoured certain concessions to the Protestants.

There were at one time no fewer than 18 branches of the family; one of the most important was that of Contarini dallo Zaffo, or di Giaffa, who had been invested with the countship of Jaffa in Syria for their services to Caterina Cornaro, queen of Cyprus; another was that of Contarini degli Scrigni ("of the Coffers"), so called because of their great wealth. Many members of the family distinguished themselves in the service of the republic, in the wars against the Turks, and no fewer than seven Contarini fought at the Battle of Lepanto. Other members of the house were famous as merchants, prelates, and men of letters; among these may be mentioned Cardinal Gasparo Contarini (1483–1542) and Marco Contarini (1631–1689), who was celebrated as a patron of music and collected at his villa of Piazzola a large number of valuable musical manuscripts, now in the Marciana Library at Venice. The family owned many places in various parts of Venice, and several streets still bear its name.

Conté, Nicolas-Jacques (b. Aug. 4, 1755, Aunou-sur-Orne, near Sées, Fr.—d. Dec. 6, 1805, Paris), French mechanical genius who developed the method on which the manufacture of modern pencils is based.

At 14 he took up portrait painting, from which he derived a considerable income. Passionately interested in mechanical arts and science, he began displaying his inventive faculty during the French Revolution. With the supply of plumbago (a native English graphite) cut off by war, Conté devised a mixture of clay and graphite used to this day in pencils.

Napoleon called upon him to serve as chief of the balloon corps in the Egyptian expedition (1798). When most of the French instruments and munitions were lost after the Battle of Aboukir (July 1799) and the revolt of Cairo, Conté immediately put his inventive genius to work, improvising tools and machines to supply bread, cloth, arms and munitions, exact tools for engineers, and operating instruments for surgeons. He seemed able to invent anything required—to design, build models, and organize and supervise the manufacturing process. On his return to France (1802), he was commissioned to publish a voluminous work on Egypt. He invented an engraving machine to shorten the task, which, however, he did not live to see finished.

conté crayon, French CRAYON CONTÉ, drawing pencil named after Nicolas-Jacques Conté, the French scientist who invented it late in the 18th century. The conté crayon is an especially hard pencil, made of an admixture of graphite and clay that can be varied for different degrees of hardness. It is usually made in black, red, or brown and is used as a drawing medium in any combination of these colours.



"Lady Clown," black conté crayon with colour by Henri de Toulouse-Lautrec, *c.* 1899; in a private collection

contempt, in law, insult to, interference with, or violation of a sovereign court or legislative body. The concept is of English origin and is found only in countries that follow the common-law system. The primary importance of the notion of contempt is that it warrants judicial action in defense of the judicial or legislative power itself. Often, this power is without many of the safeguards that generally restrict the power of the state in the punishment of civil or criminal wrongs.

An act or language that consists solely of an affront to a court or interferes with the conduct of its business falls in the category of criminal contempt. An act of disobedience to a court order, however, because of its multiple effects, may be treated either as civil or criminal contempt or both. On the one hand, it is an insult to the court and an interference with its judicial authority and therefore constitutes criminal contempt. It may also have the consequence of depriving a party to a lawsuit of the relief that the court order afforded him, thereby constituting civil contempt. In the latter case, the court may take measures to secure to the litigant that to which he was entitled under the court order or to compensate him for the loss resulting from the disobedient act.

In both criminal and civil contempt proceedings, but more commonly in the former, a distinction is drawn between contumacious acts that take place in the presence of the court and are labeled direct contempts and those that are committed outside the geographical boundaries of the court and are called indirect, or constructive, contempts.

In England, both houses of Parliament have asserted their power to punish contumacious acts. The power to punish for contempt has involved the sanction of direct imprisonment of the offender by the offended house. The House of Commons, however, can detain an offender only during its session, whereas the House of Lords can detain an offender for any fixed period, even beyond adjournment.

Until 1927, the U.S. courts severely limited the investigative and contempt powers of Congress. The expansion of congressional investigative power in the 1930s was upheld by the courts, although with certain limitations. While there is no doubt that a congressional committee can compel the attendance of witnesses, a witness who has refused to testify or to answer a question cannot be held in contempt unless it has been made clear to him that his refusal will be treated as contumacious. The contempt must be deliberate and intentional, and the question addressed to the witness must be pertinent to the inquiry authorized by Congress. Moreover, its pertinency must be made clear to the objecting witness. Further, the protection of the Fifth Amendment of the U.S. Constitution against compulsory self-incrimination applies to witnesses before congressional committees. *See also* perjury.

Contending States (China): *see* Warring States.

Conti, PRINCES OF, titled French nobility belonging to the Condé branch of the House of Bourbon, grouped below chronologically and indicated by the symbol •.

• **Conti, François de Bourbon, prince de** (b. 1558—d. Aug. 13, 1614, Paris), third son of Louis I de Bourbon, 1st prince of Condé; he was given the title of marquis de Conti and between 1581 and 1597 was elevated to the rank of a prince.

Conti, who was a Roman Catholic, appears to have taken no part in the Wars of Religion until 1587, when his distrust of Henri, third duke of Guise, caused him to declare against the League and to support Henry of Navarre, afterward King Henry IV of France. In 1589, after the murder of Henry III, he was one of the two princes of the blood who signed the declaration recognizing Henry IV as king, and he continued to support Henry, although on the death of Charles, cardinal de Bourbon, in 1590, he himself was mentioned as a candidate for the throne. In 1605 Conti (whose first wife, Jeanne de Cöeme, heiress of Bonnêtable, had died in 1601) married the beautiful and witty Louise-Marguerite de Lorraine (1574–1631), daughter of Henri, duke of Guise, and Catherine of Cleves, whom, but for the influence of his mistress Gabrielle d'Estrées, Henry IV would have made his queen. Conti died in 1614. His only child, Marie, having predeceased him in 1610, the title lapsed.

His widow, the princess of Conti, followed the fortunes of Marie Médicis, from whom she received many marks of favour, and was secretly married to François de Bassompierre, who joined her in conspiring against Cardinal de Richelieu. Upon the exposure of the plot, the cardinal exiled her to her estate at Eu, near Amiens, where she died on April 30, 1631. The princess wrote *Aventures de la cour de Perse,* in which, under the veil of fictitious scenes and names, she told the history of her own time.

• **Conti, Armand I de Bourbon, prince de** (b. Oct. 11, 1629, Paris—d. Feb. 21, 1666, Pézénas, Fr.), second son of Henry II de Bourbon, 3rd prince of Condé, and younger brother of Louis II, the Great Condé, and of the duchess of Longueville. The title of prince of Conti was revived in his favour in 1629.

Destined for the church, Armand de Bourbon was the French crown's immediate nominee for a cardinal's hat; this gave rise to intrigues aimed at securing the nomination for another candidate if he should renounce it. On the outbreak of the Fronde in 1649, when his brother was supporting the government, his sister took Conti to join the Parisians, whereupon he was made generalissimo of the Fronde—to be the puppet of his supporters. Arrested with Condé and his sister's husband in 1650, he was released with them in 1651 as a result of the coalition between their faction and the Frondeurs, one of the terms of which was that he should marry Charlotte de Lorraine, daughter of the duchesse de Chevreuse. He accordingly renounced his ecclesiastical prospects, but the bargain was set aside by Condé. In 1652 he was left by Condé in command in Bordeaux, whence government forces expelled him in July 1653. He then made his peace with Cardinal Mazarin, marrying his niece Anne-Marie Martinozzi (1637–72) in 1654 and being sent to command in Catalonia (1654) and in Italy (1657). After figuring as a patron of literature, he fell like his sister under the influence of Jansenism. He died in Languedoc, of which he was governor.

• **Conti, Louis-Armand I de Bourbon, prince de** (b. April 4, 1661, Paris—d. Nov. 9, 1685, Fontainebleau, Fr.), eldest surviving son of Armand I de Bourbon, prince of Conti; he succeeded his father in 1666. His marriage (1680) to Marie-Anne de Bourbon (1666–1739), daughter of Louis XIV and Louise de La Vallière, was the first union between a prince of the blood and one of the King's bastards. He served with distinction in Flanders in 1683 and, against the wish of the king, went to Hungary, where he assisted the Imperialists to defeat the Turks at Gran in 1683. After a dissolute life he died at Fontainebleau from smallpox.

• Conti, François-Louis de Bourbon, prince de, also called (until 1685) PRINCE DE LA ROCHE-SUR-YON, byname THE GREAT CONTI, French LE GRAND CONTI (b. April 30, 1664, Paris—d. Feb. 22, 1709, Paris), younger brother of Louis-Armand I de Bourbon.

Naturally possessed of great ability, he received an excellent education and was distinguished for both the independence of his mind and the popularity of his manners. On this account he was not received with favour by Louis XIV; so in 1683 he assisted the Imperialists in Hungary, and while there he wrote some letters in which he referred to Louis as *le roi du théâtre* ("the theatre king"), for which on his return to France he was temporarily banished to Chantilly. Conti was a favourite of his uncle, the Great Condé, whose granddaughter Marie-Thérèse de Bourbon (1666–1732) he married in 1688. In 1689 he accompanied his intimate friend Marshal Luxembourg to the Netherlands and shared in the French victories at Fleurus, Steinkirk, and Neerwinden. On the death of his cousin, Jean-Louis-Charles, duc de Longueville, Conti, in accordance with his cousin's will, claimed the principality of Neuchâtel against Marie, duchesse de Nemours, a sister of the Duke. He failed to obtain military assistance from the Swiss and, by the King's command, yielded the disputed territory to Marie, although the courts of law had decided in his favour.

The King's dislike was exacerbated as the well-informed, deliberately charming, and sexually ambivalent Conti won prestige at court and ingratiated himself with the Dauphin. To get rid of him, the King sponsored his candidature for the Polish crown, and Conti was elected king of Poland on June 27, 1697. Conti started rather unwillingly for his new kingdom, probably, as Saint-Simon remarks, owing to his affection for Françoise, wife of Philippe II, duc d'Orléans, and daughter of Louis XIV and Mme de Montespan. When he reached Danzig and found his rival Augustus II, elector of Saxony, already in possession of the Polish crown, he returned to France, where he was graciously received by Louis, although Saint-Simon says the King was vexed to see him again. But the misfortunes of the French armies during the earlier years of the War of the Spanish Succession compelled Louis to appoint Conti, whose military renown stood very high, to command the troops in Italy. He fell ill before he could take the field, and died, his death calling forth exceptional signs of mourning from all classes.

• Conti, Louis-Armand II de Bourbon, prince de (b. Nov. 10, 1695, Paris—d. May 4, 1727, Paris), only surviving son of François-Louis, the Great Conti. He was treated with great liberality by Louis XIV and also by the regent, Philippe, duc d'Orléans. He served under Marshal Villars in the War of the Spanish Succession, but he lacked the soldierly qualities of his father. In 1713 he married Louise-Élisabeth (1693–1775), daughter of Louis-Henri de Bourbon, 7th prince of Condé, and granddaughter of Louis XIV. He was a prominent supporter of the financial schemes of John Law, by which he made large sums of money.

Articles are alphabetized word by word, not letter by letter

• Conti, Louis-François de Bourbon, prince de (b. Aug. 13, 1717, Paris—d. Aug. 2, 1776, Paris), Louis-Armand II's second son.

He adopted a military career and, when the War of the Austrian Succession broke out in 1741, accompanied Charles Louis, duc de Belle-Isle, to Bohemia. His services there led to his appointment to command the army in Italy, where he distinguished himself by forcing the pass of Villafranca and winning the Battle of Coni in 1744. In 1745 he was sent to check the Imperialists in Germany and in 1746 was transferred to the Netherlands, where some jealousy between Marshal Saxe and himself led to his retirement in 1747.

In 1747 a faction among the Polish nobels offered Conti the crown of that country, where owing to the feeble health of King Augustus III a vacancy was expected. He won the personal support of Louis XV for his candidature, although the policy of the French ministers was to establish the House of Saxony in Poland, because the French dauphiness was a daughter of Augustus. Louis therefore began secret personal relations with his ambassadors in eastern Europe, who were thus receiving contradictory instructions—a policy known later as the *secret du roi*. Although Conti did not secure the Polish throne he remained in the confidence of Louis until 1755, when his influence was destroyed by the intrigues of Mme de Pompadour, so that when the Seven Years' War broke out in 1756 he was refused the command of the Army of the Rhine and began the opposition to the administration which caused Louis to refer to him as "my cousin the advocate." In 1771 he was prominent in opposition to the chancellor Maupeou. He supported the Parlements against the ministry, was especially active in his hostility to Turgot, and was suspected of aiding a rising at Dijon in 1775.

Conti inherited literary tastes from his father, was a brave and skillful general, and a diligent student of military history. His house, over which the Comtesse de Boufflers presided, was the resort of many men of letters, and he was a patron of Jean-Jacques Rousseau and Beaumarchais.

• Conti, Louis-François-Joseph de Bourbon, prince de (b. Sept. 1, 1734, Paris—d. March 10, 1814, Barcelona), last of the princes of Conti, the only legitimate son of Louis-François de Bourbon, the former prince.

He possessed considerable talent as a soldier and distinguished himself during the Seven Years' War. He took the side of Maupeou in the struggle between the chancellor and the Parlements and in 1788 declared that the integrity of the constitution must be maintained. At the outbreak of the Revolution in 1789 he emigrated because of the weakness of Louis XVI but refused to share in the plans for the invasion of France and returned to his native country in 1790. Arrested as a monarchist by order of the National Convention in 1793, he was acquitted but was reduced to poverty by the confiscation of his possessions. He afterward received a pension, but the Directory banished him from France, and, because he refused to share in the plots of the royalists, he lived at Barcelona until his death in 1814, when the House of Conti became extinct.

Conti, Gregory (antipope): *see* Victor (IV).

Conti, Michelangiolo dei, Michelangiolo also spelled MICHELANGELO (pope): *see* Innocent XIII.

Conti, Niccolò dei (b. *c.* 1395, Chioggia?, near Venice—d. 1469, Venice?), Venetian merchant who brought back a vivid account of his 25 years of travels in southern Asia.

As a young man living in Damascus, he learned Arabic. In 1414 he set out for Baghdad, then journeyed down the Tigris River and eventually reached Hormuz, now in Iran, near the southern end of the Persian Gulf. He moved on to Calacatia, a trading centre on the Persian coast, learned the language, and entered a partnership with some Persian merchants who accompanied him on his travels.

In India, where he apparently married an Indian woman, he visited the state of Cambay in the northwest; Vijayanagar (now Hampi, Karnataka state), about 150 miles east of Goa; and Maliapur (now Mylapore, a suburb of modern Madras). Maliapur, regarded as the resting place of St. Thomas the Apostle, was the shrine most sacred to Indian Christians. He then went to Sumatra, where he encountered cannibalism and found pepper and gold. He also visited Tenasserim, now in Burma, and the Ganges Delta region. In Burma he sailed down the Irrawaddy River, stopping at the prosperous city of Pegu.

Java was the farthest point Conti reached. By way of Ciampa (perhaps modern Thailand) and probably Ceylon, he went on to Quilon in extreme southwestern India. His stops along India's Malabar Coast included Cochin and Calicut, now Kozhikode. He revisited Cambay before making his way to the southern coast of the Arabian Peninsula and the city of Aden. He also stopped at Jidda, the port for Mecca, and then went overland to Cairo and Mt. Sinai before arriving in Venice (1444). As penance for renouncing Christianity during his travels he was required to recount his ventures to Pope Eugenius IV's secretary, the scholar and Humanist Poggio (Gian Francesco Poggio Bracciolini). His narrative, recorded in Latin, is a valuable account of southern Asia in the 15th century. It appeared in 1857 in an English translation, edited by R.H. Major, as *India in the Fifteenth Century*.

contiguity, theory of, psychological theory of learning which emphasizes that the only condition necessary for the association of stimuli and responses is that there be a close temporal relationship between them. It holds that learning will occur regardless of whether reinforcement is given, so long as the conditioned stimulus and the response occur together. Psychologists John Watson and E.R. Guthrie were both proponents of the theory of contiguity.

continent, one of the larger continuous masses of land, namely, Asia, Africa, North America, South America, Antarctica, Europe, and Australia, listed in order of size. (Europe and Asia are sometimes considered a single continent, Eurasia.)

There is great variation in the sizes of continents; Asia is more than five times as large as Australia. The largest island in the world, Greenland, is only about one-fourth the size of Australia. The continents differ sharply in their degree of compactness. Africa has the most regular coastline and, consequently, the lowest ratio of coastline to total area. Europe is the most irregular and indented and has by far the highest ratio of coastline to total area.

The continents are not distributed evenly over the surface of the globe. If a hemisphere map centred in northwestern Europe is drawn, most of the world's land area can be seen to lie within that hemisphere. More than two-thirds of the Earth's land surface lies north of the Equator, and all the continents except Antarctica are wedge shaped, wider in the north than they are in the south.

The distribution of the continental platforms and ocean basins on the surface of the globe and the distribution of the major landform features have long been among the most intriguing problems for scientific investigation and theorizing. Among the many hypotheses that have been offered as explanation are: (1) the tetrahedral (four-faced) theory, in which a cooling earth assumes the shape of a tetrahedron by spherical collapse; (2) the accretion theory, in which younger rocks attached to older shield areas became buckled to form the landforms; (3) the continental-drift theory, in which an ancient floating continent drifted apart; and (4) the convection-current theory, in which convection currents in the Earth's interior dragged the crust to cause folding and mountain making.

Geological and seismological evidence accumulated in the 20th century indicates that the continental platforms do "float" on a crust of

heavier material that forms a layer completely enveloping the Earth. Each continent has one of the so-called shield areas that formed 2 billion to 4 billion years ago and is the core of the continent to which the remainder (most of the continent) has been added. Even the rocks of the extremely old shield areas are older in the centre and younger toward the margins, indicating that this process of accumulation started early. In North America the whole northeast quarter of the continent, called the Canadian, or Laurentian, Shield, is characterized by the ancient rocks of what might be called the original continent. In Europe the shield area underlies the eastern Scandinavian peninsula and Finland. The Guiana Highlands of South America are the core of that continent. Much of eastern Siberia is underlain by the ancient rocks, as are western Australia and southern Africa. *See also* continental drift.

Continental Airlines, Inc., American-based airline dating from 1934 and serving both North American and overseas destinations, with hubs mainly in Newark, N.J.; Cleveland, Ohio; Houston, Texas; and Denver, Colo., U.S. Its parent company is Continental Airlines Holdings, Inc. (formerly, 1980–90, Texas Air Corporation), headquartered in Houston.

The company's history traces to Varney Airlines, incorporated by Walter T. Varney in 1934. Later it came under the control of Robert Forman Six (president 1938–82), who gave the airline the name Continental and, in the following decades, transformed the shoestring operation into one of the major American transportation companies, headquartered first in Denver and then (from 1963) in Los Angeles, Calif. By the 1970s it was flying routes from Chicago, Miami, and New Orleans to various continental points westward to the Pacific Coast and to Hawaii,

Continental geographic extremes

feature	Africa	North America	South America	Antarctica	Asia*	Europe*	Oceania
total area	11,667,000 sq mi 30,218,000 sq km	9,355,000 sq mi 24,230,000 sq km	6,878,000 sq mi 17,814,000 sq km	5,500,000 sq mi 14,245,000 sq km	17,226,000 sq mi† 44,614,000 sq km	4,056,000 sq mi 10,505,000 sq km	3,283,000 sq mi 8,503,000 sq km
insular area	235,000 sq mi 608,000 sq km	1,570,000 sq mi† 4,066,000 sq km	54,000 sq mi 139,000 sq km	7,600 sq mi (ice free) 19,700 sq km	1,244,000 sq mi 3,221,000 sq km	351,000 sq mi 908,000 sq km	356,000 sq mi 923,000 sq km
length of coastline	19,000 miles 30,500 km	37,000 miles 60,000 km	16,000 miles 26,000 km	19,000 miles 30,000 km	39,000 miles† 62,000 km	24,000 miles 38,000 km	12,200 miles‡ 19,700 km
largest island	226,658 sq mi 587,041 sq km Madagascar	840,000 sq mi† 2,175,600 sq km Greenland	18,530 sq mi 47,992 sq km Tierra del Fuego	16,700 sq mi 43,200 sq km Alexander	283,400 sq mi 734,000 sq km Borneo	83,698 sq mi 216,777 sq km Great Britain	310,000 sq mi§ 800,000 sq km New Guinea
altitude							
maximum	19,340 feet 5,895 m Kilimanjaro	20,320 feet 6,194 m Mt. McKinley	22,831 feet 6,959 m Cerro Aconcagua	16,066 feet 4,897 m Vinson Massif	29,028 feet† 8,848 m Mt. Everest	18,510 feet 5,642 m Mt. Elbrus	16,500 feet 5,030 m Puncak Jaya
minimum	−502 feet −153 m Lake Assal	−282 feet −86 m Death Valley, California	−131 feet −40 m Peninsula Valdez	−8,327 feet†‖ −2,538 m Bentley Subglacial Trench	−1,312 feet −400 m Dead Sea	−94 feet −29 m Caspian Sea	−51 feet −15 m Lake Eyre
largest lake	26,828 sq mi 69,485 sq km Victoria	31,700 sq mi 82,100 sq km Superior	5,130 sq mi 13,280 sq km Maracaibo	—	143,000 sq mi† 371,000 sq km Caspian Sea	6,700 sq mi 17,600 sq km Ladoga	3,700 sq mi 9,500 sq km Eyre
longest river	4,132 miles† 6,650 km Nile	3,710 miles 5,971 km Mississippi	4,000 miles 6,400 km Amazon	—	3,915 miles 6,300 km Yangtze	2,193 miles 3,530 km Volga	1,702 miles 2,739 km Darling
highest waterfall	3,110 feet 948 m Tugela	2,425 feet¶ 739 m Yosemite	3,212 feet† 979 m Angel	—	1,148 feet 350 m Mawsmai	2,625 feet 800 m Utigardsfossen	1,904 feet 580 m Sutherland
largest desert	3,320,000 sq mi† 8,600,000 sq km Sahara	25,000 sq mi 65,000 sq km Mojave	260,000 sq mi 673,000 sq km Patagonia	—	900,000 sq mi 2,330,000 sq km Arabian	—	250,000 sq mi 647,000 sq km Great Victoria
temperature (populated places)							
annual average, maximum	94.0° F† 34.4° C Dalol, Ethiopia	85.5° F 29.7° C Atoyac, Mexico	83.9° F 28.8° C Las Piedras, Venezuela	17.4° F −8.1° C Maudheim Station	86.0° F 30.0° C Al-Jiz'ah, Saudi Arabia; Perim Island and Kamarān, Yemen	68.5° F 20.3° C Kárpathos, Greece	84.4° F 29.1° C Wyndham, Western Australia
annual average, minimum	51.4° F 10.8° C Ifrane, Morocco	2.4° F −16.4° C Aishihik, Yukon	36.5° F 2.5° C Cerro de Pasco, Peru	−70.0° F† −56.7° C Plateau Station	2.7° F −16.3° C Oymyakon, Russia	27.3° F −2.6° C Kautokeino, Norway	43.0° F 6.1° C Miena, Tasmania
absolute maximum	136.4° F† 58.0° C Al-'Azīzīyah, Libya Sept. 13, 1922	134.0° F 56.7° C Death Valley, California July 10, 1913	120.0° F 48.9° C Rivadavia, Argentina Dec. 11, 1905	59° F 15° C Lake Vanda Jan. 5, 1974	129.0° F 53.9° C Tirat Zevi, Israel June 21, 1942	119.8° F 48.8° C Seville, Spain Aug. 4, 1881	127.5° F 53.1° C Cloncurry, Queensland Jan. 16, 1889
absolute minimum	−11.2° F −24.0° C Ifrane, Morocco Feb. 11, 1935	−81.0° F♀ −62.8° C Snag, Yukon Feb. 3, 1947	−27.4° F −33.0° C Sarmiento, Argentina June 1, 1907	−129.0° F† −89.2° C Vostok Station July 21, 1983	−89.9° F −67.7° C Oymyakon, Russia Feb. 6, 1933	−67.0° F♂ −55.0° C Ust-Shchugor, Russia January	−8.0° F −22.2° C Charlotte Pass, New South Wales July 14, 1945, and Aug. 22, 1947
rainfall							
annual average, maximum	404.6 inches 10,277 mm Debundscha, Cameroon	262.1 inches 6,657 mm Henderson Lake, British Columbia	354 inches 8,992 mm Quibdó, Colombia	—	450.0 inches 11,430 mm Cherrapunji, India	182.8 inches 4,643 mm Crkvica, Yugoslavia	460.0 inches† 11,684 mm Mt. Waialeale, Hawaii
annual average, minimum	0.16 inch 4.1 mm Wadi Halfa, Sudan	1.2 inches 30.5 mm Los Bataques, Mexico	0.03 inch† 0.5 mm Arica, Chile	—	1.5 inches 38.1 mm Aden, Yemen	6.9 inches 175.3 mm Astrakhan, Russia	4.05 inches 102.8 mm Mulka Hill, South Australia

*Russia is divided into Asian and European portions, the boundary running along the eastern foot of the Urals. †Indicates world extreme. ‡Australia. §Politically, the western half of New Guinea belongs to Indonesia, which is usually classified as part of Asia, rather than Oceania. ‖Bottom surface of ice. ¶Falls of more than one leap. ♀Northice, Greenland, −87° F (−66° C). ♂Exact date unknown; lowest in a 15-year period.

the South Pacific, and the Far East, as well as south to Venezuela.

By the 1980s Continental had fallen on hard times. In 1981–82 it was taken over by Texas Air Corporation. The merger incurred heavy debt, and, after bankruptcy proceedings (1983) and reorganization, Continental reduced services by two-thirds. In 1987 other Texas Air subsidiaries—New York Airlines, Inc. (founded 1980), People Express Airlines (1981), and Presidential Airlines (1985)—were merged into Continental Airlines, significantly increasing the company's aircraft and routes, but it continued to lose money and continued to be debt-ridden. Bitter conflicts between the airline unions and Texas Air's corporate management (headed by chairman Frank Lorenzo until August 1990) tended to aggravate operations. Continental filed for bankruptcy in December 1990. The airline emerged from bankruptcy in 1993 after being acquired by Air Canada and a group of private investors.

continental air mass, vast body of air that forms over the interior of a continent, excluding mountainous areas. *See* air mass.

Continental Can Company: *see* Continental Group, Inc.

Continental Congress (1774–89), in the period of the U.S. War of Independence, the body of delegates who spoke and acted collectively for the people of the colony-states that later became the United States of America. The term most specifically refers to the bodies that met in 1774 and 1775–81 and respectively designated as the First Continental Congress and the Second Continental Congress.

In the spring of 1774, the British Parliament's passage of the Intolerable (Coercive) Acts, including the closing of the port of Boston, provoked keen resentment in the colonies. The First Continental Congress, convened in response to the Acts by the colonial Committees of Correspondence, met in Philadelphia on Sept. 5, 1774. Fifty-six deputies represented all the colonies except Georgia. Peyton Randolph of Virginia was unanimously elected president, thus establishing usage of that term as well as "Congress." Charles Thomson of Pennsylvania was elected secretary and served in that office during the 15-year life of the Congress.

To provide unity, delegates gave one vote to each state regardless of its size. The First Continental Congress included Patrick Henry, George Washington, John and Samuel Adams, John Jay, and John Dickinson. Meeting in secret session, the body rejected a plan for reconciling British authority with colonial freedom. Instead, it adopted a declaration of personal rights, including life, liberty, property, assembly, and trial by jury. The declaration also denounced taxation without representation and the maintenance of the British army in the colonies without their consent. Parliamentary regulation of American commerce, however, was willingly accepted.

In October 1774 the Congress petitioned the crown for a redress of grievances accumulated since 1763. In an effort to force compliance, it called for a general boycott of British goods and eventual nonexportation of American products, except rice, to Britain or the British West Indies. Its last act was to set a date for another Congress to meet on May 10, 1775, to consider further steps.

Before that Second Continental Congress assembled in the Pennsylvania State House, hostilities had already broken out between Americans and British troops at Lexington and Concord, Mass. New members of the Second Congress included Benjamin Franklin and Thomas Jefferson. John Hancock and John Jay were among those who served as president. The Congress "adopted" the New England military forces that had converged upon Boston and appointed Washington as commander in chief of the American army on June 15, 1775. It also acted as the provisional government of the 13 colony-states, issuing and borrowing money, establishing a postal service, and creating a navy. Although the Congress for some months maintained that the Americans were struggling for their rights within the British Empire, it gradually cut tie after tie with Britain until separation was complete. On July 2, 1776, with New York abstaining, the Congress "unanimously" resolved that "these United Colonies are, and of right ought to be, free and independent states." Two days later, it solemnly approved this Declaration of Independence. The Congress also prepared the Articles of Confederation, which, after being sanctioned by all the states, became the first U.S. constitution in March 1781.



The Continental Congress preparing to adopt the Declaration of Independence as (from left) John Adams, Roger Sherman, Robert Livingston, Thomas Jefferson, and Benjamin Franklin present the document to John Hancock (seated) in "The Declaration of Independence," oil on canvas by John Trumbull; in the Yale University Art Gallery, New Haven, Conn.

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The Articles placed Congress on a constitutional basis, legalizing the powers it had exercised since 1775. To underline this distinction, the post-Articles Congress is often referred to as the Congress of the Confederation, or the Confederation Congress. This Congress continued to function under the Articles until the new Congress, elected under the present Constitution, met in 1789.

Continental Divide, fairly continuous ridge of north-south–trending mountain summits in western North America which divides the continent's principal drainage into that flowing eastward (either to Hudson Bay in Canada or, chiefly, to the Mississippi River in the United States) and that flowing westward (into the Pacific Ocean). Most of the divide runs along the crest of the Rocky Mountains, through British Columbia and along the British Columbia–Alberta border in Canada, and through the states of Montana, Wyoming, Colorado, and New Mexico in the United States. It continues southward into Mexico and Central America, roughly paralleling the Sierra Madre Occidental and the Sierra Madre del Sur, with their associated ranges in Central America. In general usage the name continental divide is applied to the main water parting in any continent.

continental drift, the large-scale horizontal movements of continents relative to one another and to the ocean basins during one or more episodes of geologic time.

A brief treatment of continental drift follows. For full treatment, *see* MACROPAEDIA: Plate Tectonics.

The idea of a large-scale displacement of continents has a long history. Noting the apparent fit of the bulge of eastern South America into the bight of Africa, the German naturalist Alexander von Humboldt theorized about 1800 that the lands bordering the Atlantic Ocean had once been joined. Some 50 years later Antonio Snider-Pellegrini, a French scientist, argued that the presence of identical fossil plants in both North American and European coal deposits could be explained if the two continents were formerly connected but was difficult to account for otherwise. In 1908 Frank B. Taylor of the United States invoked the notion of continental collision to explain the formation of some of the world's mountain ranges.

The first truly detailed and comprehensive theory of continental drift was proposed in 1912 by Alfred Wegener, a German meteorologist. Bringing together a large mass of geologic and paleontological data, Wegener postulated that throughout most of geologic time there was only one continent, which he called Pangaea. Late in the Triassic Period (which lasted from 245 to 208 million years ago), Pangaea fragmented and the parts began to move away from one another. Westward drift of the Americas opened the Atlantic Ocean, and the Indian block drifted across the Equator to merge with Asia. In 1937 Alexander L. Du Toit, a South African geologist, modified Wegener's hypothesis by suggesting two primordial continents: Laurasia in the north and Gondwanaland (or Gondwana) in the south.

Aside from the congruency of continental shelf margins across the Atlantic, modern proponents of continental drift have amassed impressive geologic evidence to support their views. Indications of widespread glaciation from 380 to 250 million years ago are evident in Antarctica, southern South America, southern Africa, India, and Australia. If these continents were once united around the south polar region, this glaciation would become explicable as a unified sequence of events in time and space. Also, fitting the Americas with the continents across the Atlantic brings together similar kinds of rocks and geologic structures. A belt of ancient rocks along the Brazilian coast, for example, matches one in West Africa. Moreover, the earliest marine deposits along the Atlantic coastlines of either South America or Africa are Jurassic in age (208 to 144 million years old), suggesting that the ocean did not exist before that time.

Interest in continental drift increased in the 1950s as knowledge of the Earth's magnetic field during the geologic past developed from the studies of the British geophysicists Stanley K. Runcorn, P.M.S. Blackett, and others. Ferromagnetic minerals such as magnetite acquire a permanent magnetization when they crystallize as constituents of igneous rock. The

direction of their magnetization is the same as the direction of the Earth's magnetic field at the time and place of crystallization. Particles of magnetized minerals released from their parent igneous rocks by weathering may later realign themselves with the existing magnetic field at the time these particles are incorporated into sedimentary deposits. Studies of the remanent magnetism in suitable rocks of different ages from all over the world indicate that the magnetic poles were in different places at different times. The polar wandering curves are different for the various continents, but in important instances such differences are reconciled on the assumption that continents now separated were formerly joined. The curves for Europe and North America, for example, are reconciled by the assumption that the latter has drifted about 30° westward relative to Europe since the Triassic Period (245 to 208 million years ago).

Increased knowledge about the configuration of the ocean floor and the subsequent formulation of the concepts of seafloor spreading and plate tectonics provided further support for continental drift. During the early 1960s the American geophysicist Harry H. Hess proposed that new oceanic crust is continually generated by igneous activity at the crests of midocean ridges—submarine mountains that follow a sinuous course of about 60,000 km (37,000 miles) along the bottom of the major ocean basins. Molten rock material from the Earth's mantle rises upward to the crests, cools, and is later pushed aside by new intrusions. The ocean floor is thus pushed at right angles and in opposite directions away from the crests.

By the late 1960s several American investigators, among them Jack E. Oliver and Bryan L. Isacks, had integrated this notion of seafloor spreading with that of drifting continents and formulated the basis of plate tectonic theory. According to the latter hypothesis, the Earth's surface, or lithosphere, is composed of a number of large, rigid plates that float on a soft (presumably partially molten) layer of the mantle known as the asthenosphere. The midocean ridges occur along some of the plate margins. Where this is the case, the lithospheric plates separate and the upwelling mantle material forms new ocean floor along the trailing edges. As the plates move away from the flanks of the ridges, they carry the continents with them.

On the basis of all these factors, it may be assumed that the Americas were joined with Europe and Africa until approximately 190 million years ago, when a rift split them apart along what is now the crest of the Mid-Atlantic Ridge. Subsequent plate movements averaging about 2 cm (0.8 inch) per year have brought the continents to their present position. It seems likely, though still unproven, that this breakup of a single landmass and the drifting of its fragments is merely the latest in a series of similar occurrences throughout geologic time.

Continental Group, Inc., formerly (until 1976) CONTINENTAL CAN COMPANY, American manufacturer and distributor of metal, paper, and plastic packaging products. The company also produces package-making equipment and owns paper mills and a life insurance company, the Virginia-based Richmond Company. It is headquartered in Stamford, Conn.

The company was incorporated in 1913 to acquire three can-making companies. After acquiring a number of other can and paper companies, the name Continental Can Company was adopted. In 1976, however, the name was changed to the Continental Group to reflect the company's diversification into forest products and insurance.

Continental is one of the world's major multinational companies. It has been operating in Europe since 1930, when it began investing in Dutch and German packaging companies. In 1969 Continental, deciding that the American can market had become nearly saturated, determined to emphasize overseas operations, especially in Europe. In 1970 it formed what Continental hoped would become Europe's largest packaging company, Europemballage Corporation. Antitrust action by the European Economic Community, however, eventually barred it from taking an increasing share of the European market. Continental also has marketing contracts in many countries outside western Europe, including Poland and China.

In 1976 Continental bought the Richmond Corporation, a small life insurance company that Continental hoped would provide the cash needed for continued expansion. The company also owns and operates an oil and gas exploration company and a natural-gas pipeline system. In the 1970s Continental modernized much of its equipment so as to produce thinner cans with only two pieces of metal instead of the three pieces needed in the old can-making process.

Continental Oil Company (Conoco), American petroleum company founded in 1875 (as the Continental Oil and Transportation Company. In 1981 it was acquired by E.I. Du Pont de Nemours & Company and was reorganized as Continental Group. In addition to petroleum products, the group has interests in coal, other ores, and chemicals.

The original company was founded in Ogden, Utah, but two years later it reincorporated in California. In 1885 it again reincorporated—with the new name, Continental Oil Company—as part of the nationwide Standard Oil trust (*see* Standard Oil Company and Trust). In its early years its chief operations were marketing oil and related products, primarily in the Rocky Mountain area and in California. In 1913, two years after the U.S. Supreme Court dissolved the Standard Oil combine, the company was again independently incorporated. From 1913 to 1929 the company evolved into a fully integrated oil company from production to marketing, with operations in most states west of the Mississippi River.

By 1929 Conoco had 1,800 producing wells and was selling half the gasoline consumed in the Rocky Mountain states. In that year it merged with Marland Oil Company (founded 1917), with wells and marketing operations from Oklahoma to Maryland. After World War II, Conoco acquired fields or refineries in Louisiana, Canada, Libya, Dubai, the North Sea, and Indonesia. In 1966 it acquired Consolidation Coal Company, the second largest coal company in the United States, and shortly thereafter began venturing into uranium and copper mining.

continental shelf, broad, relatively shallow submarine platform that forms a border to a continent.

A brief treatment of continental shelves follows. For full treatment, *see* MACROPAEDIA: Oceans.

A continental shelf typically extends from the coast to depths of 100–200 m (330–660 feet). In nearly all instances, it ends at its seaward edge with an abrupt drop called the shelf break. Below this lies the continental slope, a much steeper zone that usually merges with a section of the ocean floor called the continental rise at a depth of roughly 4,000 to 5,000 m (13,000 to 16,500 feet).

Continental shelves tend to vary greatly in width, but they average about 65 km (40 miles). Almost everywhere the shelves represent simply a continuation of the continental land mass beneath the ocean margins. Accordingly, they are narrow, rough, and steep off mountainous coasts but broad and comparatively level offshore from plains. The shelf along the mountainous western coast of the United States, for example, is narrow, measuring only about 32 km (20 miles) wide, whereas that fringing the eastern coast extends more than 120 km (75 miles) in width. Exceptionally broad shelves occur off northern Australia and Argentina.

Continental shelves are usually covered with a layer of sand, silts, and silty muds. Their surfaces exhibit some relief, featuring small hills and ridges that alternate with shallow depressions and valleylike troughs. In a few cases, steep-walled V-shaped submarine canyons cut deeply into both the shelf and the slope below.

Since the 1970s an increasing number of investigators have sought to explain the origin of continental shelves and their related structures in terms of plate tectonics. According to this theory, the shelves of the Pacific Ocean, for example, formed as the leading edges of continental margins on lithospheric plates that terminate either at fracture zones (sites where two such plates slide past each other) or at subduction zones (sites where one of the colliding plates plunges into the underlying partially molten asthenosphere and is consumed, while the overriding plate is uplifted). Shelves of such origin tend to be steep, deformed, and covered by a thin layer of erosional debris. The Atlantic continental shelves, on the other hand, show little or no tectonic deformation and bear a thick veneer of sedimentary material. They are thought to be remnants of the trailing edges of the enormous plates that split apart and receded many millions of years ago to form the Atlantic basin. As the edges of the plates gradually contracted and subsided, large amounts of sand, silts, and mud from the continents settled and accumulated along their seaward side.

continental shield, any of the large stable areas of low relief in the Earth's crust that are composed of Precambrian crystalline rocks. The age of these rocks is in all cases greater than 570 million years, and radiometric age dating has revealed some that are as old as 2 to 3 billion years.

Shield areas in general are regarded as continental nuclei, the observation often being made that most continental shields are bordered by belts of folded rocks of post-Precambrian age. One school of thought holds that Earth history can be interpreted in terms of the concept of continental accretion—*i.e.,* that belts of successively younger rocks have undergone intense deformation in episodes of mountain building and have become welded onto the borders of the preexisting shields. In this way, the growth of continents might have occurred through geologic time.

Continental shields, as the name implies, occur on each of the continents. One of the best known is the Canadian Shield, which extends from Lake Superior on the south to the Arctic Islands on the north, and from western Canada eastward, to include most of Greenland. In South America, the principal shield area is called the Amazonian Shield. It occupies much of the eastern bulge of the continent. Smaller areas of Precambrian rocks to the north and south of the Amazonian Shield are designated the Guiana and Platian shields, respectively.

The Baltic, or Fennoscandian, Shield occupies most of Finland and Sweden, as well as eastern Norway. It is bordered on the west by the Caledonian Belt of younger, folded rocks. Shield areas are not recognized in central Europe, but farther south nearly one-half of the continent of Africa exhibits Precambrian rocks in outcrop (at the surface). The African Shield, sometimes called the Ethiopian Shield, extends eastward to include western Saudi Arabia and the eastern half of Madagascar.

The southern two-thirds of peninsular India,

most of the western half of Australia, and the eastern segment of Antarctica are also areas of continental shields. These areas of Precambrian rocks are termed, appropriately, the Indian Shield, the Australian Shield, and the Antarctic Shield.

In Asia the name Angaran Shield is applied to a large stable block bounded by the Lena and Yenisey rivers on the east and west and by the Arctic Ocean and Lake Baikal to the north and south. An area in China and North Korea is sometimes designated the China-Korean Shield. The Angaran Shield is bordered on the west by a belt of folded rocks that presently comprise the Ural Mountains and on the south by the Himalayas; these mobile zones separate the Angaran Shield from the Baltic Shield to the west and the Indian Shield to the south.

continental slope, seaward border of the continental shelf. The world's combined continental slope has a total length of approximately 300,000 km (200,000 miles) and descends at an average angle in excess of 4° from the shelf break at the edge of the continental shelf to the beginning of the ocean basins at depths of 100 to 3,200 m (330 to 10,500 feet).

A brief treatment of continental slopes follows. For full treatment, *see* MACROPAEDIA: Oceans.

The gradient of the slope is lowest off stable coasts without major rivers and highest off coasts with young mountain ranges and narrow continental shelves. Most Pacific slopes are steeper than Atlantic slopes; gradients are flattest in the Indian Ocean. About one-half of all continental slopes descend into deep-sea trenches or shallower depressions; most of the remainder terminate in fans of sediment or continental rises. The transition from continental crust to oceanic crust usually occurs below the continental slope.

Continental slopes are indented by numerous submarine canyons and mounds. The Blake Plateau off the southeastern United States and the continental borderland off southern California are examples of continental slopes separated from continental shelves by plateaus of intermediate depth. Slopes off mountainous coastlines and narrow shelves often have outcrops of rock. The predominant sediments of continental slopes are muds; there are smaller amounts of sediments of sand or gravel.

Continental System, in the Napoleonic wars, the blockade designed by Napoleon to paralyze Great Britain through the destruction of British commerce. The decrees of Berlin (Nov. 21, 1806) and Milan (Dec. 17, 1807) proclaimed a blockade: neutrals and French allies were not to trade with the British.

To this "continental system" England responded by Orders in Council which subjected France and all countries in alliance with Napoleon to a counterblockade.

The campaign of starvation brought great suffering to the belligerents and vast annoyance to neutrals. It was one of the main causes of the Anglo-American War of 1812. But because the British had an overwhelming superiority at sea, the contest proved disastrous to Napoleon—not only because of the resulting privations but also because to maintain his system he had to take on responsibilities too great for him.

continued fraction, expression of a number as the sum of an integer and a quotient, the denominator of which is the sum of an integer and a quotient, and so on. In general,

$$x = a_0 + \cfrac{b_0}{a_1 + \cfrac{b_1}{a_2 + \cfrac{b_2}{a_3 + \cdots}}}$$

In a simple continued fraction (SCF), all the numerators b_i are equal to 1 and all the leading terms a_i of the denominators are positive integers. An SCF is written, in the compact form, $[a_0; a_1, a_2, a_3, \ldots]$. If the number of terms a_i is finite, the SCF is said to terminate, and it represents a rational number; for example, $802/251 = [3; 5, 8, 6]$. If the number of these terms is infinite, the SCF does not terminate, and it represents an irrational number; for example, $\sqrt{23} = [4; 1, 3, 1, 8]$, in which the bar spans a sequence of terms that repeats indefinitely. A nonterminating SCF in which a sequence of terms recurs represents an irrational number that is a root of a quadratic equation with rational coefficients. Nonterminating SCFs that represent numbers such as π or e can be evaluated after any given number of terms to obtain a rational approximation to the irrational quantity.

continuing education: *see* adult education.

continuity, in mathematics, rigorous formulation of the intuitive concept of a function (a relationship in which every value of an independent variable—say x—is associated with a value of a dependent variable—say y) that varies smoothly, with no abrupt breaks or jumps. Continuity is sometimes expressed by saying that if the x-values are close together, then the y-values of the function will also be close. But if the question "How close?" is asked, difficulties arise.

For close x-values, the distance between the y-values will depend upon the slope of the function near these points and can be large even if the function has no sudden jumps. For example, if $y = 1{,}000x$, then two values of x that differ by 0.01 will have corresponding y-values differing by 10. On the other hand, for any point x points can be selected close enough to it so that the y-values of this function will be as close as desired, simply by choosing the x-values to be closer than 0.001 times the desired closeness of the y-values. Thus, continuity is defined precisely by saying that a function $f(x)$ is continuous at a point x_0 if, for any degree of closeness ε desired for the y-values, there is a distance δ for the x-values (in the above example equal to 0.001ε) such that for any x within the distance δ from x_0, $f(x)$ will be within the distance ε from $f(x_0)$. The function that equals 0 for x less than or equal to 1 and equals 2 for x larger than 1 is not continuous at the point $x = 1$, because the difference between the value of the function at 1 and at any point ever so slightly greater than 1 is never less than 2.

A function is said to be continuous on an interval if it is continuous at each point of the interval. The sum, difference, and product of continuous functions are also continuous, as is the quotient, except at points at which the denominator is zero. Continuity can also be defined in terms of limits (*see* limit) by saying that $f(x)$ is continuous at x_0 if

$$\lim_{x \to x_0} f(x) = f(x_0).$$

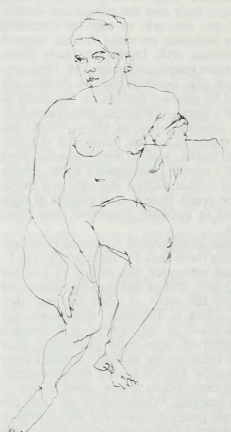
A more abstract definition can be given in terms of sets, as is done in topology, by saying that for any closed set of y-values, the corresponding set of x-values is also closed. Continuous functions are the most basic and widely studied class of functions in mathematical analysis, as well as the most commonly occurring ones in physical situations.

continuo (music): *see* thorough bass.

continuous voyage, in international law, a voyage that, in view of its purposes, is regarded as one single voyage though interrupted (as in the transshipment of contraband of war). The doctrine specifically refers to the stoppage and seizure of goods carried by neutral vessels either out of or heading toward a neutral port. If such goods were to be transshipped to another belligerent (the enemy) at some point in the voyage, the state invoking the doctrine could claim that, regardless of the period of neutral possession, the voyage was continuously geared toward trade with the belligerent power.

Perhaps the most famous invocation of the doctrine of continuous voyage occurred during the Napoleonic wars, when American merchants attempted to evade British blockade restrictions by carrying goods from the French West Indies to France via U.S. ports. British courts ruled that such voyages were in fact continuous and were not entitled to be considered neutral commerce.

contour drawing, version of outline drawing, in which the artist, looking closely at the contour of an object, transfers it in one continuous line to paper without looking down to see what he is doing, except when he needs to place an internal feature such as an eye. The use of the word contour suggests that more



Nude female, contour drawing from *The Natural Way to Draw* by Kimon Nicolaïdes

K. Nicolaides, *The Natural Way to Draw*, copyright 1941 and © 1969 by Anne Nicolaides, reprinted by permission of the publisher Houghton Mifflin Company

emphasis is given to rendering mass and volume than in an outline drawing, and indeed in such works the tactile values are given as much importance as the purely visual ones. As a method of teaching art, contour drawing was popularized by Kimon Nicolaïdes in *The Natural Way to Draw* (1941).

contour farming, the practice of tilling sloped land along lines of consistent elevation in order to conserve rainwater and to reduce soil losses from surface erosion. These objectives are achieved by means of furrows, crop rows, and wheel tracks across slopes, all of which act as reservoirs to catch and retain rainwater, thus permitting increased infiltration and more uniform distribution.

Contour farming has been practiced for centuries in parts of the world where irrigation farming is important. Although in the United States the technique was first practiced at the turn of the 19th century, straight-line planting in rows parallel to field boundaries, regardless of slopes, long remained the prevalent method. Efforts by the U.S. Soil Conservation Service to promote contouring in the 1930s as an essential part of erosion control eventually led to its widespread adoption.

The practice has been proved to reduce fertilizer loss, power and time consumption, and wear on machines, as well as to increase crop

yields and reduce erosion. Contour farming is most effective when used in conjunction with such practices as strip-cropping, terracing, and water diversion.

contour integral (mathematics): *see* line integral.

contour mapping, the delineation of any property in map form by constructing lines of equal values of that property from available data points. A topographic map, for example, reveals the relief of an area by means of contour lines that represent elevation values; each such line passes through points of the same elevation. The method is not wholly objective because two investigators may produce somewhat different maps whenever interpolation between data points is necessary for construction of the contours. In addition to topography, there are scores of geophysical, geochemical, meteorological, sociological, and other variables that are mapped routinely by the method. The availability of plotting devices in recent years has permitted mapping by computer, which reduces the effect of human bias on the final product.

Contra-Remonstrant (Calvinist movement): *see* Gomarist.

contra tenor: *see* countertenor.

contraband, in the laws of war, goods that may not be shipped to a belligerent because they serve a military purpose.

The laws of war relating to contraband developed in the later European Middle Ages and have undergone continual development in order to meet the needs of the major maritime powers. In his *De jure belli ac pacis* (1625; *On the Law of War and Peace*), Hugo Grotius took note of a long-standing controversy in regard to what categories of cargo might be confiscated in the same way as weapons. He suggested a threefold classification, the forerunner of several different classifications enumerated from time to time with no visible effect on practice. Governments have issued proclamations listing the items they would seize, and these differed from country to country and from war to war.

From 1908 to 1909, however, 10 naval powers met in London to draw up an agreed code regarding belligerent restrictions on neutral trade. The resulting Declaration of London classified goods as (1) absolute contraband; (2) conditional contraband; and (3) free. The first class, military equipment, was subject to seizure on its way to any destination in enemy territory. The second class consisted of items such as food, clothing, and rolling stock, which were to be treated as contraband only if in transit to the government or armed forces of an enemy. The third class listed goods not subject to capture.

Though never ratified, the declaration was near enough to a general consensus to be provisionally adopted by both sides when World War I broke out in 1914. The demands of total war, however, resulted in such items as rubber, cotton, and soap being moved from the free list to absolute contraband. The declaration eventually became irrelevant and was explicitly discarded in 1916.

Apart from the difficulty of arriving at an agreed classification of contraband, a major problem was posed by maritime trade between neutrals. Goods shipped by one neutral to another were in principle free, but British and American practice in the 19th century, under the doctrine of "continuous voyage," extended the right to seizure of goods that, though on their way to a neutral destination, were to be forwarded to an enemy. The trend was thus toward the right to deprive an enemy of any benefits of neutral trade. This was emphasized during World War I by the Allied imposition of quotas on European neutrals to prevent them from supplying the enemy from their own stocks, which they would then replace from foreign sources.

In 1939 proclamations issued by the Allied powers and by Germany again differentiated between absolute and conditional contraband. The only secure maritime trade left to neutrals was that covered by the naval certificates issued by belligerents to approved shippers and cargos. This practice, originated by the English in 1590 and used in World War I, was greatly extended during World War II. Its widespread adoption amounted to official assertion that, in time of war, trade by sea could be conducted only with the approval of belligerents.

contraception, in human physiology, birth control (*q.v.*) through the deliberate prevention of conception or impregnation.

The link between pregnancy and a man's semen was dimly understood even in ancient times, so that the earliest contraceptive methods involved preventing semen from entering the woman's uterus. Coitus interruptus, or withdrawal of the penis before ejaculation, is one of the oldest methods, and, though it is not reliable, it is still widely practiced. Documents surviving from ancient Egypt record various methods for averting conception. The most lucid and detailed early account of contraceptive methods, however, is the work of Soranus of Ephesus (2nd century AD). For all practical purposes the education of the general populace on the subject of contraception was not initiated until the early 1800s. The first systematic work in contraception was begun in 1882 by Dr. Aletta Jacobs of The Netherlands.

From the late 19th century a greater understanding of reproductive anatomy and physiology led to the widespread use of methods and devices of varying reliability and risk. Sterilization, one of the most effective forms of contraception, is permanent and generally irreversible. The most effective of the reversible methods are hormonal contraceptives (birth-control pills, Norplant, Depo-Provera), intrauterine devices, and the condom used with a spermicide. Each of these has a potential success rate of some 99 percent if used consistently and correctly. Many methods of contraception involve secondary health risks. The safest contraceptive methods include the use of barrier devices and the avoidance of sexual intercourse during the period of ovulation.

Sterilization. More than 99 percent effective, sterilization (*q.v.*) procedures are relatively simple operations. In males the sterilization procedure is the vasectomy—the blocking or severing of the ductus deferentes (or vasa deferentia), which transport the male gametes; in females sterilization results from tubal ligation—the blocking or severing of the fallopian tubes, which transport the female gamete and provide an environment for fertilization. Although sterilization operations are considered permanent, procedures developed from the 1970s improved the chances of reversal.

Hormonal contraceptives. Several different kinds of drugs have been marketed that alter hormonal levels and suppress the hormonal signal from the pituitary gland for the ovaries to release an egg. One type of birth-control pill is a combination of synthetic estrogen and synthetic progesterone, which inhibit ovulation by simulating the biochemical action by which ovulation is arrested during pregnancy. The "mini-pill" contains synthetic progesterone, which inhibits ovulation only half the time, but also prevents the necessary monthly enrichment of the uterine lining and hampers sperm motility.

Generally, birth-control pills must be taken orally on a precise schedule for 20 or more days during each menstrual cycle, the exact number of days depending on the contents of the pill. Depo-Provera, a progesterone available in many countries, is administered by injection once every three months. Norplant consists of a set of small, soft tubes that are surgically implanted under the skin of a woman's arm, where they release the synthetic hormone progestin, which can prevent conception for up to five years.

The "morning-after pill"—a series of pills containing either high dosages of both estrogen and progestogen (any progestational steroid, such as progesterone) or only progestogen—is one of the few methods for preventing pregnancy after intercourse.

The safety of the use of hormonal contraceptives remains controversial. In addition to such troublesome but nonthreatening side effects as weight gain and nausea, the use of oral contraceptives has been linked to a greater incidence of blood-clotting disorders. High-risk groups include women over the age of 35, women who smoke, and women who have a history of clotting disorders, diabetes, high blood pressure, sickle-cell anemia, and various other conditions. Decreasing the hormonal dosage has mitigated some side effects, and further research has demonstrated some benefits, such as the prevention of certain kinds of tumour growth. Possible links between hormonal contraceptives and cancer or infertility have been the object of study.

Intrauterine devices (IUDs). IUDs are plastic or metal objects in a variety of shapes that are implanted inside the uterus. How they work is unclear, though researchers suspect that they cause a mild inflammation of the endometrium, thus inhibiting ovulation, preventing fertilization, or preventing implantation of a fertilized egg in the uterine lining. In some countries, various types of IUDs were taken off the market during the 1970s and '80s because of high instances of pelvic inflammatory disease (PID; an infection of the pelvic cavity that often leads to infertility and in severe cases can be fatal), ectopic pregnancies, and spontaneous septic abortions.

Barrier devices. Various mechanical devices used with spermicides have fewer risks attached, but they are generally less effective in practice because the user must be well-informed and willing to use them consistently. All barrier devices prevent sperm from entering the uterus—by sheathing the penis, as with a condom; by covering the uterine cervix with a diaphragm or cervical cap (used with a spermicidal cream or jelly); or by inserting a female condom (vaginal pouch) or a vaginal sponge permeated with a spermicide. The vaginal sponge is less effective than other devices but can be used for 24 hours. Spermicides, which—as the name suggests—kill sperm, also help prevent sperm from getting past the barrier device, improving the effectiveness of such devices to nearly 100 percent. Condoms and spermicides can help prevent the spread of sexually transmitted diseases (STDs). The diaphragm and the cervical cap, widely used before the advent of the birth-control pill and the IUD, have once again become popular because of the health risks associated with the newer methods.

Fertility awareness techniques. Three procedures can be followed to predict ovulation so that, during the approximately six days of a woman's most fertile monthly phase, sexual intercourse can be avoided. Their effectiveness is typically about 80 percent but may reach as high as 99 percent, depending on social and motivational factors. These techniques are attractive to women who do not want to use birth-control devices. In addition to keeping a calendar record of her cycle, a woman can, by taking her temperature daily, detect when an increase in her basal body temperature signals ovulation. These two procedures are often combined with a third, in

which a woman observes the difference in the constitution of the cervical mucus discharge that also signals the highly fertile period. The effectiveness of fertility observation depends on a regular menstrual cycle, which allows a woman to predict when ovulation will occur, and a great deal of awareness and training.

Some of the cheapest and most widely available contraceptive methods are too ineffective to be practical. Spermicides, whether in the form of cream, foam, or jelly, are only about 80 percent effective when used without some kind of barrier. Douching with water or with a spermicidal agent only affects the sperm that remain in the vaginal canal; the sperm that have already entered the uterus are not affected. Coitus interruptus, or withdrawal, does not account for drops of seminal fluid that are released before ejaculation. Breast-feeding inhibits ovulation, but not reliably enough to be effective.

Experimental and less widespread forms of birth control include an oral contraceptive for men.

contract, agreement entered into voluntarily by two or more parties who promise to exchange money, goods, or services according to a specified schedule. A simple purchase is effected as soon as each party has what it wants—usually money on one side and goods or services on the other—and hence a contract is unnecessary. More complicated and time-consuming transactions call for an agreement consisting of reciprocal promises that form the contract and that will remain in force until all parties are satisfied. Failure to honour a contract allows the other party to bring an action for damages in a court of law. Enforcement of good faith in matters of contract is considered among the most important functions of legal justice.

A brief treatment of contracts follows. For full treatment, *see* MACROPAEDIA: Business Law.

In establishing contract law, society attempts to maintain standards of fairness and social utility. On the one hand, a community functions best if everyone lives up to his promises; on the other hand, nonperformance of one's promise must be shown to have caused damage before it can be judged deserving of punishment.

A contract is said to exist when an offer is made and then accepted. Words of promise uttered before there is a consideration for them can be no more than an offer. Furthermore, the obligation of an offerer remains open until either it is accepted by the other party to the contract or the offerer rejects the offer prior to acceptance. An offer generally cannot be rejected once it has been accepted.

All contracts must be entered into both willingly and freely. A contract may be declared unenforceable if it violates this principle. Also, legal minors, the insane, and others viewed by the law as unable to care for themselves are usually forbidden from signing contracts, on the grounds that they may too easily be taken advantage of. Society, looking to its own general welfare, often forbids contracts that result in restraint of trade. And it goes without saying that agreements cannot be enforced when their performance violates the law. Even without such reasons for not enforcing a contract, the consent of a contracting party may still not be binding if the party can demonstrate that the proposal was essentially fraudulent. For example, a legal transfer of title for land may be voided and the money returned if it can be shown that what is actually swamp was represented as a suitable site for a dwelling. Such a contract may be voided for reason of misrepresentation (if not fraud) even if the seller can prove that he himself was unaware of the true state of affairs. Contracts may also be nullified in the case of so-called "acts of God" (*i.e.*, natural disasters) or in times of political unrest or war that make performance of the promises impossible.

Because it is in the nature of a contractual agreement to be quid pro quo, contract law usually demands that an exchange be transacted. Thus, a written promise to give property, with no price stipulated, can be held unenforceable by the courts. This possibility is generally avoided by the exchange of an object of real value (the disguised gift) for what is called nominal consideration: one dollar or even one peppercorn.

When the terms of fulfilling a contract are brought into dispute—as often happens in modern multiparty agreements—the disputants may decide to submit their differences to private, but binding, arbitration, believing that public litigation would be disadvantageous to all parties. In this way, trade secrets can be kept private, and disputes that could prove embarrassing can be kept from public records. However, on the whole, most contract actions are brought in regular courts of law that decide the terms of the contract and the rights and obligations of each party, assessing damages where called for.

contract bridge, card game developed in the 1920s that was the final step in the historical progression from whist to bridge whist to auction bridge to contract bridge. *See* bridge.

contract labour, the labour of workers whose freedom is restricted by the terms of a contractual relation and by laws that make such arrangements permissible and enforceable. The essence of the contract labourer's obligation is his surrender, for a specified period, of the freedom to quit his work and his employer. Other stipulations cover such matters as repayment of the costs of transportation, housing, and other expenses.

Contract labour has been based upon conditions of poverty and upon political and religious intolerance expressed in harsh penal codes. Deception, kidnapping, and coercion were often used to obtain workers, usually unskilled and poorly educated adult males. The contractual terms often reflected the disadvantageous position of the labourer, even approaching slavery in their severity. Contract labour still carries implications of compulsion and unfairness.

Indentured labour, one form of contract labour, was common in North America in colonial times. Its subjects were western European (mainly British) males and females. Some of the contracts were similar to apprenticeships, while the terms of others were harsh—usually imposed on criminals whose sentences were commuted if they agreed to colonial indenture. The indenture of Chinese and Indian labourers, who were commonly called coolies, was associated with European imperialism.

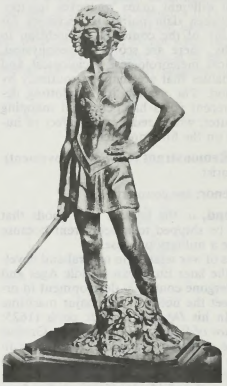
Contract labour is still found among migrant workers. A U.S. law of 1951 permitted the importation of agricultural workers from Mexico under contract, specifying that such importation would be subject to governmental supervision.

contractile vacuole, regulatory organelle, usually spherical, found in freshwater protozoa and lower metazoans, such as sponges and hydras, that collects excess fluid from the protoplasm and periodically empties it into the surrounding medium. It may also excrete nitrogenous wastes. In amoebas it changes position with the animal's movement; in most ciliates it follows a definite path through the cell; in the *Euglena* and other flagellates it remains stationary. The filling and emptying cycle may last from seconds to a minute, depending on the species.

contrail (aerology): *see* vapour trail.

contralto, in vocal music, the second-highest voice in four-part music, also called alto (*q.v.*).

contrapposto (Italian: "opposite"), in the visual arts, a sculptural scheme, originated by the ancient Greeks, in which the human figure is poised such that the weight rests on one leg (called the engaged leg), freeing the other leg, which is bent at the knee. With the weight shift, the hips, shoulders, and head tilt, suggesting internal organic movement. Contrapposto may be used for draped as well as nude figures. The Greeks invented this formula in the early 5th century BC as an alternative to the frontal, static pose—in which the weight is distributed equally on both legs—that had



"David," bronze statue in a contrapposto pose, by Andrea del Verrocchio, before 1476; in the Bargello, Florence
F. Bruckmann

dominated Greek figure sculpture from its inception. There is a clear development from the "Critius Boy" of the 5th century, whose leg is bent while his torso remains erect, to the completely relaxed 4th-century "Hermes of Praxiteles." The relaxation of the static frontal pose vastly enlarged the expressive possibilities of figure sculpture.

Gothic sculpture occasionally retained the idea of a supporting and a bent leg, transforming it so that the figure appeared to rise from, rather than rest heavily upon, the ground. Italian Renaissance artists such as Donatello and Andrea del Verrocchio revived the classical formula, giving it the name contrapposto, which suggests the action and reaction of the various parts of the figure, and enriching the conception by scientific anatomical study. Michelangelo introduced a tension of masses by pushing one forward and another back—thrusting an arm forward over a receding leg, for instance. The "David," which exemplifies his method, deeply influenced Gian Lorenzo Bernini and other Baroque sculptors. In modern times, contrapposto has been used for naturalistic representations of the relaxed standing figure, as in Aristide Maillol's "Venus with a Necklace" (*c.* 1918–28).

contrast medium, substance comparatively opaque to X ray, which, when present in an organ or tissue, causes a lighter appearance—*i.e.*, a more definite image—on the X-ray film. Some body structures, such as the lungs, show in X-ray films and in fluoroscopic images by virtue of the sharp difference between the X-ray absorbing power of the air that distends them and that of the pulmonary tissue itself. This difference in absorbing power is called contrast. The heart, being composed largely of muscle and blood, contrasts strongly with

the air-filled lungs adjacent to it but scarcely at all with the liver beneath; bones are distinguished from surrounding muscle and the various parts of bone from one another because of the calcium phosphate they contain. To a great extent, however, the clinical usefulness of the X-ray examination depends on the use of artificial contrast media. The most extensively used opaque medium is barium sulfate. Stirred into water and usually flavoured, this insoluble heavy metal salt is swallowed by the patient for examination of his esophagus and stomach; it is also used as a barium enema to examine the rectum, colon, and terminal ileum. Iodized organic compounds are used for examination of the gallbladder, urinary tract, blood vessels, spleen, liver, and bile ducts. X-ray visualization of the bronchi better than that obtained merely by the contrast of contained air is made possible by the introduction into the bronchial tree of unsaturated vegetable oil partially saturated with iodine. An emulsion of ethyl iodophenylundecylate also is used in bronchography and in the examination of the spinal canal (myelography). *See also* diagnostic radiology.

Contratación, Casa de (Spanish: House of Commerce), byname CASA DE LAS INDIAS (House of the Indies), central trading house and procurement agency for Spain's New World empire from the 16th to the 18th century. Organized in 1503 by Queen Isabella in Seville, it was initially headed by Juan Rodríguez de Fonseca, her chaplain and former overseer of the Columbus expeditions, and it became an instrument of the Spanish crown's policy of centralization and imperial control. Besides serving as general overseer of commerce between Spain and its American possessions, as the 16th century progressed, the Casa began controlling the African slave trade, scheduling ships and shipping routes, collecting duties, and maintaining royal revenues. It also established navigational and cartography schools and began the Archives of the Indies, still an important source of colonial documents. The Casa de Contratación was moved from Seville to Cádiz in 1717 and abolished in 1790.

contravention (law): *see* crime, délit, and contravention.

contredanse, genre of dance for several couples. The contredanse was an 18th-century French development of the English country dance (*q.v.*) and was performed into the 19th century by French, English, and German aristocrats and bourgeoisie. Contredanses at first used only the country dance's "longways" formations, in which each couple danced its way to the head of a double line (men on one side, women on the other). At the head of the line, the pair danced a duet before relinquishing the position to the next couple in line. Later contredanses on the Continent appropriated square formations from country dancing; these became the popular cotillion and quadrille (*qq.v.*). Cooperation was required to execute the various geometric figures of the contredanses because steps were often not standardized; *e.g.,* the longways duet could be performed differently by successive couples.

As a musical form written in $\frac{2}{4}$ or $\frac{6}{8}$ time, the contredanse was used by Beethoven and Mozart.

Contreras (Mexico): *see* Magdalena.

Contreras, Battle of, U.S. victory at a hamlet southwest of Mexico City, with which on Aug. 19–20, 1847, the army of Maj. Gen. Winfield Scott opened the final campaign of the Mexican War. Finding the road from Acapulco to Mexico City blocked by units of Gen. Antonio López de Santa Anna's army, Scott took the difficult road across the lava beds south of Lake Chalco. That route was held by Gen. Gabriel Valencia, who occupied the hill of Padierna, north of Contreras. On August 19 in an engagement lasting less than 20 minutes, Scott drove Valencia from Contreras and gained control of several roads leading to Mexico City. Before pushing on to the capital, he turned to attack the Mexicans on the Acapulco road and on August 20 captured Santa Anna's principal army at Churubusco.

Consult the INDEX *first*

contributory negligence, in law, behaviour that contributes to one's own injury or loss and fails to meet the standard of prudence that one should observe for one's own good. Contributory negligence of the plaintiff is frequently pleaded in defense to a charge of negligence.

Historically the doctrine grew out of distrust of juries, which have usually been more sympathetic to plaintiffs in personal injury lawsuits. The policy of not apportioning liability between parties to lawsuits (that is, charging each with some fraction of the blame) also encouraged the doctrine.

Contributory negligence usually arises in a lawsuit in which a plaintiff has accused a defendant of negligence. The defendant may then charge the plaintiff with contributory negligence. At common law, if the defendant proves this charge by a preponderance of evidence, the plaintiff cannot recover any damages—even if the defendant was negligent—because the contributory negligence breaks the causal connection between defendant's negligence and plaintiff's injury or loss. In English law since the Law Reform (Contributory Negligence) Act (1945) and in many states in the United States, if the plaintiff is shown to have contributed to the injury, recovery may still be allowed, but provision is made for an equitable reduction of damages.

Contributory negligence should be distinguished from several other doctrines often applied in negligence cases: assumption of risk, which relieves the defendant of an obligation of due care toward the plaintiff when the latter voluntarily exposes himself to certain dangers; last clear chance, which allows the plaintiff to recover even though contributorily negligent—if the defendant had the last clear chance to avoid the mishap.

Contributory negligence is criticized by some authorities because it excuses one party (defendant) even though both were negligent. One solution is loss apportionment—charging both parties when both were at fault. This practice operates in maritime law in Canada and Australia and in most civil-law countries (*e.g.,* France and Germany). *See also* negligence.

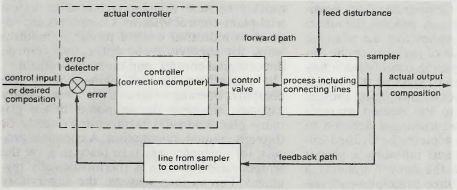
control system, means by which a variable quantity or set of variable quantities is made to conform to a prescribed norm. It either holds the values of the controlled quantities constant or causes them to vary in a prescribed way. A control system may be operated by electricity, by mechanical means, by fluid pressure (liquid or gas), or by a combination of means. When a computer is involved in the control circuit, it is usually more convenient to operate all of the control systems electrically, although intermixtures are fairly common.

Development of control systems. Control systems are intimately related to the concept of automation (*q.v.*), but the two fundamental types of control systems, feedforward and feedback, have classic ancestry. The loom invented by Joseph Jacquard of France in 1801 is an early example of feedforward; a set of punched cards programmed the patterns woven by the loom; no information from the process was used to correct the machine's operation. Similar feedforward control was incorporated in a number of machine tools invented in the 19th century, in which a cutting tool followed the shape of a model.

Feedback control, in which information from the process is used to correct a machine's operation, has an even older history. Roman engineers maintained water levels for their aqueduct system by means of floating valves that opened and closed at appropriate levels. The Dutch windmill of the 17th century was kept facing the wind by the action of an auxiliary vane that moved the entire upper part of the mill. The most famous example from the Industrial Revolution is James Watt's flyball governor of 1769, a device that regulated steam flow to a steam engine to maintain constant engine speed despite a changing load.

The first theoretical analysis of a control system, which presented a differential-equation model of the Watt governor, was published by James Clerk Maxwell, the Scottish physicist, in the 19th century. Maxwell's work was soon generalized and control theory developed by a number of contributions, including a notable study of the automatic steering system of the U.S. battleship "New Mexico," published in 1922. The 1930s saw the development of electrical feedback in long-distance telephone amplifiers and of the general theory of the servomechanism, by which a small amount of power controls a very large amount and makes automatic corrections. The pneumatic controller, basic to the development of early automated systems in the chemical and petroleum industries, and the analogue computer followed. All of these developments formed the basis for elaboration of control-system theory and applications during World War II, such as anti-aircraft batteries and fire-control systems.

Most of the theoretical studies as well as the practical systems up to World War II were single-loop—*i.e.,* they involved merely feedback from a single point and correction from a single point. In the 1950s the potential of multiple-loop systems came under investigation. In these systems feedback could be initiated at more than one point in a process and corrections made from more than one point. The introduction of analogue- and digital-computing equipment opened the way for much greater complexity in automatic-control



Essential components of a typical closed-loop control system

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theory, an advance since labelled "modern control" to distinguish it from the older, simpler, "classical control."

Basic principles. With few and relatively unimportant exceptions, all the modern control systems have two fundamental characteristics in common. These can be described as follows: (1) The value of the controlled quantity is varied by a motor (this word being used in a generalized sense), which draws its power from a local source rather than from an incoming signal. Thus there is available a large amount of power to effect necessary variations of the controlled quantity and to ensure that the operations of varying the controlled quantity do not load and distort the signals on which the accuracy of the control depends. (2) The rate at which energy is fed to the motor to effect variations in the value of the controlled quantity is determined more or less directly by some function of the difference between the actual and desired values of the controlled quantity. Thus, for example, in the case of a thermostatic heating system, the supply of fuel to the furnace is determined by whether the actual temperature is higher or lower than the desired temperature. A control system possessing these fundamental characteristics is called a closed-loop control system, or a servomechanism (see Figure). Open-loop control systems are feedforward systems.

The stability of a control system is determined to a large extent by its response to a suddenly applied signal, or transient. If such a signal causes the system to overcorrect itself, a phenomenon called hunting may occur in which the system first overcorrects itself in one direction and then overcorrects itself in the opposite direction. Because hunting is undesirable, measures are usually taken to correct it. The most common corrective measure is the addition of damping somewhere in the system. Damping slows down system response and avoids excessive overshoots or overcorrections. Damping can be in the form of electrical resistance in an electronic circuit, the application of a brake in a mechanical circuit, or forcing oil through a small orifice as in shock-absorber damping.

Another method of ascertaining the stability of a control system is to determine its frequency response—*i.e.,* its response to a continuously varying input signal at various frequencies. The output of the control system is then compared to the input with respect to amplitude and to phase—*i.e.,* the degree with which the input and output signals are out of step. Frequency response can be either determined experimentally—especially in electrical systems—or calculated mathematically if the constants of the system are known. Mathematical calculations are particularly useful for systems that can be described by ordinary linear differential equations. Graphic shortcuts also help greatly in the study of system responses.

Several other techniques enter into the design of advanced control systems. Adaptive control is the capability of the system to modify its own operation to achieve the best possible mode of operation. A general definition of adaptive control implies that an adaptive system must be capable of performing the following functions: providing continuous information about the present state of the system or identifying the process; comparing present system performance to the desired or optimum performance and making a decision to change the system to achieve the defined optimum performance; and initiating a proper modification to drive the control system to the optimum. These three principles—identification, decision, and modification—are inherent in any adaptive system.

Dynamic-optimizing control requires the control system to operate in such a way that a specific performance criterion is satisfied. This criterion is usually formulated in such terms that the controlled system must move from the original to a new position in the minimum possible time or at minimum total cost.

Learning control implies that the control system contains sufficient computational ability so that it can develop representations of the mathematical model of the system being controlled and can modify its own operation to take advantage of this newly developed knowledge. Thus, the learning control system is a further development of the adaptive controller.

Multivariable-noninteracting control involves large systems in which the size of internal variables is dependent upon the values of other related variables of the process. Thus the single-loop techniques of classical control theory will not suffice. More sophisticated techniques must be used to develop appropriate control systems for such processes.

Modern control practices. There are various cases in industrial control practice in which theoretical automatic control methods are not yet sufficiently advanced to design an automatic control system or completely to predict its effects. This situation is true of the very large, highly interconnected systems such as occur in many industrial plants. In this case, operations research (*q.v.*), a mathematical technique for evaluating possible procedures in a given situation, can be of value.

In determining the actual physical control system to be installed in an industrial plant, the instrumentation or control-system engineer has a wide range of possible equipment and methods to use. He may choose to use a set of analogue-type instruments, those that use a continuously varying physical representation of the signal involved—*i.e.,* a current, a voltage, or an air pressure. Devices built to handle such signals, generally called conventional devices, are capable of receiving only one input signal and delivering one output correction. Hence they are usually considered single-loop systems, and the total control system is built up of a collection of such devices. Analogue-type computers are available that can consider several variables at once for more complex control functions. These are very specific in their applications, however, and thus are not commonly used.

The number of control devices added to an industrial plant may vary widely from plant to plant. They may comprise only a few instruments that are used mainly as indicators of plant-operating conditions. The operator is thus made aware of off-normal conditions and he himself manually adjusts such plant operational devices as valves and speed regulators to maintain control. On the other hand, there may be devices of sufficient quantity and complexity so that nearly all the possible occurrences may be covered by a control-system action ensuring automatic control of any foreseeable failure or upset and thus making possible unattended control of the process.

With the development of very reliable models in the late 1960s, digital computers quickly became popular elements of industrial-plant-control systems. Computers are applied to industrial control problems in three ways: for supervisory or optimizing control; direct digital control; and hierarchy control.

In supervisory or optimizing control the computer operates in an external or secondary capacity, changing the set points in the primary plant-control system either directly or through manual intervention. A chemical process, for example, may take place in a vat the temperature of which is thermostatically regulated. For various reasons, the supervisory control system might intervene to reset the thermostat to a different level. The task of supervisory control is thus to "trim" the plant operation, thereby lowering costs or increasing production. Though the overall potential for gain from supervisory control is sharply limited, a malfunction of the computer cannot adversely affect the plant.

In direct-digital control a single digital computer replaces a group of single-loop analogue controllers. Its greater computational ability makes the substitution possible and also permits the application of more complex advanced-control techniques.

Hierarchy control attempts to apply computers to all the plant-control situations simultaneously. As such, it requires the most advanced computers and most sophisticated automatic-control devices to integrate the plant operation at every level from top-management decision to the movement of a valve.

The advantage offered by the digital computer over the conventional control system described earlier, costs being equal, is that the computer can be programmed readily to carry out a wide variety of separate tasks. In addition, it is fairly easy to change the program so as to carry out a new or revised set of tasks should the nature of the process change or the previously proposed system prove to be inadequate for the proposed task. With digital computers, this can usually be done with no change to the physical equipment of the control system. For the conventional control case, some of the physical hardware apparatus of the control system must be replaced in order to achieve new functions or new implementations of them.

Control systems have become a major component of the automation of production lines in modern factories. Automation began in the late 1940s with the development of the transfer machine, a mechanical device for moving and positioning large objects on a production line (*e.g.,* partly finished automobile engine blocks). These early machines had no feedback control as described above. Instead, manual intervention was required for any final adjustment of position or other corrective action necessary. Because of their large size and cost, long production runs were necessary to justify the use of transfer machines.

The need to reduce the high labour content of manufactured goods, the requirement to handle much smaller production runs, the desire to gain increased accuracy of manufacture, combined with the need for sophisticated tests of the product during manufacture, have resulted in the recent development of computerized production monitors, testing devices, and feedback-controlled production robots. The programmability of the digital computer to handle a wide range of tasks along with the capability of rapid change to a new program has made it invaluable for these purposes. Similarly, the need to compensate for the effect of tool wear and other variations in automatic machining operations has required the institution of a feedback control of tool positioning and cutting rate in place of the formerly used direct mechanical motion. Again, the result is a more accurately finished final product with less chance for tool or manufacturing machine damage.

control theory, field of applied mathematics that is relevant to the control of certain physical processes and systems. Although control theory has deep connections with classical areas of mathematics, such as the calculus of variations and the theory of differential equations, it did not become a field in its own right until the late 1950s and early 1960s. After World War II, problems arising in engineering and economics were recognized as variants of problems in differential equations and in the calculus of variations, though they were not covered by existing theories. At first, special modifications of classical techniques and theories were devised to solve individual

problems. It was then recognized that these seemingly diverse problems all had the same mathematical structure, and control theory emerged.

The systems, or processes, to which control theory is applied have the following structure. The state of the system at each instant of time t can be described by n quantities, which are labeled $x_1(t), x_2(t), \ldots, x_n(t)$. For example, the system may be a mixture of n chemical substances undergoing a reaction. The quantities $x_1(t), \ldots, x_n(t)$ would represent the concentrations of the n substances at time t.

At each instant of time t, the rates of change of the quantities $x_1(t), \ldots, x_n(t)$ depend upon the quantities $x_1(t), \ldots, x_n(t)$ themselves and upon the values of k so-called control variables, $u_1(t), \ldots, u_k(t)$, according to a known law. The values of the control variables are chosen to achieve some objective. The nature of the physical system usually imposes limitations on the allowable values of the control variables. In the chemical-reaction example, the kinetic equations furnish the law governing the rate of change of the concentrations, and the control variables could be pressure and temperature, which must lie between fixed maximum and minimum values at each time t.

Systems such as those just described are called control systems. The principal problems associated with control systems are those of controllability, observability, stabilizability, and optimal control.

The problem of controllability is the following. Given that the system is initially in state $a_1, a_2, \ldots, a_n$, can the controls $u_1(t), \ldots, u_k(t)$ be chosen so that the system will reach a preassigned state $b_1, \ldots, b_n$ in finite time? The observability problem is to obtain information about the state of the system at some time t when one cannot measure the state itself, but only a function of the state. The stabilizability problem is to choose control variables $u_1(t), \ldots, u_k(t)$ at each instant of time t so that the state $x_1(t), \ldots, x_n(t)$ of the system gets closer and closer to a preassigned state as the time of operation of the system gets larger and larger.

Probably the most prominent problem of control theory is that of optimal control. Here, the problem is to choose the control variables so that the system attains a desired state and does so in a way that is optimal in the following sense. A numerical measure of performance is assigned to the operation of the system, and the control variables $u_1(t), \ldots, u_k(t)$ are to be chosen so that the desired state is attained and the value of the performance measure is made as small as possible. To illustrate what is meant, consider the chemical-reaction example as representing an industrial process that must produce specified concentrations c_1 and c_2 of the first two substances. Assume that this occurs at some time T, at which time the reaction is stopped. At time T, the other substances, which are by-products of the reaction, have concentrations $x_3(T), x_4(T), \ldots, x_n(T)$. Some of these substances can be sold to produce revenue, while others must be disposed of at some cost. Thus the concentrations $x_3(T), \ldots, x_n(T)$ of the remaining substances contribute a "cost" to the system, which is the cost of disposal minus the revenue. This cost can be taken to be the measure of performance. The control problem in this special case is to choose the temperature and pressure at each instant of time so that the final concentrations c_1 and c_2 of the first two substances are attained at minimal cost.

The control problem discussed here is often called deterministic, in contrast to stochastic control problems, in which the state of the system is influenced by random disturbances. The system, however, is to be controlled with objectives similar to those of deterministic systems.

Contucci, Andrea: *see* Sansovino, Andrea.

conure, any of numerous gaudy American parrots of the subfamily Psittacinae (family Psittacidae). There are about 45 species, formerly grouped as *Conurus* and now placed in *Aratinga, Pyrrhura,* and about 5 other genera. These birds, with slender build and long, pointed tail, resemble parakeets and are often so called. The Carolina parakeet, *Conuropsis carolinensis,* originally found in eastern North America but presumed extinct by 1970, was a conure. Conures are found from Mexico to Argentina. Several are familiar caged birds; though handsome, they tend to be bad-tempered, have unpleasant calls, and usually do not mimic. Among them is the half-moon conure, *A. canicularis,* called Petz's conure, or "dwarf parrot"; from Central America, it is 24 cm (about 10 inches) long and mostly green, with orange forehead, dull-blue crown, and blue in the wings. The large (to 50 cm [20 inches]) Patagonian conure, or burrowing parrot, *Cyanoliseus patagonus,* nests colonially in cliff holes in temperate regions of Chile and Argentina.



Rock parakeet (*Pyrrhura rupicola*)
Painting by John P. O'Neill

convection, process by which heat is transferred by movement of a heated fluid such as air or water.

Natural convection results from the tendency of most fluids to expand when heated—*i.e.,* to become less dense and to rise as a result of the increased buoyancy. Circulation caused by this effect accounts for the uniform heating of water in a kettle or air in a heated room: the heated molecules expand the space they move in through increased speed against one another, rise, and then cool and come closer together again, with increase in density and a resultant sinking.

Forced convection involves the transport of fluid by methods other than that resulting from variation of density with temperature. Movement of air by a fan or of water by a pump are examples of forced convection.

Atmospheric convection currents can be set up by local heating effects such as solar radiation (heating and rising) or contact with cold surface masses (cooling and sinking). Such convection currents primarily move vertically and account for many atmospheric phenomena, such as clouds and thunderstorms.

convent, local community or residence of a religious order, particularly an order of nuns. *See* abbey.

convention, political: *see* political convention.

Convention Nationale (French Revolution): *see* National Convention.

Convention of ———: *see under* substantive word or words (*e.g.,* Malvana, Convention of).

convergence, in mathematics, property (exhibited by certain series and functions) of approaching a limit more and more closely as an argument of the function increases or decreases or as the number of terms of the series increases.

For example, the function $y = 1/x$ converges on zero as x increases. Although no finite value of x will cause the value of y actually to become zero, the limiting value of y is zero because y can be made as small as desired by choosing x large enough. The line $y = 0$ (the x-axis) is called an asymptote of the function.

Similarly, for any value of x between (but not including) -1 and $+1$, the series $1 + x + x^2 + \ldots + x^n$ converges toward the limit $1/(1 - x)$ as n, the number of terms, increases. The interval $-1 < x < 1$ is called the range of convergence of the series; for values of x outside this range, the series is said to diverge.

convergence and divergence, in meteorology, the enlarging and spreading out of air, as well as the rate at which this takes place. The twin term refers specifically to the horizontal inflow or outflow of air. The convergence of horizontal winds, as in one of the convergence zones, causes air to rise and the velocity of the rising air to increase aloft, whereas the divergence of horizontal winds causes downward motion of the air (subsidence). Ground-level atmospheric pressure is not affected by convergence, because divergence occurs simultaneously at higher levels.

In the region of the subtropical high-pressure centres, such as those over the oceans of the Northern Hemisphere, the clockwise flow of the large anticyclones causes the ocean's surface layer to converge because the water flow is deflected to the right of the wind direction. As the surface water converges, it tends to pile up in the centre of the vortex and must sink; this subsidence is aided by the increased density (salinity) caused by rapid evaporation. Conversely, in the Aleutian or Icelandic low-pressure areas, divergence of the surface water occurs because of the counterclockwise flow of the large cyclones.

converse, in logic, the proposition resulting from an interchange of subject and predicate with each other. Thus, the converse of "No man is a pencil" is "No pencil is a man." In traditional syllogistics, generally only E (universal negative) and I (particular affirmative) propositions yield a valid converse. The converse of a relation R is the relation S such that xSy (y has the relation S to x) if, and only if, yRx (x has the relation R to y). If a relation is identical to its converse, it is symmetric.

Converse, Frederick Shepherd (b. Jan. 5, 1871, Newton, Mass., U.S.—d. June 8, 1940, Westwood, Mass.), composer, prominent in the United States in the first quarter of the 20th century. His essentially Romantic music is coloured with Impressionistic touches.

Converse studied under two members of the conservative, German-influenced group of American composers, John Knowles Paine and George Chadwick. Later he studied in Munich. He taught at Harvard University (1901–07) and at the New England Conservatory of Music (1899–1901, 1930–38). His opera, *The Pipe of Desire* (1906), was the first opera by an American composer staged by the Metropolitan Opera Company (1910). Although his early works were conservative, he adopted a mildly modern idiom in the sym-

phonic fantasy *Flivver Ten Million* (1927), written to celebrate the production of the 10,000,000th Ford automobile. He also wrote six symphonies, chamber music, and many songs.

conversion, in law, unauthorized possession of personal property causing curtailment of the owner's possession or alteration of the property. The essence of conversion is not benefit to the wrongful taker but detriment to the rightful owner.

Conversion concerns possession, not ownership; thus, unauthorized taking of an object from a renter is the same as if the renter were owner. The property must be personal—as opposed to land—but may be merely a paper (*e.g.,* a club membership card) entitling the possessor to something.

To be conversion, a taking of property must be without the owner's consent. There must be some act giving the taker some control over the object, though actual physical removal is not essential.

The taking need not be malicious or even knowledgeable. Thus, one can commit conversion unaware of the owner's claim—although sometimes the owner must give notice of ownership (when a taker might believe the item has been abandoned). If the owner's mistaken belief that the object is not his causes a wrongful taking, however, that taking is not conversion.

Besides ordinary unauthorized takings, certain exceptional situations constitute conversion: detention of goods under an invalid contract; obtaining goods by fraud or duress; sale of another's property, if delivered; taking of specific money (*e.g.,* in a lost wallet).

Legal remedies for conversion used to be a tangle of formalities under the common law, but modern statutes have greatly simplified these. Generally the remedies for conversion allow return of the object taken and compensation for deprivation of its use, interest that would have been earned by the monetary value of the object and the cost of seeking its return (not including attorney's fees).

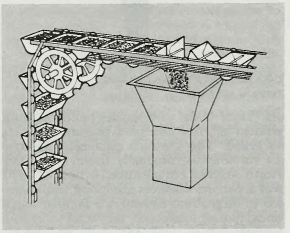
conversion, in syllogistic, or traditional, logic, interchanging the subject and predicate of a categorical proposition (*q.v.*), or statement. Conversion yields an equivalent proposition (and is hence a valid inference) in general only with so-called *E* and *I* propositions (universal negatives and particular affirmatives). For example, the converse of the *E* proposition "No men are immortal" is "No immortals are men" and that of the *I* proposition "Some man is mortal" is "Some mortal is man."

In mathematics the term converse is used for the proposition obtained by the transformation of *AB* implies *C* into *AC* implies *B*, rendered symbolically as $AB \supset C$ into $AC \supset B$. This operation may in some instances be reduced to the simple converse of an *A* proposition (universal affirmative) in the sense of traditional logic—for example: "Every equilateral triangle is equiangular," and, conversely, "Every equiangular triangle is equilateral." But such a reduction often becomes either impossible or very artificial. In this sense of conversion, the passage from a proposition to its converse is not, in general, a valid inference; and though often a mathematical proposition and its converse may both hold, separate proofs must be given for each case.

converso (Spanish: "converted"), one of the Spanish Jews who adopted the Christian religion after a severe persecution in the late 14th and early 15th centuries and the expulsion of religious Jews from Spain in the 1490s. In the minds of many Roman Catholic churchmen the *conversos* were still identified as Jews, partly because they remained within the Jewish communities in the cities and partly because their occupations (merchants, doctors, tailors) had been monopolized by the Spanish Jewish people. Such identification caused many Christians to regard *conversos* as a subversive force within the church.

In 1499 a staunch and somewhat fanatical Roman Catholic, Pedro Sarmiento, wrote the anti-Semitic *Sentencia-Estatuto,* which prohibited *conversos* from holding public or ecclesiastical offices and from testifying against Spanish Christians in courts of law. That statute was followed by the 16th-century laws of purity of blood (*limpieza de sangre*) which further strengthened the laws against anyone of Jewish ancestry and were more racial than religious in nature. It was not until the late 19th and early 20th centuries that some of the legalized prejudice against Jews in Spain was modified.

conveyor, any of various devices that provide mechanized movement of material, as in a factory; they are used principally in industrial applications but also on large farms, in warehousing and freight-handling, and in movement of raw materials. Conveyors may be only a few inches in length, or they may be integrated systems several miles long.



Bucket conveyor
By courtesy of Conveyor Equipment Manufacturers Association

Gravity-roller conveyors consist of a series of parallel rollers fastened to a metal frame supported at intervals. The frame can be inclined slightly for gravity flow, but objects and packages may also be rolled along manually. Gravity-wheel conveyors are similar but consist of skate wheels instead of rollers and are usually used for lighter loads. Live-roller conveyors are gravity-roller conveyors that are power driven by means of a belt snubbed against the underpart of the rolls or by a chain driving sprockets attached to the rolls.

Belt conveyors of fabric, rubber, plastic, leather, or metal are driven by a power-operated roll mounted underneath or at one end of the conveyor. The belt forms a continuous loop and is supported either on rollers, for heavy loads, or on a metal slider pan when the load is light enough to prevent frictional drag on the belt. Electric motors operating through constant- or variable-speed reduction gears usually provide the power.

Floor conveyors use chain, cable, or other linkage mounted in or close to the floor in an endless track. They are usually designed to drag a train of four-wheeled carts around in a loop to carry large products or materials for assembly on the conveying system. Power is furnished to the chain by guiding rollers.

Slat conveyors consist of endless chains, driven by electric motors operating through reduction gears and sprockets, with attached spaced slats to carry objects that would damage a belt because of sharp edges or heavy weights.

Flight conveyors have scrapers, or flights, mounted at intervals perpendicular to the direction of travel on endless power-driven chains operating within a trough. Bulk materials such as sawdust, sand, gravel, coal, and chemicals may be pushed along the trough.

Apron conveyors consist of endless chains with attached overlapping and interlocking plates to provide a continuous-carrying surface that forms a leakproof bed suitable for bulk materials without containers.

Vibrating conveyors consist of troughs or tubes flexibly supported and vibrated by mechanical or electrical means to convey objects or bulk materials; vibration takes place in an inclined, elliptical pattern to cause directional as well as upward movement of the material.

In trolley conveyors an overhead rail carries a series of load-bearing containers (trolleys) that are coupled together on an endless propelling medium such as cable, chain, or other linkage. The trolleys may be hooks, magnets, or various carriers designed for the particular load to be handled. The rails are usually supported by the framework of the plant building.

En masse conveyors use skeletal or solid flights mounted at intervals on a cable or chain power driven within a closely fitting casing. Designed for bulk materials that must be enclosed to prevent leakage or explosion, the conveyors can operate in horizontal, vertical, or inclined positions.

Bucket conveyors consist of endless chains or belts to which are attached buckets to convey bulk material in horizontal, inclined, and vertical paths. The buckets remain in carrying position until they are tipped to discharge the material. Various discharging mechanisms are available.

Screw conveyors consist of revolving shafts with continuous or broken spiral flighting that operates inside a casing. Powered by an electric motor and suitable gearing, the screw conveyor usually operates in one direction only to move fine bulk material such as meal, seed, and coal.

Pneumatic conveyors use air pressure or vacuum to move bulk material in tubes or ducts.

Tow conveyors may be overhead trolley cars or floor conveyors adapted for handling dollies, trucks, and cars, which are locked into the towing chain to be moved from any point in the system to any other point.

Various conveyors may be mounted on mobile supports, particularly gravity roller and wheel conveyors and short belt conveyors, for adaptation to portable use.

During the 1960s, air-float conveyors were introduced consisting of a platform, or pallet, equipped with air jets underneath to provide levitation. Thus supported, the platform can be easily moved in any direction over a flat surface.

Convocations of Canterbury and York: *see* Canterbury and York, Convocations of.

Convolvulaceae, the morning glory family of flowering plants, which includes about 50 genera and at least 1,400 species, widely cultivated for their colourful funnel-shaped flowers. The family is classified as a member of the phlox order, Polemoniales. Most are twining and erect herbs, with a few woody vines, trees, and shrubs. The family is widespread in both tropical and temperate areas. The sweet potato (*Ipomoea batatas*) is an economic plant of the family, but the ornamental vines are used in horticulture; several species of bindweeds are agricultural pests. The seeds of two species, *Rivea corymbosa* and *Ipomoea violacea,* are sources of hallucinogenic drugs of historical interest and contemporary concern.

The leaves of plants belonging to the family are alternate and simple or compound, and the flower petals are united in the characteristic funnel-shaped corolla. The stems often contain latex and are rarely tuberous. The roots are usually fibrous but sometimes form rootstalks or tubers.

convoy, vessels sailing under the protection of an armed escort. Originally, convoys of merchant ships were formed as a protection

against pirates. Since the 17th century, neutral powers have claimed the "right of convoy"; that is, immunity from search for neutral merchant vessels sailing under the convoy of a warship of the neutral. England, the dominant naval power, refused to recognize this right. Among states recognizing the right of convoy were the United States, Austria, and France. Great Britain deviated from its position only during the Crimean War in order to harmonize its practice with that of its French ally.

In the Declaration of London, 1909, the principal powers, including Great Britain, recognized and formalized the right of neutral convoy. The London declaration failed to enter into force, however. During World War I the right of convoy was invoked on only one or two occasions.

Convoys were to serve a totally different purpose during World War I—the protection of British merchant shipping against German surface raiders and submarines. The German practice of proclaiming as war zones large areas of the high seas and waging unrestricted submarine war on belligerent and neutral commercial shipping left the British no alternative to the practice of consolidating merchant vessels into large, protected groups, or convoys. The advantage of using convoys was that defenseless merchant vessels no longer need traverse the high seas alone and unprotected, but could travel in groups large enough to justify the allocation of scarce destroyers and other patrol vessels to escort them across the Atlantic. These warships, whose guns, torpedoes, and depth charges were more than a match for any submarine, would form a protective screen or cordon around the central core of merchant vessels. In order to come within striking distance of the merchant ships, the German submarines would themselves come under the deadly guns of the escort ships. Although the convoy system was not adopted in World War I until losses of British merchant ships became catastrophic in 1917, it then quickly proved effective.

During World War II the convoy system was developed to its fullest extent, and it played a decisive role in achieving victory against the formidable German submarine fleet formed to prey on Allied shipping. The new use of sonar, air escorts, specially designed rescue ships, and voice radio communications permitted convoys to be more easily coordinated, and afforded greater protection against the new German tactics of marshalling U-boats into "wolf packs" of 8 or even 20 submarines that would intercept convoys and attack them at night en masse. The effectiveness of the convoy system during World War II can be seen in the fact that of the approximately 2,700 Allied and neutral merchant vessels sunk by submarines, less than 30% were torpedoed while sailing in convoy, while 60% were unescorted and the rest were stragglers from convoys. From 1939 to 1942, 4,435 Allied and neutral ships were lost from all causes, including U-boats. From 1943, when the convoy system became fully operational, only 1,452 Allied and neutral ships were lost.

convulsion, pathological body condition characterized by abnormal, violent, and uncontrolled spasmodic contractions and relaxations of the voluntary muscles, taking the form of a fit. Convulsions may be a symptom resulting from various diseases; *e.g.,* epilepsy, uremia, eclampsia, rabies, tetanus, hysteria, strychnine poisoning, cerebral tumour, and other conditions. They are usually (but not always) accompanied by loss of consciousness. Treatment of convulsions should be prompt and include quiet rest, prevention of injury from falling and from biting the tongue or cheek, and bodily warmth and comfort. Medical advice is essential. *See also* epilepsy.

convulsion root (herb): *see* Indian pipe.

Conway, city, seat of Faulkner county, central Arkansas, U.S., 25 mi (40 km) north of Little Rock. Primarily an educational community, it is the home of the University of Central Arkansas (1907), Hendrix College (which moved there from Altus in 1890), and Central Baptist College (1893). Arkansas Children's Colony (1959), for the mentally retarded, is also in the city.

Founded in 1871 and incorporated in 1875, Conway was named after a family who moved to Arkansas in the early 1800s. Manufacturing that began after World War II was fostered by the establishment (1962) of an industrial park and the building of several missile sites in the vicinity. Conway Lake is to the south. Pop. (1990) 26,481.

Conway (Wales): *see* Conwy.

Conway, Henry Seymour (b. 1721—d. July 9, 1795, Park Place, near Henley-on-Thames, Oxfordshire, Eng.), military commander and prominent British politician who urged moderate treatment of the American colonies.

Conway began his military career while still in his teens and fought in the War of the Austrian Succession. After receiving the command of a regiment in 1749, he served in Ireland and was successively promoted to major general in 1756 and to lieutenant general in 1759.

Conway's concurrent political career began in the House of Commons, where he sat from 1741 to 1774 and, after a brief lapse, from 1775 to 1784. He emerged as a leading figure in the opposition when he attacked the government's use of general warrants (warrants not naming the person to be arrested) in the John Wilkes controversy. Conway's resistance to the crown in this affair lost him the King's favour, his military command, and his post as groom of the royal bedchamber in 1764. George III, however, was forced to accept the Rockingham administration, with Conway as secretary of state for the southern department, in July 1765. Inclined toward a policy of reconciliation with the Colonies, Conway successfully moved the repeal of the Stamp Act in 1766. He continued to serve as secretary of state and leader of the House of Commons in the Pitt-Grafton administration, during which time he opposed Chancellor of the Exchequer Charles Townshend's hardhanded colonial taxation policy.

Following his resignation from the government in January 1768, Conway returned to military duty and, in 1772, was promoted to general and awarded the governorship of the island of Jersey. In Parliament he strongly criticized continued British prosecution of the war with the American colonies. He played a crucial role in the House of Commons' resolution against continuing the war, a move that helped lead to the fall of Lord North's government in 1782. That March, Conway was appointed commander in chief and given a Cabinet seat in Rockingham's successor administration. Conway's political career came to an end, however, after he violently criticized the following government of the younger Pitt and lost his Parliamentary seat in the general election of 1784.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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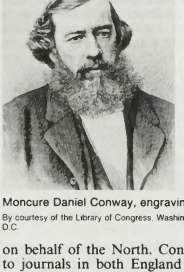
Conway, Moncure Daniel (b. March 17, 1832, Stafford County, Va., U.S.—d. Nov. 15, 1907, Paris), U.S. clergyman, author, and vigorous Abolitionist.

Conway was born of Methodist slaveholding parents and educated at Dickinson College, Carlisle, Pa., graduating in 1849. While serving in the Methodist ministry he was converted to Unitarianism, but because of his outspoken Abolitionist views he was dismissed from his first Unitarian pastorate, in Washington, D.C., in 1856. He moved to Cincinnati, Ohio, and became active in Abolitionist causes, even settling a colony of fugitive slaves at Yellow Springs, Ohio.

In 1862 he became co-editor in Boston of the *Commonwealth*, an anti-slavery paper. During the Civil War he went to England to lecture



Moncure Daniel Conway, engraving
By courtesy of the Library of Congress, Washington, D.C.

on behalf of the North. Conway contributed to journals in both England and the United States and wrote more than 70 books and pamphlets on a great variety of subjects. His scholarly works include *Life of Thomas Paine,* 2 vols. (1892) and *Collected Works of Thomas Paine,* 4 vols. (1894–96). His *Autobiography* (1904) is valuable for sketches of important 19th-century figures.

Conway, Thomas (b. Feb. 27, 1735, Ireland—d. *c.* 1800), general during the American War of Independence who advocated that George Washington be replaced by Horatio Gates as the army's commander in chief.

Conway moved from Ireland to France at the age of six. In 1749 he joined the French army, and by 1772 he held the rank of colonel. In 1776 Conway was recommended for service in the American army, and he arrived in the United States the following year. Appointed a brigadier general, he saw action at Brandywine and Germantown. Although regarded as a skillful disciplinarian of infantry, Conway was refused promotion to major general—largely due to the opposition of George Washington.

Conway then offered his resignation to Congress. Congress not only refused to accept it but commissioned him major general and—on the same day (Dec. 14, 1777)—inspector general. Believing Congress lacked confidence in Washington, Conway launched a secret correspondence with Gen. Horatio Gates, bolstering Gates's ambitions and criticizing Washington. The correspondence came to Washington's attention and the American commander wrote to both Conway and Gates (sending the Gates letter through Congress). With the "plot" exposed, congressional support for replacing Washington immediately evaporated. Although Conway himself played a minor role in the conspiracy, the entire event has been called the Conway Cabal.

In 1778 Conway intrigued to be named second in command to Lafayette during an expedition to Canada, but Lafayette refused to go along with the plan. Conway did accompany the expedition—but as third in command. On April 22, 1778, Conway again offered his resignation to Congress. This time, to his surprise, Congress accepted it.

On July 4, 1778, in a duel brought on by his criticism of Washington, Conway was wounded. Believing himself about to die, he wrote a long letter of apology to Washington. But Conway recovered, returned to France, and rejoined the French army. He served in

Flanders and India before returning to France after the start of the Revolution. In 1793 he was forced to flee France because of support for the royalist cause. He died in exile.

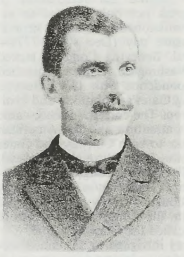
Conway (of Allington), William Martin Conway, Baron (b. April 12, 1856, Rochester, Kent, Eng.—d. April 19, 1937, London), British mountain climber, explorer, and art historian whose expeditions ranged from Europe to South America and Asia.

Conway began his climbing career in 1872 with an ascent of Breithorn in the Alps. In 1892 he mapped 2,000 square miles (5,180 square km) of the Karakoram Range in the Himalayas, for which achievement he was knighted three years later. He chronicled his feat in *Climbing and Exploration in the Karakoram-Himalayas* (1894). His traverse of the Alpine range from Monte Viso to Gross Glockner in 1894 was described in *The Alps from End to End* (1895), and *The First Crossing of Spitsbergen* (1897) records his exploration of the island in 1896–97. During expeditions in the Bolivian Andes in 1898, Conway climbed Aconcagua (22,831 feet [6,959 m]), the highest summit in the Western Hemisphere; Illimani (21,201 feet [6,462 m]); and Illampu (21,066 feet [6,421 m]), and explored the Tierra del Fuego archipelago. He retired from mountaineering in 1901.

Conway was also a Slade professor of fine arts at Cambridge University (1901–04) and a Unionist member of Parliament (1918–31). He was created a baron in 1931; the peerage became extinct upon his death. A prolific writer, he also authored *The Zermatt Pocket Book* (1881), a guide to climbing the Pennine Alps; *Early Tuscan Art* (1902); and *Mountain Memoirs* (1920).

Conwell, Russell Herman (b. Feb. 15, 1843, South Worthington, Mass., U.S.—d. Dec. 6, 1925, Philadelphia), American lawyer, author, clergyman, and educator whose lecture "Acres of Diamonds," which expressed his formula for success, brought him fame and wealth on the Chautauqua circuit.

In 1862 Conwell began law study at Yale but left a few weeks later to raise a company for service in the American Civil War, in which he was awarded the rank of captain. Admitted to the bar in 1865 (after graduating from Albany Law School, Albany, N.Y.), he



Conwell, lithograph by George H. Walker & Co.

By courtesy of the Library of Congress, Washington, D.C.

practiced law in Minneapolis and Boston. In 1867 he was editor in chief of the *Minneapolis Daily Chronicle,* and he was co-owner of the *Somerville* (Massachusetts) *Journal.*

Conwell was ordained a minister in 1881 and in 1882 was called to Grace Baptist Church in Philadelphia, a small congregation struggling with debt. The church prospered under his leadership, moving eventually to the much larger Baptist Temple. Conwell founded Temple University in 1884 as a series of night study courses for ministerial students; the school received a college charter in 1888 and became a university in 1907, with Conwell as its first president (from 1887).

Conwell delivered his lecture "Acres of Diamonds" no fewer than 6,000 times. The theme of the lecture was that opportunity lurks in everyone's backyard. Everyone, Conwell believed, can and ought to get rich and then use his money for the good of others. "Keep clean, fight hard, pick your openings judiciously, and have your eyes forever fixed on the heights toward which you are headed," was his simple formula for success and the central emphasis of his preaching.

Conwy, also spelled CONWAY, town, Aberconwy district, Gwynedd county, Wales, on the River Conwy Estuary of the North Wales coast.

Conwy was created by the English king Edward I in 1283 as one of a chain of fortified towns in the then newly invaded North Wales.



Thomas Telford's suspension bridge across the River Conwy, and the castle at Conwy, Gwynedd

J. Allan Cash — EB Inc.

A Cistercian monastery already occupied this site; but Edward removed the monastery upstream to Maenan, leaving its church as the borough's parish church. The town was built on as nearly a grid plan as the site permitted, with the castle on the river bank in the southeast corner. Though the castle was partially dismantled in 1665, the town walls (with 21 towers and 3 gateways) have remained virtually complete, making Conwy one of Europe's finest surviving examples of a medieval bastide (a town laid out according to a definite geometric plan). Sixteenth-century buildings in the town include the mansion Aberconwy (*c.* 1500), Plâs Mawr (the Great House, built 1577–80, now housing the Royal Cambrian Academy of Art), and the Black Lion (1582, a coaching inn). Across the Conwy Estuary, Deganwy is of much greater antiquity, with a 6th-century Welsh fortress; but little remains of its fortifications, and after Conwy was founded it became subordinate to the new town.

During the 19th century, transport improvements brought to Conwy Thomas Telford's graceful suspension bridge (1826) and Robert Stephenson's tubular railway bridge (1848). Conwy is now primarily a tourist centre. Pop. (1981) 13,462.

cony, also spelled CONEY, any of certain unrelated animals, including two mammals and two fishes.

The mammalian cony is a small, guinea pig–like relative to the rabbit; it is more commonly known by the name pika (*q.v.*). The name cony was once applied to the rabbit and is still sometimes used in the fur business to indicate rabbit fur. The cony of the Old World and of the Bible is an unrelated mammal, the hyrax (*q.v.*).

A variety of whitefish (*q.v.*), sometimes called inconnu, or sheefish, is also called cony, as are certain varieties of sea bass (*q.v.*).

Conybeare, William Daniel (b. June 7, 1787, St. Botolph, West Sussex, Eng.—d. Aug. 12, 1857, Itchen Stoke), English geologist and paleontologist, known for his classic work on the stratigraphy of the Carboniferous (280,000,000 to 345,000,000 years ago) System in England and Wales.

Conybeare was vicar of Axminster from 1836 until 1844, when he became dean of Llandaff, in Wales. In 1822 he and William Phillips produced their classic *Outlines of the Geology of England and Wales* (1822), in which fossils were used to date sedimentary formations; the book summarized geologic layers of Great Britain to the Carboniferous.

Conybeare contributed to the elucidation of the geology of Ireland and was also one of the first to use geologic cross sections to express subsurface structure. He wrote *On the Origin of a Remarkable Class of Organic Impressions Occurring in Nodules of Flint* (1814), *Hydrographical Basin of the Thames* (1829), and *Ichthyosaurus* (1821), the first description of this animal.

Conyngham, Gustavus (b. *c.* 1747, County Donegal, Ire.—d. Nov. 27, 1819, Philadelphia), American naval officer who fought the British in their own waters during the United States War of Independence.

Conyngham was taken to America in his youth and apprenticed to a captain in the West Indian trade. Advancing to shipmaster, he was employed to bring gunpowder from The Netherlands at the outbreak of the American Revolution but became stranded in The Netherlands. The American commissioners in France supplied him with a commission dated March 1, 1777, and sent him forth from Dunkirk, Fr., in May in an armed lugger. He captured a packet plying with mail between England and The Netherlands and brought it and another prize back to Dunkirk. Upon British protest, Conyngham and his crew were imprisoned, the prizes restored, and the captain's commission confiscated. The commissioners secured his release, supplied him with a new commission and the cutter *Revenge* and sent him again on a cruise out of Dunkirk. Sailing around the British Isles and operating off Spain and in the West Indies, he took 29 prizes in the ensuing two years, but he was finally captured, carried to England, and threatened with death as a pirate. Amid threatened reprisals on the part of the Continental Congress, Conyngham escaped to The Netherlands, where, in 1780, he joined John Paul Jones in a cruise in the frigate *Alliance.*

From the end of the war in 1783 until his death in Philadelphia in 1819, he waged a hopeless fight to gain recognition by Congress of his rank in the Navy. Almost a century after his death the commission that the French had confiscated and that could have substantiated his claim was found in the collection of a Parisian autograph dealer.

Coo (Greece): *see* Cos.

Coober Pedy, town and mining field in central South Australia, 590 miles (950 km) northwest of Adelaide. Most of the total world production of opals comes from this site in the Stuart Range on the edge of the Great Victoria Desert. The first stones were found in 1911. The settlement, owned by the local Progress Association, was established in 1915 and declared a town in 1960. Its name is an Aboriginal term meaning "white man's hole," referring to a practice of the miners, who, in order to escape temperatures that often climb to 125° F (52° C) three to four months of the year, built their dwellings below ground. Pop. (1986 est.) 2,103.

Cooch Behār, also spelled KUCH, or KOCH, BIHĀR, town, administrative headquarters of

Cooch Behār district, West Bengal state, northeastern India. The town lies just east of the Torsa River. It is an agricultural market centre, has major road and rail connections, and is linked by air with Calcutta. Leather-goods manufacture is an important industry. Cooch Behār contains the maharaja's palace, a hospital, and five colleges affiliated with the University of North Bengal.

Cooch Behār district (1,307 sq mi [3,386 sq km]), a former princely state, comprises an alluvial piedmont tract drained by the Tista, Torsa, and Jaldhāka rivers. Floods caused by the shifting of river courses are common. Rice, corn (maize), legumes, oilseeds, and tobacco are the chief crops. Dispersed forest areas shelter rhinoceroses, tigers, and gaurs (Indian bison). The district formed part of the ancient Kāmarūpa kingdom, with its capital at Kamatpur, near Cooch Behār town. In the 16th century the Koch kingdom was established. It was annexed by the Mughals in 1660 and ruled by the British in the 18th century, and the area was merged as a district with West Bengal in 1950. Pop. (1981) town, 62,127; metropolitan area, 80,101; district, 1,771,643.

Coogan, Jackie, byname of JOHN LESLIE COOGAN (b. Oct. 26, 1914, Los Angeles—d. March 1, 1984, Santa Monica, Calif., U.S.), the first major Hollywood child star, who rose to fame in the silent-film era and was best known as the sad-eyed waif of *The Kid* (1921) and similar movies.

The son of a vaudevillian and an actress, Coogan appeared in his first film, *Skinner's Baby* (1916), when he was 18 months old. Charlie Chaplin later noticed him in a stage act and featured him, aged 6, in *The Kid*, which gave him immediate international fame and led to roles in such films as *Peck's Bad Boy* (1921), *My Boy* (1921), *Trouble* (1922), *Oliver Twist* (1922), *Daddy* (1923), *Circus Days* (1923), *Long Live the King* (1923), *A Boy of Flanders* (1924), *Little Robinson Crusoe* (1924), *Old Clothes* (1925), *The Bugle Call* (1927), *Tom Sawyer* (1930), and *Huckleberry Finn* (1931). In 1923–24 he was making $22,000 a week and earning 60 percent of the profits from his pictures.

In 1935 he was the sole survivor of an auto accident in which his father and three others were killed. In 1938 he sued his mother and stepfather (his former business manager), only to learn that his parents had spent virtually all of his multimillion-dollar fortune. The larger result was that the California legislature enacted the Child Actors Bill, popularly called the "Coogan Law," ensuring child movie actors such rights as having their contracts approved by the courts and their income governed by financial institutions. During World War II Coogan served in the U.S. Army Air Force. In later years he played character roles in various films and television programs, most notably as Uncle Fester in the television series *The Addams Family* (1964–66).

Cook, Arthur James (b. Nov. 22, 1883, Wookey, Somerset, Eng.—d. Nov. 2, 1931, London), British labour leader, an impassioned orator who had a great following among British coal miners and who came, in the 1920s, to symbolize the miners' determined but ineffective struggle against the mineowners' insistence on lower wages and longer hours.

A coal miner from age 16, Cook in 1911 won a scholarship to the Central Labour College, London, and the following year he helped to write *The Miners' Next Step*, a report of the reform committee of the South Wales Miners' Federation. During World War I he was an outspoken pacifist. In 1918 and again in 1921 he was jailed for his leadership of striking miners. Elected secretary of the Miners' Federation of Great Britain in 1924, he was active in the miners' strike of 1926 and in the British general strike in May of that year. When the



Arthur Cook, 1926
BBC Hulton Picture Library

Trades Union Congress (TUC) abandoned the general strike, Cook urged the miners to return to work, but, after their initial refusal, he directed their strike until they capitulated. He later supported the planned-economy proposals (December 1930) of Sir Oswald Mosley, then a Labour Party member of the House of Commons and subsequently head of the British Union of Fascists.

Cook, Frederick Albert (b. June 10, 1865, Hortonville, N.Y., U.S.—d. Aug. 5, 1940, New Rochelle, N.Y.), American physician and explorer whose claim that he had discovered the North Pole in 1908 made him a controversial figure. His fellow American explorer Robert E. Peary, who is generally credited with having achieved this feat in 1909, denounced Cook's claim.

Cook began practicing medicine after graduating from New York University in 1890. He soon achieved fame as an explorer, serving as surgeon on Peary's first Arctic expedition (1891–92) and leading others to explore and climb Mt. McKinley (1903–06). Cook's claim that he had reached the North Pole on an expedition in 1908 was immediately disputed by Peary. Cook's Eskimo companions on his journey later asserted that he had stopped short hundreds of miles south of the Pole, and that the photographs of his expedition were actually shot at locations far distant from the North Pole. The controversy between Cook and Peary lasted until World War I, after which time public support for Cook's claim disappeared. Cook was later charged with fraudulent use of the mails and imprisoned in 1923. He was paroled in 1929 and given a presidential pardon in 1940.

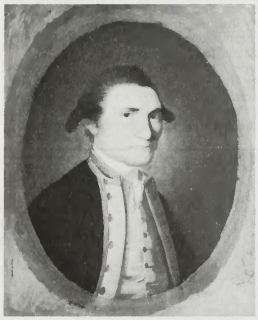
Cook, George Cram (b. Oct. 7, 1873, Davenport, Iowa, U.S.—d. Jan. 14, 1924, Delphi, Greece), novelist, poet, and playwright who, with his wife, Susan Glaspell (*q.v.*), established the Provincetown Players in 1915, which gave a forward thrust to the U.S. theatre.

After completing his B.A. degree at Harvard in 1893, he studied at Heidelberg in 1894 and the Université de Genève the following year. He then taught English literature at the University of Iowa (1895–99) and at Stanford University, Stanford, Calif. (1902). Cook left the academic world to support his literary work as a small farmer, living in the gardener's cottage of his family's estate in Davenport. The influence of Friedrich Nietzsche is reflected in his first novel, *Roderick Taliaferro* (1903), a historical romance set in the Mexico of Emperor Maximilian. One of his hired workers, Floyd Dell, who later became a novelist, converted him to Socialism (Cook appears as Tom Alden in Dell's *Moon-Calf*, 1920). Cook's novel *The Chasm* (1911) explores the conflict experienced by an American girl in Russia and the United States between Nietzschian aristocratic individualism and Socialist ideas, with the latter winning.

Cook worked with Dell as associate literary editor of the *Chicago Evening Post* and in 1913 married the novelist and playwright Susan Glaspell, also from Davenport. While summering at Provincetown, Mass., they launched the Provincetown Players in a former fish warehouse, initially to perform their jointly written one-act play *Suppressed Desires* (1915, published 1920), a satire on psychoanalysis. Cook continued with the group in New York City's Greenwich Village as the Playwrights' Theatre, performing native U.S. plays. Despite the success of their venture, Cook was dissatisfied with cultural life in the United States and in 1921 moved to Greece, where for three years he lived among the rural people. His poems *Greek Coins* appeared in 1925, and his play *The Athenian Women* was published the next year in Athens.

Cook, James (b. Oct. 27, 1728, Marton-in-Cleveland, Yorkshire, Eng.—d. Feb. 14, 1779, Kealakekua Bay, Hawaii), British naval captain, navigator, and explorer, who explored the seaways and coasts of Canada (1759, 1763–67) and conducted three expeditions to the Pacific Ocean (1768–71; 1772–75; 1776–79), ranging from the Antarctic ice fields to the Bering Strait and from the coasts of North America to Australia and New Zealand.

Early life. James Cook was the son of a farmhand migrant from Scotland. While Cook



James Cook, oil painting by J. Webber; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

was still a child, his father became the foreman on a farm in a neighbouring village. Young James early showed signs of an inquiring and able mind, and his father's employer paid for his schooling in the village until he was 12 years old. His early teens were spent on the farm where his father worked, but a brief apprenticeship in a general store in a coastal village north of Whitby brought him in contact with ships and the sea. At the age of 18, in 1746, he was apprenticed to a well-known Quaker shipowner, John Walker of Whitby, and at 21 was rated able seaman in the Walker collier-barks—stout, seaworthy, slow 300- and 400-tonners mainly in the North Sea trade. When the ships were laid up for refitting (done by the apprentices and crews) at Whitby during the worst months of winter, Cook lived ashore and studied mathematics by night. The Whitby barks, constantly working North Sea waters off a dangerous and ill-marked lee shore, offered Cook splendid practical training: the young man who learned his seamanship there had little to fear from any other sea.

Promoted to mate in 1752, Cook was offered command of a bark three years later, after eight years at sea. Advancement of this nature opened up a career that would have satisfied most working seamen, but instead Cook volunteered as able seaman in the Royal Navy.

The navy, he was sure, offered a more interesting career for the competent professional seaman, and greater opportunity than in the North Sea barks. Tall, of striking appearance, Cook almost immediately caught the attention of his superiors, and with excellent power of command, he was marked for rapid advancement.

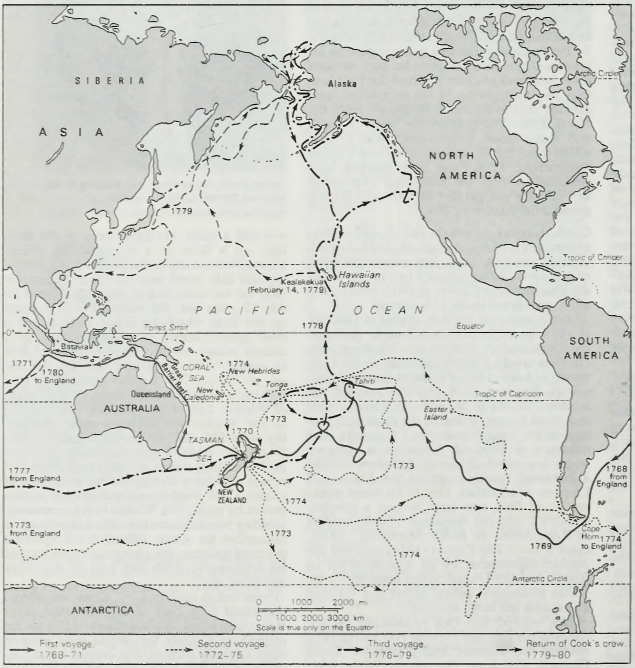
After advancing to master's mate, and boatswain, both noncommissioned ranks, he was made master of HMS "Pembroke" at the age of 29. During the Seven Years' War between Great Britain and France (1756–63) he saw action in the Bay of Biscay, was given command of a captured ship, and took part in the siege of Louisburg in Nova Scotia and in the successful amphibious assault against Quebec. His charting and marking of the more difficult reaches of the St. Lawrence River contributed to the success of General Wolfe's landing there. Based at Halifax during the winters, he mastered surveying with the plane table. Between 1763 and 1768, after the war had ended, he commanded the schooner "Grenville" while surveying the coasts of Newfoundland, sailing most of the year and working on his charts at his base in England during the winters. In 1766 he observed an eclipse of the Sun and sent the details to the Royal Society in London—an unusual activity for a noncommissioned officer, for Cook still rated only as master.

Voyages and discoveries. In 1768 the Royal Society, in conjunction with the Admiralty, was organizing the first scientific expedition to the Pacific, and the rather obscure 40-year-old James Cook was appointed commander of the expedition. Hurriedly commissioned as lieutenant, he was given a homely looking but extremely sturdy Whitby coal-hauling bark renamed HMS "Endeavour," then four years old, of just 368 tons, and less than 98 feet long. Cook's orders were to convey gentlemen of the Royal Society and their assistants to Tahiti to observe the transit of the planet Venus across the Sun. That done, on June 3, 1769, he was to find the southern continent, the so-called Terra Australis, which philosophers argued must exist to balance the landmasses of the Northern Hemisphere. The leader of the scientists was the rich and able Joseph Banks, aged 26, who was assisted by Daniel Solander, a Swedish botanist, as well as astronomers (Cook rating as one) and artists. Cook carried an early nautical almanac and brass sextants, but no chronometer on the first voyage.

Striking south and southwest from Tahiti, where his predecessors had sailed west and west-northwest with the favouring trade winds, Cook found and charted all of New Zealand, a difficult job that took six months. After that, instead of turning before the west winds for the homeward run around Cape Horn, he crossed the Tasman Sea westward and, on April 19, 1770, came on the southeast coast of Australia. Running north along its 2,000-mile eastern coast, surveying as he went, Cook successfully navigated Queensland's Great Barrier Reef—since reckoned as one of the greatest navigational hazards in the world—taking the Coral Sea and the Torres Strait in his stride. Once the bark touched on a coral spur by night, but it withstood the impact and was refloated. After the "Endeavour" was grounded on the nearby Queensland coast and repaired, Cook sailed it back to England. He stopped briefly at Batavia (modern Jakarta) for supplies, and, although the crew had been remarkably healthy until then, 30 died of fever and dysentery contracted while on land. None of the crew, however, died of scurvy (a dietary disease caused by a lack of ascorbic acid and that habitually decimated the crews of ships on lengthy voyages in the 18th century). This was because, in addition to ensuring cleanliness and ventilation in the crew's quarters, Cook insisted on an appropriate diet that included cress, sauerkraut, and a kind of orange extract. The health in which he maintained his sailors in consequence made his name a naval byword.

Back in England, he was promoted to commander and presented to King George III, and soon he began to organize another and even more ambitious voyage. The success of the expedition of Joseph Banks and his scientists (which established the useful principle of sending scientists on naval voyages—*e.g.*, Charles Darwin in the "Beagle," T.H. Huxley in the "Rattlesnake," and J.D. Hooker with Sir James Ross to the Ross Sea in the Antarctic) stimulated interest not only in the discovery of new lands but in the new knowledge in many other scientific subjects. The wealth of scientifically collected material from the "Endeavour" voyage was unique. Cook was now sent out with two ships to make the first circumnavigation of and penetration into the Antarctic.

Between July 1772 and July 1775 Cook made what ranks as one of the greatest sailing ship voyages, again with a small former Whitby ship, the "Resolution," and a consort ship, the "Adventure." He found no trace of Terra Australis, though he sailed beyond latitude 70° S in the Antarctic, but he successfully completed the first west–east circum-



The voyages of Captain Cook

navigation in high latitudes, charted Tonga and Easter Island during the winters, and discovered New Caledonia in the Pacific and the South Sandwich Islands and South Georgia Island in the Atlantic. He showed that a real Terra Australis existed only in the landmasses of Australia, New Zealand, and whatever land might remain frozen beyond the ice rim of Antarctica. And, once again, not one of his crew died of scurvy. Back in England, he was promoted to captain at last, elected a fellow of the Royal Society, and awarded one of its highest honours, the gold Copley Medal, for a paper that he prepared on his work against scurvy.

There was yet one secret of the Pacific to be discovered: whether there existed a northwest passage around Canada and Alaska or a northeast one around Siberia, between the Atlantic and Pacific. Although the passages had long been sought in vain from Europe, it was thought that the search from the North Pacific might be successful. The man to undertake the search obviously was Cook, and in July 1776 he went off again on the *Resolution,* with another Whitby ship, the *Discovery.* This search was unsuccessful, for neither a northwest nor a northeast passage usable by sailing ships existed, and the voyage led to Cook's death. In a brief fracas with Hawaiians over the stealing of a cutter, Cook was slain on the beach at Kealakekua by the Polynesian natives.

Cook's voyaging left him comparatively little time for family life. Although Cook had married Elizabeth Batts in 1762, when he was 34 years old, he was at sea for more than half of their married life. The couple had six children, three of whom died in infancy. The three surviving sons, two of whom entered the navy, had all died by 1794.

Cook had set new standards of thoroughness in discovery and seamanship, in navigation, cartography, and the sea care of men, in relations with natives both friendly and hostile, and in the application of science at sea; and he had peacefully changed the map of the world more than any other single man in history.

(A.J.V.)

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To make the best use of the Britannica, consult the INDEX *first*

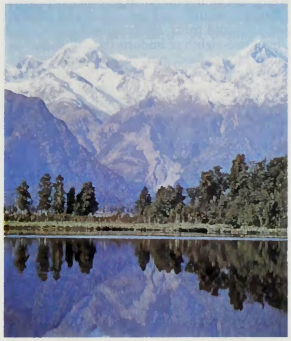
Cook, Sir Joseph (b. Dec. 7, 1860, Silverdale, Staffordshire, Eng.—d. July 30, 1947, Sydney, N.S.W., Australia), early prime minister (1913–14) of a federated Australia who helped found the nation's military institutions.

Cook emigrated to New South Wales in 1885 and worked as a coal miner until 1891, when he was elected to the New South Wales Legislative Assembly as a member of the Labor Party. After leaving the party over the tariff issue in 1894, he held posts in the state cabinet until 1899.

Beginning his 20-year tenure in the federal Parliament in 1901, Cook became leader of the Free Trade Party in 1908 and the following year formed a coalition with the Liberal government headed by Alfred Deakin. In Deakin's administration (1909–10), he helped establish the Australian navy. He was elected prime minister in 1913 but had inadequate support in Parliament and was voted out of office the following year. His government's most imaginative step was to appoint an Inter-State Commission.

In 1917 Cook joined the wartime ministry of William Hughes as minister of the navy, served on the Imperial War Cabinet in London (1918), and was Australia's senior delegate to the Versailles Peace Conference in 1919. Between 1921 and his retirement in 1927, he acted as high commissioner for Australia in London and as his country's representative to the League of Nations. He was knighted in 1918.

Cook, Mount, mountain, the highest in New Zealand, in the Southern Alps, west-central South Island. Surrounded by 22 peaks exceeding 10,000 feet (3,000 m), the perma-



Lake Pukaki reflecting Mount Tasman and Mount Cook (right), New Zealand
Robin Smith—Photographic Library of Australia

nently snow-clad mountain rises to 12,349 feet (3,764 m). It is flanked by the Hooker Glacier to the west and Tasman Glacier to the east.

Sighted in 1642 by the Dutch navigator Abel Tasman, it was known as Aorangi (from the Maori for "cloud piercer") before being renamed for Captain James Cook (1851). First climbed in 1894, the mountain is the central feature of Mount Cook National Park, 210 miles (338 km) southwest of Christchurch.

Cook, Thomas (b. Nov. 22, 1808, Melbourne, Derbyshire, Eng.—d. July 18, 1892, Leicester, Leicestershire), English innovator of the conducted tour and founder of Thomas Cook and Son, a worldwide travel agency.

Cook left school at the age of 10 and worked at various jobs until 1828, when he became a Baptist missionary. In 1841 he persuaded the Midland Counties Railway Company to run a special train between Leicester and Loughbor-



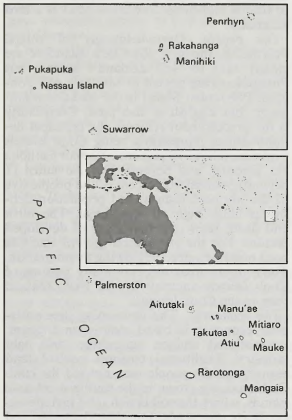
Thomas Cook
By courtesy of Thos. Cook and Son Ltd.

ough for a temperance meeting on July 5. It was believed to be the first publicly advertised excursion train in England. Three years later the railway agreed to make the arrangement permanent if Cook would provide passengers for the excursion trains. During the Paris Exposition of 1855, Cook conducted excursions from Leicester to Calais, Fr. The next year he led his first Grand Tour of Europe.

In the early 1860s he ceased to conduct personal tours and became an agent for the sale of domestic and overseas travel tickets. His firm took on military transport and postal services for England and Egypt during the 1880s. On his death the business passed to his only son, John Mason Cook (1834–99), who had been his father's partner since 1864.

Cook Inlet, inlet of the Gulf of Alaska, U.S., in the North Pacific Ocean. Bounded by the Kenai Peninsula on the east, it extends northeast for 220 miles (350 km), narrowing from 80 to 9 miles (129 to 14 km). The city of Anchorage in southern Alaska is situated near the head of the inlet (which receives the Susitna River), where Turnagain Arm stretches southeast and Knik Arm northeast. The inlet, experiencing tidal flows sometimes approaching 33 feet (10 m) in a daily cycle, is a salmon- and herring-fishing ground and an oil field. It was entered in 1778 by the British navigator Captain James Cook during his search for the Northwest Passage.

Cook Islands, internally self-governing island-state in free association with New Zealand in the South Pacific Ocean, 2,000 miles (3,000 km) northeast of New Zealand, with a total land area of 91 square miles (236 square km). The population was estimated at 17,000 in 1990. The administrative centre is Avarua on Rarotonga.



Cook Islands

A brief treatment of the Cook Islands follows. For information about regional aspects of the Cook Islands, *see* MACROPAEDIA: Pacific Islands.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Fifteen islands scattered from north to south over 900 miles (1,450 km) of ocean are divided into a southern group of eight islands and a northern group of seven. In the southern group, Rarotonga, Mangaia, Mauke, Atiu, and Mitiaro have volcanic interiors, among which rugged Rarotonga, geologically the youngest, rises to Te Manga, at

2,139 feet (652 m) the highest peak in the Cooks. In the other four islands, the peaks and rolling hills slope down to swampy lowlands at the base of ancient raised coral limestone reefs, called *makatea,* that ring the islands. The cliffs range from 200 feet (60 m) high on Mangaia to 12 feet (4 m) on Rarotonga and Atiu and 6 feet on severely eroded Mitiaro. The jagged cliffs slope steeply to narrow beaches, with fringing reefs beyond. Mitiaro, Atiu, and Mangaia have small lakes in the swampy area at the inner base of their cliffs. Aitutaki is a severely eroded, partly subsided volcanic island with a fringing reef forming a lagoon and atoll. Manu'ae and Takutea in the southern group, and all the northern Cooks (Penrhyn [Tongareva], Manihiki, Rakahanga, Pukapuka [Danger], Nassau, Suwarrow [Suvarov], and Palmerston), are true atolls, or reef islands. Swiftly flowing rivers occur only on the high volcanic islands, where they disappear in the swamps and flow under the limestone cliffs; on Atiu and Mangaia they have formed caves now filled with stalagmites and stalactites.

Rainfall ranges from 80 inches (2,000 mm) annually on Rarotonga to as much as 100 inches (2,540 mm; unevenly distributed) on the northern atolls, where the porous soil necessitates the use of rain catchments to ensure an adequate water supply. Night-to-day temperatures range between 58° F (15° C) and 92° F (33° C) in the southern group and 70° F (21° C) and 92° F (33° C) in the northern group. December to March, the rainy season, also brings typhoons. Vegetation ranges from more than 500 species on Rarotonga to about 30 species, mainly coconut palm and pandanus, on the coral atolls. Wildlife is limited to lizards and birds. Suwarrow atoll is a bird sanctuary.

The people. Overwhelmingly of mixed Polynesian ancestry, the Cook Islanders are closely akin to New Zealand's Maoris, but Pukapukans are related to Samoans and Tongans. Polynesian Maori is the traditional language, but English is also used. Christianity is the predominant religion, the principal denominations represented being Cook Islands Christian (about 70 percent), Roman Catholic (15 percent), and Seventh Day Adventist (7 percent). Almost 90 percent of the people live in the southern islands, and population density is fairly high on Rarotonga. The birth and death rates resemble those of developed nations, but the population growth rate has been negative since 1970 owing to emigration. Today more than twice as many persons of Cook Islands ancestry live in New Zealand than in the Cook Islands.

The economy. The developing, free-enterprise economy is based mainly on tourism, international finance, agriculture, and light industry. Traditional customs control land tenure, and the people may not sell the land. Cash crops are grown in the southern volcanic islands, where the soil is rich, and include citrus fruits, pineapple, tomatoes, bananas, and tropical fruits. Coconuts and copra are the only cash crop in the northern atolls. Subsistence crops include taro, sweet potatoes, yams, and breadfruit. Pigs, goats, and chickens are the principal livestock, and some cattle are reared on Rarotonga and Mauke for meat and hides. Fishing is mainly for domestic consumption; the sale of fishing licenses to other countries is important.

Manufacturing, mostly centred on Rarotonga, includes fruit canning, clothing manufacture, and local handicrafts. Cook Islands stamps and coins are a source of revenue. All electricity on the islands derives from thermal-power plants. Tourism has grown with hotel construction but is closely controlled. Most of the tourists are visitors from New Zealand, Australia, Canada, and the United States. In the early 1980s the islands became an offshore financial centre and a major tax haven. Several thousand international companies were registered there by the 1990s.

The majority of the labour force is employed in traditional or cash-crop agriculture, fishing, government service, or the industries on Rarotonga. Many Cook Islanders emigrate to work in New Zealand, and there is also migration from the outer islands to Rarotonga.

Roadways consist mostly of a paved ring road around Rarotonga. Interisland shipping uses two ports, Avarua and Avatiu, that were cut through Rarotonga's reef. Suwarrow, Manihiki, Rakahanga, and Penrhyn have navigable passages into their lagoons. Avarua on Rarotonga has an international airport.

Exports, mainly canned citrus and pineapple juice and fruits, clothing, and copra, total about one-eighth of imports (by value) that include mostly food, timber, fuels, and cement. New Zealand is the main trading partner, and its grants-in-aid and Cook Island worker remittances help balance the trade deficit.

Government and social conditions. According to the 1965 self-government constitution (with changes introduced in 1981), the British monarch and New Zealand each appoint their own representative to the Cook Islands' government. The prime minister heads the Cabinet, which is collectively responsible to the 24-member Legislative Assembly, elected by universal adult suffrage. The House of Ariki (hereditary chiefs) advises the Assembly. Each island is governed locally by an island council.

Health care is free, and schoolchildren receive free dental care also. The hospital on Rarotonga and cottage hospitals or dispensaries on each inhabited island provide good health care.

Education is free and compulsory between ages 5 and 16; there are government- and church-run primary and secondary schools. Higher education is available in New Zealand and Fiji. The government owns a radiobroadcasting station and a television station, the latter providing service only to Rarotonga and Aitutaki.

Maori traditions remain strong in the land-tenure system, the *ariki* institution, and traditional crafts, as well as dancing and *umukai* (feasts). Aitutaki's dance teams yearly take part in festivals in Tahiti. Mauke was the home of the Cook Islands author Julian Dashwood.

History. Traditions and linguistic patterns indicate that the Cook Islands were initially settled by Polynesians from Tonga and Samoa, some of whom later colonized New Zealand. The Ara Metua road on Rarotonga and other remains indicate a highly organized society in about AD 1100. Most islands were independent, but Atiu's *arika* had control of Mauke and Mitiaro. The Spanish navigator Alvaro de Mendaña de Neira first sighted Pukapuka in 1595. Subsequently, Spaniards, Russians, and French sighted some of the islands. Captain James Cook explored many of the islands on his three voyages (1773, 1774, and 1777), and the group is named for him. Captain William Bligh of the HMS *Bounty* sighted Rarotonga and Aitutaki. The arrival of the London Missionary Society's John Williams (1821) started Christianization in the group. The *ariki* together with missionaries governed the southern islands into the 1880s, when the British established a protectorate over Rarotonga (1888), extended over the southern Cooks by 1892. A federal parliament was created and each island had self-government. The northern islands, especially Manihiki and Penrhyn, suffered Peruvian slave raids in the 1860s. New Zealand annexed the group, including the Northern islands, in 1901. In 1915 New Zealand appointed a minister for the islands and a resident commissioner. Many Cook Islanders served with New Zealand contingents in World War I. In 1946 a Legislative Council was created, becoming the Legislative Assembly in 1957. Limited self-government was introduced in 1962 with an advisory Executive Committee to the Assembly. This became the Cabinet in 1965, when a UN-supervised election created the first popularly elected Assembly. The Assembly subsequently voted for internal self-government in association with New Zealand.

Cook Strait, strait separating the North and South islands of New Zealand, extending northwest to southeast from the Tasman Sea to the south Pacific Ocean. About 14 miles (23 km) wide at its narrowest point, it averages 420 feet (128 m) in depth. Both shores are lined with steep cliffs, and that of the South Island is deeply embayed. Treacherous currents and fierce storms present serious hazards to navigation, and travel from Wellington (North Island) to Blenheim (South Island) is chiefly by rail ferry and air. Communications and electric-power cables follow the strait's floor.

In 1642 the Dutch navigator Abel Tasman entered the western end of the strait and believed it to be a bay. Captain James Cook discovered its true nature as a strait in 1770.

cookbook, collection of recipes, instructions, and information about the preparation and serving of foods. At its best, a cookbook is also a chronicle and treasury of the fine art of cooking, an art whose masterpieces—created only to be consumed—would otherwise be lost.

Cookbooks have been written in almost every literate society. One of the most famous of the early ones is the *Deipnosophistai* ("The Learned Banquet"), a treatise on food and food preparation written in the 2nd century BC by Athenaeus, a Greek gourmet. The treatise is presented in the form of a dialogue between two banqueters, who talk for days and relate recipes for dishes such as stuffed vine leaves and several varieties of cheesecake. Athenaeus was by no means the earliest Greek writer on cooking; he mentions more than 20 authors who preceded him, one of whom, Archestratus, produced his masterpiece, *Hēdypatheia* ("Pleasant Living"), in 350 BC.

Another famous gourmet of the ancient world was Apicius, a wealthy Roman merchant of the reign of Tiberius (AD 14–37). Apicius' colossal banquets eventually drove him to bankruptcy and suicide, but he left behind a cookbook so prized that it has been preserved, in numerous editions, down to the 20th century.

The gastronomy of early China is preserved in a number of treatises, one of the most interesting of which is called *The Important Things to Know About Eating and Drinking,* by Huou, master chef of the imperial court of Kublai Khan (1215–94). Huou's collection consists largely of recipes for soups, but it is also a useful encyclopaedia of household information.

Medieval Europe also produced cookbooks. Among the earliest in English was *The Form of Cury* (the word *cury* is an obsolete term for cooked food), compiled in the 12th century. It consists of 196 recipes, many of which reveal their French origin in names such as "Blank Manng" and "Payn Fondewe." One of the first French books, called *La Ménagier de Paris,* was published in 1394 and contained recipes for such delicacies as frogs and snails.

The printing press revolutionized the culinary arts by making cookbooks widely available. The first known to have been printed, in 1485, was produced by an Italian, Bartolema Scappi, who mainly recorded recipes for marzipans and other sweets.

Cookbooks proliferated as the rising middle classes gained interest in better food preparation. The first cookbook written by a woman was Hannah Wooley's *The Queen-like Closet;*

or Rich Cabinet, published in 1670. The secrets of French cuisine were made available to a wide public by the cookbooks of great chefs like Alexis Soyer of the mid-19th century, whose *Shilling Cookery for the People* sold more than 100,000 copies. One of the most successful and popular cookbooks of all time was produced in the United States in 1896, when Fannie Merritt Farmer took on the editorship of *The Boston Cooking-School Cook Book.* Farmer was the first to standardize the methods and measurements of her recipes, assuring reliable results to her readers.

The 20th century has seen a prodigious burst of interest in cookery, including thousands of national or regional specialty dishes that were previously unknown outside their own countries or areas. Cookbooks have become a mainstay of the publishing world, with scores produced annually by amateur and professional chefs, cooking schools, and the food departments of the major food producers and popular magazines.

Cooke, Alistair, in full ALFRED ALISTAIR COOKE (b. Nov. 20, 1908, Manchester, Eng.), British-born American journalist and commentator, best known for his lively and insightful interpretations of American history and culture.

The son of a Wesleyan Methodist lay preacher, Cooke pursued literary and theatrical interests at Jesus College, Cambridge, and graduated summa cum laude in 1930. Later he won a Commonwealth Fund fellowship to study theatre in the United States, first at Yale University (1932–33), then at Harvard University (1933–34). Cooke's cross-country travels during the summers of these years had a profound influence on his professional life.

Following a brief period as a scriptwriter in Hollywood, he returned to England to become a film critic for the British Broadcasting Corporation (BBC) and later served as London correspondent for the National Broadcasting Company (NBC) of the United States. In 1937 he returned to the United States, settled in New York City, and became an American citizen in 1941. From the late 1930s, Cooke reported and commented on American affairs for BBC radio and several major British newspapers. His weekly fifteen-minute radio program, *Letter from America,* commenced in 1946 and ran for half a century. The texts of many broadcasts were collected in *One Man's America* (1952) and *Talk About America* (1968). From 1956 to 1961 he hosted and narrated the weekly television "magazine" *Omnibus,* which won numerous broadcasting awards.

Cooke's interpretation of the American experience culminated in his BBC-produced television series *America* (1972–73). In 13 installments, filmed on location throughout the United States, Cooke surveyed some 500 years of American history in an eclectic and personal but highly coherent narrative. *Alistair Cooke's America,* the book based on the award-winning program, was a best-seller in the United States. From the 1970s to the early '90s, as host of *Masterpiece Theatre,* Cooke served as an interpreter of British culture through the presentation of BBC dramatic-television programming to American audiences.

His other works include the critical biography *Douglas Fairbanks: The Making of a Screen Actor* (1940); *Generation on Trial: U.S.A. v. Alger Hiss* (1950), based on his coverage of a celebrated Congressional investigation; *The Vintage Mencken* (1955); *The Patient Has the Floor* (1986); *America Observed* (1988); and, with Robert Cameron, *The Americans* (1977).

Cooke, Jay (b. Aug. 10, 1821, Sandusky, Ohio, U.S.—d. Feb. 18, 1905, Ogontz, Pa.), American financier and fund-raiser for the federal government during the American Civil War.

At 18 Cooke entered the Philadelphia banking house of E.W. Clark and Co., and three years later he became a member of the firm. In 1861 he opened his own banking house in Philadelphia and floated a war loan of $3,000,000 for the state of Pennsylvania. He was engaged by the United States Treasury Department in 1862 for the sale of $500,000,000 worth of bonds. His services were secured again in 1865, when he disposed of three series of notes totaling $830,000,000. In 1870 Cooke's firm undertook to finance the construction of the Northern Pacific Railway but failed at the approach of the financial crisis of 1873. By 1880 he had discharged all his obligations and had again become wealthy.

Cooke, Sir William Fothergill (b. May 4, 1806, Ealing, Middlesex, Eng.—d. June 25, 1879, Surrey), English inventor who worked with Charles Wheatstone in developing electric telegraphy.

Cooke's attendance at a demonstration of the use of wire in transmitting messages led to his experimentation in 1836 with telegraphy. Soon afterward, he and Wheatstone, who had also worked with the telegraph, formed a partnership.

In 1837 they were granted their first patent, but the cost of their model made it impractical. A quarrel between them over credit for the invention was settled amicably in 1841 but flared again a few years later. Wheatstone is generally considered the more important of the two in the history of the telegraph, but Cooke contributed a superior business ability. Their most important invention, an electric telegraph using only one magnetic needle instead of several, was recognized by patent in 1845. Cooke was knighted in 1869 and granted a civil-list pension in 1871.

Cookeville, city, seat (1854) of Putnam county, on the Highland Rim in north-central Tennessee, U.S., about halfway between Nashville and Knoxville. Founded in 1854, it was named for Major Richard F. Cook, one of the organizers of Putnam county. It developed as an agricultural, timber, and mining community but then acquired diversified industries, including marble and granite works and the manufacture of clothing, filtration equipment, furniture, heating elements, and automotive parts. Cookeville is the seat of Tennessee Technological University (1915). The Center Hill Dam and Lake are nearby. Inc. town, 1903; city, 1962. Pop. (1993 est.) 24,021.

cookie (from Dutch *koekje,* diminutive of *koek,* "cake"), primarily in the United States, any of various small sweet cakes, either flat or slightly raised, cut from rolled dough, dropped from a spoon, cut into pieces after baking, or curled with a special iron. In Scotland the term cookie denotes a small, plain bun.

Probably the most popular cookies in the United States are those that are based on a simple dough of flour, butter, sugar, and egg, to which a variety of flavouring and texturizing ingredients, such as chocolate chips, oatmeal, raisins, or peanut butter, may be added. More delicate, decorative, or exotically flavoured cookies, such as macaroons, fruited pastries, and gingerbread men, are traditionally associated with baking done for holidays, particularly Christmas.

cooking, the preparation of food for eating by means of heat. *See* cuisine; food processing; gastronomy.

Cookstown, Irish AN CHORR CHRÍOCHACH, town, seat, and district (established 1973; formerly astride Counties Londonderry and Tyrone) west of Lough ("lake") Neagh, Northern Ireland. The town, a 17th-century Plantation of Ulster (English colonial) settlement, was named after its founder, Alan Cook. It is the dairying centre of the district, and its main industries produce millinery, corsetry, and motor vehicle components.

Districts bordering Cookstown are Magherafelt to the north, Omagh to the west, and Dungannon to the south. The outer limits of the Sperrin Mountains, constituting most of northwestern Cookstown district, slope gradually eastward to the Ballinderry River valley and the flat shores of Lough Neagh. There is extensive dairy farming, and cattle, poultry, and pigs are raised. To the northeast of Cookstown is Springhill, a well-preserved Plantation of Ulster manor. Also nearby is the rath ("ring-fort") of Tullaghoge, which before its destruction in 1602 was the inauguration site for the chiefs of the O'Neill clan of Ulster. Area 241 square miles (623 square km). Pop. (1991) town, 9,842; district, 30,808.

Cooktown, town and port, northeastern Queensland, Australia, at the mouth of the Endeavour River, on the Coral Sea facing the Great Barrier Reef. The town and nearby Mount Cook (1,415 feet [431 m]) are named after the British navigator Captain James Cook, who beached the *Endeavour* there for repairs in 1770. Cooktown was founded in 1873 during the Palmer River gold rush. Its population reached 30,000, and it was declared a municipality in 1876, but it declined after 1885, when gold production dropped. Some sugar, citrus fruits, livestock, and tin ore are produced in the area. The town has an airfield, and it is linked by the Mulligan Highway to Cairns (120 miles [190 km] south), the nearest railhead. Pop. (1991) 1,342.

Cookworthy, William (b. April 12, 1705, Kingsbridge, Devonshire, Eng.—d. Oct. 17, 1780, Plymouth, Devonshire), china manufacturer who first produced an English true hard-paste porcelain similar to that of the Chinese and Germans.

Cookworthy was apprenticed at 14 to a London apothecary, who later set him up in a business, Bevans and Cookworthy, at Plymouth. He became interested in china manufacture about 1745, when he was visited by the American china maker Andrew Duché of Georgia. The first soft-paste (artificial) porcelain factories were established about this time. A few years later he discovered the only English source of china clay (kaolin) and china stone (petuntse) at St. Austell in Cornwall. After many years of experiment with these materials, he finally learned the secret of hard porcelain, obtained a patent (1768), and established the Plymouth China factory.

cool jazz, a style of jazz that emerged in the United States during the late 1940s. The term cool derives from what journalists perceived as an understated or subdued feeling in the music of Miles Davis, The Modern Jazz Quartet, Gerry Mulligan, Lennie Tristano, and others. Tone colours tended toward pastels, vibratos were slow or nonexistent, and drummers played softer and less interactively than in bop, hard bop, and other modern styles that coexisted with cool. There was also a renewed interest in contrapuntal collective improvisation among melody instruments. Within the style, however, there is considerable variety in emotional range, level of intricacy, and instrumentation. For example, the term cool describes the intricate, intense music of New York-based pianist Lennie Tristano as well as the tuneful and light-hearted music of Los Angeles-based saxophonist Dave Pell.

Much recording activity and publicity surrounded a community of white jazz musicians, including Gerry Mulligan, Dave Brubeck, Shorty Rogers, and others, who were based in California during the early and middle 1950s; thus the label West Coast jazz was applied despite the fact that most of its performers were

not born there and some remained there only briefly. Neither black nor white disciples of tenor saxophonist Lester Young, who exerted enormous influence on the cool style, and trumpeter Miles Davis, himself a pioneer of cool, for example, were necessarily more plentiful in any particular region than disciples of the "hot" modern style of saxophonist Charlie Parker or trumpeter Dizzy Gillespie. Thus, while white saxophonists Gerry Mulligan and Art Pepper were making names for themselves in Los Angeles in the so-called West Coast style, leading black saxophonists Dexter Gordon and Wardell Gray (both influenced by Parker) were playing in the same city, neither being called West Coast-style players; at the same time, in Boston, white saxophonist John LaPorta and trumpeter Herb Pomeroy were playing very much in the cool style that was considered West Coast.

Cooley, Charles Horton (b. Aug. 17, 1864, Ann Arbor, Mich., U.S.—d. May 8, 1929, Ann Arbor), U.S. sociologist who followed



Charles Cooley

By courtesy of the Michigan Historical Collections of the University of Michigan, Ann Arbor

a socio-psychological approach to the understanding of society.

Son of the noted jurist Thomas McIntyre Cooley, he taught sociology at the University of Michigan from 1894. He was more productive as a theorist than as a research scientist, believing that social reality is qualitatively different from physical reality and therefore is less subject to measurement.

Cooley's *Human Nature and the Social Order* (1902; reprinted 1956), is mainly concerned with the determination of the self by interaction with other persons. In his view, the sense of self is formed by one's actual experiences and also by imagining others' ideas of oneself. From this conception follows Cooley's fundamental theory that the mind is social and society is a mental construct.

In *Social Organization* (1909; reprinted 1956), Cooley deals with the objective consequences of his psychological views. The ideal of the moral unity of society, involving qualities of loyalty, justice, and freedom, is said to be derived from face-to-face relationships in primary groups such as the family and neighbourhood or children's play groups. In his last major work, *Social Process* (1918; reprinted 1966), he applied to collective existence the Darwinian principles of natural selection and adaptation.

Cooley and Social Analysis (1968) is a collection of centenary lectures by University of Michigan scholars.

Cooley, Denton A(rthur) (b. Aug. 22, 1920, Houston, Texas, U.S.), U.S. surgeon and educator chiefly noted for heart-transplant operations. He was also the first to implant an artificial heart in a human. In April 1969 Cooley observed that the heart of a 47-year-old patient would not function adequately after he removed a section of diseased heart muscle. He implanted a mechanical heart made of silicone, which served as a substitute organ for 65 hours until a heart from a human donor was inserted to replace it. Nevertheless, the patient died 38 hours after the second operation because of pneumonia and kidney failure.

Cooley received an M.D. degree from Johns Hopkins University, Baltimore (1944), and joined the medical faculty of Baylor University College of Medicine, Houston, in 1954. In 1969 he left Baylor to found the Texas Heart Institute, of which he became surgeon in chief, and from 1975 he served also as professor of clinical surgery at the University of Texas Medical School in Houston.

Cooley, The Cattle Raid of (Irish epic): *see* Cattle Raid of Cooley, The.

Cooley's anemia: *see* thalassemia.

Coolgardie, town, south central Western Australia. It was founded in 1892 with the discovery of quartz gold in the vicinity, which marked the beginning of a rush to the East Coolgardie field. Known consecutively as Gnaralbine, Bayley's Reward, and Fly Flat, it was finally renamed Coolgardie, an Aboriginal term meaning "water hole," "depression," or "hollow surrounded with mulga trees." By the turn of the century, it had a population of 15,000 to 20,000, but many soon left to work the more productive Golden Mile of Kalgoorlie (25 mi [40 km] east); Coolgardie then became known as the "Old Camp." The 2,000-oz (55-kg) Eldorado gold nugget was found there in 1951, but the town is now primarily a tourist attraction featuring deserted reminders of its gold-mining past. It is also a service centre on the Great Eastern Highway with rail connections to Perth (350 mi west). It has been served by the Goldfields Water Supply Scheme since 1903, drawing its water from the Mundaring Weir, near Perth. Pop. (1981) 891.

Coolidge, (John) Calvin (b. July 4, 1872, Plymouth, Vt., U.S.—d. Jan. 5, 1933, Northampton, Mass.), 30th president of the United States (1923–29), whose conservative Republican policies of government inaction toward domestic and international problems came to symbolize the era between World War I and the Great Depression. His New England background stressed frugality, modesty, and unpretentiousness—qualities that clung to him all his life.



Calvin Coolidge

EB Inc.

Coolidge began the practice of law in 1897 at Northampton and entered politics two years later as city councilman. He then rose through a series of political posts, including mayor of Northampton, state senator, and lieutenant governor, and in 1918 he was elected governor. The following year (September 1919), he was catapulted into the national spotlight when he called out the state guard to quell two days of rioting and disorder resulting from a Boston police strike. When labour leaders called upon him to help enforce their demands for reinstatement of policemen who had struck, Coolidge refused with a typically succinct phrase: "There is no right to strike against the public safety by anybody, anywhere, any time."

At the Republican National Convention of 1920, delegates nominated Coolidge for vice president on the first ballot, in a spontaneous gesture of retaliation against the party bosses who had chosen Warren G. Harding to run for president. The slate easily won the election on a "Return to Normalcy" platform.

Acceding to the presidency upon the unexpected death of Harding (Aug. 2, 1923), Coolidge inherited a divided party, a fractious Congress, a national administration discredited by scandals, and pressing problems of domestic and foreign policy. Cautiously, quietly, and with skill, he brought about an executive reformation, restored integrity at the seat of government, and gained control of his party so that he easily won renomination in 1924. By minimizing problems and pointing with pride to traditional institutions for security and faith, Coolidge became a fondly accepted symbol of calm, practical leadership. Using the slogan "Keep Cool with Coolidge," he easily won the 1924 election after a standpat campaign directed mainly against the "dangerous radicalism" of the third-party (Progressive) candidate, Robert LaFollette.

The Coolidge era was distinguished by absence of crises, lack of spectacular political leadership, and the expansion of apparent prosperity. An outstanding presidential policy was noninterference in the affairs of business and industry. Regulatory agencies became institutions for the assistance of business, a program of tax reductions favoured capital, and a high protective tariff was maintained. Coolidge firmly opposed proposals for effective farm relief and the payment of a bonus to World War I veterans, though Congress passed the bonus measure over his veto (1924). He twice vetoed the McNary–Haugen farm relief bills (1927, 1928). He reflected general public sentiment by pursuing a foreign policy of aloofness, theoretically favouring good relations, peace, and disarmament, but without entanglements.

Coolidge refused renomination in 1928 and retired to Northampton, where he wrote his autobiography (1929) and occasional articles on public issues.

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Coolidge, Julian Lowell (b. Sept. 28, 1873, Brookline, Mass., U.S.—d. March 5, 1954, Cambridge, Mass.), U.S. mathematician and educator who published numerous works on theoretical mathematics.

Coolidge was born to a family of well-established Bostonians; his paternal grandmother was Thomas Jefferson's granddaughter. Following the family tradition, Coolidge attended Exeter Academy and then Harvard College where, in 1895, he graduated summa cum laude. He next enrolled at Oxford and in 1897 received the first B.Sc. ever awarded by that university. For two years he taught mathematics at the Groton School before joining the mathematics department at Harvard in 1899 as an instructor. After a brief leave of absence to obtain his Ph.D. from the University of Bonn (1904), he returned to Harvard to continue his teaching; he became assistant professor in 1908 and professor in 1918. For the next four decades Coolidge was associated with the faculty at Harvard. He was appointed department chairman in 1927 and worked closely with Harvard's president, A. Lawrence Lowell, in the latter's reforms. In 1930 Coolidge and his family moved into Lowell House, where, for the next 10 years, he served as house master.

Coolidge's first book, *Elements of Non-Euclidean Geometry,* was published in 1909, and over the next four decades he published

seven other works including *The Geometry of the Complex Domain* (1924), *Introduction to Mathematical Probability* (1925), *A History of Geometrical Methods* (1940), *Conic Sections and Quadric Surfaces* (1945), and *The Mathematics of Great Amateurs* (1949).

Coolidge, William Augustus Brevoort (b. Aug. 28, 1850, New York City—d. May 8, 1926, Grindelwald, Switz.), American-born British historian and mountaineer who, in the course of about 1,750 ascents, made one of the first systematic explorations of the Swiss, French, and Italian Alps. A graduate of Oxford University, where he taught for some years, he was also ordained a priest in the Church of England (1883).

In his youth he was introduced to the Alps by an aunt, and climbing and Alpine study became his main interest. From 1885 he resided in Switzerland. He made his chief ascents between 1865 and 1898 and accomplished the first winter ascent of the 13,642-foot (4,158-metre) Jungfrau in Switzerland (1874). As a historian he was noted for his meticulous scholarship and editing. His books include *Guide to Switzerland* (1901) and *The Alps in Nature and History* (1908).

Coolidge, William D(avid) (b. Oct. 23, 1873, Hudson, Mass., U.S.—d. Feb. 3, 1975, Schenectady, N.Y.), American engineer and physical chemist whose improvement of tungsten filaments was essential in the development of the modern incandescent lamp bulb and the X-ray tube.

After teaching at the Massachusetts Institute of Technology (Cambridge; 1897, 1901–05) and the University of Leipzig (1899), in 1905 he joined the General Electric (GE) Research Laboratory. By 1908 he had perfected a process to render tungsten ductile and therefore more suitable for incandescent light bulbs; ductile drawn-tungsten filaments have since been a part of modern lighting.

In 1916 Coolidge patented a revolutionary X-ray tube capable of producing highly predictable amounts of radiation. The Coolidge tube became the prototype of the modern X-ray tube.

During World War I Coolidge worked on the construction of 1,000,000- and 2,000,000-volt X-ray machines for cancer treatment and also for industrial quality control. In collaboration with Irving Langmuir, he also developed the first successful submarine-detection system.

In 1932 Coolidge became director of the GE Research Laboratory. In 1940 he was appointed vice president and director of research for GE. Although he retired in 1944, he remained a consultant and director emeritus.

coolie (from Hindi *kuli,* an aboriginal tribal name, or from Tamil *kuli,* "wages"), in usually pejorative European usage, an unskilled labourer or porter usually in or from the Far East hired for low or subsistence wages.

The so-called coolie trade began in the late 1840s as a response to the labour shortage brought on by the worldwide movement to abolish slavery. The majority of these contract labourers were shipped from China, especially from the southern ports of Amoy and Macao, to developing European colonial areas, such as Hawaii, Ceylon, Malaya, and the Caribbean.

Most coolies became so by voluntary negotiation, though kidnapping, decoy, and fraud were occasionally involved. Western merchants conducted the trade. Conditions in the depots (barracoons), where the labourers were stored awaiting shipment, and on the vessels in which they sailed were cramped and inhumane, resulting in much sickness, misery, and death. Neither the Western governments nor the Chinese government made more than a haphazard attempt to correct the abuses; the Chinese government had issued a ban on all emigration, but officials did nothing to enforce it.

By the late 19th century, free immigration began to supersede the coolie trade. The Chinese, Japanese, and Hindustani workers who came to Australia and California after the discovery of gold in these areas around 1850 were commonly regarded as coolies, but they were technically free immigrants, not contract labourers.

cooling system, apparatus employed to keep the temperature of a structure or device from exceeding limits imposed by needs of safety and efficiency. If overheated, the oil in a mechanical transmission loses its lubricating capacity, while the fluid in a hydraulic coupling or converter leaks under the pressure created. In an electric motor, overheating causes deterioration of the insulation. The pistons in an overheated internal-combustion engine may seize (stick) in the cylinders. Cooling systems are employed in automobiles, industrial plant machinery, nuclear reactors, and many other types of machinery. (For a treatment of cooling systems used in buildings, *see* air-conditioning.)

The cooling agents customarily employed are air and a liquid (usually water), either alone or in combination. In some cases, direct contact with ambient air (free convection) may be sufficient; in other cases, it may be necessary to employ forced convection, created either by a fan or by the natural motion of the hot body.

In a transmission, if the surface area of the housing (container) is sufficiently large compared with the power lost, or if the transmission is in a moving vehicle, no artificial cooling means may be necessary. To augment the cooling effect by increasing the surface area, the housing may be provided with thin metal fins. On some stationary mechanical transmissions, it may be necessary to circulate the lubricating oil through pipes surrounded by cold water or to use a fan to blow air through pipes surrounded by the oil in the reservoir. On many electric motors, cooling is provided by a fan that is attached to the rotating element and creates a current of air through the housing.

In an automobile, the motion of the vehicle provides sufficient forced-convection cooling for the transmission and the gears in the rear axle; in the engine, however, so much energy is released that, except for some early models and certain small cars with low-powered engines, air cooling has not been employed.

A typical automotive cooling system comprises (1) a series of channels cast into the engine block and cylinder head, surrounding the combustion chambers with circulating liquid to carry away heat; (2) a radiator, consisting of many small tubes equipped with a honeycomb of fins to radiate heat rapidly, that receives and cools hot liquid from the engine; (3) a water pump, usually of the centrifugal type, to circulate the liquid through the system; (4) a thermostat to control temperature by varying the amount of liquid going to the radiator; and (5) a fan to draw fresh air through the radiator.

To prevent freezing, an antifreeze solution is either added to or substituted for water. To raise the boiling point of the solution, the cooling system is usually pressurized by means of a pressure cap on the radiator with valves that open outwardly at a prescribed pressure and inwardly to prevent a vacuum as the system cools.

Coolins, The (Scotland): *see* Cuillin Hills.

Cooma, town, southeastern New South Wales, Australia, on the rolling Monaro grassland plateau. Established in 1849, it derives its name from the Aboriginal word *coombah,* variously meaning "lake," "sandbank," "one," and "big swamp." The town grew during the nearby Kiandra gold rush in 1860 and was proclaimed a municipality in 1879. In 1981 it became part of Cooma–Monaro Shire. Set in the Southern Tablelands and the closest railhead to Mt. Kosciusko, it was selected (1949) as the headquarters of the massive Snowy Mountains hydroelectric–irrigation scheme in the Australian Alps. During the peak years of construction, Cooma acquired a population of more than 10,000.

With the completion of the Snowy Mountains project in 1972, the town experienced some reduction in growth. Its economy is, however, being sustained by lumbering, joinery work, steel fabrication, sheep and cattle farming, and tourism based on the Alpine region, including Kosciusko National Park, and the dams, reservoirs, and aqueducts of the Snowy Mountains project. Cooma is connected to Sydney (200 mi [300 km] northeast) and Melbourne via the Snowy Mountains and Monaro highways and by rail and air. Pop. (1981) 7,978.

Coomaraswamy, Ananda Kentish (b. Aug. 22, 1877, Colombo, Ceylon—d. Sept. 9, 1947, Needham, Mass., U.S.), pioneer historian of Indian art and foremost interpreter of Indian culture to the West. He was concerned with the meaning of a work of art within a traditional culture and with examining the religious and philosophical beliefs that determine the origin and evolution of a particular artistic style. A careful scholar, he also established an art historical framework for the study of the development of Indian art.

Of mixed Ceylonese and British parentage, he was educated at Wycliffe College and the University of London, where he earned a doctorate in geology. He was named director of mineral surveys for Ceylon in 1903 but soon transferred his interests to the arts of Ceylon and India. In 1910–11 Coomaraswamy was placed in charge of the art section of the great United Provinces Exhibition in Allāhābād, India. Six years later, when the Dennison W. Ross Collection was donated to the Museum of Fine Arts, Boston, he was appointed the museum's fellow for research in Indian, Persian, and Muslim art, a post that he held until his death. He enhanced the museum's Indian collections but was primarily concerned with scholarship and contributed extensively to learned journals throughout the world.

His publications ranged over Indian music, dance, and Vedic literature and philosophy, as well as art. He also contributed to Islāmic and Far Eastern studies. Coomaraswamy's definitive *Catalogue of the Indian Collections in the Museum of Fine Arts, Boston* was published in five volumes during 1923–30; the *History of Indian and Indonesian Art* (1927) became the standard text in the field. *The Transformation of Nature in Art* (1934) and *Figures of Speech or Figures of Thought* (1946) are collections of essays expressing his views on the relationship of art to life, traditional art, and the ideological parallels between the arts of the East and the pre-Renaissance West.

Coomassie (Ghana): *see* Kumasi.

Coon, Carleton (Stevens) (b. June 23, 1904, Wakefield, Mass., U.S.—d. June 6, 1981, Gloucester, Mass.), American anthropologist who made notable contributions to cultural and physical anthropology and archaeology. His areas of study ranged from prehistoric agrarian communities to contemporary tribal societies in the Middle East, Patagonia, and the hill country of India.

Coon taught at Harvard from 1927 to 1948, earning his Ph.D. there in 1928. During World War II he served with the Office of Strategic Services in Africa. In 1948 he joined the faculty of the University of Pennsylvania and became curator of ethnology at the University Museum, Philadelphia, serving in the two positions until 1963. He is perhaps best re-

membered for his general works *The Story of Man* (1954) and *The Seven Caves* (1957), a history of archaeology in the Middle East. His other books include *Caravan* (1951), *The Origin of Races* (1962), and *The Hunting Peoples* (1971).

Coon Butte (meteor crater, Arizona): *see* Meteor Crater.

Coonabarabran, town, east-central New South Wales, Australia. It lies along the Castlereagh River, near the Pilliga Scrub district. Surveyed in 1859 and gazetted a shire in 1906, it derived its name from an Aboriginal word meaning "inquisitive person." Lying along the Newell and Oxley highways, with regular air and rail services to Sydney (210 miles [340 km] southeast), Coonabarabran serves an area of wheat and sheep farming, lumbering (cypress pine), and diatomite mining. The town's industries include a freezing plant and sawmills. The town is also a gateway to the Warrumbungle Range and the Warrumbungle National Park, which lie to the west. One of the world's largest optical telescopes is at nearby Siding Spring Mountain. Pop. (1981) 3,001.

Coonamble, town, north-central New South Wales, Australia. It lies along the Castlereagh River, at the western edge of the Pilliga Scrub district. Proclaimed a town in 1861 and a municipality in 1880, the Shire of Coonamble (1906) was merged with the Shire of Wingadee in 1957 and is now part of Coonamble Shire. Its name is derived from an Aboriginal word meaning "bullock dung" and "amazing sight."

Lying along the Castlereagh Highway, with air and rail links to Sydney (260 miles [420 km] southeast), the town of Coonamble, with its sawmills and freezing plants, serves an area of wool, wheat, and beef production; lumbering (cypress pine and ironbark eucalyptus); and blue-metal (basalt) quarrying. Wells provide water for the town. A wool festival is held in the town in October. Coonamble is close to the Macquarie Marshes, an important bird-breeding area. Pop. (1981) 3,090.

Cooney, Loretta: *see* Taylor, Laurette.

coonhound, any of several breeds of dogs used primarily in hunting raccoons by scent. Coonhounds are noted for the melodious quality of their voices. The black-and-tan coonhound is bred in the United States from strains of bloodhound and black-and-tan foxhound. It is a short-haired, bloodhoundlike dog standing 23 to 27 inches (59 to 69 cm) and having a glossy black-and-tan coat. It has the general appearance of a strong, alert dog and is able to withstand rigorous weather and terrain. It is known for its skill and perseverance in tracking deer, bears, and mountain lions, as well as raccoons.

The redbone, bluetick, Plott, and Treeing Walker are other breeds of coonhounds, all standing about 21 to 26 inches (53 to 66 cm) tall. The redbone, a reddish-brown dog, is generally a strong, determined hunter and is valued for trailing big game as well as raccoons. The bluetick is mottled blue-gray with black and reddish brown markings; it is characterized as a swift, active, and diligent hunter. The Plott hound, typically an alert, confident hunter, is brindle, with or without a black saddle marking on its back. The Treeing Walker, descended from the American foxhound, is white with black-and-tan markings; it is considered a swift, able hunter.



Black-and-tan coonhound
Walter Chandoha

coontail, aquatic plant of the hornwort (*q.v.*) family.

Cooper, Anthony Ashley: *see* Shaftesbury, Anthony Ashley Cooper, 1st earl of; Shaftesbury, Anthony Ashley Cooper, 3rd earl of; Shaftesbury, Anthony Ashley Cooper, 7th earl of.

Cooper, Sir Astley Paston, 1ST BARONET (b. Aug. 23, 1768, Brooke, Norfolk, Eng.—d. Feb. 12, 1841, London), English surgeon who, in 1816, was the first to tie the abdominal aorta as a means of treating an aneurysm. Among the records of the remarkable variety of successful operations he performed, all of them accomplished before the days of antiseptic surgery, are *The Anatomy and Surgical Treatment of Hernia* (Part 1, 1804; Part 2, 1807) and the account of an attempt to tie the carotid artery, published in the first volume of *Transactions* of the Medical and Chirurgical Society, of which he was a founder.

Cooper studied with Henry Cline and John Hunter, in London, and later in Paris and Edinburgh. In 1800 he went to Guy's Hospital as surgeon, and in 1813 he became professor of comparative anatomy to the Royal College of Surgeons. He had perhaps the largest and most lucrative private practice of any British surgeon of his time. Appointed surgeon to King George IV, he received a baronetcy in 1821.



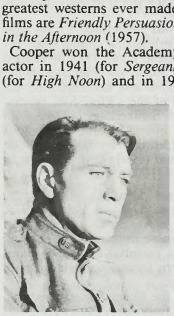
Astley Cooper, pencil drawing by Sir Francis Chantrey; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Cooper, Gary, original name FRANK JAMES COOPER (b. May 7, 1901, Helena, Mont., U.S.—d. May 13, 1961, Los Angeles), American motion-picture actor whose portrayal of homespun characters established him as a glamorized image of the average man. He was one of Hollywood's most consistently popular and beloved stars.

The son of a Montana Supreme Court justice, Cooper left Grinnell College, Iowa, in 1924 and went to Hollywood, where he earned a living as a cowboy extra and stunt rider. His agent changed his name, and he advanced to leading parts in modestly budgeted westerns that were often box-office hits. A major stroke of luck was his being cast in *The Winning of Barbara Worth* (1926). He rose to stardom in *The Virginian* (1929), one of his first talking pictures, and became one of Hollywood's leading male actors with his appearances in such films as *Morocco* (1930), *A Farewell to Arms* (1932), *Design for Living* (1933), *The Lives of a Bengal Lancer* (1935), *Desire* (1936), *The Plainsman* (1937), *Beau Geste* (1939), and *The Westerner* (1940).

Cooper often played a brave, laconic, and somewhat reticent man whose upright character compels him to perform heroic actions that he does not purposely seek. He typified the role of the unsophisticated man fighting for what he thought was right in two films directed by Frank Capra, *Mr. Deeds Goes to Town* (1936) and *Meet John Doe* (1941). Among Cooper's other important films were *Sergeant York* (1941), *Ball of Fire* (1941), *The Pride of the Yankees* (1942), *For Whom the Bell Tolls* (1943), and *The Fountainhead* (1949). His role as the aging town marshall in *High Noon* (1952) is considered Cooper's finest performance and the film one of the greatest westerns ever made. Among his last films are *Friendly Persuasion* (1956) and *Love in the Afternoon* (1957).

Cooper won the Academy Award for best actor in 1941 (for *Sergeant York*) and 1952 (for *High Noon*) and in 1961 was honoured with a Special Academy Award for his career and the international reputation he won for the film industry. A biography of him, *The Last Hero,* by Larry Swindell was published in 1980.



Gary Cooper, still from *Sergeant York,* 1941
By courtesy of United Artists Corp.

Cooper, Dame Gladys, married name DAME GLADYS MERIVALE (b. Dec. 18, 1888, Lewisham, London—d. Nov. 17, 1971, Henley-on-Thames, Oxfordshire, Eng.), popular British actress-manager who started her 66-year theatrical career as a Gaiety Girl and ended it as a widely respected mistress of her craft.

She accepted her first role in a touring production of *Bluebell in Fairyland* at the age of 16 (1905). After her London debut in *The Belle of Mayfair* (1906), Cooper worked for George Edwardes, the impresario of the Gaiety Theatre, as a chorus girl and understudy.

Her pursuit of nonmusical roles led to her successful appearance as Cecily in *The Importance of Being Earnest* (1911). After a tour entertaining the troops in France (1914), she was invited to join Frank Curzon as joint manager of London's Playhouse Theatre (1917). Her appearance as Paula in *The Second Mrs. Tanqueray* (1922) made her a star, and her well-received portrayal of Leslie in the premiere of Somerset Maugham's *The Letter* (1927) marked the beginning of her six-year tenure as sole lessee of the Playhouse.

Cooper made her American debut in *The Shining Hour* (1934). Her career as a film actress reached importance after her appearance in an American film, *Kitty Foyle* (1940). She received three Academy Award nominations as best supporting actress (1942, 1943, 1964). Of her other films, *Now Voyager* (1942), *The Song of Bernadette* (1943), *Green Dolphin Street* (1947), *Separate Tables* (1958), and *The List of Adrian Messenger* (1963) are of the greatest interest.

Her stage career was revived after the war with two particular successes: her portrayal of Felicity in the long-running London production of *Relative Values,* written and directed by Noël Coward (1951), and her characteriza-

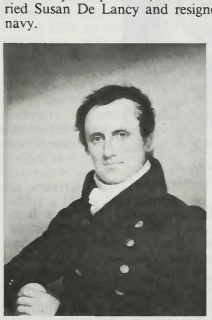
tion of Mrs. St. Maugham in the New York City world premiere of Enid Bagnold's *The Chalk Garden* (1955).

Cooper wrote two volumes of memoirs, *Gladys Cooper* (1931) and *Without Veils* (1953). In 1967 she was made Dame Commander of the Order of the British Empire, and in 1969 she celebrated her 80th birthday while appearing in Ira Wallach's *Out of the Question.*

Cooper, James Fenimore (b. Sept. 15, 1789, Burlington, N.J., U.S.—d. Sept. 14, 1851, Cooperstown, N.Y.), first major U.S. novelist, author of the novels of frontier adventure known as the Leatherstocking Tales, featuring the wilderness scout called Natty Bumppo, or Hawkeye. They include *The Pioneers* (1823), *The Last of the Mohicans* (1826), *The Prairie* (1827), *The Pathfinder* (1840), and *The Deerslayer* (1841).

Early years. Cooper's mother, Elizabeth Fenimore, was a member of a respectable New Jersey Quaker family, and his father, William, founded a frontier settlement at the source of the Susquehanna River (now Cooperstown, N.Y.) and served as a Federalist congressman during the administrations of George Washington and John Adams. It was a most appropriate family background for a writer who, by the time of his death, was generally considered America's "national novelist."

James was but a year old when William Cooper moved his family to the primitive settlement in upstate New York. He was doubtless fortunate to be the 11th of 12 children, for he was spared the worst hardships of frontier life while he was able to benefit educationally both from the rich oral traditions of his family and a material prosperity that afforded him a gentleman's education. After private schooling in Albany, he attended Yale from 1803 to 1805. Little is known of his college career other than that he was the best Latin scholar of his class and was expelled in his junior year because of a prank. Since high spirits seemed to fit him for an active life, his family allowed him to join the navy as a midshipman. But prolonged shore duty at several New York stations merely substituted naval for academic discipline. His father's death in 1809 left him financially independent, and in 1811 he married Susan De Lancy and resigned from the navy.



James Fenimore Cooper, detail of an oil painting by John Wesley Jarvis; in Yale University Art Gallery

By courtesy of Yale University Art Gallery, gift of Edward S. Harkness

For 10 years after his marriage he led the active but unproductive life of a dilettante, dabbling in agriculture, politics, the American Bible Society, and the Westchester militia. It was in this amateur spirit that he wrote and published his first fiction, reputedly on a challenge from his wife. *Precaution* (1820) was a plodding imitation of Jane Austen's novels of English gentry manners. It is mainly interesting today as a document in the history of American cultural colonialism and as an example of a clumsy attempt to imitate Jane Austen's investigation of the ironic discrepancy between illusion and reality. His second novel, *The Spy* (1821), was based on another British model, Sir Walter Scott's "Waverley" novels, stories of adventure and romance set in 17th- and 18th-century Scotland. But in *The Spy* Cooper broke new ground by using an American Revolutionary War setting (based partly on the experiences of his wife's British Loyalist family) and by introducing several distinctively American character types. Like Scott's novels of Scotland, *The Spy* is a drama of conflicting loyalties and interests in which the action mirrors and expresses more subtle internal psychological tensions. *The Spy* soon brought him international fame and a certain amount of wealth. The latter was very welcome, indeed necessary, since his father's estate had proved less ample than anybody had thought, and, with the death of his elder brothers, he had found himself responsible for the debts and widows of the entire Cooper family.

Novels. The first of the renowned "Leatherstocking" tales, *The Pioneers* (1823), followed and adhered to the successful formula of *The Spy,* reproducing its basic thematic conflicts and utilizing family traditions once again. In *The Pioneers,* however, the traditions were those of William Cooper of Cooperstown, who appears as Judge Temple of Templeton, along with many other lightly disguised inhabitants of James's boyhood village. No known prototype exists, however, for the novel's principal character—the former wilderness scout Natty Bumppo, alias Leatherstocking. The Leatherstocking of *The Pioneers* is an aged man, of rough but sterling character, who ineffectually opposes "the march of progress," namely, the agricultural frontier and its chief spokesman, Judge Temple. Fundamentally, the conflict is between rival versions of the American Eden: the "God's Wilderness" of Leatherstocking and the cultivated garden of Judge Temple. Since Cooper himself was deeply attracted to both ideals, he was able to create a powerful and moving story of frontier life. Indeed, *The Pioneers* is both the first and finest detailed portrait of frontier life in American literature; it is also the first truly original American novel.

Both Cooper and his public were fascinated by the Leatherstocking character. He was encouraged to write a series of sequels in which the entire life of the frontier scout was gradually unfolded. *The Last of the Mohicans* (1826) takes the reader back to the French and Indian wars of Natty's middle age, when he is at the height of his powers. That work was succeeded by *The Prairie* (1827) in which, now very old and philosophical, Leatherstocking dies, facing the westering sun he has so long followed. (The five novels of the series were not written in their narrative order.) Identified from the start with the vanishing wilderness and its natives, Leatherstocking was an unalterably elegiac figure, wifeless and childless, hauntingly loyal to a lost cause. This conception of the character was not fully realized in *The Pioneers,* however, because Cooper's main concern with depicting frontier life led him to endow Leatherstocking with some comic traits and make his laments, at times, little more than whines or grumbles. But in these sequels Cooper retreated stylistically from a realistic picture of the frontier in order to portray a more idyllic and romantic wilderness; by doing so he could exploit the parallels between the American Indians and the forlorn Celtic heroes of James Macpherson's pseudo-epic *Ossian,* leaving Leatherstocking intact but slightly idealized and making extensive use of Macpherson's imagery and rhetoric.

Cooper intended to bury Leatherstocking in *The Prairie,* but many years later he resuscitated the character and portrayed his early maturity in *The Pathfinder* (1840) and his youth in *The Deerslayer* (1841). These novels, in which Natty becomes the centre of romantic interest for the first time, carry the idealization process further. In *The Pathfinder* he is explicitly described as an American Adam, while in *The Deerslayer* he demonstrates his fitness as a warrior-saint by passing a series of moral trials and revealing a keen, though untutored, aesthetic sensibility.

The "Leatherstocking" tales are Cooper's great imperfect masterpiece, but he continued to write many other volumes of fiction and nonfiction. His fourth novel, *The Pilot* (1823), inaugurated a series of sea novels, which were at once as popular and influential as the "Leatherstocking" tales. And they were more authentic: such Westerners as General Lewis Cass, governor of Michigan Territory, and Mark Twain might ridicule Cooper's woodcraft, but old salts like Herman Melville and Joseph Conrad rightly admired and learned from his sea stories, in particular *The Red Rover* (1827) and The *Sea Lions* (1849). Never before in prose fiction had the sea become not merely a theatre for, but the principal actor in, moral drama that celebrated man's courage and skill at the same time that it revealed him humbled by the forces of God's nature. As developed by Cooper, and later by Melville, the sea novel became a powerful vehicle for spiritual as well as moral exploration. Not satisfied with mere fictional treatment of life at sea, Cooper also wrote a meticulously researched, highly readable *History of the Navy of the United States of America* (1839).

Cultural and political involvement. Though most renowned as a prolific novelist, he did not simply retire to his study after the success of *The Spy.* Between 1822 and 1826 he lived in New York City and participated in its intellectual life, founding the Bread and Cheese Club, which included such members as the poets Fitz-Greene Halleck and William Cullen Bryant, the painter and inventor Samuel F.B. Morse, and the great Federalist judge James Kent. Like Cooper himself, these were men active in both cultural and political affairs.

Cooper's own increasing liberalism was confirmed by a lengthy stay (1826–33) in Europe, where he moved for the education of his son and four daughters. Those years coincided with a period of revolutionary ferment in Europe, and, because of a close friendship that he developed with the old American Revolutionary War hero Lafayette, he was kept well-informed about Europe's political developments. Through his novels, most notably *The Bravo* (1831), and other more openly polemical writings, he attacked the corruption and tyranny of oligarchical regimes in Europe. His active championship of the principles of political democracy (though never of social egalitarianism) coincided with a steep decline in his literary popularity in America, which he attributed to a decline in democratic feeling among the reading—*i.e.* the propertied—classes to which he himself belonged.

Return to America. When he returned to America, he settled first in New York City and then for the remainder of his life in Cooperstown. In the gentlemanly tradition of Jefferson and Lafayette he attacked the oligarchical party of his day, in this case the Whig Party, which opposed Pres. Andrew Jackson, the exponent of a more egalitarian form of democracy. The Whigs, however, were soon able to turn the tables on Cooper and other leading Jacksonians by employing Jackson's egalitarian rhetoric against them. Squire Cooper had made himself especially vulnerable to popular feeling when, in 1837, he refused to let local citizens picnic on a family property known as Three Mile Point. This incident led to a

whole series of charges of libel, and suits and countersuits by both the Whigs and Cooper. At this time, too, agrarian riots on the estates of his old New York friends shattered his simple Jeffersonian faith in the virtue of the American farmer. All of this conflict and unrest was hard to bear, and harder still because he was writing more and earning less as the years went by. The public, which had revelled in his early forest and sea romances, was not interested in his acute political treatise, *The American Democrat* (1838), or even in such political satires as *The Monikins* (1835) or *Home As Found* (1838). And though he wrote some of his best romances—particularly the later "Leatherstocking" tales and *Satanstoe* (1845)—during the last decade of his life, profits from publishing so diminished that he gained little benefit from improved popularity. Though his circumstances were never straitened, he had to go on writing; and some of the later novels, such as *Mercedes of Castile* (1840) or *Jack Tier* (1846–48), were mere hack work. His buoyant political optimism had largely given way to calm Christian faith, though he never lost his troubled concern for the well-being of his country. (G.De.)

MAJOR WORKS. *Novels. Precaution* (1820); *The Spy* (1821); *The Pioneers* (1823); *The Pilot* (1823); *Lionel Lincoln* (1824); *The Last of the Mohicans* (1826); *The Prairie* (1827); *The Red Rover* (1827); *The Wept of Wish-ton-Wish* (1829); *The Water Witch; or, The Skimmer of the Seas* (1830); *The Bravo* (1831); *The Monikins* (1835); *Homeward Bound* (1838); *Home As Found* (1838); *The Pathfinder* (1840); *The Deerslayer* (1841); *The Two Admirals* (1842); *The Wing-and-Wing; or, Le Feu-follet* (1842); *Wyandotté; or, The Hutted Knoll* (1843); *Ned Myers* (1843); *Afloat and Ashore* (1844); *Satanstoe; or, The Littlepage Manuscripts* (1845); *The Chain-Bearer* (1845); *The Redskins; or, Indian and Injin* (1846); *The Crater; or, Vulcan's Peak* (1847); *The Sea Lions* (1849); *The Ways of the Hour* (1850).

Other works. Notions of the Americans: Picked Up by a Travelling Bachelor (1828); *A Letter to His Countrymen* (1834); *Sketches of Switzerland* (1836); *Gleanings in Europe* (1837); *The American Democrat* (1838); *The History of the Navy of the United States of America* (1839).

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The fullest and most accurate biographical account is that contained in James F. Beard's prefaces and notes to the *Letters and Journals.* James Grossman, *James Fenimore Cooper* (1949), is a sound and readable critical biography.

Important critical studies include: Mark Twain, "Fenimore Cooper's Literary Offences," *North American Review,* vol. 161 (1895), unfair, but shrewd and funny; D.H. Lawrence, "Fenimore Cooper's Leatherstocking Novels," *Studies in Classic American Literature* (1923), factually inaccurate but brilliantly suggestive; Yvor Winters, "Fenimore Cooper, or the Ruins of Time," *In Defense of Reason* (1947), first published in 1938, a masterly reappraisal of Cooper's life and writings; Henry Nash Smith, *Virgin Land* (1950), establishes Leatherstocking's place in the development of the mythology of the American West; Thomas Philbrick, *James Fenimore Cooper and the Development of American Sea Fiction* (1961), a definitive study, notable for exhaustive scholarship and penetrating criticism; Donald A. Ringe, *James Fenimore Cooper* (1962), an able critical survey of Cooper's fiction; Kay S. House, *Cooper's Americans* (1966), a pioneering study of Cooper's character types and methods of characterization; George Dekker, *James Fenimore Cooper* (1967), an examination of Cooper's achievement as a historical novelist; Stephen Railton, *Fenimore Cooper: A Study of His Life and Imagination* (1978), presenting the thesis of "a son who was trying to find himself by means of his novels" to overcome his father's psychical domination.

Cooper, John M(ontgomery) (b. Oct. 28, 1881, Rockville, Md., U.S.—d. May 22, 1949, Washington, D.C.), U.S. Roman Catholic priest, ethnologist, and sociologist who specialized in studies of the "marginal peoples"



John Cooper
By courtesy of the Catholic University of America, Washington, D.C.

of southern South America, northern North America, and other regions. He viewed these peoples as having been pushed back into less desirable territories by later migrations and as representing cultural survivals from prehistoric times.

Ordained in 1905, Cooper became a part-time instructor at the Catholic University of America, Washington, D.C., in 1909. His first ethnological work, *An Analytical and Critical Bibliography of the Tribes of Tierra del Fuego and Adjacent Territory* (1917), marked the beginning of his writing on marginal cultures. Concerned with group social work and varied sociological questions from 1917 to 1925, he became an associate professor (1923) and a professor (1928) of sociology and he served as chairman of the first department of anthropology in a Catholic university (1934–49).

Though Cooper became an authority on the Indians of southern South America, he never made field trips to the region. He made repeated visits, however, to the Algonkian-speaking tribes of the Great Plains and northeastern Canada and wrote many articles on their material culture, social customs, and magic and religion. He was particularly concerned with population distribution and historical reconstruction and advanced the theory of the "marginal peoples" in *Temporal Sequence and the Marginal Cultures* (1941). He was founder of the journal *Primitive Man (Anthropological Quarterly* since 1953). His final North American Indian monograph, *The Gros Ventres of Montana* (1957), dealt with religion and ritual.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Cooper, Kent (b. Mar. 22, 1880, Columbus, Ind., U.S.—d. Jan. 31, 1965, West Palm Beach, Fla.), U.S. journalist who achieved prominence as executive director of the Associated Press (AP).

Cooper's father was a successful Democratic politician. As a youth Cooper had an after-school reporting job at the local newspaper. After two years at Indiana University, the death of his father forced him to go to work, and he became a reporter on the Indianapolis *Press.* His newspaper career took him to the Scripps-McRae Press Association, a precursor to the United Press, and then into his own agency, where he developed innovations that brought him back to Scripps-McRae and soon to the attention of Melville Stone, editor of AP. He was hired as traveling inspector in 1910 and became chief of the traffic department in 1912. In 1920 Cooper was made assistant general manager. In subsequent years he helped make the AP a leader among the world's news agencies. Innovations adopted during his period of service included the first high-speed telegraph printing machines for the transmission of news, and the first system of transmitting news photographs by wire, which he conceived. The latter, established in 1935, became Wide World Photos, Inc.

Cooper was a longtime and vigorous advocate of international freedom of the press. He was the author of *Barriers Down* (1942); *Anna Zenger, Mother of Freedom* (1946); *The Right to Know* (1956); and *Kent Cooper and The Associated Press* (1959).

Cooper, L(eroy) Gordon, Jr. (b. March 6, 1927, Shawnee, Okla., U.S.), one of the original team of seven U.S. astronauts. On May 15–16, 1963, he circled the Earth 22 times in Faith 7, completing the sixth and last of the Mercury manned space flights. At the end of his 34-hour 20-minute flight, when the automatic control system had broken down, he piloted his craft back to Earth manually and landed just 5 miles (8 kilometres) from the primary recovery ship. In August 1965 he served as command pilot of Gemini 5 on an eight-day endurance mission.

After brief service with the Marine Corps, Cooper earned a commission with the U.S. Army at the University of Hawaii, Honolulu (1946–49), and transferred to the Air Force. He received a B.S. in aeronautics (1956) from the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, and served



L. Gordon Cooper, Jr., 1960
By courtesy of the National Aeronautics and Space Administration

as a test pilot at Edwards Air Force Base, California, until 1959. He resigned from the Air Force and the space program in 1970 and entered private business.

Cooper, Leon N. (b. Feb. 28, 1930, New York City), U.S. physicist and winner of the 1972 Nobel Prize for Physics, along with John Bardeen and John Robert Schrieffer, for his role in developing the BCS (for their initials) theory of superconductivity. The concept of Cooper electron pairs was named after him.

Cooper was educated at Columbia University, receiving his Ph.D. in 1954. He taught at Ohio State University in Columbus before joining (1958) the faculty at Brown University, Providence, R.I., where he was appointed Henry Ledyard Goddard university professor in 1966 and Thomas J. Watson, Sr., professor of science in 1974.

His principal contribution to the BCS theory was the discovery (1956) that electrons, which

under normal conditions repel each other, are attracted to each other in superconductors, a phenomenon termed the Cooper electron pairs.

He lectured extensively abroad and took a special interest in teaching physics to humanities students. His publications include *An Introduction to the Meaning and Structure of Physics* (1968), *Introduction to Methods of Optimization* (1970), and *Methods and Applications of Linear Programming* (1974).

Cooper, Peter (b. Feb. 12, 1791, New York City—d. April 4, 1883, New York City), American inventor, manufacturer, and philanthropist who built the "Tom Thumb" locomotive and founded The Cooper Union for the Advancement of Science and Art, New York City.



Peter Cooper

By courtesy of the Library of Congress, Washington, D.C.

Son of a Revolutionary War army officer who went into a succession of businesses in New York, Cooper learned an array of trades at an early age, despite having had only a single year of formal schooling. At the age of 17 he was apprenticed to a coach maker, whom he served so well that he was given a salary, and at the end of his apprenticeship was offered a loan to go into coach making on his own. Young Cooper instead went into the business of manufacturing and selling machines for shearing cloth. A few years later he saw opportunity in another industry and switched to supplying the rapidly growing markets for glue and isinglass, building up a large business that in 1828 he entrusted to his son Edward and his son-in-law Abram S. Hewitt, while he himself plunged into still another enterprise. This was the Canton Iron Works, built on 3,000 acres of land in Baltimore, primarily to supply the new Baltimore and Ohio Railroad Company. The route of the railroad, however, was so hilly and twisting that English engineers despaired of running an engine over it. Cooper at once undertook to build a suitable locomotive and by 1830 had the diminutive but powerful "Tom Thumb" experimentally pulling a load of 40 persons at 10 miles an hour.

The resulting success of the B&O contributed to Cooper's rapid expansion of business interests and growing fortune. In 1854, in his new factory at Trenton, N.J., the first structural-iron beams for buildings were rolled. He persevered in his support of Cyrus Field's Atlantic cable project until it was successfully concluded, and he became president of the North American Telegraph Company. During the same period he displayed remarkable inventive talent, producing a washing machine, a compressed-air engine for ferry boats, a waterpower device for moving canal barges, and several other devices.

Cooper's social views were farsighted; as a member of the Board of Aldermen of New York City, he advocated paid police and firemen, public schools, and improved public sanitation. In 1859 he founded Cooper Union, where free courses were offered in science, engineering, and art. In the presidential election of 1876 he headed the minority Greenback Party ticket in order to place before the public his economic views, which ran counter to the prevailing deflationary doctrine. At a reception in his honour in his later years he summed up his philosophy: "I have endeavoured to remember that the object of life is to do good."

Cooper, Samuel (b. 1609—d. May 5, 1672, London), painter, one of the finest English miniaturists, and perhaps the most celebrated of all English artists in his own day.

Cooper was the younger brother of the miniaturist Alexander Cooper and, like his brother, a pupil of their uncle, John Hoskins. He worked for Oliver Cromwell as well as for the restored monarchy and court. His miniature portraits are remarkable for both their expressive Baroque use of colour and brushwork within a tiny format and for their effective presentation of their subjects' individual character.

Cooper, Thomas, Cooper also spelled COUPER (b. *c.* 1517, Oxford—d. April 29, 1594, Winchester, Hampshire, Eng.), English bishop and author of a famous dictionary.

Educated at the University of Oxford, Cooper became master of Magdalen College school and afterward practiced as a physician in Oxford. In 1565 appeared the first edition of his most notable work, *Thesaurus Linguae Romanae et Britannicae*. Three other editions followed in 1573, 1578, and 1584.

Queen Elizabeth I was greatly pleased with the *Thesaurus*, which became known as *Cooper's Dictionary*. Cooper, who had been ordained about 1559, was made dean of Christ Church, Oxford, in 1567. Two years later he became dean of Gloucester, in 1571 bishop of Lincoln, and in 1584 bishop of Winchester. Cooper defended the practice and precept of the Church of England against the Roman Catholics on the one hand and against the Martin Marprelate writings and the Puritans on the other.

Cooper, Thomas (b. March 20, 1805, Leicester, Leicestershire, Eng.—d. July 15, 1892, Lincoln, Lincolnshire), English writer whose political epic *The Purgatory of Suicides* promulgated in verse the principles of Chartism, Britain's first specifically working-class national movement, for which Cooper worked and suffered imprisonment.

While working as a shoemaker Cooper read widely and in 1827 became a schoolmaster and in 1829 a Methodist lay preacher. He worked for the *Leicestershire Mercury* newspaper until his conversion to Chartism led to his dismissal in 1841, and he then began to edit various Chartist weeklies. In 1842 he toured the potteries to urge support for the general strike. In 1843 he was convicted of sedition and spent two years in jail, where he wrote his verse epic. After 1856 most of his writings were in defense of Christianity, as his political enthusiasm declined after quarrelling with Fergus O'Connor, a Chartist leader.

Cooper Basin, arid topographical depression and site of natural-gas and oil fields in northeastern South Australia, Australia. The Gidgealpa natural-gas field in Cooper Basin was discovered in 1963, and a second major natural-gas field was found soon after at nearby Moomba. In 1969 a natural-gas pipeline was completed from Moomba to Adelaide, and in 1976 natural gas began to be supplied to the Sydney area by a second pipeline. Petroleum exploration in the 1980s resulted in new discoveries of both oil and gas. Recoverable oil and gas reserves in the 1980s were about 3,662,000,000 cu ft (103,700,000 cu m). Seismic work, appraisal drilling, and engineering studies at Tirrawirra, Fly Lake, and Moorari oil fields have been undertaken, and an oil pipeline from Moomba to Stony Point, S.Aus., was completed in 1982.

Cooper Creek, also called COOPERS CREEK, or BARCOO RIVER, intermittent stream, east central Australia, in the Channel Country (wide floodplains, grooved by rivers). Rising as the Barcoo on the northern slopes of the Warrego Range, Queensland, it flows northwest to Blackall. Joined by the Alice River, it continues southwest past Isisford and receives its principal tributary, the Thomson, from which point it is known as Cooper Creek. It crosses the South Australian border, and carries water to Lake Eyre only during wet-year floods. Average annual discharge at Currareva is 2,900 cu ft (82 cu m) per second. The total length of this system of internal drainage is 880 mi (1,420 km), and the basin (area 114,000 sq mi [296,000 sq km]) provides cattle pasturage after the floods subside. The major source of domestic and stock water is, however, the aquifers of the Great Artesian Basin. Cooper Creek was explored (1845–46) by Charles Sturt and Sir Thomas Livingstone Mitchell.

Cooper Union, tuition-free undergraduate college located in New York City. It was endowed in 1859 by merchant and philanthropist Peter Cooper for the "advancement of science and art," and its financial resources were later increased by the Hewitt and Carnegie families. Green Camp, a 1,000-acre (400-hectare) tract in Ringwood, N.J., was acquired in 1941 for an adjunct educational and recreational facility. In 1955 the institution acquired property adjacent to its original site for a school of engineering (completed 1960).

Instruction in the school's day or evening classes is open to any student able to meet the intelligence and aptitude tests. Many national agencies for social welfare were founded at Cooper Union, and a number of U.S. presidents have spoken there. The Museum for the Arts of Decoration, opened in 1897, provides important resources for designers in the decorative arts. Cooper Union's library was the first free public reading room in New York City.

cooperative, organization owned by and operated for the benefit of those using its services. Cooperatives have been successful in a number of fields, including the processing and marketing of farm products, the purchasing of other kinds of equipment and raw materials, and in the wholesaling, retailing, electric power, credit and banking, and housing industries. The income from a retail cooperative is usually returned to the consumers in the form of dividends based on the amounts purchased over a given period of time.

Modern consumer cooperatives, usually called co-ops in the United States, are thought to have begun in Great Britain in 1844, with the Rochdale Society of Equitable Pioneers. The society created a set of organizational and working rules that have been widely adopted. They included open membership, democratic control, no religious or political discrimination, sales at prevailing market prices, and the setting aside of some earnings for education.

The cooperative movement developed rapidly in the latter part of the 19th century, particularly in the industrial and mining areas of northern Britain and Scotland. It spread quickly among the urban working class in Britain, France, Germany, and Sweden and among the rural population of Norway, The Netherlands, Denmark, and Finland.

In the United States, attempts at consumer and agricultural marketing cooperatives were made at the beginning of the 19th century. Although most U.S. cooperatives developed in rural areas, consumer and housing cooperatives spread substantially in metropolitan areas in the late 20th century.

Cooperatives were introduced in Latin Amer-

ica by European immigrants in the early 1900s; later they were often fostered by state action in connection with agrarian reform. Marketing and credit cooperatives have been important in many African nations, especially since World War II. During the Soviet era, marketing cooperatives of the U.S.S.R. and eastern Europe functioned as part of a centrally controlled purchasing network for farm produce. Cooperative farms in those countries were modeled on the Russian artel, in which all land was pooled and worked in common and income was distributed according to work performed. *Compare* credit union.

Cooperative Commonwealth Federation: *see* Co-operative Commonwealth Federation.

cooperativity, in enzymology, a phenomenon in which the shape of one subunit of an enzyme consisting of several subunits is altered by the substrate (the substance upon which an enzyme acts to form a product) or some other molecule so as to change the shape of a neighbouring subunit. The result is that the binding of a second substrate molecule to the second subunit of the enzyme differs in strength or velocity from that of the first, the third from the second, and so on. If the change in shape of the first subunit makes easier the binding of substrate to the second subunit, the effect is called positive cooperativity. In negative cooperativity, the binding of a molecule to the first subunit makes more difficult the binding of substrate to the second. *See also* allosteric control.

Cooperstown, village in Otsego and Middlefield towns (townships) and seat (1791) of Otsego county, central New York, U.S. Cooperstown is situated at the southern tip of Otsego Lake, where the Susquehanna River emerges, 38 mi (61 km) south-southeast of Utica. The site was settled in the late 1780s by Judge William Cooper; the village (inc. 1807) stands as a monument to the Cooper family. The judge's son, James Fenimore Cooper, author of the "Leatherstocking" tales, including *The Deerslayer* (1841), is buried in Christ Church cemetery. A monument to his work stands on the site of Otsego Hall, the Cooper family home, where he spent his final years (1834–51). Cooperstown is also acclaimed the birthplace of baseball; Gen. Abner Doubleday is credited with inventing the game there in 1839. The National Baseball Hall of Fame and Museum, which is located in Cooperstown, has baseball memorabilia and a gallery of bronze plaques honouring the nation's outstanding players.

Now a summer resort, the village has some light industry. Of historic interest are the Farmers' Museum, Fenimore House (containing Cooper manuscripts and mementos), Cooperstown Indian Museum, Carriage and Harness Museum, and the Woodland Museum. The Mount Otsego Ski Area is nearby. Pop. (1990) 2,180.

coordinate geometry: *see* analytic geometry.

Coordinated Universal Time (UTC), international basis of civil and scientific time. UTC is widely broadcast by precisely coordinated radio signals; these radio time signals ultimately furnish the basis for the setting of all public and private clocks. UTC is obtained from atomic clocks, and the unit of UTC is the atomic (SI) second.

UTC serves to coordinate the timekeeping differences that arise between atomic time (which is derived from atomic clocks) and solar time (which is derived from astronomical measurements of the Earth's rotation on its axis relative to the Sun). UTC is thus kept within an exact number of seconds of International Atomic Time and is also kept within 0.9 second of the solar time denoted UT1 (*see* Universal Time). Due to the irregular slowing of the Earth's rate of rotation by tidal friction and other forces, there is now about one more (atomic clock-derived) SI second in a solar year than there are UT1 seconds. To remedy this discrepancy, UTC is kept within 0.9 s of UT1 by adding a leap second to UTC as needed; the last minute of December or June is made to contain 61 seconds. The slowing of the Earth's rotation varies irregularly, and so the number of leap seconds by which UTC must be retarded to keep it in epoch with UT1 cannot be predicted years in advance. Impending leap seconds for UTC are announced at least eight weeks in advance by the Paris Observatory, however.

coordination compound, any of a class of substances with chemical structures in which a central metal atom is surrounded by nonmetallic atoms or groups of atoms, called ligands, joined to it by chemical bonds. Coordination compounds include such substances as vitamin B_{12}, hemoglobin, and chlorophyll; dyestuffs and pigments; and catalysts used in preparing organic substances.

A brief treatment of coordination compounds follows. For full treatment, *see* MACROPAEDIA: Chemical Compounds.

The metal atom in a coordination compound may be an electrically neutral atom or an ion. The ligands may also be neutral or charged. A ligand forms a chemical bond with the metal atom by sharing a pair of electrons with it. A ligand can attach to the atom by one bond (unidentate) or several bonds (multidentate). The latter configuration is cyclic, or aromatic, because it contains a ring of atoms. Multidentate compounds are called chelates and comprise an important group of compounds.

Many coordination compounds have distinct geometric structures. Two common forms are the square planar, in which four ligands are arranged at the corners of a hypothetical square around the central metal atom, and octahedral, in which six ligands are arranged, four in a plane and one each above and below the plane. Altering the position of the ligands relative to one another can produce different compounds with the same chemical formula. Thus, a cobalt ion linked to two chloride ions and four molecules of ammonia can occur in both green and violet forms according to how the six ligands are placed. Replacing a ligand also can affect the colour. A cobalt ion linked to six ammonia molecules is yellow. Replacing one of the ammonia molecules with a water molecule turns it rose red. Replacing all six ammonia molecules with water molecules turns it purple.

Some synthetic dyes and pigments are coordination compounds. Moreover, a number of natural coordination compounds are responsible for colour in biological systems. Heme, the red pigment of blood, is an iron coordination compound, for example. The plant pigment chlorophyll is based on a magnesium coordination compound. Both heme and chlorophyll are multidentate. In heme the iron atom is joined to four nitrogen atoms, which are part of a heterocyclic organic structure called a porphyrin. The magnesium ion in chlorophyll is similarly bound to nitrogen porphyrin atoms.

A very stable class of organometallic coordination compounds has provided impetus to the development of organometallic chemistry. In these compounds two molecules of an unsaturated cyclic hydrocarbon, which lacks one or more hydrogen atoms, bond on either side of a metal atom, forming a "sandwich." This results in a highly stable aromatic system.

Multidentate ligands are useful in some industrial processes as chelating agents. They can sequester a metal ion by forming a coordination compound with it. This changes its properties in such a way that it can be used, for example, in softening hard water or extracting metals from ores. In medicine, it can remove poisonous concentrations of metal ions from the body.

Metal carbonyls—neutral compounds in which several molecules of carbon monoxide are coordinated to a metal atom—are also important in some metallurgical processes. These compounds are often volatile. Their volatility assists in the purification of metals and also facilitates their deposition as thin, even films. Metal carbonyls are generally toxic. In carbon monoxide poisoning a carbon monoxide molecule attaches to the iron in heme, which affects its ability to transport oxygen.

A major application of coordination compounds is their use as catalysts, which serve to alter the rate of chemical reactions. Certain complex metal catalysts, for example, play a key role in the production of polyethylene and polypropylene. A future use of coordination compounds as industrial catalysts could be to convert carbon monoxide into useful petroleum products.

coordination number, also called LIGANCY, the number of atoms, ions, or molecules that a central atom or ion holds as its nearest neighbours in a complex or coordination compound or in a crystal. Thus the metal atom has coordination number 8 in the coordination complexes $[Mo(CN)_8]^{4-}$ and $[Sr(H_2O)_8]^{2+}$; 7 in the complex $[ZrF_7]^{3-}$; 4 in the complexes $[Zn(CN)_4]^{2-}$, $[Cu(CN)_4]^{3-}$, and $[Ni(CN)_4]^{4-}$; 2 in the complexes $[Ag(NH_3)_2]^{+}$, $[AuCl_2]^{-}$, and $[HgCl_2]$. Coordination numbers from 2 to 9 have been observed in complexes; higher coordination numbers occur, although rarely. A given ion or atom does not necessarily have one characteristic coordination number; *e.g.*, Al^{3+} has coordination number 4 in $[AlCl_4]^{-}$ but 6 in $[AlF_6]^{3-}$.

The forces that hold the atoms together in these complexes and that lead to the observed coordination numbers are of different kinds. The bonds to the highly electronegative fluorine atoms in the fluoride complexes are essentially ionic; and the increase in coordination number, with fluoride ion, from 4 to 6 to 7 for B^{3+}, Fe^{3+}, and Zr^{4+} is the result mainly of the increase in size of the cation, which permits a successively larger number of fluoride ions to be packed about the central ion.

The influence of the relative size of the coordinated molecule and the central ion is important in hydrated cations, in which the coordinating bond is mainly the electrostatic attraction of the central cation and the negative end (oxygen atom) of the water molecule.

In many complexes of metal ions—including those formed by the cyanide ion, the nitrite ion or nitro group, the thiocyanate ion, the halide ions (other than fluoride), the ammonia molecule, and the carbon monoxide molecule—the bonds between the attached atom or group and the central atom are essentially covalent, and the coordination number is determined by the nature of the bond orbitals of the central atom. Thus, Zn^{2+} and Cu^{+} have their five *3d* orbitals completely filled (each one containing two electrons), leaving as orbitals suited to bond formation the one *4s* and the three *4p* orbitals. These can hybridize to form four bond orbitals directed toward the corners of a regular tetrahedron; accordingly, then, these ions form cyanide complexes $[Zn(CN)_4]^{2-}$ and $[Cu(CN)_4]^{3-}$, with coordination number 4 and the tetrahedral configuration.

A more recent theory, called the ligand field theory (*q.v.*), assumes that the inner *d* orbitals of the central atom or ion are affected by the presence of the ligands. The number of orbitals made available for bonding, hence the coordination number, depends on the geometrical arrangement of the ligands and the strength of the ligand field.

Coorg, also called KODAGU, district, southwestern Karnātaka (formerly Mysore) state, southern India, at the southern end of the Western Ghāts. Its 1,585-sq-mi (4,104-sq-km) area is rugged and hilly with a high rainfall and a climate tempered by the altitude. The thickly forested hills often exceed 5,000 ft (1,500 m) and rise from the Karnātaka plateau. Notable summits, all above 5,300 ft, include Tadramol, Pushpagiri, and Kottebetta. The name Coorg is probably a corruption of the Kanarese *koḍagu* ("steepness"). Coorg is drained by the upper Cauvery River and its tributaries, which in legend have some of the life-giving properties of the Ganges.

Rice is cultivated on the valley floors. Coffee plantations occupy hillside clearings. Other crops are tea, cardamom, rubber, pepper, and millet. There are orange groves in the south and evergreen timber forest in the west.

From the 9th century Coorg was an independent kingdom. A Hindu dynasty ruled almost continuously from the late 16th century until it was overthrown by the British in 1834. The region became a province (a state after 1950) of British India and because of its ruggedness was sometimes referred to as the "Wales of India." Administered by the chief commissioner of Mysore from 1881 to 1947, Coorg was absorbed into Mysore in 1953. The main towns are the district headquarters, Mercāra (*q.v.*), Somvarpet, Virarājendrapet, and Ponnampet. Pop. (1981) 461,888.

Coornhert, Dirck Volckertszoon (b. 1522, Amsterdam—d. Oct. 29, 1590, Gouda, Neth.), Dutch poet, translator, playwright, and moralist who set down Humanist values for the first time in the vernacular. His clear, unpretentious prose style contrasted with that of the contemporary Rederijkers (rhetoricians) and served as a model to the great 17th-century Dutch writers. His book of songs *Liedekens* (1575) shows his determination to choose a form for the content and not vice versa.

Coornhert settled in Haarlem as an engraver on copper. Holding positions in the city's government, he threw himself into the struggle against Spanish rule and drew up the manifesto of William of Orange (1566). He was imprisoned at The Hague (1568) but escaped to Cleves. Although he was recalled to Haarlem in 1572, his aversion to warfare led him back to Cleves, where he continued in William's employ.

Coornhert published Dutch translations of Cicero, Seneca, and Boethius. His translation of the *Odyssey*—*De dolinghe van Ulysse* (1561)—was the first great work of the Dutch early Renaissance. Here Coornhert's powers of imagery and sensuous description are fully evident, while in his original poetry the religious–humanistic intent precludes any stress on figurative language.

All his works testify to his belief in a loving God. His dramas are allegorical and didactic: the *Comedie van Israël* (1575) attacks the worldly, hypocritical Netherlands of his time. Coornhert stood for toleration and opposed capital punishment for heretics.

His best known prose work is the moralist tract *De wellevenskunste* (1586; "The Polite Art"), in which he holds that the true path can be found only through spiritual love.

Coos Bay, city, Coos county, southwestern Oregon, U.S., on Coos Bay (an inlet of the Pacific), adjacent to North Bend, Eastside, and the port of Charleston. Settled in 1854 by J.C. Tolman, who named it Marshfield after his hometown in Massachusetts, it developed early shipbuilding industries. A landlocked harbour, proximity to large stands of timber, and the construction of sawmills in the early 1900s made the city a major lumber-shipping port. It also processes seafood, dairy, and poultry products and is the heart of a seaside resort area. Southwestern Oregon Community College was established there in 1961. Incorporated in 1874, it was renamed Coos Bay (Coos is an Indian tribal name) in 1944 and absorbed the adjacent city of Empire in 1965. Pop. (1990) 15,076.

Coosa River, river flowing through northwestern Georgia and eastern Alabama, U.S. It is formed by the confluence of the Etowah and Oostanaula rivers at Rome, Ga., and flows southward for 286 mi (460 km) through the Appalachian Ridge and Valley region into the Gulf coastal plain at Wetumpka, Ala. Its initial course is southwesterly into Cherokee County, Ala., where it receives the Chattooga River, then southwest past Gadsden, Childersburg, and Talladega Springs. Four miles southwest of Wetumpka and 10 mi north of Montgomery, it joins the Tallapoosa River to form the Alabama River. Locks and power dams make navigation possible for barges to Rome. The dams are located between Wetumpka and Talladega Springs. The name Coosa is derived from that of an Indian tribe.

coot, any of ten species of ducklike waterdwelling birds of the genus *Fulica* in the rail family, Rallidae. Coots are found throughout the world in larger inland waters and streams, where they swim and bob for food, mostly plants, seeds, mollusks, and worms. Coots have greenish or bluish gray feet, the toes of



Mud hen (*Fulica americana*)
Benjamin Goldstein from Root Resources—EB Inc.

which are fringed by a lobed membrane that facilitates swimming and walking over plant-choked marshes and ooze. The beak is short and conical, surmounted by a flattened fleshy shield that extends onto the forehead.

The European coot (*F. atra*) breeds abundantly in many northern parts of the Old World, in winter resorting to river mouths or shallow bays of the sea. About 45 centimetres (18 inches) long and sometimes more than 900 grams (2 pounds) in weight, the seemingly short-winged coot appears to rise with difficulty from the water, pattering along the surface with its feet. It is capable of long-sustained and rapid flight. Although not considered to be game birds, coots sometimes are hunted in winter, when they are most gregarious.

Coots nest in masses of water plants, laying as many as ten speckled eggs. The young are beautifully clothed in jet-black down, with heads of bright orange scarlet, varied with purplish blue. This brilliant colouring is soon lost; adults have sooty black plumage and a bare white callus on the forehead.

The coot of North America, or mud hen (*F. americana*), closely resembles the European bird. In South America about six species are found, one (*F. gigantea*) being of considerable size; *F. caribaea* occurs also in the West Indies. An African species (*F. cristata*) is distinguished by two red knobs on the forehead.

The scoter (*q.v.*), a diving duck of the family Anatidae, is also called a sea coot.

Cootamundra, town, south central New South Wales, Australia, in the Western Slopes region of the fertile Riverina, was founded in 1830 as a livestock station. Its name (Cootamundry until 1952) is Aboriginal for "swamp with turtles." Proclaimed a town in 1861, it was made a municipality in 1884 and a shire in 1975. On the principal Sydney–Melbourne rail line, Cootamundra is also the rail and road junction for routes serving the state's central region, which produces sheep, wheat, and some gold. The town is a major livestock auction centre and conducts one of the largest sheep shows in the state. It is linked to Sydney (190 mi [300 km] northeast) by air and has flour and rice mills, butter factories, and slaughterhouses. Furniture, plaster, concrete, cordials, and small goods are manufactured. Pop. (1981) 6,540.

Coote, Sir Eyre (b. 1726, Kilmallock, County Limerick, Ire.—d. April 28, 1783, Madras), tempestuous and effective British soldier who served as commander of the East India Company forces in Bengal and as commander in chief in India.

Born the sixth son of an Irish Protestant clergyman, Coote served first in the uprising in 1745 of the Jacobites, who favoured the male and Roman Catholic descendants of James II; Coote soon obtained a captaincy in the 39th Regiment, the first to be sent to India. With his headquarters in Madras, he in 1756 joined forces with the soldier-statesman Robert Clive in operations against Calcutta, which had fallen under Indian control. After the victorious Battle of Plassey, Coote led the pursuit of a French force for 400 miles under extraordinary difficulties. For that feat he won the rank of lieutenant colonel and command of the 84th Regiment. After further successes in the Carnatic region (which includes the Malabar Coast in South India), Wandiwash, and Pondicherry, he was given command of East India Company forces in Bengal in 1761. Returning to England in 1762 with company rewards for his services, he sat in Parliament for the borough of Leicester. He was promoted to colonel and commander in chief of the company forces and went back to Bengal in 1769, but he quarrelled with the civil government and returned to England, where he was knighted in 1771.

In their wars with the North American colonies and with the French, the British called upon Coote (1778) to be commander in chief in India. Accepting comfortably the policies of Warren Hastings, the first governor general, Coote refused to take sides in the disagreements between Hastings and his council but retained firm control of the army. The military progress of Prince Hyder Ali of Mysore again required his presence in the field in South India, but he faced grave difficulties. Not until June 1781 did he defeat Hyder Ali at the town of Porto Novo, thus saving South India for Britain. That engagement, in addition to a hard-fought victory at Pollilur and the rout of the Mysore troops at Sholingur a month later, brought him to exhaustion; he relinquished his command and moved to Calcutta. With the increase both of French harassment and of friction between the Governor and the new commander in chief, Hastings pleaded with Coote to go back to Madras; he died soon after his return.

Copacabana, sector of the city of Rio de Janeiro, Brazil, occupying a narrow strip of land between the mountains and the sea. It is famous for its magnificent 2½-mi (4-km) curved beach. Skyscraper hotels, apartment houses, cafés, nightclubs, restaurants, theatres, and bars line the waterfront. Copacabana is almost a self-contained city; its traffic con-

gestion has been progressively eased by the construction of tunnels that connect it with other parts of Rio de Janeiro.

copal, any of various varnish resins, consisting of the exudates obtained from various tropical trees. The name copal was probably derived from the Nahuatl *copalli,* "resin." When hard, copal is lustrous, varying in hue from almost colourless and transparent to a bright yellowish brown. It dissolves in alcohol or other organic solvents upon heating and is used in making varnishes and printing ink. Copal is obtained from various sources; the term is vaguely used for resins that, though similar in physical properties, differ in their chemical makeup and are altogether distinct as to their source.

Copal may be collected from living trees or mined as a fossil. The raw, or recent, copal, sometimes called jackass copal, which is obtained directly from trees or found at their roots or near the ground, is used in varnish manufacture in India and China but does not enter into European commerce. In the varnish trade, several varieties of soft Manila copal are used. Zanzibar copal, the principal commercial copal, is the fossil yielded by *Trachylobium verrucosum;* it is found embedded in the earth over a wide belt of East Africa on the western coast of Zanzibar on tracts where not a tree is now visible. South American copals are available from the *Hymenaea courbaril* and other species of trees in Brazil, Colombia, and other South American countries.

Dammar resins and the piney varnish of India are sometimes called copal.

copal tree: *see* tree of heaven.

Copán, ruined ancient Mayan city, in extreme western Honduras near the Guatemalan border, that was an important centre of Mayan art and astronomy. The site lies on the western bank of the Copán River, about 35 miles (56 km) west of the town of Santa Rosa de Copán.

Copán was an important Mayan city during the Classic Period (*c.* AD 300–900), and at its peak in the 8th century it may have been home to as many as 20,000 people. The site consists of stone temples, two large pyramids, several stairways and plazas, and a court for playing the ball game *tlachtli.* Most of these structures centre on a raised platform called the Acropolis that was apparently the architectural centre of the ancient city. Copán is particularly noted for the friezes on some of its other buildings and the portrait sculptures on its many stelae. The Hieroglyphic Stairway, which leads to one of the temples, is beautifully carved with hieroglyphics on the risers of each of its 63 steps. During the Classic Period, there is evidence that astronomers in Copán calculated the most accurate solar calendar produced by the Maya up to that time.

The site's ruins were discovered by Spanish explorers in the early 16th century. The American traveler John Lloyd Stephens rediscovered them in 1839, and between 1936 and 1950 the ruins were restored by a group jointly sponsored by the Carnegie Institution of Washington and the government of Honduras. Another major investigation that began in 1975 revealed much of Copán's political and dynastic history through the decipherment of hieroglyphic inscriptions on its monuments. A dynasty of at least 16 kings ruled Copán from about AD 426 to 822, by which latter date the city had entered a serious decline. The Maya had completely abandoned the site by about 1200.



Stela with portrait sculpture, Copán
Walter Aguiar

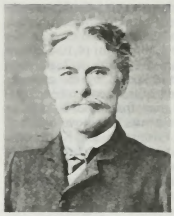
cope, liturgical vestment worn by Roman Catholic and some Anglican clergy at noneucharistic functions. A full-length cloak formed from a semicircular piece of cloth, it is open at the front and is fastened at the breast by hooks or a brooch. It is made of silk or other rich material in various colours. Originally, a hood was attached to the neck, but this was replaced by a shield-shaped piece of material. In the 20th century the hood was restored. The cope was adapted from the *cappa choralis* ("choir mantle"), a black, hooded vestment worn by clergy in processions and choir services. It is known that the cope was in use by the end of the 8th century as a liturgical vestment, and by the end of the 11th century it was universally adopted.



The Syon cope, English, late 13th–early 14th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

Cope, Edward Drinker (b. July 28, 1840, Philadelphia, Pa., U.S.—d. April 12, 1897, Philadelphia), paleontologist who discovered approximately a thousand species of extinct vertebrates in the United States and led a revival of Lamarckian evolutionary theory, based largely on paleontological views.

After a brief period at Haverford College, Pennsylvania, as professor of comparative zoology and botany (1864–67), Cope devoted 22 years to exploration and research. Most of this time was spent in the discovery and description of extinct fishes, reptiles, and mammals of the western United States, from Texas to Wyoming. He served as paleontologist with the U.S. Geological Survey and, with Joseph Leidy, described the fossils collected by the Ferdinand Hayden Survey in Wyoming. He worked out the evolutionary histories of the horse and of mammalian teeth. A race with his colleague Othniel Marsh for priority in discovering American fossil dinosaurs culminated in a bitter feud that proved damaging to the reputations of both men.



Edward Drinker Cope, *c.* 1889
By courtesy of Margaret W. Cope

Cope's theory of kinetogenesis, stating that the natural movements of animals aided in the alteration and development of moving parts, led him to openly support Lamarck's theory of evolution through inheritance of acquired characteristics. Financial difficulties compelled him to accept a position on the faculty of the University of Pennsylvania (1889–97).

Cope is most noted for his invaluable contribution to knowledge of the vertebrates that flourished between the extinction of the dinosaurs (66 million years ago) and the rise of man (1.6 million years ago), known as the Tertiary Period of geologic time. Among his 1,200 books and papers are *Reptilia and Aves of North America* (1869–70) and *Relation of Man to Tertiary Mammalia* (1875).

Cope, Jack, byname of ROBERT KNOX COPE (b. June 3, 1913, Mooi River, Natal, S.Af.), South African writer best known for his short stories and novels about South African life.

Cope became a journalist in Durban and then in London. Unwelcome in England by 1940 owing to his pacifism, he returned to South Africa to farming, shark fishing, and writing fiction. *The Fair House* (1955), a family history centring on the Zulu revolt of 1902, was the first of a series of novels including *The Golden Oriole* (1958), *The Road to Ysterberg* (1959), *Albino* (1964), *The Dawn Comes Twice* (1969), *The Student of Zend* (1972), and *My Son Max* (1977). Short-story collections were *The Tame Ox* (1960), *The Man Who Doubted* (1967), and *Alley Cat* (1973).

Cope's writing is always credible and lucid and shows genuine insight into the varied classes, races, and individuals who populate his fiction. Sometimes criticized as overly sensitive to the demands of South African society and to the evils he acknowledged in it, he nevertheless chose to live and write in South Africa rather than seek the independence exile might have given him. Yet this same sensitivity was essential to the scope, skill, and

morality of his art. In any case, he did not entirely, in spite of care, avoid censorship. *The Dawn Comes Twice* was (belatedly) banned in the late 1970s. He founded and for many years edited the bilingual journal *Contrast* and edited and translated the works of many other writers. In 1982 Cope published *The Adversary Within: Dissident Writers in Afrikaans.*

Copeau, Jacques (b. Feb. 4, 1879, Paris, Fr.—d. Oct. 20, 1949, Beaune), French actor, literary critic, stage director, and dramatic coach who led a reaction against realism in early 20th-century theatre.

After a brief career as an art dealer, Copeau became drama critic for *L'Ermitage* (1904–06) and *La Grand Revue* (1907–10). In 1909, with André Gide, Jean Schlumberger, and others, he founded *La Nouvelle Revue Française* and edited it until 1911. His adaptation of Fyodor Dostoyevsky's *Brothers Karamazov,* written in collaboration with Jean Croué, was staged in 1911.

In 1913 Copeau founded the Théâtre du Vieux-Colombier (from 1961 the Théâtre du Vieux-Colombier-Jacques Copeau), where he produced dramatic works ranging from those of William Shakespeare to the 20th-century plays of such writers as Paul Claudel. Seeking to break down the barrier between actor and audience, he designed his theatre as a reconstruction of the Elizabethan apron stage without proscenium arch and with simple screens to suggest locale. The atmosphere of each play was created almost entirely by lighting.

Emphasizing the play rather than its trappings, Copeau concentrated on training actors, and eventually his company ranked with the great Moscow Art Theatre of Konstantin Stanislavsky. In 1917 Copeau took his company to New York City, and in 1924 he left the Vieux-Colombier and moved his school of young actors to Burgundy. There, besides studying acting, they were employed throughout the countryside, the peasants calling them "Les Copiaux," under which name they first appeared at Basel in 1926. The new company—which toured Europe and had its own playwright, André Obey—was taken over by Michel Saint-Denis in 1930.

One of Copeau's greatest contributions to the theatre was his idea of a permanent architectural stage for modern productions.

Copeland, district and borough, county of Cumbria, northwestern England, occupying an area of 285 square miles (737 square km) in the southwestern part of the county bordering the Irish Sea on the west; there are narrow coastal plains along the sea. Copeland is a scenic mountain and lake-filled valley district coextensive with the southwestern part of the Lake District National Park in the Cumbrian Mountains. Scafell Pike, reaching 3,210 feet (978 m) above sea level, is England's highest point and is located in the district's northeastern corner. Coal mined in the vicinity of the port of Whitehaven on the northwestern coast and iron ore mined near Egremont 5 miles (8 km) southeast and at Millom in the extreme south were used to develop the late 19th- and early 20th-century iron and steel industry at Workington, 8 miles (13 km) north of Whitehaven. In the late 20th century only one of the mines remained open, producing only small amounts of high-grade hematite.

Whitehaven, the district seat, is also a fishing port (cod and pilchard). Evidence of ancient Roman and Viking settlements is found throughout the district. The contemporary varied industrial base includes modern chemical works based on anhydrite mined near Whitehaven. The United Kingdom's first (1956) nuclear power station, Calder Hall, is 10 miles (16 km) south of Whitehaven. The adjacent Windscale nuclear power research station was formally shut down in 1981 and was used as a test-bed for the dismantling of a nuclear reactor. Pop. (1989 est.) 71,700.

Copeland, Charles Townsend (b. April 27, 1860, Calais, Maine, U.S.—d. July 24, 1952, Waverly, Mass.), American journalist and teacher who was preeminent as a mentor of writers and as a public reciter of poetry.

Copeland was educated at Harvard University (A.B., 1882), and, after a year as a teacher at a boys' school in New Jersey and another at Harvard Law School, he was a drama critic and book reviewer for the Boston *Advertiser* and the Boston *Post* for nine years. In 1893 he returned to Harvard as an instructor in the English department, becoming assistant professor (1917) and Boylston professor (1925) until his retirement in 1928.

In his writing course at Harvard from 1905 Copeland had as students such later famous writers as poets T.S. Eliot and Conrad Aiken; historians Van Wyck Brooks and Bernard De Voto; journalists Heywood Broun, John Reed, and Walter Lippman; playwrights S.N. Behrman and Robert Sherwood; novelists Oliver La Farge and John Dos Passos; critics Gilbert Seldes, Brooks Atkinson, and Malcolm Cowley; and editor Maxwell Perkins, who later edited Copeland. So great was Copeland's popularity that his students founded an alumni association for him in 1907, which persisted until 1937. His Monday evening socials for students, with unannounced guests such as John Barrymore, Robert Frost, Ernest Hemingway, and Archibald MacLeish, became legendary. From 1906 to 1926 he lectured at Lowell Institute, Boston, in university extension courses on English literature.

His *The Copeland Reader* (1926), an anthology of selections from his favourite works, indicated the scope of his interests and was extremely popular.

Copenhagen, Danish KØBENHAVN, capital and largest city of Denmark, seat of København *amtskommune* (county commune), eastern Denmark. It is located on the islands of Zealand (Sjælland) and Amager, at the southern end of The Sound (Øresund).

A small village existed on the site of the present city by the early 10th century. In 1167 Bishop Absalon of Roskilde built a castle on an islet off the coast and fortified the town with ramparts and a moat. In 1445 Copenhagen was made the capital of Denmark and the residence of the royal family. In the civil and religious conflicts of the Protestant Reformation, the town was often sacked.

During the late 16th century Copenhagen's trade began to flourish, and the city itself expanded. Among the new buildings erected were the Børsen (Exchange), the Holmens Church, Trinitatis Church, with the adjacent famous Round Tower, and the palace of Rosenborg (now the museum of the royal family).

During the wars with Sweden (1658–60) Copenhagen was besieged for two years. Fires in 1728 and 1795 destroyed many houses and buildings, and in the early 1800s the city was bombarded by the British. The ramparts were pulled down in 1856. Since then, the city has expanded still further and incorporated many of the adjacent districts.

The heart of the city is the Raadhuspladsen ("Town Hall Square"). From the square, an old crooked shopping street leads northeast to the former centre of the city, Kongens Nytorv ("King's New Square"), laid out in the 17th century. Buildings there include the Thott Palace (now the French Embassy) and the Charlottenborg Palace (now the Royal Academy of Fine Arts), both of the 17th century, and the Royal Theatre, built in 1874.

Located on the island of Slotsholmen ("Castle Islet") is Christiansborg Palace, built on the site of the old castle founded by Bishop Absalon in 1167. Since 1928 the palace has been occupied by Parliament, the Supreme Court, and the Foreign Office. Nearby buildings house other government offices. Slotsholmen also contains the Bertel Thorvaldsen Museum, the Arsenal, the state archives, and the Royal Library.

Other important buildings include the Prinsens Palace, now the National Museum; the Church of Our Lady; the University of Copenhagen, founded in 1479; the Petri Church, used after 1585 as a parish church for the German residents of the city; the 17th-century citadel; and the palace of Amalienborg. The botanical gardens laid out in 1874 have an observatory with a statue of the Danish astronomer Tycho Brahe. Other popular sites are the Tivoli amusement park and the Ny Carlsberg Glyptotek, with a fine collection of traditional and modern art.

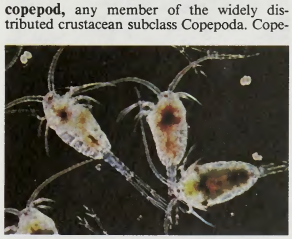
The old quarter of Christianshavn is on the harbour to the south. It contains the 17th-century Church of Our Saviour. The western quarter contains the Frederiksberg Park, with its palace and a zoological garden.

Formerly a centre of trade and shipping, Copenhagen has also become an industrial city. Shipbuilding, machinery production, and canning and brewing are among the chief manufacturing activities. A number of arterial streets carry traffic toward the centre, across the harbour bridges. There are electric railways (*S-baner*) for commuters and a network of city bus lines. The last streetcars disappeared in 1972. Copenhagen's airport is at Kastrup, southeast of the city.

In addition to the University of Copenhagen, there are a number of other institutions of higher education. These include the Technical University of Denmark (1829), the Engineering Academy of Denmark (1957), the Royal Danish Academy of Music (1867), the Royal Veterinary and Agricultural College (1856), and the Copenhagen School of Economics and Business Administration (1917). Pop. (1990 est.) city, 466,723; (1989 est.) *amtskommune,* 602,046; metropolitan area, 1,343,916.

Copenhagen University Botanical Garden, Danish KØBENHAVNS UNIVERSITET BOTANISK HAVE, one of the notable botanical gardens of Europe. Founded in 1759 on part of the ancient fortifications of Copenhagen, the garden occupies more than 9 hectares (24 acres) and has about 15,000 kinds of plants, both under glass and outdoors. The outdoor plantings are surprisingly rich, considering the northern climate (latitude 55° N); except for summer annuals, all plants, including many handsome specimen trees, are perennials. A large greenhouse-conservatory covering 3,000 square m (32,000 square feet) displays exceptionally large collections of orchids from Thailand, begonias, and ferns. The garden also has a special air-conditioned greenhouse that can re-create environments suitable for Arctic plants. The university's botanical museum and herbarium are housed in a building situated within the garden, giving the garden staff ready access to reference works and more than 2 million dried plant specimens.

copepod, any member of the widely distributed crustacean subclass Copepoda. Cope-



Copepods (*Temora*)
Douglas P. Wilson

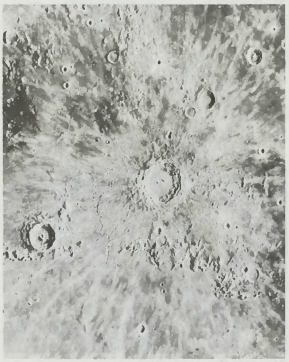
pods are of great ecological importance, providing food for many species of fish. Most of the 10,000 known species are free-living marine forms, occurring both at the surface of the sea and at great depths. Some live in freshwater; a few live in damp moss, in moisture at the base of leaves, or in humus. Some species are parasitic. Water fleas (genus *Cyclops*), microscopic freshwater species of the order Cyclopoida, can transmit the guinea worm to humans.

Most copepods are 0.5 to 2 mm (0.02 to 0.08 inch) long. The largest species, *Pennella balaenopterae,* which is parasitic on the finback whale, grows to a length of 32 cm (about 13 inches). Males of *Sphaeronellopsis monothrix,* a parasite of marine ostracods, are among the smallest copepods, attaining lengths of only 0.11 mm.

Copepods lack compound (*i.e.,* multifaceted) eyes. Unlike most crustaceans, they also lack a carapace—a shieldlike plate over the dorsal, or back, surface. Some species feed on microscopic plants or animals; others prey on animals as large as themselves. Parasitic forms suck the tissues of the host. Most species reproduce sexually, but certain forms also reproduce by parthenogenesis—*i.e.,* the eggs develop into new individuals without being fertilized by the male.

Copernican system, in astronomy, model of the solar system centred on the Sun, with Earth and other planets moving around it, formulated by Nicolaus Copernicus, and published in 1543. It appeared with an introduction by Rhāticus (Rheticus) as *De revolutionibus orbium coelestium libri VI* ("Six Books on the Revolutions of the Celestial Orbs"). The Copernican system gave a truer picture than the older Ptolemaic system, which was geocentric, or centred on Earth. It correctly described the Sun as having a central position relative to Earth and other planets. Copernicus retained from Ptolemy of Alexandria, although in somewhat altered form, the imaginary clockwork of epicycles and deferents (orbital circles upon circles), to explain the seemingly irregular movements of the planets in terms of circular motion at uniform speeds.

Copernicus, one of the most prominent craters on the Moon. It constitutes a classic example of a relatively young, well-preserved lunar impact crater. Located at 10° N, 20° W, Copernicus measures 93 km (58 miles) in diameter and is a source of radial bright rays (light-coloured streaks on the lunar surface).



Bright surface rays around the Copernicus crater
Lick Observatory Photograph

A photograph of the crater interior taken in 1966 by the U.S. probe Lunar Orbiter 2 shows terraced slumps on the crater wall that resemble giant stairs leading to the floor, 3.8 km (2.4 miles) below the rim crest. Peaked mountains rise from the centre of the crater to a height of 800 m (2,625 feet); they probably were formed as a result of a rebound of deep-seated rocks at the site of impact.

Copernicus, Nicolaus (Latin), German-Prussian dialect NIKLAS KOPPERNIGK, Polish MIKOŁAJ KOPERNIK (b. Feb. 19, 1473, Toruń, Pol.—d. May 24, 1543, Frauenberg, East Prussia [now Frombork, Pol.]), Polish astronomer noted as the proponent of the view of an Earth in daily motion about its axis and in yearly motion around a stationary Sun, a hypothesis that had profound effects on the science and philosophy of succeeding centuries.

A brief treatment of Copernicus follows. For full treatment, *see* MACROPAEDIA: Copernicus.

Copernicus received his university education at Kraków (1491–94?) in Poland and at Bologna and Padua in Italy (1497–1503). In 1503 he returned to Poland and took up residence in Frauenburg, where in 1497 he had been elected a canon of the cathedral, a post ensuring lifelong financial security. In 1497 he also made the first of his few recorded astronomical observations. Becoming increasingly dissatisfied with Earth-centred ideas of the universe, he spent years developing the theory that Earth and the other planets revolved about a point in space near the Sun.

From 1510 to 1514 Copernicus circulated the *Commentariolus,* a manuscript summary of his theory. Not until 1540 did he consent to the publication of his complete work, *On The Revolutions of the Celestial Spheres.* A finished copy is believed to have been brought to him on the last day of his life. Copernicus also published, in 1509, a Latin version of Greek epistles by Theophylact (fl. AD 610–629), and an exposition of principles of currency reform for certain Polish provinces was written in 1525 but not published until 1816 at Warsaw.

Cophes River (Afghanistan-Pakistan): *see* Kābul River.

Copiapó, capital of Copiapó *provincia,* and Atacama *región,* an extremely arid territory in northern Chile. It lies 35 miles (56 km) inland from the Pacific coast in the fertile Copiapó River valley, an irrigated oasis (usually regarded as the southern limit of the Atacama Desert) that has been farmed at least since the Inca period prior to Spanish settlement in 1540. The community was elevated to *villa* (town) status in 1744, when it became San Francisco de la Selva de Copiapó. With the discovery of gold and silver deposits in the 19th century, Copiapó became a significant mining and political centre, its position being exemplified by the construction (1850–51) of the Caldera and Copiapó railway, one of the first in South America. After a period of decline from 1875 to 1925, the town's economy was revived by the development of copper mines, and a smelter was completed in 1950 at nearby Paipote. The railway and all-weather roads connect Copiapó to the port and resort of Caldera, 50 miles (80 km) northwest, to Santiago, and to the adjacent provinces. A road also crosses the Andes Mountains into Argentina. Pop. (1990 est.) 80,241.

Copland, Aaron (b. Nov. 14, 1900, Brooklyn, N.Y., U.S.—d. Dec. 2, 1990, North Tarrytown, N.Y.), American composer who achieved a distinctive musical characterization of American themes in an expressive modern style.

Copland, the son of Russian-Jewish immigrants, was born in New York City and attended public schools there. An older sister taught him to play the piano, and by the time he was 15 he had decided to become a composer. As a first step Copland tried to learn harmony through a correspondence course. Haltingly and in an environment not particularly conducive to art, he struggled toward his goal.



Copland
By courtesy of the Boston Symphony Orchestra

In the summer of 1921 Copland attended the newly founded school for Americans at Fontainebleau, where he came under the influence of Nadia Boulanger, a brilliant teacher who shaped the outlook of an entire generation of American musicians. He decided to stay on in Paris, where he became Boulanger's first American student in composition. After three years in Paris, Copland returned to New York City with an important commission: Nadia Boulanger had asked him to write an organ concerto for her American appearances. Copland composed the piece while working as the pianist of a hotel trio at a summer resort in Pennsylvania. That season the *Symphony for Organ and Orchestra* had its premiere in Carnegie Hall with the New York Symphony under the direction of the composer and conductor Walter Damrosch.

In his growth as a composer Copland mirrored the important trends of his time. After his return from Paris, he worked with jazz rhythms in *Music for the Theater* (1925) and the *Piano Concerto* (1926). There followed a period during which he was strongly influenced by Igor Stravinsky's Neoclassicism, turning toward an abstract style he described as "more spare in sonority, more lean in texture." This outlook prevailed in the *Piano Variations* (1930), *Short Symphony* (1933), and *Statements for Orchestra* (1933–35). After this last work, there occurred a change of direction that was to usher in the most productive phase of Copland's career. He well summed up the new orientation: "During these years I began to feel an increasing dissatisfaction with the relations of the music-loving public and the living composer. It seemed to me that we composers were in danger of working in a vacuum." Furthermore, he realized that a new public for modern music was being created by the new media of radio, phonograph, and film scores: "It made no sense to ignore them and to continue writing as if they did not exist. I felt that it was worth the effort to see if I couldn't say what I had to say in the simplest possible terms." Copland therefore was led to what became a most significant development after the 1930s: the attempt to simplify the new music in order that it would have meaning for a large public.

The decade that followed saw the production of the scores that spread Copland's fame throughout the world. Most important of these were the three ballets based on American folk

material: *Billy the Kid* (1938), *Rodeo* (1942), and *Appalachian Spring* (1944; commissioned by dancer Martha Graham). To this group belong also *El salón México* (1936), an orchestral piece based on Mexican melodies and rhythms; two works for high-school students—the "play opera" *The Second Hurricane* (1937) and *An Outdoor Overture* (1938); and a series of film scores, of which the best known are *Of Mice and Men* (1939), *Our Town* (1940), *The Red Pony* (1948), and *The Heiress* (1948). Typical too of the Copland style are two major works that were written in time of war—*Lincoln Portrait* (1942), for speaker and chorus, on a text drawn from Lincoln's speeches, and *Letter from Home* (1944), as well as the melodious *Third Symphony* (1946).

In his later years Copland refined his treatment of Americana: "I no longer feel the need of seeking out conscious Americanism. Because we live here and work here, we can be certain that when our music is mature it will also be American in quality." His later works include an opera, *The Tender Land* (1954); *Twelve Poems of Emily Dickinson* (1950), for voice and piano; and the delightful *Nonet* (1960). During these years Copland also produced a number of works in which he showed himself increasingly receptive to the serial techniques of the so-called 12-tone school of composer Arnold Schoenberg. Notable among such works are the stark and dissonant *Piano Fantasy* (1957); *Connotations* (1962), which was commissioned for the opening of Lincoln Center for the Performing Arts in New York City; and *Inscape* (1967). The 12-tone works were not generally well-received; after 1970 Copland virtually stopped composing, though he continued to lecture and to conduct through the mid-1980s.

For the better part of four decades, as composer (of operas, ballets, orchestral music, band music, chamber music, choral music, and film scores), teacher, writer of books and articles on music, organizer of musical events, and a much sought after conductor, Copland expressed "the deepest reactions of the American consciousness to the American scene." He received more than 30 honorary degrees and many additional awards. His books include *What to Listen for in Music* (1939), *Music and Imagination* (1952), *Copland on Music* (1960), and *The New Music, 1900–60* (1968). With the aid of Vivian Perlis, he wrote a two-volume autobiography (*Copland: 1900 Through 1942* [1984] and *Copland: Since 1943* [1989]). (J.Ma./Ed.)

BIBLIOGRAPHY. Julia F. Smith, *Aaron Copland: His Work and Contribution to American Music* (1955), is a comprehensive account of the composer's life and works. Arthur Berger, *Aaron Copland* (1953, reprinted 1989), offers an analysis of Copland's music. Neil Butterworth, *The Music of Aaron Copland* (1986), surveys his works through 1982. JoAnn Skowronski, *Aaron Copland* (1985), includes a discography and an extensive bibliography.

Copley, John Singleton (b. July 3, 1738, Boston [Mass., U.S.]—d. Sept. 9, 1815, London, Eng.), American painter of portraits and historical subjects, generally acclaimed as the finest artist of colonial America.

Little is known of Copley's boyhood. He developed within a flourishing school of colonial portraiture, and it was as a portraitist that he reached the high point of his art, and—as his Boston portraits later revealed—he gained an intimate knowledge of his New England subjects and milieu and was able to convey a powerful sense of physical entity and directness—real people seen as they are. From his stepfather, the limner and engraver Peter Pelham, Copley gained familiarity with graphic art as well as an early sense of vocation. Before he was 20 he was an accomplished draughtsman. To the Rococo portrait style derived from the English painter Joseph Blackburn he brought his own powers of imagination and a technical ability surpassing anyone painting in America at the time. Copley, in his portraits, made eloquent use of a Rococo device, the *portrait d'apparat*—portraying the subject with the objects associated with him in his daily life—that gave his work a liveliness and acuity not usually associated with 18th-century American painting.



"The Copley Family," oil on canvas by John Singleton Copley, 1776–77; in the National Gallery of Art, Washington, D.C.

By courtesy of the National Gallery of Art, Washington, D.C., Andrew Mellon Fund

Although he was steadily employed with commissions from the Boston bourgeoisie, Copley wanted to test himself against the more exacting standards of Europe. In 1766, therefore, he exhibited "Boy with a Squirrel" at the Society of Artists in London. It was highly praised both by Sir Joshua Reynolds and by Copley's countryman Benjamin West. Copley married in 1769. Although he did not venture out of Boston except for a seven-month stay in New York City (June 1771–January 1772), he was urged by fellow artists who were familiar with his work to study in Europe. When political and economic conditions in Boston began to deteriorate (Copley's father-in-law was the merchant to whom the tea that provoked the Boston Tea Party was consigned), Copley left the country—never to return—in June 1774. In 1775 his wife, children, and several other family members arrived in London, and Copley established a home there in 1776.

His ambitions in Europe went beyond portraiture; he was eager to make a success in the more highly regarded sphere of historical painting. In his first important work, "Watson and the Shark" (1778), Copley used what was to become one of the great themes of 19th-century Romantic art, the struggle of man against nature. He was elected to the Royal Academy in 1779. Although his English paintings grew more academically sophisticated and self-conscious, in general they lacked the extraordinary vitality and penetrating realism of his Boston portraits. Toward the end of his life, his physical and mental health grew worse. Though he continued to paint with considerable success until the last few months of his life, he was obsessed by the sale (at a loss) of his Boston property and by his increasing debts.

Consult the INDEX *first*

copolymer, any of a diverse class of substances of high molecular weight prepared by chemical combination, usually into long chains, of molecules of two or more simple compounds (the monomers forming the polymer). The structural units derived from the different monomers may be present in regular alternation or in random order, or strings of several units of one kind may alternate with strings of another.

Certain homopolymers have properties almost ideally suited to an intended application but are deficient in some respect. A copolymer with only a small proportion of a second monomer often possesses the desirable properties of the parent homopolymer, while the minor component lends the qualities formerly lacking. Synthetic fibres made from the homopolymer of acrylonitrile, for example, have excellent dimensional stability and resistance to weathering, chemicals, and microorganisms but poor affinity for dyes. Copolymerization of acrylonitrile with small amounts of other monomers yields the fibre Orlon, with the desirable qualities of the homopolymer and the advantage of dyeability.

The marked elastomeric (rubberlike) properties of several copolymeric substances make them valuable in the manufacture of synthetic rubbers. *See also* polymer.

Coppard, A(lfred) E(dgar) (b. Jan. 4, 1878, Folkestone, Kent, Eng.—d. Jan. 13, 1957, London), writer who achieved fame with his short stories depicting the English rural scene and its characters.

Born in humble circumstances, his father being a journeyman tailor and his mother a hostler's daughter, Coppard left school at the age of nine and worked first as an errand boy in Whitechapel, London, and later as a clerk in Brighton and Oxford. His love for literature, painting, and music led him to abandon his office career; he settled in a cottage in the country, and his first book of short stories,



Coppard, 1925

The Mansell Collection

Adam and Eve and Pinch Me, was published when he was 43. His talent was recognized and other collections of stories followed, including *Fishmonger's Fiddle* (1925), which contained what is perhaps his best story, "The Higgler." The charm of his stories lay in his poetic feeling for the countryside and in his amusing and dramatic presentation of rustic characters.

Several volumes of Coppard's poems were also published, and the first volume of his autobiography, up to the early 1920s, *It's Me, O Lord,* appeared after his death.

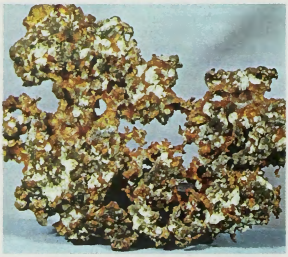
Coppée, François (b. Jan. 26, 1842, Paris, Fr.—d. May 23, 1908, Paris), French poet, known for his somewhat sentimental treatment of the life of the poor.

Coppée served as a clerk in the Ministry of War and was successful in 1869 with a play, *Le Passant.* His best-known and most characteristic collection of verse is *Les Humbles* (1872). He was elected to the Académie Française in 1884. In 1898, after a serious illness, he was reconverted to Roman Catholicism; that same year he published *La Bonne Soufrance,* a novel arising from this experience.

Coppée's reputation has been diminished because of his involvement in nationalist and racialist politics. Return to religion seemed to intensify his patriotic sentiments. He was active on behalf of the prosecution against the Jewish officer Alfred Dreyfus, whose trial on a charge of treason divided France. Coppée later helped to found the anti-Semitic Ligue de la Patrie Française (French Fatherland League).

copper (Cu), chemical element, reddish, extremely ductile metal of Group Ib of the periodic table, unusually good conductor of electricity and heat. Copper is found in the free metallic state in nature; this native copper was first used (*c.* 8000 BC) as a substitute for stone by Neolithic man. Metallurgy dawned in Egypt as copper was cast to shape in molds (*c.* 4000 BC), was reduced to metal from ores with fire and charcoal, and was intentionally alloyed with tin as bronze (*c.* 3500 BC). The Roman supply of copper came almost entirely from Cyprus; it was known as *aes Cyprium*, "metal of Cyprus," shortened to *cyprium* and later corrupted to *cuprum*. *See also* bronze.

Occurrence, uses, and properties. Native copper is found at many locations as a primary mineral in basaltic lavas and also as reduced from copper compounds. The greatest known deposit of copper is in porphyries formed by



Crystalline copper from Michigan
By courtesy of Ted Boente Collection; photograph, John H. Gerard

volcanic activity in the Andean Mountains of Chile. (For mineralogical properties, *see* native elements [table].) Copper occurs combined in many minerals, such as chalcocite, chalcopyrite, bornite, cuprite, malachite, and azurite. It is present in the ashes of seaweeds, in many sea corals, in the human liver, and in many mollusks and arthropods. Copper plays the same role of oxygen transport in the hemocyanin of blue-blooded mollusks and crustaceans as iron does in the hemoglobin of red-blooded animals. The copper present in humans as a trace element helps catalyze hemoglobin formation.

Copper is commercially produced mainly by smelting or leaching, usually followed by electrolytic refining or recovery. For a detailed treatment of the production of copper, *see* MACROPAEDIA: Industries, Extraction and Processing.

The major portion of copper produced in the world is used by the electrical industries; most of the remainder is combined with other metals to form alloys. Important series of alloys in which copper is the chief constituent are brasses (copper and zinc), bronzes (copper and tin), and nickel silvers (copper, zinc, and nickel, no silver). There are many useful alloys of copper and nickel, including Monel; the two metals are completely miscible. Copper also forms an important series of alloys with aluminum, called aluminum bronzes. Beryllium copper (2 percent Be) is an unusual copper alloy in that it can be hardened by heat treatment. Copper is a part of nearly all coinage metals. Long after the Bronze Age passed into the Iron Age, copper remained the metal second in use and importance to iron; but, by the 1960s, cheaper and much more plentiful aluminum had moved into second place in world production.

Copper is one of the most ductile metals, not especially strong or hard. Strength and hardness are appreciably increased by cold-working because of the formation of elongated crystals of the same face-centred cubic structure that is present in the softer annealed copper. Common gases, such as oxygen, nitrogen, carbon dioxide, and sulfur dioxide are soluble in molten copper and greatly affect the mechanical and electrical properties of the solidified metal. Natural copper is a mixture of two stable isotopes: copper-63 (69.17 percent) and copper-65 (30.83 percent).

Because copper lies below hydrogen in the electromotive series, it is not soluble in acids with the evolution of hydrogen, though it will react with oxidizing acids, such as nitric and hot, concentrated sulfuric acid. Copper resists the action of the atmosphere and seawater; exposure for long periods to air, however, results in the formation of a thin protective coating of green, basic copper carbonate (patina).

Principal compounds. Copper forms compounds in the oxidation states +1 and +2 in its normal chemistry, although under special circumstances some compounds of trivalent copper can be prepared. It has been shown that trivalent copper survives no more than a few seconds in an aqueous solution.

Copper(I) (cuprous) compunds are all diamagnetic and, with few exceptions, colourless. Among the important industrial compounds of copper(I) are cuprous oxide (Cu_2O), cuprous chloride (Cu_2Cl_2), and cuprous sulfide (Cu_2S). Cuprous oxide is a red or reddish brown crystal or powder that occurs in nature as the mineral cuprite. It is produced on a large scale by reduction of mixed copper oxide ores with copper metal or by electrolysis of an aqueous solution of sodium chloride using copper electrodes. The pure compound is insoluble in water but soluble in hydrochloric acid or ammonia. Cuprous oxide is used principally as a red pigment for antifouling paints, glasses, porcelain glazes, and ceramics and as a seed or crop fungicide.

Cuprous chloride is a whitish to grayish solid that occurs as the mineral nantokite. It is usually prepared by reduction of copper(II) chloride with metallic copper. The pure compound is stable in dry air; moist air converts it to a greenish oxygenated compound, and upon exposure to light it is transformed into copper(II) chloride. It is insoluble in water but dissolves in concentrated hydrochloric acid or in ammonia because of the formation of complex ions. Cuprous chloride is used as a catalyst in a number of organic reactions, notably the synthesis of acrylonitrile from acetylene and hydrogen cyanide; as a decolourizing and desulfurizing agent for petroleum products; as a denitrating agent for cellulose; and as a condensing agent for soaps, fats, and oils.

Cuprous sulfide occurs in the form of black powder or lumps and is found as the mineral chalcocite. Large quantities of the compound are obtained by heating cupric sulfide (CuS) in a stream of hydrogen. Cuprous sulfide is insoluble in water but soluble in ammonium hydroxide and nitric acid. Its applications include use in solar cells, luminous paints, electrodes, and certain varieties of solid lubricants.

Copper(II) compounds of commercial value include cupric oxide (CuO), cupric chloride ($CuCl_2$), and cupric sulfate ($CuSO_4$). Cupric oxide is a black powder that occurs as the minerals tenorite and paramelaconite. Large amounts are produced by roasting mixed copper oxide ores in a furnace at a temperature below 1,030° C (1,900° F). The pure compound can be dissolved in acids and alkali cyanides. Cupric oxide is employed as a pigment (blue to green) for glasses, porcelain glazes, and artificial gems. It is also used as a desulfurizing agent for petroleum gases and as an oxidation catalyst.

Cupric chloride is a yellowish to brown powder that readily absorbs moisture from the air and turns into the greenish blue hydrate, $CuCl_2 \cdot 2H_2O$. The hydrate is commonly prepared by passing chlorine and water in a contacting tower packed with metallic copper. The anhydrous salt is obtained by heating the hydrate to 100° C (212° F). Like cuprous chloride, cupric chloride is used as a catalyst in a number of organic reactions—*e.g.*, in chlorination of hydrocarbons. In addition, it serves as a wood preservative, mordant (fixative) in the dyeing and printing of fabrics, disinfectant, feed additive, and pigment for glass and ceramics.

Cupric sulfate is a salt formed by treating cupric oxide with sulfuric acid. It forms as large, bright-blue crystals containing five molecules of water ($CuSO_4 \cdot 5H_2O$) and is known in commerce as blue vitriol. The anhydrous salt is produced by heating the hydrate to 150° C (300° F). Cupric sulfate is utilized chiefly for agricultural purposes, as a pesticide, germicide, feed additive, and soil additive. Among its minor uses are as a raw material in the preparation of other copper compounds, reagent in analytic chemistry, electrolyte for batteries and electroplating baths, and in medicine as a locally applied fungicide, bactericide, and astringent.

Other important copper(II) compounds include cupric carbonate [$Cu_2(OH)_2CO_3$], which is prepared by adding sodium carbonate to a solution of copper sulfate and then filtering and drying the product. It is used as a colouring agent; with arsenic it forms cupric acetoarsenite (commonly known as Paris green), a wood preservative and insecticide.

For statistical data on mine production of ore, refining of metal, reserves, and trade worldwide and for major national industries, *see* mining (table).

atomic number	29
atomic weight	63.546
melting point	1,083° C (1,981° F)
boiling point	2,567° C (4,653° F)
density	8.96 (20° C)
valence	1, 2
electronic config.	2-8-18-1 or $(Ar)3d^{10}4s^1$

Copper Age, early phase of the Bronze Age (*q.v.*).

copper butterfly, any member of the insect subfamily Lycaeninae of the widely distributed Lycaenidae family of common butterflies (order Lepidoptera). Adult lycaenids, sometimes known as gossamer-winged butterflies, are delicate, with an 18- to 38-millimetre (.75- to 1.5-inch) wingspan. They are rapid fliers and are



Different markings on the (left) upper and (right) underwing of the female copper
G.E. Hyde—EB Inc.

usually distinguished by iridescent wings. The male's forelegs are reduced, but the female's are fully developed.

The copper's typical coloration ranges from orange-red to brown, usually with a copper tinge and dark markings. The most common North American copper is species *Lycaena phleas*. Copper larvae feed on clover, dock, or sorrel.

copper deficiency, condition in which an organism fails to receive enough copper, an element necessary for oxidation and absorption of iron and vitamin C (ascorbic acid) in digestion. Copper also acts as a catalyst in the

formation of hemoglobin, the oxygen-carrying blood component, and a condition similar to iron deficiency anemia has been produced experimentally with a copper-deficient diet. Copper is known to be associated with intestinal enzyme activity and is carried to body tissues in blood plasma. The highest concentrations in body tissue are found in the liver and in certain areas of the central nervous system, particularly the brain.

Sources of supply for human diet are animal flesh (especially liver), oysters, fish, whole grains, nuts, and legumes.

copper work, tools, implements, weapons, and artwork made of copper. Copper's discovery precedes recorded history, and it was the first metal that was used in fashioning tools and weapons. Its use dates at least from 4000 BC in Chaldea, and perhaps earlier. Although bronze, and later iron, became the preferred material for weapons and tools, copper found wide uses in such wares as cooking vessels, household utensils, mirrors, and ornaments. Although unsuited for casting, copper is malleable and readily worked by hammering, chasing, engraving, and cold-rolling. Copper work was often further ornamented by gilding, enamelling, or applying precious stones. From the 8th century, gilded copper was frequently used for liturgical vessels, the characteristic reddish colour of the copper imparting a deeper gold colour to the gilt. The use of gilded copper in Europe reached its peak in the 15th and 16th centuries—primarily in jewelry and ornamental objects. More utilitarian uses of copper work in common housewares grew out of the lower cost of copper than of brass and other metals. The excellent qualities of copper utensils continue to be appreciated in modern times, especially in such items as copper pots and pans.

In the 18th century, Sheffield plate was developed, in which thin sheets of silver are fused to copper plate and then formed into the desired object. Sheffield plate enjoyed immediate popularity not only because of the lower cost of silver-plated copper but also because Sheffield plate was designed and fashioned in most of the popular designs of solid silver.

Copperbelt, in African geography, zone of copper deposits and associated mining and industrial development dependent upon them, forming the greatest concentration of industry in black Africa outside the Republic of South Africa, extending about 280 mi (450 km) northwest from Luanshya, Zambia, into Shaba (formerly Katanga) Region of Zaire. The zone is up to 160 mi in width and contains more than a tenth of the world's copper deposits, found mostly in Late Precambrian sedimentary deposits with the ore concentrated in zones indicative of hilltop and beach, or near-shore, environments. Estimates of total reserves range from 57,000,000 to 90,000,000 metric tons in the two countries, about 11 to 27 percent of the world total.

The deposits had been known and worked for centuries before 1867, when David Livingstone described the smelting of ore by Katangan natives into 50- to 100-lb (22.5- to 45-kg) ingots. Exploitation of the deposits during the colonial period was always separate in the two countries. It began in the Belgian Congo (now Zaire) with the formation in 1906 of the Union Minière du Haut-Katanga (nationalized in 1967 as Gécamines, La Générale des Carrières et des Mines), which during the early 1930s was the largest copper-producing company in the world. The first copper-mining claim in Zambia, the Roan Antelope, was pegged in 1902, after W.C. Collier, a Bulawayo (Southern Rhodesia) prospector, shot the eponymous beast, which fell upon a deposit of green malachite copper ore. Commercial development in Zambia began in 1909, after the railroad reached Broken Hill, Northern Rhodesia (now Kabwe, Zambia); the same rail line also opened the Katangan deposits of the Belgian Congo when it later reached northward to Elizabethville (now Lubumbashi, Zaire) in 1910. Extensive commercial exploitation did not occur in Zambia until the late 1920s, when concessions were granted by the British South African Company. One of these concessionaires, the Selection Trust, developed the first modern mine at the Roan Antelope deposit near Luanshya; it came into production in 1929. The Nkana mine was developed in the same year, followed by those in Mufulire (1933), Nchanga (1939), Chibaluma (1955), and Chambishi (1965).

The exploitation and export of these ores has long been one of the most complicated geopolitical and economic questions of the region, not only because of colonial (and later nationalistic) rivalries but also because of the energy requirements of the smelters (Zambia smelts almost 100 percent of its ore; Zaire only about 50 percent). These requirements were satisfied earliest by coal from Wankie, Southern Rhodesia (now Hwange, Zimbabwe), and later by hydroelectrical power transmitted from the Kariba power station to the Copperbelt about 230 mi southeast of Luanshya and to Zaire's smelters from Inga, on the Congo River about 1,000 mi northwest of Shaba. These difficulties have been exacerbated by the problems of exporting the ore via, successively: the Cape (rail) route (after 1909); the Benguela Railroad (after 1933); the Belgian Congo's Voie National, a railroad connecting Elizabethville (Lubumbashi) with Port-Francqui (Ilebo) for transshipment to Kinshasa-Matadi; the Kamina-Albertville (Zaire); the Kigoma–Dar es Salaam–Umtali–Beira; and, most recently, the Tazara railroad.

In the early 1980s Zambia and Zaire's total production amounted to more than 1,000,000 tons annually, about 14 percent of the world total. As a centre of employment in mines, smelters, transportation, and industrial activity, the Copperbelt is one of the major industrial complexes of black Africa.

Copperbelt, formerly WESTERN, province, central Zambia, East Africa, bounded by the provinces of North-Western (west) and Central (south). It borders Zaire on the north and east and covers an area of 12,096 sq mi (31,328 sq km). The region lies on the eastern Central African Plateau, with gently undulating terrain mostly between 3,000 and 5,000 ft (900 and 1,500 m) in elevation and occasionally broken by isolated hills. The Kafue River, tributary to the Zambezi River, traverses the province in a generally southward direction and swamps occur along the river and its numerous tributaries. Broad areas of the plateaus are covered with an open mixture of shrubs, trees, and tall grasses.

Discoveries at Gwisho brought to light remains of the Wilton culture (Late Stone Age culture in South Africa) dating from 3,000 BC. Early, Middle, and Late Stone Age, and Early Iron Age sites are in the province, as well as a number of rock paintings (*c.* AD 500–1750). Chiefdoms dominated by the Lamba, Lima, and Lala peoples rose in the early 17th century, and after raiding the area, the Chikunda later settled there. The 1890s treaties with the British South Africa Company brought the territory into what became in 1924 the colony of Northern Rhodesia, ruled by a legislative council with a white majority. In the northern mining towns popular African discontent found effective expression against colonial rule, especially after the federation (1953) of Northern and Southern Rhodesia, and under the leadership of Kenneth Kaunda. Upon independence (1964) the area became a province of the new state of Zambia.

The province is industrially advanced and urbanized and its modern peoples are the Bemba, Lamba, and Swahili. Subsistence agriculture produces corn (maize), tobacco, peanuts (groundnuts), potatoes, and fodder crops. Commercial farming goes on near urban centres and includes beef cattle and pigs. The Copperbelt industrial area lies on the Congo–Zambezi watershed near the Zaire border and contains mineral deposits. Copper is mined at Ndola, the capital of the province, and also at Chambishi, Kalulushi, Chililabombove, Mufulira, Chingola, Kitwe, and Luanshya, all of which are connected by road, railway, and air. Other minerals mined include cobalt and uranium. Industries produce beverages, metal products, batteries, chemicals, wire and cable, cement, and textiles. Pop. (1980 prelim.) 1,248,888.

Copperhead, also called PEACE DEMOCRAT, during the American Civil War, pejoratively, any citizen in the North who opposed the war policy and advocated restoration of the Union through a negotiated settlement with the South. The word Copperhead was first so used by the *New York Tribune* on July 20, 1861, in reference to the snake that sneaks and strikes without warning.

Nearly all Copperheads were Democrats, but most Northern Democrats were not Copperheads. Copperhead strength was mainly in the Midwest (Ohio, Indiana, and Illinois), where many families had Southern roots and where agrarian interests fostered resentment of the growing dominance of industrialists in the Republican Party and federal government.

In addition, groups opposed to conscription and emancipation—*e.g.*, the Irish population in New York City, who feared that freed Southern blacks would come north and take jobs away—backed such Peace Democrat leaders as Horatio Seymour, Fernando Wood, and Clement L. Vallandigham. Copperheads also drew strength from the ranks of those who objected to Lincoln's abrogation of civil liberties and those who simply wanted an end to the massive bloodshed.

In 1862 the Copperheads organized the Knights of the Golden Circle, which successively became the Order of American Knights and the Sons of Liberty. Although Republicans accused these groups of treasonable activities, there is little evidence to support the accusation. Most Copperheads were more interested in maintaining the existence of the Democratic Party and defeating Republican opponents for public office than they were in participating in any disloyal activities.

On the other hand, Copperheads were able to block important war legislation in the Indiana state government, and they controlled the lower house in Illinois for a time. Seymour was elected governor of New York in 1862, and Vallandigham ran (unsuccessfully) for governor of Ohio in 1863. At the 1864 Democratic national convention, Copperheads gained control of the party platform and inserted a plank calling the war a failure and advocating immediate peace negotiations. Party presidential candidate George McClellan repudiated the Copperhead peace plank, however. By the end of the war, the terms Democrat and Copperhead had become virtually synonymous throughout much of the North. As a result, even though the Copperheads failed to exercise any significant influence on the conduct or outcome of the war and even though most Northern Democrats supported Lincoln and the war effort, the Democratic Party carried the stigma of disloyalty for decades after Appomattox.

copperhead, any of several unrelated snakes named for their reddish head colour. The North American copperhead *Agkistrodon* (also spelled *Ancistrodon*) *contortrix* is a venomous species found in swampy, rocky, and wooded regions of the eastern and central United

States. Also called highland moccasin, it is a member of the viper family (Viperidae) and is placed in the subfamily Crotalinae (pit vipers) because it has the characteristic small, sensory pit between each eye and nostril. It is usually less than 1 m (3 feet) long and is a pinkish or reddish snake with a copper-coloured head and reddish brown, often hourglass-shaped, crossbands on its back. It takes both cold- and warm-blooded prey and is important in rodent control. Many snakebites by it have been reported, but the venom of this snake is relatively weak and rarely fatal.

The Australian copperhead (*Denisonia superba*), a venomous snake of the cobra family (Elapidae) found in Tasmania and along the southern Australian coasts, averages 1.5 m



Copperhead (*Agkistrodon contortrix*)
Jack Dermid

long. It is usually coppery or reddish brown. It is dangerous but is unaggressive when left alone. The copperhead of India is a rat snake, *Elaphe radiata.*

copperleaf (genus *Acalypha*), any of several plants of the spurge family (Euphorbiaceae), but usually *A. wilkesiana,* a popular shrub of tropical gardens that has red, blotched reddish brown, and pink foliage. It is also known widely as Jacob's coat and as match-me-if-you-can. The copperleaf is native to Polynesia. It reaches about 3 m (10 feet) in height, and one variety attains about 6 m (20 feet).

The 430 species in the genus *Acalypha* include erect shrubs and weedy herbs found mostly in the tropics of both hemispheres; and some annuals and perennials, known as three-seeded mercury, are native in the southern United States. Another ornamental species, the chenille plant, or red hot cattail (*A. hispida*), reaches a height of 3 m and is grown for its long, taillike, pendent flower spikes, rust red in colour. It is native to tropical east-



Chenille plant (*Acalypha hispida*)
Walter Chandoha

ern Asia. *A. godseffiana,* which has green and white leaves, is from New Guinea.

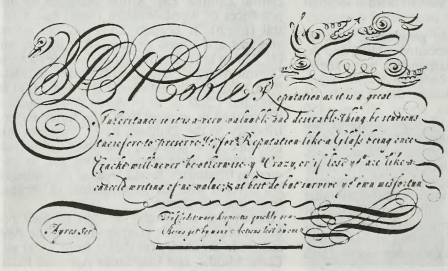
Coppermine River, stream, in southern Kitikmeot and northern Fort Smith regions, Northwest Territories, Canada. From its



The Coppermine River flowing through the Barren Grounds region of the Northwest Territories
Ted Grant—National Film Board of Canada Phototheque

source in a small lake of the Barren Grounds (a subarctic prairie region), north of Great Slave Lake, it flows northward for 525 miles (845 km), draining several lakes, including de Gras, Point, Itchen, Takiyuak, and Dismal, before emptying into Coronation Gulf, an arm of the Arctic Ocean, near the Inuit (Eskimo) settlement of Coppermine. The river was discovered in 1771 by the English explorer Samuel Hearne, who named it for the copper that was reportedly found along its banks. Unnavigable because of numerous rapids and a short ice-free season, it is a noted Arctic char fishing stream.

copperplate script, formally ENGLISH ROUND HAND, also called ANGLAISE, in calligraphy, dominant style among 18th-century writing masters, whose copybooks were splendidly printed from models engraved on copper. The alphabet was fundamentally uncomplicated, but the basic strokes were often concealed in luxuriant flourishing and dazzling



Copperplate script by John Ayres, 1683; in the collection of the Columbia University Libraries
By courtesy of the Columbia University Libraries, New York

professional displays of "command of hand." Hence, the term "copperplate hand" usually connotes calligraphic showiness and sleekness.

coppice, also called COPSE, or THICKET, a dense grove of small trees or shrubs that have grown from suckers or sprouts rather than from seed. A coppice usually results from human woodcutting activity and may be maintained by continually cutting new growth as it reaches usable size.

Coppola, Francis Ford (b. April 7, 1939, Detroit, Mich., U.S.), American motion-picture director, writer, and producer whose films range from sweeping epics to small-scale character studies.

Confined to bed with polio at the age of nine, Coppola devised puppet shows for his own entertainment. After taking a graduate degree in film at the University of California at Los Angeles, he worked for a time with director Roger Corman in the production of low-budget horror films. Coppola's first independent directorial efforts—*Tonight for Sure* (1961), *Dementia 13* (1963), and *You're a Big Boy Now* (1967)—met with mixed critical and popular reaction, but the musical *Finian's Rainbow* (1968) enjoyed considerable success. In 1970 Coppola received an Academy Award for his screenplay of *Patton* (1969), a traditional film about the controversial American general of World War II.

Coppola directed and cowrote *The Godfather* (1972). This film, which was based on a novel by Mario Puzo, won virtually unanimous critical acclaim and numerous awards (including three Academy Awards) and proved enormously popular at the box office. The epic drama, remarkable for its accomplished performances and visual authenticity, transformed the inner workings of the organized-crime subculture into a metaphor for corruption on a larger scale. It was followed by *The Conversation* (1974), a penetrating portrait of one man's involvement in the electronic-surveillance business. *The Godfather, Part II* of the same year received seven Academy Awards. Another sequel, *The Godfather, Part III,* appeared in 1990.

Coppola's most controversial—and costly—film, *Apocalypse Now* (1979), was a transposition of Joseph Conrad's novella "Heart of Darkness" to a Vietnam War setting. Later works include *One from the Heart* (1982), a musical set in a sound-stage re-creation of Las Vegas; *Rumble Fish* and *The Outsiders* (both 1983), which treated themes of underprivileged adolescence; *The Cotton Club* (1984); *Gardens of Stone* (1987); and *Tucker: The Man and His Dream* (1988).

copra, dried sections of the meat of the coconut, the kernel of the fruit of the coconut palm (*Cocos nucifera*). Copra is valued for the coconut oil extracted from it and for the resulting residue, coconut-oil cake, which is used mostly for livestock feed.

Copra was introduced as a source of edible fat in northern Europe in the 1860s because of a shortage of dairy fats. Early in the 20th century it became known in the United States. Western Europe now imports about half a million tons annually, principally from the Philippines, but it is also an important export in Papua New Guinea, Vanuatu (formerly the New Hebrides), Mozambique, Malaysia, and the Pacific Islands.

Naturally growing coconut palms are a significant source of copra, but commercial estates and plantations now predominate. The nuts are husked by bringing them down forcibly

on a sharp point, by hand or mechanically. The shell is then cracked, usually into two halves, with a chopping knife, exposing the meat, which is about 50 percent water and 30 to 40 percent oil. About 30 nuts provide meat for 10 pounds (4.5 kg) of copra. Whole copra, also called ball or edible copra, is produced by the less common drying of the intact, whole nut kernel.

Exposing the kernels to the air and sun was the earliest method of drying and is still extensively followed; it gives a good quality white copra. A more rapid process, adopted particularly where the humidity is high, is kiln drying, used generally in the Philippines. The kiln, essentially a fire pit overlaid with a grid, on which the copra is placed, is sheltered from rain by a roof. More uniform quality copra is produced by hot-air drying, first introduced in India and the Samoan islands. The copra is drawn through a heated tunnel, meeting a countercurrent of hot air. A fine, white copra of higher value than the sun-dried product is obtained. Well-dried copra contains 4 to 5 percent moisture and 63 to 70 percent oil.

Coconut oil is obtained from the cleaned and crushed copra chiefly by pressing and solvent extraction.

Coconut oil is a yellowish white solid that melts at 23° C (74° F). The crude product has a characteristic coconut odour. Its many industrial uses include manufacture of soaps, detergents, shampoos, synthetic rubber, and glycerin. After refining to remove free fatty acids and deodorizing, coconut oil is used in edible fats such as margarines and vegetable shortenings. An important food use of coconut oil arises from its high percentage of lauric acid, which is saturated and so resists oxidation and rancidity. Confectioners and bakers use refined coconut oil in products that may stand for a time after manufacture.

Coprinus, genus of mushrooms comprising some 100 species, better known by its common name, inky cap (*q.v.*).

coprolalia (sexual deviance): *see* scatologia.

coprolite, the fossilized excrement of animals. The discovery of the true nature of this material was made by the English geologist William Buckland, who observed that certain convoluted bodies occurring in the Lias (rock strata of Early Jurassic age, 187 to 208 million years old) of Gloucestershire had a form that would have been produced by their passage in the soft state through the intestines of reptiles or fishes. These bodies had long been known as fossil fir cones and bezoar stones. Buckland's conjecture that they were of fecal origin and similar to the excrement of hyenas was confirmed on analysis; they were found to consist essentially of calcium phosphate and carbonate and not infrequently contained fragments of unaltered bone. The name coprolites (from Greek *kopros,* "dung"; and *lithos,* "stone") was accordingly given them by Buckland.

copse (forestry): *see* coppice.

Coptic art, any of the visual arts associated with the Greek- and Egyptian-speaking Christian peoples of Egypt from about the 3rd to the 12th century AD. It is essentially reflected in the stone reliefs, wood carvings, and wall paintings of the monasteries of Egypt. It is, nonetheless, common practice to include within Coptic art such means of expression as the so-called Coptic textiles, which have no religious intent.

The style of Coptic Christian art evolved from the late antique art of Egypt. Economic conditions doubtless played a major role in the emergence of a freer, more popular style of art; the lack of an extensive patronage system is evident in many aspects of Coptic art, the emphasis on nonmonumental art, the avoidance of costly materials, and the dearth of skilled craftsmen with extensive training among them. The stylistic flatness of Coptic art shows a movement away from a naturalistic rendering of the human form and features and of animal and plant ornamentation. Outline and detail are simplified, and the number of motifs is limited.

Coptic Catholic Church, Eastern Catholic church of the Alexandrian rite (*q.v.*) in Egypt, in communion with Rome since 1741, when Athanasius, a Monophysite (acknowledging only one nature in the person of Christ) Coptic bishop, became a Roman Catholic. Two succeeding bishops remained unconsecrated because they were unable to travel to Europe and there was no Egyptian bishop to perform the ceremony. In 1893 the Franciscans in Egypt gave the Catholic Copts 10 churches. In 1895 Pope Leo XIII divided the 5,000 Catholic Copts into three dioceses directed by an administrator, who, four years later, was appointed patriarch of Alexandria, with residence in Cairo.

Coptic chant, liturgical music of the descendants of ancient Egyptians who converted to Christianity prior to the Islāmic conquest of Egypt in the 7th century. The term Coptic derives from Arabic *qibṭ,* a corruption of Greek Aigyptios ("Egyptian"); when Muslim Egyptians no longer called themselves by that name, it was applied to the Christian minority. Coptic, a Hamito-Semitic language, was officially banned by the Arabs in 997 and survives today only in the Coptic liturgy. It is assumed that the Coptic religious services have their roots in the earliest layers of the Christian ritual of Jerusalem, with some strong admixtures of Syrian influence. It appears also that there was a certain amount of Arabic influence, and some scholars believe that the Coptic ritual may have exercised some influence on Muslim religious practices.

It is assumed but not verified that the Copts inherited a rich musical tradition. Only in most recent times have musical manuscripts or liturgical books with developed musical notation been used for this music. It has been transmitted only orally.

On the basis of present-day performances, much of the Coptic chant consists of melody types, or melodic formulas that serve as starting points for improvisation by singers. Because it would be difficult for a singer to memorize all the religious services, prompters whisper cues to the singers, who then begin the appropriate melodies for a given service.

The Coptic ritual uses a few percussion instruments that resemble ancient Egyptian instruments known from frescoes and reliefs. On this basis some scholars believe that the Coptic liturgy preserves some ancient traits uncorrupted. *See also* sistrum; stone chimes.

Coptic language, Hamito-Semitic language that was spoken in Egypt from about the 2nd century AD and that represents the final stage of the ancient Egyptian language. In contrast to earlier stages of Egyptian, which were written in monumental hieroglyphs, hieratic script, or demotic script, Coptic was written in the Greek alphabet, supplemented by seven letters borrowed from demotic writing. Coptic also replaced the religious terms and expressions of earlier Egyptian with words borrowed from Greek.

Coptic is usually divided by scholars into six dialects, four of which were in Upper Egypt and two of which were in Lower Egypt; these differ from one another chiefly in their sound systems. The Fayyūmic dialect of Upper Egypt, spoken along the Nile River valley chiefly on the west bank, survived until the 8th century. Asyūṭic, or Sub-Akhmīmic, spoken around Asyūṭ, flourished in the 4th century. In it are preserved a text of the Gospel According to John and of the Acts of the Apostles, as well as a number of Gnostic documents. Akhmīmic was spoken in and around the Upper Egyptian city of Akhmīm. Sahidic (from Arabic, aṣ-Ṣaʿīd [Upper Egypt]) was originally the dialect spoken around Thebes; after the 5th century it was the standard Coptic of all of Upper Egypt. It is one of the best-documented and well-known dialects.

The dialects of Lower Egypt were Bashmūric, about which little is known (only a few glosses in the dialect are extant), and Bohairic (from Arabic, al-Buḥayrah), originally spoken in the western part of Lower Egypt including the cities of Alexandria and Memphis. Bohairic has been used for religious purposes since the 11th century by all Coptic Christians. The latest Coptic texts date from the 14th century. *See also* Egyptian language.

Coptic literature, body of writings, almost entirely religious, that dates from the 2nd century, when the Coptic language of Egypt, the last stage of ancient Egyptian, began to be used as a literary language, until its decline in the 7th and 8th centuries. It contains, in addition to translations from the Greek, original writings by the Greek Fathers and founders of Eastern monasticism and texts throwing light on early Gnosticism and Manichaeism within the Christian church.

The earliest original writings in Coptic were the letters by St. Anthony of Egypt, first of the "Desert Fathers." During the 3rd and 4th centuries many ecclesiastics and monks wrote in Coptic, among them St. Pachomius, whose monastic rule (the first cenobitic rule, for solitary monks gathered in communities) survives only in Coptic; St. Athanasius, the first patriarch of Alexandria to use Coptic, as well as Greek, for didactic homilies; Macarius (the Elder) of Egypt, a famous ascetic desert solitary; and St. Serapion, bishop of Thmuis, whose liturgical texts are a valuable source for early church worship. The first to realize fully the language's literary potentialities was Shenute (*c.* 360–450), abbot of the White Monastery, near Atripe, Upper Egypt. In sermons, treatises, and homilies, he showed mastery of style and the forceful character that made him (though unknown in the West until the 20th century) the most influential personality of his period in Egypt, where he is still regarded as a saint. His works remain the outstanding original writings in Coptic, equaled in intensity only by 7th- and 8th-century hymns sung antiphonally to traditional tunes and written to encourage the Coptic Christians during the persecutions that followed the 7th-century Muslim invasions.

Coptic Orthodox Church, also called COPTIC CHURCH, principal Christian church in predominantly Muslim Egypt. The people of Egypt before the Arab conquest in the 7th century identified themselves and their language in Greek as Aigyptios (Arabic *qibṭ,* Westernized as Copt); when Egyptian Muslims later ceased to call themselves Aigyptioi, the term became the distinctive name of the Christian minority. From the 5th century onward, these Christians belonged to a Monophysite church (acknowledging only one nature in Christ), calling themselves simply the Egyptian Church. In the 19th and 20th centuries they began to call themselves Coptic Orthodox to be distinguished from Copts who had converted to Roman Catholicism and from Eastern Orthodox, who are mostly Greek.

In the 4th and 5th centuries a theological conflict arose between the Copts and the Greek-speaking Romans, or Melchites ("Emperor's Men"), in Egypt over the Council of Chalcedon (451), which rejected Monophysite doctrine.

After the Arab conquest of Egypt in the 7th century, the Copts ceased speaking Greek, and the language barrier added to the controversy. Various attempts at compromise by the

Byzantine emperors came to naught. Later, the Arab caliphs, although they tended to favour those who adopted Islām, did not interfere much in the internal affairs of the Christian church.

Apart from the Monophysite question, the Coptic and the Eastern Orthodox churches agree in doctrinal matters. Arabic is now used in the services of the Coptic Orthodox Church for the lessons from the Bible and for many of the variable hymns; only certain short refrains that churchgoing people all understand are not in Arabic. The service books, using the liturgies attributed to St. Mark, St. Cyril of Alexandria, and St. Gregory of Nazianzus, are written in Coptic (the Bohairic dialect of Alexandria), with the Arabic text in parallel columns.

The Coptic Orthodox Church developed a democratic system of government after the 1890s. The patriarch and the 12 diocesan bishops, with the assistance of community councils in which the laity is well represented, regulate the finances of the churches and schools and the administration of the rules relating to marriage, inheritance, and other matters of personal status. When the patriarch dies, an electoral college, predominantly of laymen, selects three duly qualified monks at least 50 years of age as candidates for the office of patriarch. Among these three, the final choice is made by lot after prayer.

The patriarch of Alexandria resides in Cairo. The church has its own primary and secondary schools in many places in Egypt, as well as a strong Sunday-school movement for the religious education of children unable to go to Coptic schools. There is an Institute of Coptic Studies in Cairo, a theological college connected with the institute, and a Coptic museum; the teaching of the Coptic Orthodox Church has even become the basis of the syllabus used in the religious instruction of Christian children in government schools.

There is a Coptic Orthodox Church in Jerusalem, and there are a few other churches in the Holy Land, built in the 19th and 20th centuries, as well as a Coptic bishopric in Khartoum, Sudan. The Ethiopian, Armenian, and Syrian Jacobite churches are in communion with the Coptic Orthodox Church.

Coptos (Egypt): *see* Qift.

copulation: *see* sexual intercourse.

copyhold, in English law, a form of landholding defined as a "holding at the will of the lord according to the custom of the manor." Its origin is found in the occupation by villeins, or nonfreemen, of portions of land belonging to the manor of the feudal lord.

A portion of the manor reserved for the lord was cultivated by labourers who were bound to the land; their service was obligatory, and they could not leave the manor. They were allowed, however, to cultivate land for their own use. This copyhold was mere occupation at the pleasure of the lord, but in time it grew into an occupation by right, called *villenagium,* that was recognized first by custom and later by law. The records of the court baron constituted the title of the villein tenant to the land held by copy of the court roll (hence the term copyhold); and the customs of the manor recorded therein formed the real property law applicable to his case. In 1926 all copyhold land became freehold (*q.v.*) land, though the lords of manors retained mineral and sporting rights.

copyright, the exclusive, legally secured right to publish, reproduce, and sell the matter and form of a literary, musical, dramatic, or artistic work.

Copyright is designed primarily to protect an artist, publisher, or other owner against any unauthorized copying of his works—as by reproducing the work in any material form, publishing it, performing it in public, filming it, broadcasting it, causing it to be distributed to subscribers, or making any adaptation of the work. A copyright supplies a copyright holder with a kind of monopoly over the created material, which assures him of both control over its use and the pecuniary benefits derived from it.

Historically copyrights grew out of the same system as royal patent grants, by which certain authors and printers were given the exclusive right to publish books and other materials. The purpose of such grants was not to protect authors' or publishers' rights but to raise government revenue and to give governing authorities control over publication contents. This system was in effect in late 15th-century Venice as well as in 16th-century England, where the London Stationers' Company achieved a monopoly on the printing of books and was regulated by the Court of Star Chamber.

The Statute of Anne, passed in England in 1710, was a milestone in the history of copyright law. It recognized that authors should be the primary beneficiaries of copyright law; it also established the idea that such laws should have only limited duration, after which works could pass into public domain. The designated period came to be set at 28 years. Similar laws were enacted in Denmark (1741), the United States (1790), and France (1793). Through the 19th century most civilized countries established laws that protected the work of native authors.

With the development of technology in communications in the industrial age, there was increasing concern over the protection of authors' rights on an international scale. In 1852 France extended the protection of its copyright laws to all authors, regardless of nationality. This began a movement for some international accord, which eventually came about at a meeting in Berne, Switz., in 1886. The Berne Convention adopted there resulted in the formation by 14 original member states of the Berne Union. The core of the convention is its provision that each of the contracting countries shall provide automatic protection for works in other countries of the union and for unpublished works whose authors are citizens of or residents in such other countries.

In 1988 the United States reversed its longstanding opposition to the Berne Convention and approved membership in the Berne Union, effective in the following year. The United States Copyright Law nonetheless continues to differ somewhat from the general laws of other member countries. One major difference is in the treatment of "moral rights," which includes the right of an author to preserve his or her work from any alteration. The Berne Convention recognizes such "right of integrity," while U.S. copyright law does not.

In the United States, Article I, Section 8 of the Constitution authorizes Congress to create a national copyright system to "promote the Progress of Science and useful Arts, by securing for limited Times to Authors . . . the exclusive Right to their . . . Writings." Congress' last major revision of its copyright law was in 1978. That legislation specifies that copyright subsists in original works of authorship fixed in any tangible medium of expression and provides that such works include literary, musical, and dramatic works; pantomimes and choreographic works; pictorial, graphic, and sculptural works; motion pictures and other audiovisual works; and sound recordings. Under this legislation, copyright extends to computer programs, while a separate statute (the Semiconductor Chip Protection Act of 1984) affords protection for mask works fixed in a semiconductor chip product. Under certain circumstances, computer programs may receive patent protection where the program is part of product or process claims.

The enactment of 1978 accords to the owner of copyright the exclusive right to reproduce and distribute the work, to prepare derivative works, and to publicly perform and display the work. These rights, however, are made the subject of numerous limitations, one of the most important being "fair use," which is not considered an infringement.

Among the other limitations imposed on the rights of copyright owners are certain compulsory licenses, including licenses for certain retransmissions by cable-television systems and for the public performance of copyrighted musical works in coin-operated players. The enactment established the Copyright Royalty Tribunal, with the power to adjust the royalty rates under these compulsory licenses and to redistribute the royalty fees.

An important feature of the legislation of 1978 is the establishment of the general term of copyright protection as the life of the author plus 50 years. For anonymous works, pseudonymous works, and works made for hire, the term is 75 years from first publication or 100 years from the date of creation of the work, whichever is shorter. Under the new law, all terms of copyright run through the end of the calendar year in which they would otherwise expire. Copyrights secured prior to the 1978 revision last 28 years from the date originally secured, as previously provided by law; the second term of an existing copyright, however, may be renewed for an additional 47 years (for a total of 75 years).

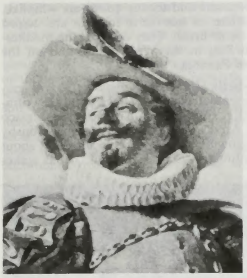
The new act contains the requirement of a notice of copyright to be affixed to copies and phonorecords of published works in such manner and location as to give reasonable notice of the claim to copyright. Although the provisions are complex, the notice for copies should generally contain the symbol ©, the word "Copyright," or the abbreviation "Copr.," together with the year of first publication and the name of the owner of copyright. For phonorecords of sound recordings the notice should be the symbol ℗ together with the year of first publication and the name of the owner of copyright in the sound recording.

A second international convention was convened in Geneva in 1952 and took effect in 1955. The Universal Copyright Convention (UCC) exists alongside the Berne Convention. The UCC provides for the same protection of foreign works as for domestic works in all countries, regardless of where the work was first published; it also provides exclusivity for translation rights up to seven years. By calling for inclusion of the copyright symbol on first publication date of a work, the UCC requirements effectively included U.S. practice also.

Coquelin, Benoît-Constant (b. Jan. 23, 1841, Boulogne, Fr.—d. Jan. 27, 1909), French actor of unusual range and versatility.

Coquelin studied acting at the Conservatoire in 1859 and in 1860 made his debut at the Comédie-Française. At the age of 23 he was a full member of the company. Mascarille in Molière's *Étourdi* and Figaro, comic valets of brilliant exuberancy, were his greatest parts in the classical repertory, but he was also successful as a romantic lover or an old schoolmaster.

In 1886 he resigned his position to tour in Europe and the United States, rejoining the Comédie-Française in 1890. Two years later he left it for good and toured the European capitals with a company of his own. He was a member of the Renaissance Theatre in Paris from 1895 until 1897, becoming in the latter year director of the Théâtre de la Porte-Saint-Martin, where he created Rostand's *Cyrano* (1897). In 1900 he toured in America with Sarah Bernhardt. During his last years he acted at the Théâtre Sarah Bernhardt. He died while rehearsing for Rostand's *Chantecler.* Coquelin was the author of three treatises on the craft



Coquelin as Cyrano, photogravure by H. Dujardin after a watercolour by J. Guth

By courtesy of the Bibliotheque de l'Arsenal, Paris; photograph, J.E. Bulloz

of the actor: *L'Art et le comédien* (1880), *Les Comédiens par un comédien* (1882), and *L'Art du comédien* (1894). His son Jean (1865–1944) also became an actor.

His brother, Ernest-Alexandre-Honoré Coquelin (1848–1909), called Coquelin *cadet,* was a member of the Comédie-Française from 1879 until his death. He specialized in supporting comedy parts.

Coquilhatville (Zaire): *see* Mbandaka.

Coquimbo, *región,* northern Chile, bordering Argentina to the east and fronting the Pacific Ocean to the west. It lies in an arid to semiarid area of east-west valleys and brush-covered ridges called the Norte Chico ("Little North"). It was one of the eight original Chilean provinces created in 1826; its present



Shrine of the Virgin of Rosario de Andacollo, Coquimbo region, Chile

Peter L. Gould

boundaries date from 1929, and internal administrative structure dates from 1974. It comprises Elqui, Limarí, and Choapa provinces.

Goats, sheep, and cattle are raised, but more important economically are irrigation and dry farming, concentrated primarily on marine terraces and in the Elqui, Limarí, and Choapa river valleys. Subtropical fruits, wine grapes, cereals, and alfalfa are cultivated, primarily for the national market. Mining of iron, gold, manganese, and copper, among other minerals, is scattered, but large-scale operations exist near La Serena (*q.v.*), the regional capital. Both the Pan-American Highway and the north-south railroad run the length of the *región,* passing through both Coquimbo city and La Serena. Area 15,697 square miles (40,656 square km). Pop. (1993 est.) 505,916.

Coquimbo, city, capital of Elqui *provincia,* Coquimbo *región,* northern Chile. Founded in 1850, it is the main port in Coquimbo region. Situated 7 miles (11 km) southwest of La Serena on Coquimbo Bay, its roadstead and dock area, among the best sheltered in Chile, are a winter haven for the Chilean navy as well as a loading point for cement, phosphate fertilizer, agricultural products, and various ores and concentrates. The Pan-American Highway and the main north-south railway pass through the city. Pop. (1992 prelim.) 80,961.

coquina, limestone formed almost entirely of sorted and cemented fossil debris, most commonly coarse shells and shell fragments. Microcoquinas are similar sedimentary rocks that are composed of finer material. Common among microcoquinas are those formed from the disks and plates of crinoids (sea lilies). A distinction is made between coquina, which is a detrital rock (*i.e.,* rock formed from debris), and coquinoid limestone, formed in situ and composed of coarse shelly materials with a fine-grained matrix.

coquina clam, any bivalve mollusk of the genus *Donax.* These marine invertebrates inhabit sandy beaches along coasts worldwide. A typical species, *Donax variabilis,* measures only about 10 to 25 mm (0.4 to 1 inch) in length. Its shell is wedge-shaped and varies widely in colour from white, yellow, and pink to blue and mauve. Coquina clams are very active; they migrate up and down wave-washed beaches with the tide and can reburrow between each wave. They have short siphons and feed on suspended plant material and detritus. Coquina clams are edible and are used in broths and chowder. The word coquina is a geologic term of Spanish origin for a limestone composed chiefly of shells. Deposits of such limestone containing abundant *D. variabilis* shells are found in Florida.

cor (musical instrument): *see* horn.

cor anglais (musical instrument): *see* English horn.

Cor Caroli, also called ALPHA CANUM VENATICORUM, binary star in the constellation Canes Venatici consisting of a brighter component (A) of visual magnitude 2.9 and a companion (B) of magnitude 5.5. It is the prototype for a group of unusual spectrum-variable stars that show strong and fluctuating absorption lines of silicon, chromium, strontium, or certain rare earths. Europium apparently is concentrated around one magnetic pole, chromium around the other. Cor Caroli ("Heart of Charles") was named by Sir Edmond Halley for King Charles II of England.

cor pulmonale: *see* pulmonary heart disease.

Cora (people): *see* Huichol and Cora.

Cora (Italy): *see* Cori.

Coraciidae (bird family): *see* roller.

coraciiform, also called ROLLERLIKE BIRD, any bird of the order Coraciiformes, including the kingfishers, todies, motmots, bee-eaters, rollers, hoopoes, and hornbills. Coraciiforms are chiefly arboreal and total about 191 species.

A brief treatment of coraciiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

Distribution of the 10 families of this order is nearly worldwide in temperate and tropical areas, with the greatest number of species in Africa, Asia, and Papuan areas. The kingfishers (family Alcedinidae) are found in both the Old and New Worlds. Motmots (Momotidae) and todies (Todidae) are limited to the New World tropics. Bee-eaters (Meropidae), rollers (Coraciidae), and hoopoes (Upupidae) are restricted to the Old World. Hornbills (Bucerotidae) are found in the African and Asian tropics, while wood hoopoes (Phoeniculidae) are found only in southern Africa. The ground rollers (Brachypteraciidae) and cuckoo rollers (Leptosomatidae) live only on Madagascar.

Coraciiform birds range in size from 10-centimetre (4-inch) todies to some hornbills reaching more than 100 cm. These large-headed, compact-bodied birds have small feet with some fusion of the toes, and large wings; the tail varies in length. The bill is generally large in most species. Kingfishers have a long, straight bill. Hornbills have a huge, laterally flattened bill with a large horny casque on top. This bill may help the birds reach fruit on the outer twigs of trees and may be used in courtship and other social behaviour.

The plumage is often immensely colourful, particularly in such species as the bee-eaters. In the kingfishers, coloration tends toward bright metallic blues and greens, and the bill may be orange or red. The feathers of the hornbills are usually some combination of black and white with accents of rust or yellow. Bright hues accent the skin around the face in some species.

Coraciiforms vary widely in habitat, their distribution being strongly affected by the requirements of feeding and breeding of individual species. Coraciiform diet and feeding behaviour can be divided into four types, with each family having a characteristic pattern of feeding. One type of feeding behaviour, watchful waiting on a perch, is practiced by kingfishers, motmots, and todies, which sit quietly for long periods until prey is sighted and then seize it in direct flight. Bee-eaters and rollers are mostly aerial feeders, although they perch often as well. The larger hornbills and small wood hoopoes search on foot among branches of trees for food. The common hoopoe, the ground rollers, and a few hornbills are primarily ground feeders, searching for prey on foot. The diet of this order is mainly animal (mollusk, crustacean, insect, fish, amphibian, reptile, mammal); some species eat fruit.

Both rollers and bee-eaters gather in the vicinity of grassfires. They wait or fly near the flames to capture fleeing insects. Certain hornbills forage on the ground after the flames have passed.

Courtship may include various calls and display flights. Rollers have a tumbling display in their courtship flight that has earned them their name.

Some coraciiform species are highly social. Bee-eaters nest in colonies. Hornbills and wood hoopoes nest in pairs but forage in small groups outside the breeding season. The nest is always placed in a cavity, whether in a tree, bank, wall, or cliff. The hoopoe (*Upupa epops*) is the only species that adds any lining to the nest. In all species but hornbills and hoopoes, the parents share incubation duties; the females of these species incubate alone, with the males bringing them food. Incubation lasts from 18 to 22 days and nestling from 25 to 28 days, but the larger species have much longer nestling periods.

The breeding behaviour of hornbills is different from that of other birds. The female enters the nest cavity, and the male brings mud and various litter with which she fills the entrance hole, leaving only a bill-sized slit for feeding. When the young are partially grown, the females of some hornbill species break out of the nest and help the male forage for the young; remarkably, the young rebuild the wall after the mother exits. In the African hornbill species, the female remains walled in until the young are fledged.

The newly hatched young of most coraciiforms are helpless (nidicolous) and naked, except for some down on the hoopoe and certain kingfishers. Young coraciiforms are fed by both parents except in the case of the hoopoe and the hornbills; in these species the male brings food to the female, who then feeds the young.

Coraciiform birds undergo one molt a year, replacing their flight feathers in the period following the breeding season. Female African hornbills are somewhat aberrant in this respect, as they undergo a complete molt while walled in with their young.

In Africa coraciiform birds such as kingfishers, bee-eaters, hoopoes, and wood hoopoes

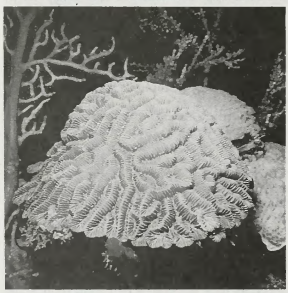
are victimized by the honey guides (family Indicatoridae), which are brood parasites. The honey guides lay their eggs in a host's nest while destroying the host eggs. If any of the natural offspring do hatch, the nestling honey guides will kill them. Thus the brood parasite gets the benefit of all the food brought by the host parents.

coracle, Irish CURRAGH, primitive, light, bowl-shaped boat with a frame of woven grasses, reeds, or saplings covered with hides. Those still used, in Wales and on the coasts of Ireland, usually have a canvas and tar covering. American Indians used the similar bullboat, covered with buffalo hides, on the Missouri River, and the corita, often sealed with bitumen, on the Colorado.

coral, any of a variety of invertebrate marine organisms of the class Anthozoa (phylum Cnidaria) that are characterized by skeletons—external or internal—of a stonelike, horny, or leathery consistency. The term coral is also applied to the skeletons of these animals, particularly to those of the stonelike corals.







(Top) Soft coral (*Sarcophyton*); (centre) blue coral (*Heliopora*); (bottom) stony coral (*Diploria*)

(Top) Valerie Taylor—Ardea; (centre) Douglas Faulkner; (bottom) Jack McKenney—Tom Stack & Associates

Stony corals (order Madreporaria or Scleractinia) number about 1,000 species; black corals and thorny corals (Antipatharia), about 100 species; horny corals, or gorgonians (Gorgonacea), about 1,200 species; and blue corals (Coenothecalia), one living species.

The body of a coral animal consists of a polyp—a hollow, cylindrical structure attached at its lower end to some surface. At the free end is a mouth surrounded by tentacles. The tentacles, which gather food, are more or less extensible and are armed with specialized stinging structures, called nematocysts, that paralyze prey.

Eggs and sperm, usually produced by separate individuals, develop as outgrowths in the gastrovascular cavity and are expelled through the mouth into the open water. Fertilization usually takes place in the water but sometimes occurs in the gastrovascular cavity. The larva, a ciliated form known as a planula, swims about for several days or as long as several weeks, then settles onto a solid surface and develops into a polyp. Reproduction also occurs by budding. The bud remains attached to the original polyp. A colony develops by the constant addition and growth of new buds. As new polyps develop, the old ones beneath die, but the skeletons remain.

Soft coral, horny coral, and blue coral are colonial in habit. Individual polyps have eight feathery tentacles and, in the gastrovascular cavity, eight septa, or partitions. Cilia (tiny hairlike projections) on six septa draw water into the cavity. Cilia on the other two septa expel water. The skeleton is internal. Soft corals, a widely distributed group, have internal skeletons consisting of separate calcareous (calcium-bearing) spicules (needlelike structures). Some species are platelike in form; others (*e.g.*, dead men's fingers, *Alcyonium*) have fingerlike projections. Horny corals are most numerous in shallow tropical waters. They are ribbonlike or branching in form, sometimes growing to a length of 3 metres (10 feet). They include the so-called precious coral (also called red, or rose, coral) used in jewelry. A common species of precious coral, *Coralium rubrum*, is found in the Mediterranean Sea. Blue coral, *Heliopora coerula*, occurs on reefs of stony coral in the Indian and Pacific oceans. It forms lumps up to 2 metres in diameter.

Stony corals, the most familiar and most widely distributed forms, are both colonial and solitary in habit. They, as well as black and thorny corals, have more than eight septa and simple rather than feathery tentacles. Stony, black, and thorny corals differ from the related sea anemone (*q.v.*) chiefly in having an external skeleton. Stony corals occur in all oceans from the tidal zone to depths of nearly 6,000 metres (about 20,000 feet). The polyps of colonial forms are 1 to 30 millimetres (0.04 to 1.2 inches) in diameter. Most living stony corals are yellowish, brownish, or olive, depending on the colour of the algae living on the coral. The skeletons, however, are always white. The largest solitary form, a species of *Fungia*, grows to a diameter of about 25 centimetres (10 inches).

The skeleton of stony coral is almost pure calcium carbonate and is deposited in a cup-shaped form with the polyp inside. The growth rate varies with age, food supply, water temperature, and species. Atolls and coral reefs are composed of stony coral. Such formations grow at an average rate of about 0.5 to 2.8 centimetres per year. Common types of stony coral include brain coral, mushroom coral, star coral, and staghorn coral, all named because of their appearance.

Black corals and thorny corals are whiplike, feather-like, or treelike in form or are shaped like a bottle brush. They occur in the Mediterranean Sea, in the West Indies, and off the coast of Panama.

coral-bells (*Heuchera sanguinea*), hardy garden perennial, of the saxifrage family (Saxifragaceae), native to North America from Mexico to the Arctic. Coral-bells is a compact, bushy plant growing in tufts, with flower stems about 45 centimetres (18 inches) tall. It has spikes



Coral-bells (*Heuchera sanguinea*)

A to Z Botanical Collection—EB Inc.

covered with pendant coral-coloured flowers about the size of lily of the valley bells. The leaves are borne on short stalks that rise from the base of the plant. Many colourful varieties of this summer-blooming plant have been developed as garden ornamentals.

Coral Gables, city, Dade county, southeastern Florida, U.S., adjoining Miami (northeast). George E. Merrick developed the site from a nucleus of his family's 160 ac (65 ha) of citrus and farmland and named it, at its incorporation in 1925, for the family's house of coral rock walls and gables. It is a well-planned residential area, noted for its landscaped plazas with architecture that blends Spanish with contemporary styles and for unique "villages" (compounds of houses built in French, South African Dutch, and Chinese styles). Six mi (10 km) of waterway, navigable for small boats, provide access to Biscayne Bay and outside waters. Coral Gables is the seat of the University of Miami (1925), site of the U.S. Weather Bureau's National Hurricane Research Center. Pop. (1990) 40,091.

coral reef, ridge or hummock formed in shallow ocean areas by the calcareous skeletons of certain coelenterates, of which coral polyps are the most important. A coral reef may grow into a permanent coral island.

A brief treatment of coral reefs and islands follows. For full treatment, *see* MACROPAEDIA: Oceans.

Coral polyps resemble sea anemones, to which they are closely related, but, unlike most anemones, most reef corals are colonial. Initial polyps divide themselves into daughter polyps, and they divide in turn, so growing into colonies that can be up to several metres in diameter, all held together in one continuous rigid calcareous skeleton. They remain attached to the seafloor and become so large and heavy that only storms disturb them. Under the right conditions, generally clear and well-circulating water that is not too rough, the corals grow profusely side by side, even on and over each other. The corals in effect build limestone because their skeletons are made of calcium carbonate.

Calcareous algae (stony seaweeds), mollusks, echinoderms, and protozoans also contribute to the reef. Different organisms have different reef-building roles. Some, especially the corals, provide the main structural framework of the growing reef, although in parts of the world such as the central Pacific, where the surf is very strong, calcareous algae may be more important in the roughest places. Almost all shelly and calcareous organisms and those with spicules, such as sponges and sea cucumbers, provide fragments that wash or fall into the gaps between corals. Other organisms, especially algae and protozoans, bind and cement everything together with sheetlike growth.

The whole structure is attacked by waves and by organisms seeking shelter and food. Fragments of every size from blocks to fine mud result and accumulate within the reef and are shifted by waves and currents away from the main growing structure into calmer areas on top of the reef or around and behind it.

A coral reef is actually a complex of features, only part of which is a living coral or algal framework, although the other associated features result from this live segment. The accumulations of carbonate sand and mud provide a habitat for two important groups of marine flowering plants, sea grasses and mangroves, and for almost inconspicuous blue-green algal mats. These plants trap and stabilize sediment, and their accumulations are also accreted to the whole reef complex. Storms and surf heap up fragmental material into beaches and shoals, and the shoals may develop into low sandy or rubbly islets or cays on top of the reef.

Coral reefs take four principal forms. Fringing reefs consist of a flat reef area directly skirting a nonreef island, often volcanic, or a mainland mass. Barrier reefs are also close to a nonreef landmass but lie several kilometres offshore, separated from the landmass by a lagoon or channel often about 50 m (160 feet) deep. Some barrier reefs are more or less circular, surrounding an island, but larger barrier reefs, such as those along the Red Sea coast and the Great Barrier Reef of Australia, are complex linear features consisting of chains of reef patches, some of them elongated into ribbon reefs. The third category of reefs consists of atolls, which are like circular barrier reefs but without their central landmass. Finally, there are patch reefs, which have irregular tablelike or pinnacle features. Smaller patches occur inside atoll lagoons. Larger patches occur as isolated parts of larger developments of any of the other three reef categories. They sometimes occur completely separate from other kinds of reefs.

A typical coral reef generally faces the open sea, seaward of which is the fore reef, descending into deeper water and floored deeper down by fragmental material derived from the reef. Behind the growing fore-reef edge, which rises to about mean high-water level, is a shallow platform formed partly by a now dead area of reef framework and partly of fragmental material and often colonized by sea grasses, algal mats, or mangroves. Patches of living framework occur in places. Cays may occur along the platform, or the reef may terminate here against the shore of a proper landmass. If there is no immediately adjacent landmass, the reef descends again into deeper water, generally more gently, on this, its leeward side. There are usually live reef frameworks on this slope too, but these are often irregular and patchy.

The reef becomes true rock by an almost imperceptible dissolution, redeposition, recrystallization, and chemical transformation of reef material. The shape of coral reefs, while due at least in part to the tendency of reef builders to grow upward and outward toward the prevailing winds and currents, is also the result of changes of sea level during the last 2,000,000 years or more. Coral reefs that developed during this time were left above the sea during the last glaciation, when they were eroded and subjected to solution weathering. As sea level rose again during the last 10,000 years, new reef growth mantled this older, drowned landscape but has still not masked it completely.

Coral islands consist of low land perhaps only a few metres above sea level, generally with coconut palms and surrounded by white coral sand beaches. They may extend dozens of kilometres and include almost any tropical limestone island whose structure is integrally part of a living or relatively recent coral reef. Reef building takes place mostly below high-tide level, and a typical coral island or cay usually surmounts the relatively flat top of the whole reef system. Geologically, the island is just one small part of the whole coral reef.

Coral reef islands occur in association with all types of reef but especially on reefs whose flat tops are well developed, perhaps a kilometre or more in width. Reef islands may occur in isolation or in a chain along the length of the reef. Sometimes they take the form of long strips of land occupying most of the length of the central area of a reef top.

There are two completely different mechanisms of origin of reef islands: uplift and accretion. In the first, part or all of a reef system may become land as a result of crustal movements raising it above sea level (*e.g.*, the Aldabra Islands in the western Indian Ocean). The previously submarine reef top becomes a low plateaulike feature, and such islands are typically rocky, with cliffs and with land surfaces pitted and sculpted by solution weathering. They are often still recognizable as atolls with a lagoon, now much shallower or even completely dry, as an interior basin. If present sea levels were to fall again, as they did in the recent geologic past owing to an increase in polar ice, most of the world's coral reefs would, in effect, become raised features. It is only because present sea levels are the highest for many thousands of years that there are no raised reef islands of this kind now.

Coral islands created by accretion have developed from rubbly reef rock broken off from the reef by storms and waves and mixed with finer reef detritus. The exceptional conditions of cyclonic storms are sometimes sufficient to create reef-top shoals in a single event. Other material accumulates by more regular methods such as normal currents and wave action. Beaches develop around the shoal, and wind may heap up the lighter, finer material into dunes. Rainwater can now reach all this material, which, being almost entirely of calcium carbonate, is readily dissolved by it, and the dissolved lime is redeposited around the loose material, cementing it together. The newly formed land is soon colonized by plants and animals, which also contribute their own remains to the island, helping soil to develop. Many of the reef islands in the central and southern Pacific and of the Maldive Islands in the Indian Ocean originated in this way.

Reef islands, especially those close to sea level, are not very stable. The cyclones that help to create them may also damage and destroy them. Waves may attack one side and redeposit the material on the other. Precarious though reef islands are, they have nevertheless long been the homes of peoples like the Polynesians and Micronesians in the Pacific and the Maldivians in the Indian Ocean.

Coral Sea, sea of the southwestern Pacific Ocean, extending east of Australia and New Guinea, west of New Caledonia and the New Hebrides, and south of the Solomon Islands. It is about 1,400 miles (2,250 km) north-south and 1,500 miles east-west and covers an area of 1,849,800 square miles (4,791,000 square km). To the south it merges with the Tasman Sea, to the north with the Solomon Sea, and to the east with the Pacific; it is connected to the Arafura Sea (west) via the Torres Strait. North of latitude 20° S, the seafloor is dominated by the Coral Sea Plateau, which is marked north and south by the Osprey and Swain reefs. To the north of the plateau is the Coral Sea Basin. The South Solomon Trench reaches depths of 24,002 feet (7,316 m), and the New Hebrides Trench plunges to 25,134 feet.

The sea was named for its numerous coral formations, highlighted by the Great Barrier Reef, extending 1,200 miles (1,900 km) down the Australian northeast coast. Ocean shipping between eastern Australia and the South Pacific islands and China traverses the sea by way of a channel 200 miles (320 km) east of the reef. The sea has a subtropical climate and is subject to typhoons, especially from January to April. Economic resources include fisheries and petroleum deposits in the Gulf of Papua.

Consult the INDEX *first*

Coral Sea, Battle of the (May 4–8, 1942), World War II naval and air engagement in which a U.S. fleet turned back a Japanese invasion force that had been heading for strategic Port Moresby in New Guinea.

By the end of April 1942 the Japanese were ready to seize control of the Coral Sea (between Australia and New Caledonia) by establishing air bases at Port Moresby in southeastern New Guinea and at Tulagi in the southern Solomons. But Allied intelligence learned of the Japanese plan to seize Port Moresby and alerted all available sea and air power. When the Japanese landed at Tulagi on May 3, carrier-based U.S. planes from a task force commanded by Rear Admiral Frank J. Fletcher struck the landing group, sinking one destroyer and some minesweepers and landing barges. Most of the naval units covering the main Japanese invasion force that left Rabaul, New Britain, for Port Moresby on May 4 took a circuitous route to the east, which invited a clash with Fletcher's forces.

On May 5 and 6, 1942, opposing carrier groups sought each other, and in the morning of May 7 Japanese carrier-based planes sank a U.S. destroyer and an oiler. Fletcher's planes sank the light carrier *Shoho* and a cruiser. The next day Japanese aircraft sank the U.S. carrier *Lexington* and damaged the carrier *Yorktown,* while U.S. planes so crippled the large Japanese carrier *Shokaku* that it had to retire from action. So many Japanese planes were lost that the Port Moresby invasion force, without adequate air cover and harassed by Allied land-based bombers, turned back to Rabaul. The four-day engagement was a strategic victory for the Allies, whose naval forces, employing only aircraft, never closed within gunshot range of Japanese vessels.

Coral Sea Islands, officially CORAL SEA ISLANDS TERRITORY, group of islands situated east of Queensland, Australia, in the South Pacific. Spread over a sea area of about 400,000 square miles (1,035,995 square km), the islands comprise only a few square kilometres of actual land area. They are scattered coral reefs and sand cays with large populations of seabirds. In 1770 Captain James Cook explored parts of the region, and in the late 1800s guano was collected from the islands. Some of the better-known islands are Cato Island, Chilcott Islet in the Coringa group, the Willis group, and Bird Islet and West Islet forming part of Wreck Reef. Other formations include Herald Beacon Islet (part of Mellish Reef), Frederick Reef, Pocklington Reef, Bougainville Reef, and Lihou Reef. The

most recently acquired of Australia's external territories, the islands were declared to be Australian territory in 1969 by the Coral Sea Islands Act. There is a manned weather station in the Willis group; otherwise the islands are uninhabited.

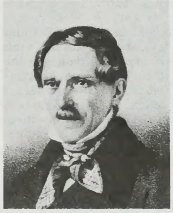
coral snake, any of about 65 species of strongly patterned burrowing snakes of the cobra family, Elapidae. True coral snakes are confined to the New World, chiefly in the tropics, but similar forms occur in Asia and Africa. Secretive and docile, they rarely bite when handled; however, the venom of some can kill a man. Most coral snakes prey on other snakes. The largest genus, *Micrurus,* ranges from the southern United States to Argentina; most of the more than 50 species are ringed with red, black, and yellow or white. An example is the eastern coral snake, or harlequin snake (*M. fulvius*), of North Carolina and Missouri to northeastern Mexico. It is about 76 centimetres (30 inches) long and has wide bands of red and black separated by narrow bands of yellow: the rhyme "Red touching yellow, dangerous fellow" distinguishes it from similar species. This nocturnal snake is common but rarely seen.

The Arizona coral snake (*Micruroides euryxanthus*) is a small, rare denizen of southwestern U.S. deserts. Old World coral snakes include five to ten species of *Calliophis,* found from Malaysia to the Philippines. In the genus *Maticora* of the East Indies, the venom glands extend more than one-third of the way down the body. African coral snakes belong chiefly to *Elaps,* and are black-and-white banded.

In the family Colubridae (*q.v.*), the false coral snakes (*Erythrolamprus*) of South American forests are rear-fanged. For the false coral snake of North America, *see* scarlet snake; king snake.

Coralli, Jean, original name JEAN CORALLI PERACINI (b. Jan. 15, 1779, Paris—d. May 1, 1854, Paris), French ballet dancer and a choreographer of *Giselle,* considered by many the finest example of Romantic ballet.

Trained at the Paris Académie (now Opéra), Coralli made his debut there in 1802. He danced and choreographed in Milan, Lisbon,



Coralli, engraving by Charles Vogt, *c.* 1852

By courtesy of Ivor Guest

and Marseille (1815–24); in 1825 he returned to Paris as choreographer for the Théâtre de la Porte Saint-Martin.

He was choreographer in residence at the Paris Académie (1831–45), where, during the height of ballet's Romantic period, he choreographed for such famous ballerinas as Fanny Elssler and Carlotta Grisi, creator of the title role in *Giselle* (1841). Coralli also helped establish Elssler's popularity by including in several of his ballets the spectacular *pas de caractère,* or theatricalized folk dances, in which she excelled. In addition to *Giselle,* which he choreographed with Jules Perrot, Coralli also choreographed such successful and frequently revived ballets as *Le Diable Boiteux* (1836), *La Tarentule* (1839), and *La Péri* (1843).

coralroot, any plant of the genus *Corallorhiza,* family Orchidaceae, consisting of about 13 species of nearly leafless, nonphotosynthetic orchids that live primarily on dead organic matter. One species is Eurasian; the others are native to North and Central America. The



Spotted coralroot (*Corallorhiza maculata*)

F.K. Anderson—EB Inc

name coralroot refers to the coral-like shape of the reddish rhizomes (underground stems).

The spotted coralroot (*Corallorhiza maculata*), found throughout most of the United States, has several varieties. Each has a white flower lip, which may be spotted.

Corantijn River (South America): *see* Courantyne River.

Corato, town, Bari province, Puglia (Apulia) region, southeastern Italy, on a slope descending to the Adriatic Sea, west of Bari. Founded by the Normans, Corato became subject to Alfonso V, king of Aragon, at the end of the 15th century, and later to the Carafa family. The chief features of the ancient centre of the town, which is surrounded by modern buildings, are the Romanesque church of Sta. Maria Maggiore, the Gothic church of S. Domenico, and the Catalano and Ottinera palaces. Corato is an agricultural market for fruit, vegetables, and cereals and produces wine and olive oil. Pop. (1981 prelim.) mun., 41,138.

Corbeil, William of, Corbeil also spelled CORBAIL, or CORBEUIL (b. *c.* 1060–80, probably Corbeil, Fr.—d. Nov. 21, 1136, Canterbury, Kent, Eng.), archbishop of Canterbury from 1123 to 1136.

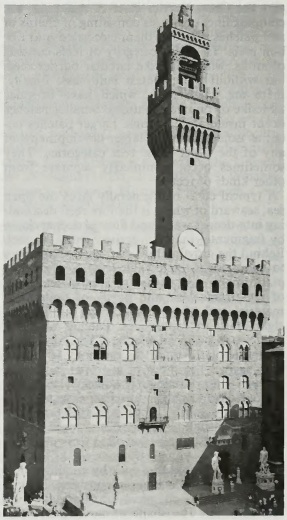
Educated at Laon, he entered the order of St. Augustine at the house of the Holy Trinity, Aldgate, London, and became prior of the Augustinian foundation at St. Osyth in Essex. After a long conflict with Thurstan, archbishop of York, he was consecrated archbishop of Canterbury. Three years later, after a dispute with the papal legate Cardinal John of Crema, William was appointed legate in England and Scotland, an important precedent in the history of the English church. William built the keep of Rochester Castle and finished the cathedral at Canterbury, which he dedicated with great pomp in May 1130. He crowned Stephen as king of England in 1135 at Westminster.

Corbeil-Essonnes, town, Essonne *département,* Paris region, north central France, at the confluence of the Seine and Essonnes rivers, just southeast of Paris. Corbeil and Essonnes, formerly separate towns, were united in 1951. Corbeil (ancient Corbilium) has a 14th-century gate and the medieval church of Saint-Spire (originally an abbey). An independent county in the Carolingian period, it was annexed to France by Louis VI in 1108 and was probably the birthplace of William of Corbeil, archbishop of Canterbury (1123–36). A treaty between Louis IX of France and James I the Conqueror of Aragon was signed there in 1258. Industrial development includes flour and paper mills, printing plants, and foundries. The flour mills are among the most important in France; railway equipment, electronics, printing, and paper manufacturing also contribute to the economy. A new town is under construction at nearby Evry. Pop. (1982) 37,741.

corbel, in architecture, bracket or weight-carrying member, built deeply into the wall so that the pressure on its embedded portion counteracts any tendency to overturn or fall outward. The name derives from a word meaning "crow" because of its beaklike shape. Corbels may be individual pieces of stone, separate from each other like brackets, as in the case of many medieval and Renaissance cornices, which were elaborately carved, or they may be continuous courses of masonry such as the corbels under projecting oriel windows.

A corbel arch consists of two opposing sets of overlapping corbels, resembling inverted staircases, which meet at a peak and create a structure strong enough to support weight from above. Babylonian architecture made wide use of corbel arches. When such arches are used in a series, they become a corbel vault, which, as in the Mayan style, can support a roof or upper story. Corbel vaults and arches were useful in cultures that had not yet developed curving arches and other ceiling structures. Today, therefore, structural corbelling has fallen out of general use.

corbel table, in architecture, a continuous row of corbels (a block of stone projecting from a wall and supporting some heavy feature), usually occurring just below the eaves of a roof in order to fill in beneath a high-pitched roof and to give extra support. It was a popular architectural feature in early medieval



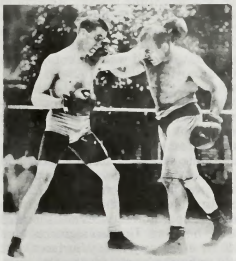
Corbel tables on the facade and tower of the Palazzo Vecchio, Florence, attributed to Arnolfo, 1298–1314

Alinari—Art Resource/EB Inc.

churches, particularly in Romanesque buildings, in which the corbels were carved and elaborately ornamented with decorative motifs, such as fancifully sculptured grotesques. On medieval castle walls, parapets were supported by boldly projecting corbel tables, with floor openings between the corbels through which defenders of the castle could drop missiles, molten lead, or boiling oil on the attacking force below.

Corbett, James J(ohn), byname GENTLEMAN JIM (b. Sept. 1, 1866, San Francisco—d. Feb. 18, 1933, New York City), U.S. world heavyweight boxing champion from Sept. 7, 1892, when he knocked out John L. Sullivan in 21 rounds at New Orleans, until March 17, 1897, when he was knocked out by Robert Fitzsimmons in 14 rounds at Carson City, Nev. His introduction of finesse in boxing led to what came to be called scientific boxing. He retired from the ring in 1903.

The first fully successful fighter under Queensberry rules, Corbett was one of the most scientific boxers in the history of the sport. His tasteful dress and personality made him popular and contributed much to public acceptance of prizefighting. Having acquired the theatrical promoter William A. Brady as his ring manager, he appeared in leading roles



Jim Corbett (left) sparring with Jim Jeffries
UPI Compix/EB Inc.

in several plays, including Shaw's *Cashel Byron's Profession*, and was considered a competent actor.

Corbett National Park, national park in Uttar Pradesh state, northern India. Extending over an area of 193 sq mi (525 sq km) and established as Hailey National Park in 1935, it was first renamed Rāmgangā in 1954 and then Corbett in 1957, in memory of Jim Corbett, a well-known British sportsman and writer. Located in the foothills of the Himalayas about 36 mi (50 km) northwest of Rāmnagar town, the park consists mainly of the broad Patlidoon Valley, through which the Rāmgangā River flows in a westerly direction. The forest cover includes sal (*Shorea*), teak, oak, silver fir, spruce, cypress, and birch. The park was established mainly for the protection of the tiger; it is there that India's Project Tiger was established (1973) to provide protection for tigers in the national parks. Langur, sloth bear, Indian gray mongoose, jungle cat, elephant, wild boar, barking deer, nilgai, black kile, shikra, Indian whitebacked vulture, black partridge, red jungle fowl, and peafowl are also found in the park. It has roads for elephant rides and *machan*, or observation posts. A reed forest was planted to afford natural cover for the animals, and a large man-made lake on the western side of the park is used for sport fishing.

Corbeuil, William of: *see* Corbeil, William of.

corbie step, also called CROW STEP, stone used for covering any of the steps or indentations in the coping (uppermost, covering course) of a gable; the term is also applied to the step itself. Corbie steps were common in late medieval buildings of the Netherlands and Belgium and occurred frequently in 15th-



Corbie steps on the D'Leuwenburgh Taverne, Amsterdam, 1600
Graphic House, Inc.—EB Inc.

century Scottish architecture. They also appear in some 15th-century English houses, such as Oxburgh Castle, Norfolk (1482).

Corbière, Tristan, pseudonym of ÉDOUARD JOACHIM CORBIÈRE (b. July 18, 1845, Coat-Congar, near Morlaix, Fr.—d. March 1, 1875, Morlaix), French poet remarkable for his realistic pictures of seafaring life and for his innovative use of irony and slang and the rhythms of common speech, which contrasted sharply with the elevated lyricism of the French Romantics, whom he frequently parodied.

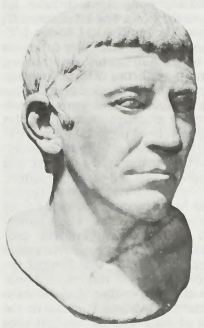
Educated at Morlaix and the lycées of Saint-Brieuc and Nantes, he settled in Roscoff, where, apart from three years in Paris, he spent the rest of his life and wrote most of his only volume of poems, *Les Amours jaunes* (1873). His main themes are love, Paris, the sea, and his native province. His work has affinities with that of the Symbolists and with the harsher aspects of that of Charles Baudelaire, but he did not belong to any literary school and was almost unknown until Paul Verlaine included him in *Les Poètes maudits* (1884). His influence is apparent in the poetry of his near contemporary Jules Laforgue and in the early works of Ezra Pound and T.S. Eliot. A biography of Corbière by R. Martineau was published in 1925 and one by C.F. MacIntyre (which contains selections in English translation) in 1954.

Corbinaye, Rose-Perrine le Roy de la: *see* Bellecour, Madame.

Corbulo, Gnaeus Domitius (d. AD 67), Roman general who restored Roman control over Armenia.

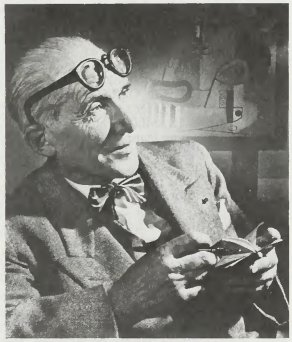
In AD 47 Corbulo was victorious over the German tribe of the Frisii on the Rhine, thereby restoring them to Roman tributary status. Appointed legate of Galatia and Cappadocia (two provinces to the west of Armenia) by the emperor Nero in 54, Corbulo was ordered to recover Armenia from Tiridates, brother of the Parthian king Vologases. In 58 he invaded Armenia and installed Tigranes, a Roman client, on the throne.

When Tigranes provoked a new attack by the Parthians in 61, Nero sent the general Lucius Caesennius Paetus to Armenia and ordered Corbulo to defend Syria. Paetus surrendered to the Parthians at Rhandeia in 62, and Corbulo then invaded Armenia and reestablished Roman ascendancy. He remained in Syria until 66, when his son-in-law, Annius Vinicianus, was caught conspiring against Nero. Recalled to Rome, Corbulo was forced to commit suicide.



Corbulo, marble bust; in the Capitoline Museum, Rome
Alinari—Art Resource/EB Inc.

Corbusier, Le, byname of CHARLES-ÉDOUARD JEANNERET (b. Oct. 6, 1887, La Chaux-de-Fonds, Switz.—d. Aug. 27, 1965, Cap Martin, Fr.), internationally influential Swiss architect and city planner, whose designs combine the functionalism of the modern movement with a bold, sculptural expressionism. He belonged to the first generation of the so-called International school of architecture and was their most able propagandist in



Le Corbusier, photograph by Yousuf Karsh, 1954
© Karsh—Woodfin Camp and Associates

his numerous writings. In his architecture he joined the functionalist aspirations of his generation with a strong sense of expressionism. He was the first architect to make a studied use of rough-cast concrete, a technique that satisfied his taste for asceticism and for sculptural forms.

Education and early years. Le Corbusier was born in a small town in the mountainous Swiss Jura region, since the 18th century the world's centre of precision watchmaking. All his life he was marked by the harshness of these surroundings and the puritanism of a Protestant environment. At 13 years of age, Le Corbusier left primary school to learn the

enamelling and engraving of watch faces, his father's trade, at the École des Arts Décoratifs at La Chaux-de-Fonds. There, Charles L'Eplattenier, whom Le Corbusier later called his only teacher, taught him art history, drawing, and the naturalist aesthetics of Art Nouveau.

It was L'Eplattenier who decided that Le Corbusier, having completed three years of studies, should become an architect and gave him his first practice on local projects. From 1907 to 1911, on his advice, Le Corbusier undertook a series of trips that played a decisive role in the education of this self-taught architect. During these years of travel through central Europe and the Mediterranean, he made three major architectural discoveries. The Charterhouse of Ema at Galluzzo, in Tuscany, provided a contrast between vast collective spaces and "individual living cells" that formed the basis for his conception of residential buildings. Through the 16th-century Late Renaissance architecture of Andrea Palladio in the Veneto region of Italy and the ancient sites of Greece, he discovered classical proportion. Finally, popular architecture in the Mediterranean and in the Balkan peninsula gave him a repertory of geometric forms and also taught him the handling of light and the use of landscape as an architectural background.

At the age of 30 he returned to live in Paris, where his formation was completed a year later when he met the painter and designer Amédée Ozenfant, who introduced him to sophisticated contemporary art. Ozenfant initiated Le Corbusier into Purism, his new pictorial aesthetic that rejected the complicated abstractions of Cubism and returned to the pure, simple geometric forms of everyday objects. In 1918 they wrote and published together the Purist manifesto, *Après le cubisme.* In 1920, with the poet Paul Dermée, they founded a polemic avant-garde review, *L'Esprit Nouveau.* Open to the arts and humanities, with brilliant collaborators, it presented ideas in architecture and city planning already expressed by Adolf Loos and Henri van de Velde, fought against the "styles" of the past and against elaborate nonstructural decoration, and defended functionalism.

The association with Ozenfant was the beginning of Le Corbusier's career as a painter and as a writer. Ozenfant and Le Corbusier (then still known as Jeanneret) together wrote a series of articles for *L'Esprit Nouveau* that were to be signed with pseudonyms. Ozenfant chose Saugnier, the name of his grandmother, and suggested for Jeanneret the name Le Corbusier, the name of a paternal forebear. The articles written by Le Corbusier were collected and published as *Vers une architecture.* Later translated as *Toward a New Architecture* (1923), the book is written in a telling style that was to be characteristic of Le Corbusier in his long career as a polemicist. "A house is a machine for living in" and "a curved street is a donkey track, a straight street, a road for men" are among his famous declarations. His books, whose essential lines of thought were born of travels and lectures hardly changed at all in 45 years, constituted a bible for succeeding generations of architects. Among the most famous are *Urbanisme* (1925; *The City of Tomorrow,* 1929), *Quand les cathédrales étaient blanches* (1937; *When the Cathedrals Were White,* 1947), *La Charte d'Athènes* (1943), *Propos d'urbanisme* (1946), *Les Trois Établissements humains* (1945), and *Le Modular I* (1948; *The Modular,* 1954).

L'Esprit Nouveau was the springboard for Le Corbusier's entrance into practice. In 1922 he became associated with his cousin Pierre Jeanneret, and together they opened a studio. The association of the two cousins lasted until 1940. It corresponds to the first of the two main periods, separated by World War II, that can be distinguished in Le Corbusier's work; the second period covers the years from 1944 to the architect's death in 1965.

The first period. The years from 1922 to 1940 were as remarkably rich in architecture as in city planning projects. As was always to be the case with Le Corbusier, unbuilt projects, as soon as they were published and circulated, created as much of a stir as did the finished buildings. In the Salon d'Automne of 1922, Le Corbusier exhibited two projects that expressed his idea of social environment and contained the germ of all the works of this period. The Citrohan House displays the five characteristics by which the architect five years later defined his conception of what was modern in architecture: pillars supporting the structure, thus freeing the ground beneath the building; a roof terrace, transformable into a garden and an essential part of the house; an open floor plan; a facade free of ornamentation; and windows in strips that affirm the independence of the structural frame. The interior provides the typical spatial contrast between open, split-level living space and the cell-like bedrooms. An accompanying diorama of a city illustrated ahead of its time the concept of green parks and gardens at the foot of a cluster of skyscrapers.

The ideas for city planning set forth at the Salon d'Automne, an annual semi-official exhibition, were taken up again and developed in 1925 at the Exposition des Arts Décoratifs in Paris, in a pavilion that was to be a "manifesto of the *esprit nouveau.*" In this little duplex-flat, the interior walls violently coloured under the influence of the painter Fernand Léger, Le Corbusier exhibited his first collection of industrially produced furniture.

During these years, in fact, Le Corbusier's social ideals were realized on two occasions. One of these was in 1925–26 when, thanks to the financial support of an industrialist, he built at Pessac, near Bordeaux, a workers' city of 40 houses in the style of the Citrohan House; the scorn for local tradition and the unconventional use of colour provoked hostility on the part of municipal authorities, who refused to provide a public water supply. Pessac was thus deprived of inhabitants for six years, and Le Corbusier did not forget this affront. In 1927 the architect participated in the international exposition of the Deutscher Werkbund, an association of various groups concerned with producing functional objects of high aesthetic value. For this exposition Le Corbusier constructed two houses in the experimental residential quarter of Weissenhof at Stuttgart.

Although Le Corbusier was from the beginning most interested in building for large numbers of people, during the prewar period he built primarily for privileged individuals who commissioned individual houses. They were functional in design and ascetic in appearance, incorporating rigorous geometric forms and bare facades. The first was for Ozenfant in 1922, followed by, among others: the house of the Swiss collector Raoul La Roche (1923), which later became the quarters of the Le Corbusier Foundation in Paris (1968); the villa (1927) of Michael Stein, a brother of the expatriate American writer and patron of Fauvism and Cubism Gertrude Stein; the Savoye House (1929–30), at Poissy, set in a lush, rural landscape on slender concrete pillars.

In 1927 Le Corbusier participated in the competition set by the League of Nations for the design of its new centre in Geneva. His project, with its wall of insulating and heating glass, is one of the finest examples of the architect's gift for functional analysis. For the first time anywhere, he proposed an office building for a political organization that was not a Neoclassical temple but corresponded in its structure and design to a strict analysis of function. This plan was to become the prototype of all future United Nations buildings. It probably would have shared a first prize but was eliminated on the grounds of not having been drawn up in India ink as the rules of the competition specified. After the disappointment of Pessac, this disqualification, which was almost certainly the result of a conspiracy on the part of conservative members of the jury, further embittered Le Corbusier in his attitude toward official architectural circles. The scandal accompanying the elimination of his design, however, gave him needed publicity by identifying him with modern avant-garde architecture. An immediate consequence of the Geneva affair was the creation, in La Sarraz, Switz., in 1928, of the International Congresses of Modern Architecture (CIAM), intended at first to defend the avant-garde architectural values defeated in Geneva. By 1930 the organization had become oriented toward city planning theory. Le Corbusier, as secretary of the French section, played an influential role in the five prewar congresses and especially in the fourth, which issued in 1933 a declaration that elaborated some of the basic principles of modern architecture.

The publicity from the Geneva competition also made possible for Le Corbusier a lecture tour in South America that was the source for his *Précisions sur un état présent de l'architecture et de l'urbanisme* (1930; "Reflections on the Present State of Architecture and Urbanism") and a trip to Moscow, where he was able to make contact with avant-garde constructivist architects and won the competition for the Centrosoyuz building (1929–35).

Le Corbusier constructed two other important buildings during this period, the Salvation Army Hostel in Paris, with its attempt at a "breathing" glass wall conceived as an unopenable glass surface equipped with an air conditioning system (a technological and financial failure), and the Swiss Dormitory at the Cité Universitaire in Paris (1931–32). In the latter structure he set the dormitory area apart from the common services areas located in a separate building. The two segments were connected by a stairway tower. Surfaces were left largely unfinished, and, for the first time, the massive pillars took on a sculptural value. At this point Le Corbusier's rational functionalism began to be balanced by a desire for expression.

The end of the 1930s saw such especially famous projects as the masterplans for Algiers (1938–42) and Buenos Aires (1938); the building for the Ministry of Education and Health in Rio de Janeiro (1936); and an infinitely expandable museum for Philippeville (1938), in French North Africa. There was also a trip to the United States (1935), where Le Corbusier was already famous.

Le Corbusier's diverse activities corresponded to a chosen life-style. He was not a teacher, like his colleague Walter Gropius, but the boss, who shut himself up alone in his office while his collaborators, who had come from all over the world and some of whom would later become famous, worked outside in the long hall that served as a studio. Le Corbusier came to his office only in the afternoons. His break with Ozenfant, in 1925, had not interrupted his painting career, and he usually spent his mornings painting at home. He was, by the mid-1930s, marked by the influence of Fernand Léger, who remained one of his few good friends.

The war years. World War II and the German occupation of France interrupted his activity as a builder and a traveller and his 20-year association with Pierre Jeanneret, who, unlike Le Corbusier, had joined the French Résistance. Although he was prepared to work with the Vichy government, there was little building being done at the time in France, and his only activities were painting, writing, and reflection.

Le Corbusier's thoughts during this time led

to the elaboration of the first bases of the "Modulor" concept, a scale of harmonic measures that set architectural elements in proportion to human stature. This theory was finally perfected in 1950, and Le Corbusier used it in designing all his subsequent buildings, wishing them to incorporate "a human scale." By the time the war ended, Le Corbusier had welded the attacks launched against him by representatives of traditional architecture into a myth. He had become, for the public, the Picasso of architecture, and, for architecture students, the symbol of modernity.

The second period. Le Corbusier thought that he would finally be able to apply his theories of planning in the reconstruction of France. He prepared in 1945 two plans for the cities of Saint Dié and La Pallice-Rochelle. At Saint Dié, in the Vosges Mountains, he proposed regrouping the 30,000 inhabitants of the destroyed town into five functional skyscrapers. These plans were rejected, but they subsequently circulated throughout the world and became doctrine. Le Corbusier was bitter, however, and his bitterness increased when he was named a member of the jury of architects for the construction of the United Nations building in New York City instead of being asked to design it himself.

At last, thanks to the unlimited support of the French government, Le Corbusier was given the opportunity to construct a large (private) housing complex; he was commissioned to build, in Marseille, a residential complex that embodied his vision of a social environment.

The Marseille project (*unité d'habitation*) is a vertical community of 18 floors. The 1,800 inhabitants are housed in 23 types of duplex (*i.e.*, split-level) apartments. Common services include two "streets" inside the building, with shops, a school, a hotel, and, on the roof, a nursery, a kindergarten, a gymnasium, and an open-air theatre. The apartments are conceived as individual "villas" stacked in the concrete frame like bottles in a rack. It was completed in 1952, and two more *unités* were built at other locations in France, at Nantes and Briey, as well as others in West Berlin.

Two religious buildings in France were commissioned as a result of the influence of the Dominican father Reverend Couturier, creator of the review *L'Art Sacré*. The more lyrical of the two, the chapel Notre-Dame-du-Haut at Ronchamp (1950–55), sacrifices Le Corbusier's famous principles of apparent functionalism; the wall has been built to a double thickness for visual effect and the roof, which appears to be suspended, actually rests on a forest of supports. More brutal and austere is the convent of Sainte-Marie-de-la-Tourette at Eveux-sur-Arbresle, near Lyon. The square building imposes a fortress of concrete in a natural setting. In the three-tiered facade of glass at la Tourette, Le Corbusier first employed panes of glass set at "musical" intervals to obtain a lyrical effect. Le Corbusier's reputation in France was established with two large expositions of his work in Paris in 1953 and in 1962.

Only from 1950 on did Le Corbusier become active on a large scale outside of France. In 1951 the government of the Punjab named him architectural advisor for the construction of its new capital, Chandīgarh. For the first time in his life, Le Corbusier was able to apply his principles of city planning on a metropolitan scale. Totally without reference to local tradition he designed the Palace of Justice, the Secretariat, and the Palace of the Assembly. Unfinished concrete, with windows sheltered by enormous concrete sunshades, the sculptural facades, swooping rooflines, and monumental ramps are principal elements of his architecture, which immediately influenced architects all over the world. He built the National Museum of Western Art in Tokyo (1960), the Carpenter Visual Art Center at Harvard University (1964), and designed an Exposition Pavilion in Zürich that was constructed posthumously (1964).

Le Corbusier was not greatly impressed by his late recognition. He seemed to prefer the image of a solitary and persecuted genius. Nevertheless, he continued to conceive new projects until the end of his life: an art centre for Frankfurt (1963), the Olivetti computer centre in Milan (1963), the Palais des Congrès in Strasbourg (1964), and the French embassy in Brasília (1964). Le Corbusier died suddenly in 1965 while swimming. The man who had thought himself so misunderstood in his own time was given a national funeral, and in 1968 the Le Corbusier Foundation was created.

(F.C./Ed.)

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Corby, district, county of Northamptonshire, England, on the crest of the ridge of hills that crosses the county from southwest to northeast and yields iron ore from the formation known as the Northampton Sands. With an area of 31 sq mi (80 sq km), the district comprises the new town of Corby with seven villages of the former Kettering rural district.

Corby was a village of 1,596 inhabitants in 1931. In the next five years it became the scene of a remarkable experiment: a steel-making firm from Scotland moved to Corby with a large number of its original Scottish employees and began to mine the ironstone and manufacture steel and tubing. This Scottish enclave in the English Midlands was designated a new town in 1950, with a development corporation to plan it and a projected population of 82,000. A large new town centre was opened in 1954, and by 1971 the population had increased to more than 47,000. New industries were drawn to the town, but the steelworks (a part of the British Steel Corporation [BSC]) closed in 1979. Pop. (1991 prelim.) 52,300.

Corcaigh (Ireland): *see* Cork.

Corchorus, genus of flowering plants of the linden family Tiliaceae (order Malvales). The bark of *C. capsularis* and to a lesser extent that of *C. olitorius* constitute the chief source of jute (*q.v.*), and these species are much cultivated in India and Bangladesh. The leaves and young shoots are eaten as a vegetable in Europe and as a potherb in West Africa. The seeds, however, are poisonous.

Corcoran Gallery of Art, museum in Washington, D.C., chartered by Congress in 1870 and established through the provisions made by the banker William W. Corcoran. The collection, noted for its comprehensive display of American painting from the colonial through the modern period, has been housed in its present classical revival building since 1897.

The museum also houses the private collection of Sen. William A. Clark, bequeathed to the Corcoran in 1926 and contained in a separate wing of the building. It is particularly noted for its French and Dutch paintings and decorative arts.

Corcovado, Mount, Portuguese MORRO DO CORCOVADO, sharp rocky peak (2,310 ft [704 m]), a part of the Carioca Range, overlooking Rio de Janeiro. Mt. Corcovado (Hunchback) is named for its shape. On its narrow summit towers the imposing statue of Christ the Redeemer, 98.5 ft tall. The peak is accessible by road and cog railway.

Corcyra (Greece): *see* Corfu.

Corcyra Melaina (Croatia): *see* Korčula.

cord, unit of volume for measuring stacked firewood. A cord is equivalent to a stack $4 \times 4 \times 8$ feet (128 cubic feet), and its principal subdivision is the cord foot, which measures $4 \times 4 \times 1$ feet. A standard cord consists of sticks or pieces 4 feet long stacked in a 4×8-foot rick. A short cord is a 4×8-foot rick of pieces shorter than 4 feet, and a long cord is a similar rick of pieces longer than 4 feet. A face cord is a 4×8-foot stack of pieces 1 foot long. The cord was originally devised in order to measure firewood and was so named because a line, or cord, was used to tie the wood into a bundle.

The useful amount of wood a cord actually contains varies greatly, depending upon such factors as the type of wood, the size and straightness of the pieces, and the amount of bark present. A tree with a usable height of 40 feet and a circumference of 75 inches will contain about one cord of wood.

Cord, Errett Lobban (b. July 20, 1894, Warrensburg, Mo., U.S.—d. Jan. 2, 1974, Reno, Nev.), U.S. automobile manufacturer, advocate of front-wheel-drive vehicles.

Previously a racing car mechanic and driver, he became president of the Auburn Automobile Company (founded 1900), Auburn, Ind., in 1924. Two years later he acquired the Duesenberg Motor Company (founded 1920), Indianapolis, Ind.; the brothers Fred and August Duesenberg designed the Model J (produced 1928–37) and other outstanding cars bearing the Duesenberg name for him. In 1929 the Auburn concern introduced the Cord L-29, the first widely sold front-wheel-drive car (produced through 1932). Subsequently, Cord built the streamlined Model 810 (1935) and Model 812 (1937).

Because of the Depression of the 1930s, manufacture of Auburns, Cords, and Duesenbergs ceased in 1937.

cord moss, any of the plants of the genus *Funaria* (order Bryales), distinguished by the spirally twisted seta (stalk) of the capsule (spore case). More than 100 species of *Funaria* are



Cord moss (*Funaria hygrometrica*) growing with cup fungus

C. Foord

found in many habitats throughout the world, especially on limestone or recently burned areas. About nine species are present in North America; the most common is *F. hygrometrica*, which is often described in textbooks as a representative bryophyte (member of a group including mosses and liverworts).

Pale-green, loose tufts of cord moss may form large carpets. Male and female reproductive organs are borne on separate branches of the same plant; each cluster of male organs is surrounded by a group of large phyllids (leaves), forming a structure resembling a small green flower. The numerous curved, yellowish or orange-brown capsules shed their spores through an obliquely placed "mouth." Each capsule stalk is moisture sensitive, curling when dry and unwinding when wet.

Cordaitales, an order of coniferophytes (class, sometimes division, Coniferophyta), fossil plants dominant during the Carboniferous Period (from 280,000,000 to 345,000,000 years ago). It is believed to be directly ancestral to the conifers (order Coniferales). Many were trees up to 30 metres (100 feet) tall, branched, and crowned with large, leathery, strap-shaped leaves. Three families are included—Pityaceae, Poroxylaceae, and Cordaitaceae—of which the Cordaitaceae is the best known. Its genera *Cordaites* and *Cordaianthus* are represented by fossil leaves, branches, and loosely formed cones, investigations of which have led to the formulation of the cordaite-conifer evolutionary sequence through the primitive conifer family Lebachiaceae (*see* Lebachia). The Pityaceae, from the Early Carboniferous, and the Poroxylaceae, geologically later but more primitive in wood structure, are closer in many respects to the seed ferns (pteridosperms). They are provisionally grouped with the Cordaitales until evidence displaces them.

Corday, Charlotte, in full MARIE-ANNE-CHARLOTTE CORDAY D'ARMONT (b. July 27, 1768, Saint-Saturnin, near Séez, Normandy, Fr.—d. July 17, 1793, Paris), the assassin of the French revolutionary Jean-Paul Marat.

Descended from a noble family, educated in



Charlotte Corday, engraving by É.-L. Baudran after a portrait by J.-J. Hauer
By courtesy of the Bibliotheque Nationale, Paris

a convent at Caen, and royalist by sentiment, yet susceptible also to the ideals of the Enlightenment, she was living with an aunt in Caen when it became the centre of a "federalist" movement against the Convention after the expulsion of the Girondins in May–June 1793. Inspired especially by Charles Barbaroux among the Girondin refugees, Charlotte Corday left for Paris to work for the Girondin cause. There she solicited an interview with Marat because of the influence of his newspaper over the masses, and on July 13 she was finally admitted to his presence while he was in his bath. She named dissidents in Normandy; he noted them and assured her that they would be guillotined. She then drew a knife from under her dress and stabbed him through the heart. Arrested on the spot, Charlotte Corday was tried and convicted by the Revolutionary Tribunal (July 16–17) and forthwith guillotined on the Place de la Révolution.

Cordeiro da Matta, Joaquim Dias (b. Dec. 25, 1857, Icolo-e-Bengo, Angola—d. March 2, 1894, Barra do Cuanza, Angola), African poet, novelist, journalist, pedagogue, historian, philologist, and folklorist whose creative zeal and research in the late 19th century helped establish in Angola an intellectual respect for Kimbundu culture and tradition.

Writing in Portuguese, Cordeiro da Matta, by profession a trader in wood, was one of the first Angolans to speak in favour of an autochthonous, or native, literature. Cordeiro da Matta was self-taught, and although he wrote many poems and two unpublished novels, the manuscripts of most of his literary works were lost. Only the poems from his published volume *Delírios* (1887; "Delirium") and individual verses from the *Almanach de Lembranças* are extant, but it is primarily as a collector of proverbs (*Filosofia Popular em Provérbios Angolenses,* 1891) and as a lexicographer (his Kimbundu–Portuguese dictionary was published in 1893) that he is remembered.

Cordeiro da Matta belonged to the generation of the 1880s, a decade in which there was a flowering of literary activity in Angola. An incipient press enabled black and mulatto writers to reach a literate audience interested in cultural and political affairs. Encouraged by the Swiss Protestant missionary and ethnologist Heli Chatelain, Cordeiro da Matta began to investigate the history, legends, and language of his people. One of his important works, a lost manuscript entitled *A Verdadeira História da Rainha Jinga* ("The True Story of Queen Jinga"), documented the life of the legendary Mbundu queen who actively resisted Portuguese expansion in the 17th century. As a journalist he contributed to *O Arauto Africans, O Policia Africano,* and *O Futuro de Angola.* He believed that the African intellectual's task was as an educator of the people, whom he felt needed to understand African history and national traditions, and he was one of the cultivators of a growing Angolan literary and intellectual life.

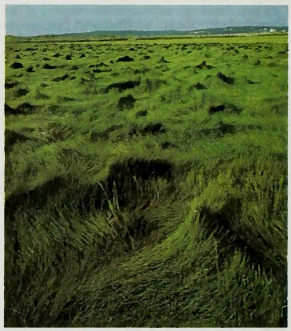
Cordeliers, Club of the, formally SOCIETY OF THE FRIENDS OF THE RIGHTS OF MAN AND OF THE CITIZEN, French CLUB DES CORDELIERS, or SOCIÉTÉ DES AMIS DES DROITS DE L'HOMME ET DU CITOYEN, one of the popular clubs of the French Revolution, founded in 1790 to prevent the abuse of power and "infractions of the rights of man." The club's popular name was derived from its original meeting place in Paris, the nationalized monastery of the Cordeliers (Franciscans). It became a political force under the leadership of such men as Jean-Paul Marat and Georges Danton. After Louis XVI's flight to Varennes (June 1791), the Cordeliers, now meeting at the Salle du Musée in the Place de Thionville (modern Place Dauphine), demanded the deposition of the King and organized the famous demonstration in the Champ-de-Mars (July 17) to present their petition. The demonstration, dispersed by the National Guard, resulted in the deaths of 50 demonstrators and in the temporary disbanding of the club.

After the fall of the monarchy (August 1792), Danton and his friends abandoned the leadership of the club to such men as Antoine-François Momoro and Jacques-René Hébert, who took a large part in the overthrow of the Girondins and gave the club an increasingly radical tone. The club favoured local autonomy, direct democracy, the atheistic program of the Paris Commune, and the formation of a "Revolutionary army" to advance the popular movement. After an unsuccessful insurrection in 1794, Hébert and his friends were arrested and executed; thereafter the club fell into oblivion.

Cordemoy, (Louis-)Géraud de (b. *c.* 1620, Paris—d. Oct. 8, 1684, Paris), French historian and philosopher, who showed considerable originality in his development of the general principles of physical theory. He introduced a new atomism into the mechanistic system of René Descartes by linking unity and substantiality; matter is homogeneous but contains a multiplicity of bodies each of which is an individual substance. His works include *Le Discernement du corps et de l'âme* (1666; "The Differentiation of the Body and the Soul") and *Lettre à un savant religieux de la Comp. de Jésus* (1668), on animal magnetism.

cordgrass, also called MARSH GRASS, or SALT GRASS, any of 16 species of grasses constituting the genus *Spartina* (family Poaceae). The erect, tough, long-leaved plants range from 0.3 to 3 metres (1 to 10 feet) in height and are found on marshes and tidal mud flats of North America, Europe, and Africa.

Most species grow in clumps, with short flower spikes alternating along and often ad-



Saltmeadow cordgrass (*Spartina patens*)
Grant Heilman—EB Inc.

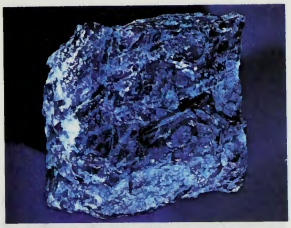
herent to the upper portion of the stems, and with spreading underground stems (rhizomes) that send up new plants and are good soil binders. Prairie cordgrass (*Spartina pectinata*) and gulf cordgrass (*S. spartinae*) are the most widely distributed North American species.

Cordia, genus of about 250 warm-region New and Old World trees and shrubs, of the family Boraginaceae, many valued for their decorative clusters of red-orange, yellow, or white papery blooms, for edible fruits, and for use as furniture timber. The foliage is alternate and simple, often rough surfaced.

The leaves of the tropical American geiger tree, aloewood, or sebesten plum (*C. sebestena*) are used as a substitute for sandpaper. The bright red-orange, six- to seven-lobed flowers are striking and occur in large clusters. The greenish, acid-tasting fruits are edible. The tree grows to 10 metres high (about 33 feet).

cordial, a liqueur (*q.v.*); though the term cordial was formerly used for only those liqueurs that were thought to have a tonic or stimulating quality due to the medicinal components of their flavourings, the terms cordial and liqueur are now used interchangeably.

cordierite, also called DICHROITE or IOLITE, blue silicate mineral that occurs as crystals or grains in igneous rocks, only as a result of contamination of the magma by aluminous sediment. Most typical, however, are its occurrences in thermally altered clayey sediments



Cordierite from Wyoming
Emil Javorsky

surrounding igneous intrusions and in schists and paragneisses. Precambrian deposits of the Laramie Range, Wyo., U.S., contain more than 500,000 tons of cordierite. Cordierite is sometimes called dichroite because of its marked pleochroism (different coloured light is transmitted in different directions). For chemical formula and detailed physical properties, *see* silicate mineral (table).

The natural mineral has little commercial use. When clear, cordierite is sometimes cut as a gem; the stones from the gem gravels of Sri Lanka have been called water sapphires. Synthetic magnesium cordierite has a low thermal expansion and is used as a semirefractory material because of its resistance to thermal shock.

cordillera (from old Spanish *cordilla,* "cord," or "little rope"), a system of mountain ranges that often consist of a number of more or less parallel chains. Cordilleras are an extensive feature in the Americas and Eurasia. In North America the Rocky Mountains, the Sierra Nevadas, and the mountains between them are collectively known as the Cordilleras, and the entire area has been termed the Cordilleran region. The term Cordillera is used with a directional modifier (*e.g.,* Cordillera Oriental) to differentiate the various chains of the Andes Mountains as they extend through Colombia, Venezuela, Bolivia, and other countries in South America.

Cordillera Central (Dominican Republic): *see* Central, Cordillera.

Cordillera Central (Puerto Rico): *see* Central, Cordillera.

Cordilleran Geosyncline, a linear trough in the Earth's crust in which rocks of Late Precambrian to Mesozoic age (600 million to 66.4 million years ago) were deposited along the western coast of North America, from southern Alaska through western Canada and the United States, probably to western Mexico. The eastern boundary of the geosyncline extends from southeastern Alaska along the eastern edge of the Northern Cordillera and Northern Rocky Mountains of Canada and Montana, along the eastern edge of the Great Basin of Utah and Nevada, and into southeastern California and Mexico.

The principal mountain-building phases of the geosyncline took place during Mesozoic time, but many earlier orogenic events have also been recorded. Deformation of the Cordilleran Geosyncline and the formation of the Cordilleran fold appear to be related to the development of oceanic trenches along the western margins of the North American continent, the underriding of the continental plate by oceanic crust, and the development of batholithic intrusions and extrusion of volcanic rocks associated with this movement.

Córdoba, *provincia,* central Argentina, with an area of 65,161 square miles (168,766 square km). From the Sierra Grande in the west, which rises to 9,462 feet (2,884 m), the land slopes eastward to the great Pampa grasslands, being drained by the Primero, Segundo, Tercero, Cuarto, and Quinto rivers. Only the Tercero reaches the Paraná River; the others terminate in swamps or in the saline Laguna Mar Chiquita in the northeast.

Spanish settlements were first established in the area in the 16th century, when trade was carried on with Bolivia and Chile. Although Córdoba was a stubborn region of Spanish resistance to the Latin American war of independence, it joined (1816) the Argentine Confederation, which it later (1852–62) strongly supported against the political dominance of Buenos Aires. Completion of the railway from Rosario in 1869 was the first important transportation link with the east, but Córdoba has retained its provincial loyalties.

Cattle raising, carried over from colonial times, is of great economic importance, as are the cultivation of wheat, corn (maize), and soybeans. Granite and limestone are quarried, and there is mining (tungsten, mica, and beryllium) in the sierras. The province's chief industrial centres, which process foods and manufacture textiles, are Córdoba (*q.v.*), the provincial capital, Río Cuarto, and Villa María. Important tourist resorts in the sierras include Cosquín (site of an annual folklore festival), Villa Carlos Paz, and La Falda. The province has an excellent communications network of roads, railways, and airlines. Pop. (1989 est.) 2,748,000.

Córdoba, city, the second largest in Argentina, and capital of Córdoba *provincia.* It lies on the Primero River along the northwest perimeter of the Pampas, where the foothills of the Sierra de Córdoba meet the plains, 1,440 feet (472 m) above sea level.

The city was founded in June 1573 by Jerónimo Luis de Cabrera, then governor of Tucumán, who named it Córdoba de la Nueva Andalucía (Córdoba of the New Andalusia), for the city and region of that name in Spain. The location of Córdoba, between the coast and the interior settlements, played an important role in its early development. The city, as part of the viceroyalty of Peru, began to prosper and by the end of the 17th century had become the wealthiest city in Tucumán. In 1599 Jesuits settled in the city to teach and work with Indians, and in 1613 they founded the first university in the country. Córdoba's economy began to suffer with the creation in 1776 of the viceroyalty of Río de la Plata (embracing the area of modern Argentina, Uruguay, Paraguay, and southern Bolivia), with its capital at Buenos Aires, and Córdoba subsequently opposed the imposition of a strong central government based in Buenos Aires. This opposition persisted until the 1860s, causing numerous incidents of violence.

Córdoba's commercial growth and industry were stimulated by the completion of rail connections with the east (1869) and the building on the Primero River in 1866 of San Roque Dam, one of South America's earliest large dams. The lake impounded by the dam, which has since been improved, supplies Córdoba with water, irrigates orchards and grain fields, and is the source of hydroelectric power for the city's leather, textile, automotive, glass, and food-processing factories.



Cathedral and main plaza, Córdoba, Arg.
E.V. Harris

The city's religious conservatism and loyalty to the Roman Catholic church caused Córdoba to remain a centre of conservative ideas during the 19th and early 20th centuries. In the 1880s the city strongly opposed the institution of laws that would secularize education. During the 20th century the city was also a centre of labour activism; after 1912 Córdoba came under the influence of the Radicals, reflecting the size of Argentina's growing industrial work force. In 1955 General Eduardo Lonardi's capture of Córdoba initiated the downfall of President Juan Perón.

Córdoba's rich colonial inheritance is displayed by the old cabildo (town council chamber), the viceroy's palace (18th century), the cathedral (1758), and the church and convent of Santa Teresa (begun 1714). The Plaza San Martín commemorates the liberator of Argentina. Owing to its history and to summer resorts in the nearby sierras, Córdoba has developed a thriving tourist trade. It is the railway and highway hub of central Argentina, linking the Pampas with important centres of the northwest. Pajas Blancas is a modern airport close to the city. Pop. (1980) 968,829.

Córdoba, *departamento,* northwestern Colombia. It occupies the Caribbean lowlands north of the Andean Cordillera (mountains) Occidental During most of the colonial period the area was sparsely settled, the original densely settled Indian population having disappeared by the time of the first major Spanish penetration in 1534. Created in 1951, the territory, 9,660 square miles (25,020 square km) in area, is one of the country's most important cattle-raising regions. Cotton, rice, and corn (maize) are cultivated on extensive holdings along the Bocas (distributary) del Sinú. Nickel deposits are located near Montelíbano. The departmental capital of Montería (*q.v.*) is connected by daily air service to Medellín and Cartagena and by riverboat to Cartagena and the lower Sinú ports of Cereté and Lorica. Pop. (1985) 1,013,247.

Córdoba, city, west-central Veracruz *estado* ("state"), east-central Mexico. It lies at 3,031 feet (924 m) above sea level along the San Antonio River, within sight of the dormant volcano Citlaltépetl. The settlement was founded in 1618 as Villa de Córdoba and was host to the signing of the Treaty of Córdoba on Aug. 24, 1821, giving Mexico its independence from Spain. The city is set in a tropical landscape and retains a colonial atmosphere. It is a processing centre for coffee, sugarcane, tobacco, and bananas and other fruits raised in the area. It is also a highway and railroad junction. In August 1973 a massive earthquake, centred near Córdoba, caused widespread destruction in the city and throughout central Mexico. Pop. (1980) 99,972.

Córdoba, *provincia,* in the *comunidad autónoma* ("autonomous community") of Andalusia, south-central Spain. It has an area of 5,297 square miles (13,718 square km) that is divided by the Guadalquivir River into a mountainous north, crossed by the Sierra Morena, and a fertile, undulating southern plain, known as La Campiña. Mining (in the north) of lead, zinc, and coal is the province's chief industry. Agriculture (cereals, olives, grapes) and horse and bull breeding predominate in the south. The historic provincial capital, Córdoba, is a popular tourist centre. Other important towns are Lucena, Puente-

Genil, Montilla, Priego de Córdoba, Cabra, and Baena. Pop. (1988 est.) 760,922.

Córdoba, English CORDOVA, city and capital of Córdoba *provincia* in the *comunidad autónoma* ("autonomous community") of Andalusia in southern Spain. It lies at the southern foot of the Sierra Morena and on the right (north) bank of the Guadalquivir River, about 75 miles (120 km) northeast of Seville.

Córdoba was probably Carthaginian in origin and was occupied by the Romans in 152 BC. The city flourished under their rule, though 20,000 of its inhabitants were massacred in 45 BC by Julius Caesar for having supported the sons of Pompey. Under Augustus, the city became the capital of the prosperous Roman province of Baetica. It declined under the rule of the Visigoths from the 6th to the early 8th century AD. In 711 Córdoba was captured and largely destroyed by the Muslims. Its recovery was impeded by tribal rivalries until ʿAbd ar-Raḥmān I, a member of the Umayyad family, accepted the leadership of the Spanish Muslims and made Córdoba his capital in 756. ʿAbd ar-Raḥmān I founded the Great Mosque of Córdoba, which was enlarged by his successors and completed about 976 by Abū ʿĀmir al-Manṣūr. Though troubled by occasional revolt, Córdoba grew rapidly under Umayyad rule; and after ʿAbd ar-Raḥmān III proclaimed himself caliph of the West in 929, it became the largest and probably the most cultured city in Europe. Under Umayyad rule, Córdoba was enlarged and filled with palaces and mosques. The city's woven silks and elaborate brocades, leather work, and jewelry were prized throughout Europe and the East, and its copyists rivaled Christian monks in the production of religious works. When the caliphate was dismembered by civil war early in the 11th century, Córdoba became the centre of a contest for power among the petty Muslim kingdoms of Spain. It fell to the Castilian king Ferdinand III in 1236 and became part of Christian Spain.

Córdoba remained a Christian military base in the frontier warfare against the Muslim kingdom of Granada. But the substitution of Spanish for Muslim rule hastened the city's economic and cultural decline, and the fall of Granada in 1492 left Córdoba a quiet city of churches, monasteries, and aristocratic houses. The exotic poetry of Luis de Góngora y Argote briefly revived Córdoba's cultural prestige in the 17th century. Besides Góngora, the city is noted as the birthplace of the Roman philosopher Lucius Annaeus Seneca, the poet Lucan, and the medieval philosophers Averroës and Maimonides.

The city was stormed and sacked by the French in 1808 for its part in fomenting the rebellion against Napoleonic French rule. It was one of the first cities occupied by Francoist forces in the Spanish Civil War (1936–39).

Córdoba remains a typically Moorish city with narrow, winding streets, especially in the older quarter of the centre and west. A Moorish bridge with 16 arches on Roman bases connects Córdoba with its suburbs across the river. The bridge is guarded at its southern end by the Calahorra fortress. West of the bridge, near the river, lies the Alcázar, or palace, which was the residence of the caliphs and is now in ruins. Other important buildings include several old monasteries and churches, the city hall, various schools and colleges, and museums of fine arts and archaeology. Córdoba's Moorish character, its fine buildings and churches—especially the Great Mosque—have made it a popular tourist attraction. (*See* Córdoba, Mosque-Cathedral of.) The city is also noted for its textile manufactures, its brewing and distilling industries, and its manufacture of gold and silver ornaments and products in copper, bronze, and aluminum. Pop. (1982 est.) 272,309.

Córdoba, Gonzalo Fernández de: *see* Fernández de Córdoba, Gonzalo.

Córdoba, Mosque-Cathedral of, Spanish MEZQUITA-CATEDRAL DE CÓRDOBA, also called GREAT MOSQUE OF CÓRDOBA, Islāmic mosque in Córdoba, Spain, which was converted into a Christian cathedral in the 13th century.

The original structure was built by the Umayyad ruler ʿAbd ar-Raḥmān I in 784–786 with extensions in the 9th and 10th centuries that doubled its size, ultimately making it one of the largest sacred buildings in the Islāmic world. The ground plan of the completed building forms a vast rectangle measuring 590 by 425 feet (180 by 130 m), or little less than St. Peter's Basilica in Rome. About one-third of this area is occupied by the Patio de los Naranjos ("Court of the Oranges") and the cloisters that surround it on the north, east, and west. Passing through the courtyard, one enters on the south a deep sanctuary whose roof is supported by a forest of pillars made of porphyry, jasper, and many-coloured marbles. Some 850 pillars divide this interior into 19 north-to-south and 29 east-to-west aisles, with each row of pillars supporting a tier of open horseshoe arches upon which a third and similar tier is superimposed. The most exquisite decoration in the whole complex is found in the third mihrab, or prayer niche, a small



Dome of the mihrab, Mosque-Cathedral of Córdoba
Archivo Mas, Barcelona

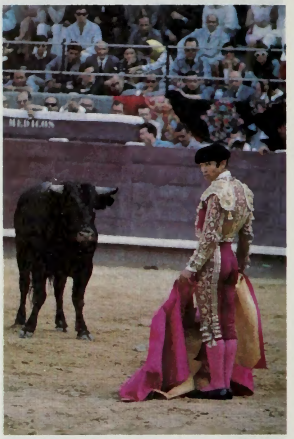
octagonal recess roofed with a single block of white marble that is carved in the form of a shell and has walls inlaid with Byzantine-style mosaics and gold.

Since 1236 the former mosque has served as a Christian cathedral, and its Moorish character was altered in the 16th century with the erection in the interior of a central high altar and cruciform choir, numerous chapels along the sides of the vast quadrangle, and a belfry 300 feet (90 m) high in place of the old minaret.

Córdoba Durchmusterung (CD), star catalog giving positions and apparent magnitudes of about 580,000 stars more than 23° south of the celestial equator. Compiled at the National Observatory of Argentina at Córdoba and completed in 1930, the catalog serves as a supplement to the *Bonner Durchmusterung* (*q.v.*) of northern stars. *See also* Cape Photographic Durchmusterung.

Cordobés, El (Spanish: "The Córdovan"), byname of MANUEL BENÍTEZ PÉREZ, also called MANOLO (b. May 4, 1936?, Palma del Río, Córdoba, Spain), Spanish bullfighter, the most highly paid torero in history. The crudity of his technique was offset by his exceptional reflexes, courage (sometimes considered total indifference to his own safety), and crowd appeal.

Reared in an orphanage in his native town, Benítez was imprisoned for stealing food and later for unauthorized entry into bullrings.



El Cordobés
Michael Kuh—Black Star

He remained illiterate until the period of his compulsory military service in the late 1950s. Said to have been inspired by a monument to the great matador Manolete in Córdoba, he began his career in 1959. During the 1960 season, while he was still a novillero (novice bullfighter), he attracted attention throughout Andalusia. He did not attain full rank as a matador until 1963, when he had already become famous. In 1965 he fought in 111 corridas, breaking the single-season record of 109 established by Juan Belmonte in 1919. In August 1965 he killed 64 bulls (a record for one month) and is believed to have been paid 35,000,000 pesetas (about $600,000).

El Cordobés attracted extraordinary crowds. He appeared in motion pictures, the first of which was *Aprendiendo a morir* (1962; "Learning to Die"). He retired in 1972, but returned briefly to the bullring in 1979.

cordon bleu, any of three species of birds belonging to the genus (or subgenus) *Uraeginthus*



Blue-capped cordon bleu (*Uraeginthus cyanocephalus*)
John Markham

of the waxbill family Estrildidae (order Passeriformes). The birds, including some popular cage birds, are native to Africa, where they frequent villages and farms. A widespread species is the 13-centimetre (5-inch) red-cheeked cordon bleu (*U. bengalus*), occurring from Senegal and Zaire to Somalia and Zimbabwe. It is brown and pale blue, with red cheek spot (in the male only) and longish pointed tail. The two other species are the blue-capped cordon bleu (*U. cyanocephalus*) and the Angola cordon bleu (*U. angolensis*), also called the Angola waxbill, or blue-breasted waxbill.

Cordova (Spain): *see* Córdoba.

Cordova, city, southern Alaska, U.S., on Prince William Sound. Named for its harbour (originally Puerto Cordova [now Orca Inlet], explored by the Spaniards in 1792), it was founded in the 1900s as a port for the Copper River and Northwestern Railroad, which served the Kennecott Copper Company mines (ceased operations 1938). Fishing, canning, and fur farming are now the economic mainstays, augmented by tourism. Ferry service to Valdez connects Cordova with the Alaskan highway system. The city was damaged by the severe earthquake of March 27, 1964. Inc. 1908. Pop. (1990) 2,110.

Cordovero, Moses ben Jacob (b. 1522—d. 1570, Safed, Palestine [now Zefat, Israel]), Galilean rabbi who organized and codified the Zoharistic Kabbala. He was the teacher of another leading Kabbalist, Isaac Luria.

Little is known of Cordovero's origin and early life. He was a disciple of Joseph Karo. His first major systematic work was *Pardes rimonim,* which he had completed by the age of 27. His second work of this type, *Elimah rabati,* was completed 10 years later. In these works and in his extensive commentary on the *Sefer ha-zohar* (the classic text of Jewish esoteric mysticism), Cordovero attempted to summarize and synthesize kabbalistic thought to that time and to put forth his own interpretive kabbalistic system.

corduroy, strong durable fabric with a rounded cord, rib, or wale surface formed by cut pile yarn. The back of the goods has a plain or a twill weave. Corduroy is made from any of the major textile fibres and with one warp and two fillings. After it is woven, the back of the cloth is coated with glue; the floats of pile yarn are then cut in their centre. The glue prevents the filling from drawing out of the goods during the cutting. The glue is removed from the face, which is then subjected to a series of brushings, waxings, and singeings to produce a velvetlike ribbed finish.

Corduroy is chiefly used for breeches, coats, hunting apparel, millinery, slacks, jackets, and trousers. The claim that the derivation of the word *corduroy* is from the French *corde du roi,* "king's cord," is spurious.

Cordylidae, family of small to medium-sized lizards. They are restricted to southern and eastern Africa and Madagascar and include about 10 genera and more than 50 species, which have spiny or platelike protective scales covering the body.



Black girdle-tailed lizard (*Cordylus nigra*)
Heather Angel

Most species are terrestrial with well-developed legs. Many are known to be insectivorous. The family is separated into two subfamilies—the girdle-tailed lizards, which are viviparous, and the plated lizards, which are oviparous.

cordylurid (insect): *see* dung fly.

core, in Earth science, the largely molten, iron-rich metallic alloy that constitutes the part of Earth that is not crust or mantle. *See* Earth.

CORE: *see* Racial Equality, Congress of.

core sampling, technique used in underground or undersea exploration and prospecting. A core sample is a roughly cylindrical piece of subsurface material removed by a special drill and brought to the surface for examination. Such a sample is needed to ascertain bulk properties of underground rock, such as its porosity and permeability, or to investigate the peculiar features of a given zone of strata (*e.g.,* to compare strata at a given level with those known to bear oil or gas).

A further purpose of employing coring devices is to recover samples of the several layers of fine-grained deposits on the seafloor in such a way as to preserve the depositional sequence. By studying the contained mineral grains, microfossils, and interstitial water (water in the pore spaces), scientists have been able to infer the depositional history and past oceanic events. In an additional application of core sampling, polar ice sheets have been penetrated to secure information about the age and rate of accumulation of the ice.

Coring tools are long metal cylinders. These may be forced beneath the surface, or sediments may be drawn into them by means of suction.

coreid bug, also called LEAF-FOOTED BUG, or SQUASH BUG, any insect of the family Coreidae (order Heteroptera). This large family contains more than 2,000 widely distributed species, many of which are important plant pests. Coreid bugs are large, usually more than 10 mm (0.4 inch) in length, and dull in colour. They occur in a wide range of environments and vary in size, shape, and colour. Their wings usually lie in a depression on the back. Some feed only on plants, others on insects, and some on both.



Squash bug (*Anasa tristis*)
E.S. Ross

One of the best-known coreid bugs in North America is the squash bug (*Anasa tristis*), an important pest of squash, melon, and pumpkin. It is about 15 mm (0.6 inch) long; and, although its basic colour is yellow, it is covered with so many black pits that it appears to be black. Control of this pest is difficult because the larvae feed underground, and the adults, which have piercing and sucking mouthparts, attack the parts of plants that insecticides usually do not penetrate. Squash bugs spend the winter in the adult stage, living in debris or some other sheltered spot. In the spring they deposit conspicuous egg masses on the leaves of young squash plants. There are several generations each season.

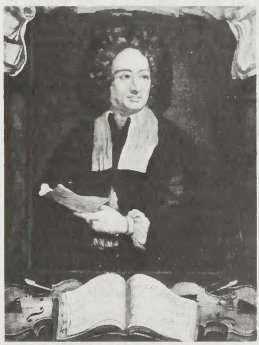
A number of species of coreid bug (*e.g., Leptoglossus phyllopus* of North America and *L. membranaceus* of Australia) have enlarged or flattened extensions on their legs, hence the common name leaf-footed bug. These insects suck plant juices from crops such as peas, beans, potatoes, and tomatoes. Leaf-footed bugs spend the winter in the adult stage. In warm climates there may be two generations a year. They may be controlled by insecticides or by the destruction of hibernation spots and alternate host plants.



Amazonian leaf-footed bug (*Diactor bilineatus*)
E.S. Ross

The box-elder bug (*Leptocoris trivittatus*) is dark brown with three longitudinal red lines on the thorax and red veins in the first pair of wings. These coreid bugs feed mostly on box-elder trees. They pass the winter in groups in some dry spot, such as under a porch or inside a house. They can be controlled by spraying. The rice bug (*Leptocorisa varicornis*) does great damage to rice and millet in the Orient. Other Coreidae are known as gum-tree bugs and crusader bugs, the latter deriving from the pale cross on the wings of the Australian species *Mictis profana.*

Corelli, Arcangelo (b. Feb. 17, 1653, Fusignano, near Imola, Papal States [Italy]—d. Jan. 8, 1713, Rome), Italian violinist and composer known chiefly for his influence on the development of violin style and for his sonatas and his 12 *Concerti Grossi,* which established the concerto grosso form.



Arcangelo Corelli, portrait by Hugh Howard; in the National Gallery of Ireland, Dublin
By courtesy of the National Gallery of Ireland, Dublin

Corelli's mother, Santa Raffini, having been left a widow five weeks before his birth, named him after his deceased father, Arcan-

gelo. There are no documented details on his first years of study. It is thought that his first teacher was the curate of San Savino, a village on the outskirts of Fusignano. Later, he went to Faenza and Lugo, where he received his first elements of musical theory. Between 1666 and 1667 he studied with Giovanni Benvenuti, violinist of the chapel of San Petronio in Bologna. Benvenuti taught him the first principles of the violin, and another violinist, Leonardo Brugnoli, furthered his education.

After a four-year stay in Bologna, Corelli went to Rome. Reliable evidence on his activities is lacking for the first five years, but it is likely that he played the violin at the Tordinona Theatre. Also, it is possible that in 1677 he made a trip to Germany, returning to Rome in 1680. On June 3, 1677, he sent his first composition, *Sonata for Violin and Lute,* to Count Fabrizio Laderchi of Faenza.

By Feb. 3, 1675, he was already third violinist in the orchestra of the chapel of San Luigi dei Francesi, Rome, and by the following year he was second violinist. In 1681 his *12 Trio Sonatas for Two Violins and Cello, with Organ Basso Continuo,* Opus 1, dedicated to Queen Christina of Sweden, who had a residence in Rome, were published. The following year he took the post of first violinist in the San Luigi dei Francesi orchestra, a position he held until 1685, the year in which his *12 Chamber Trio Sonatas for Two Violins, Violone and Violoncello or Harpsichord,* Opus 2, were published.

From September 1687 until November 1690, Corelli was musical director at the Palazzo Pamphili, where he both performed in and conducted important musical events. Corelli was particularly skilled as a conductor and may be considered one of the pioneers of modern orchestral direction. He was frequently called upon to organize and conduct special musical performances. Perhaps the most outstanding of these was the one sponsored by Queen Christina for the British ambassador, who had been sent to Rome by King James II of England to attend the coronation of Pope Innocent XII. For this entertainment, Corelli conducted an orchestra of 150 strings. In 1690 he directed the performance of the oratorio *Santa Beatrice d'Este* by Giovanni Lulier, called *del violino,* also with a large number of players (33 violins, 10 violas, and 17 cellos). The same year, he entered the service of Cardinal Pietro Ottoboni, in which he spent the rest of his life.

In 1689 Corelli's *12 Church Trio Sonatas for Two Violins and Archlute, with Organ Basso Continuo,* Opus 3, dedicated to Francesco II, duke of Modena (he had been the Modenesi Count, 1689–90), was published; and in 1694 his *12 Chamber Trio Sonatas for Two Violins and Violone or Harpsichord,* Opus 4, intended for the academy of Cardinal Ottoboni, also appeared.

It is probable that Corelli also taught at the German Institute in Rome and certain that in 1700 he occupied the post of first violinist and conductor for the concerts of the Palazzo della Cancelleria. Also in 1700 his *12 Sonatas for Violin and Violone or Harpsichord,* Opus 5, dedicated to Sophia Charlotte of Brandenburg, was published.

In 1702 Corelli went to Naples, where he probably played in the presence of the king and performed a composition by the Italian composer Alessandro Scarlatti. There is no exact documentation for this, just as there is none for his contacts with George Frideric Handel, who was in Rome between 1707 and 1708. In 1706, together with the Italian composer Bernardo Pasquini and Scarlatti, he was received into the Arcadia Academy and conducted a concert for the occasion.

Corelli did not live to see the publication of his Opus 6, consisting of 12 concerti grossi, which was published in Amsterdam the year following his death. (G.Pan.)

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Corelli, Marie, pseudonym of MARY MACKAY (b. 1855, London, Eng.—d. April 21, 1924, Stratford upon Avon, Warwick), English author of 28 romantic melodramatic novels of immense popularity.

Her first book, *A Romance of Two Worlds* (1886), dealt with psychic experience—a theme in many of her later novels. Her earliest success was *Barabbas: A Dream of the World's Tragedy* (1893), in which her treatment of the Crucifixion was designed to appeal to popular taste. *The Sorrows of Satan* (1895), also based on a melodramatic treatment of a religious theme, had an even wider vogue, and the climax of her career was reached with *The Murder of Delicia* (1896).

Thereafter, she was frequently attacked by the more critical public for her sentimentality and poor taste. She had, however, amassed a fortune and in 1901 settled in Stratford-upon-Avon, where she staunchly opposed attempts at its modernization.

Corey, Elias James (b. July 12, 1928, Methuen, Mass., U.S.), American chemist, winner of the Nobel Prize for Chemistry in 1990, principally for his work in "retrosynthetic analysis," a technique for simplifying the synthesis of large complex molecules.

Corey studied at the Massachusetts Institute of Technology (B.S., 1948; Ph.D., 1951) and held his first teaching position at the University of Illinois, Champaign-Urbana (1951–59). He became professor of chemistry at Harvard University in 1959 (becoming the Sheldon Emory professor in 1968) and there, with his graduate students, sythesized some 100 molecules hitherto found only in nature. One class of drugs for which Corey was well known is the synthetic prostaglandins—hormonelike compounds used to treat infertility and to induce labour. Another substance first made by Corey is ginkgolide B, an active chemical originally identifed in the ginkgo tree, which is used to treat asthma and circulatory problems.

In the retrosynthetic analysis that Corey developed, chemists start with the target molecule and work backward, carefully analyzing its structure and dissecting it piece by piece. By systematically breaking key chemical bonds that join the major components of the target molecule, chemists ultimately arrive at a set of simple precursors. These then can be reassembled into the target molecule in the least possible number of steps using the simplest possible reactions, thereby making the synthesis faster, cheaper, and more efficient.

Corfe Castle, parish and castle, Purbeck district, county of Dorset, England. The medieval castle, commanding a gap in the Purbeck chalk ridge, is now an imposing ruin. During the English Civil Wars it was dismantled by Parliamentary forces in 1646. The stone-built settlement that grew in its shelter was once a corporate borough and centre of the local quarrying of Purbeck marble, widely used in the 14th century for shrines and tombs. It is now a tourist centre. Pop. (1981) 1,338.



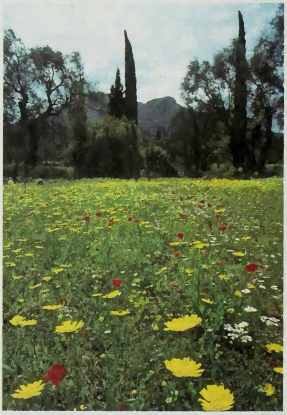
Ruins of Corfe Castle, Dorset
A.F. Kersting

Corfu, Modern Greek KÉRKIRA, ancient (Latin) CORCYRA, island in the Ionian Sea, with adjacent small islands making up the *nomós* (department) of Corfu, Greece. Lying just off the coast of Epirus (Ípiros), it is about 36 miles (58 km) long, while its greatest breadth is about 17 miles (27 km) and its area 229 square miles (593 square km). Of limestone structure, the island is mountainous in the north and low in the south. Its northeastern protrusion, close to the Albanian coast, trends east-west and reaches a peak in Pandokrator Mountain (2,972 feet [906 m]); the other range, in the island's centre, is lower.

The island is well watered, fertile, and reputed to have the most attractive countryside of the Greek islands. Olive trees predominate, but figs, oranges, lemons, grapes, and corn (maize) are also cultivated. Exports include olive oil, fruit, grain, and wine; Corfu's manufactures include soap and textiles.

Modern Kérkira, the chief city, port, and capital of the *nomós,* lies on a peninsula on the east coast. The twin-peaked old citadel, with fortifications built by the Venetians (1550), was once an islet. Its old town, with its labyrinth of hilly, narrow streets, is a seat of a Greek metropolitan and a Roman Catholic bishop.

The name *Corfu* is an Italian corruption of the Greek *coryphai* ("crests"). According to legend, the island was Scheria, home of the Phaeacians in Homeric epic. A Corinthian



Olive and cypress trees against the mountainous background of northern Corfu, Greece
Ian Gardey—Robert Harding Picture Library, London

colony established about 734 BC supplanted a settlement of Eretrians from Euboea. Proudly independent and even hostile to its mother city of Corinth, the new colony was reduced (*c.* 600 BC) by the Corinthian tyrant Periander, but later it regained independence and devoted itself to commerce. Corfu took no active part in the Persian invasion (480 BC) of Greece, but in 435 it sought the assistance of Athens in a quarrel with Corinth, a request that became a primary cause of the Peloponnesian War. Corfu quit the war in 410, but a new alliance with Athens (375) resulted in hostilities with Sparta.

After 303, the island changed hands several times for a quarter century. Seized in 229 BC by the Illyrians, it was delivered by the Ro-

mans, who retained it as a naval station and made it a free state. In 31 BC Octavian (later the emperor Augustus) used it as a base against Mark Antony, but his foundation of Nicopolis Actia on the site of his victory caused Corfu to lose a great deal of its prestige.

The island's favourable position between Greece and Italy attracted powers from east and west. In succession it fell to Goths, Lombards, Saracens, and Normans and was fought over by the kings of Sicily and the Italian city-states of Genoa and Venice. In 1204 the island was annexed to the Greek despotate of Epirus but passed back to King Manfred of Sicily (1259) and then (1267) to the Angevins of Naples. Venetian sovereignty was restored in 1401. Upon the dismemberment of the Venetian republic (1797), Corfu was assigned to France; but the French garrison soon was expelled by a Russo-Turkish fleet. Incorporated into the Napoleonic empire (1807), it became a British protectorate after the emperor's final defeat (1815). British administration displeased the inhabitants, however, and in 1864 Corfu was ceded, with the other Ionian Islands, to Greece.

In 1923 Italian forces bombarded and held Kérkira briefly, following the murder of an Italian boundary delegation. In World War II, the city was again bombed by the Italians and occupied in succession (1941–44) by Italians and Germans. Many of its buildings and other landmarks were destroyed in the fighting of 1943; but the Royal Palace (1816), a former residence of British governors and now a museum, escaped. The island was restored to Greece in 1944. The island escaped the great earthquake of 1953, which destroyed large parts of the southern Ionian Islands, and became very popular with tourists. In 1962 a palace built (1890–91) for Elizabeth, empress of Austria, was converted to use as a casino. Pop. (1981) city, 36,901; island, 97,102; *nomós,* 99,477.

Corfu Declaration (July 20, 1917), statement issued during World War I, calling for the establishment of a unified Yugoslav state (the Kingdom of Serbs, Croats, and Slovenes) after the war. It was signed by Premier Pašić of the Serbian government-in-exile (located in Corfu) and by delegates of the Yugoslav Committee, a London group comprising not only Serbs but also Croats and Slovenes who, having emigrated from territories under the Austro-Hungarian monarchy, were attempting to promote South Slav unity and to gain independence from the Habsburgs. The declaration recommended the formation of a constitutional monarchy under the Karageorgević dynasty, which would guarantee equal rights for the different religious and nationality groups to be included in the union. A demonstration of solidarity among the South Slavs, it encouraged Croats fighting in the Austrian army to join the Yugoslav movement and thereby also influenced the attitude of the Entente in favour of the Yugoslavs, which prefigured the dissolution of the Habsburg monarchy.

Cori, Latin CORA, town, Latina *provincia,* Lazio (Latium) *regione,* central Italy, on the lower slopes of the Lepini Mountains, 28 miles (45 km) southeast of Rome. Traditionally of Latin foundation, it played an active part in Rome's early wars with the Volsci and Aurunci peoples, but the site lost much of its importance when bypassed by the Appian Way (a Roman road built in 312 BC) 6 miles (10 km) to the southwest. In the 15th century, under the influence of the Roman Catholic church, it enjoyed a further period of prosperity, but it had declined by the end of the 18th. On the summit of the upper town stands the small Doric temple of the god Hercules (89–80 BC). Below, terraced down the hillside, are three concentric lines of fortification walls of cyclopean masonry (large irregular stone blocks), built almost certainly on a single occasion, although containing work of three distinct qualities and dates, of which the latest may be attributed to the years following the final recapture of the place by Rome from the Volsci about 330 BC. There is also a single-arched Roman bridge. The church of Santa Oliva has an elegant two-story cloister (1466–80). Cori is an agricultural centre. Pop. (1989 est.) mun., 10,345.

Cori, Carl; and Cori, Gerty, in full, respectively, CARL FERDINAND CORI and GERTY THERESA CORI, *née* RADNITZ (respectively b. Dec. 5, 1896, Prague, Czech.—d. Oct. 20, 1984, Cambridge, Mass., U.S.; b. Aug. 15, 1896, Prague, Czech.—d. Oct. 26, 1957, St. Louis, Mo., U.S.), American biochemists, husband and wife team whose discovery of a phosphate-containing form of the simple sugar glucose, and its universal importance to carbohydrate metabolism, led to an understanding of hormonal influence on the interconversion of sugars and starches in the animal organism and earned them (with Bernardo Houssay) the Nobel Prize for Medicine or Physiology in 1947.

They met while students at the German University of Prague and were married in 1920, receiving their medical degrees the same year. Emigrating to the United States in 1922, they joined the staff of the Institute for the Study of Malignant Disease, Buffalo, N.Y. (1922–31). As faculty members of the Washington University medical school, St. Louis (from 1931), they discovered (1936) the activated intermediate, glucose 1-phosphate (phosphate bound to a specific carbon atom on the glucose molecule), known as the "Cori ester." They demonstrated that it represents the first step in the conversion into glucose of the animal storage carbohydrate glycogen, large quantities of which are found in the liver, and—because the reaction is reversible—in some cases the last step in the conversion of blood glucose to glycogen.

Six years later they isolated and purified the enzyme responsible for catalyzing the glycogen-Cori ester reaction, and with it they achieved the test-tube synthesis of glycogen in 1943. Proof of the interconversion allowed them to formulate the "Cori cycle," postulating that liver glycogen is converted to blood glucose that is reconverted to glycogen in muscle, where its breakdown to lactic acid provides the energy utilized in muscle contraction. The lactic acid is used to re-form glycogen in the liver. Studying the way in which hormones affect carbohydrate metabolism in animals, the Coris showed that epinephrine induces the formation of a type of phosphorylase enzyme favouring conversion of glycogen to activated glucose and that insulin causes the removal of sugar from the blood by promoting the addition of phosphate to glucose.

After his wife's death Carl Cori devoted his efforts to research concerning the physicochemical action of enzymes involved in the breakdown of glycogen to lactic acid.

coriander, Spanish CILANTRO, dried fruit, common name of the seed of *Coriandrum sativum,* a feathery annual herb of the family Apiaceae (Umbelliferae). Native to the Mediterranean and Middle East regions, the herb is cultivated in Europe, Morocco, and the United States for its seeds, which are used to flavour many foods, particularly sausages, curries, Scandinavian pastries, liqueurs, and confectionery, such as English comfits. Its delicate young leaves are widely used in Latin-American, Indian, and Chinese dishes. Records of the use of coriander date to 5000 BC. The Romans used it to flavour bread. It was once used as an aromatic and carminative, but its only modern use in medicine is to mask unpleasant tastes and odours of drugs.

The plant produces a slender, hollow stem 30 to 60 mm (1 to 2.5 inches) high with bipinnate leaves and small flowers in pink or whitish umbels. The fruits, or seeds, are two semiglobular fruits joined on the commisural, or inner, sides (a schizocarp), giving the appearance of a single, smooth, nearly globular



Coriander (*Coriandrum sativum*)
Shunji Watari—EB Inc.

fruit about 5 mm (0.2 inch) in diameter. They are yellowish brown and have a mild, fragrant aroma and aromatic taste similar to a combination of lemon peel and sage. The seeds contain from 0.1 to 1 percent essential oil; its principal component is coriandrol.

Corineus, legendary eponymous hero of Cornwall. According to Geoffrey of Monmouth's *Historia regum Britanniae* (1135–39), he was a Trojan warrior who accompanied Brutus the Trojan, the legendary founder of Britain, to England. Corineus killed Gogmagog (Goëmagot), the greatest of the giants inhabiting Cornwall, by hurling him from a cliff. A cliff near Totnes, Devon, is still called Giant's Leap.

Corinna (date uncertain), Greek lyric poet of Tanagra in Boeotia, traditionally considered a contemporary and rival of the lyric poet Pindar (flourished *c.* 500 BC) though some scholars have put her date as late as about 200 BC. Surviving fragments of her poetry, written in Boeotian dialect, include a song contest between the mountain gods Cithaeron and Helicon. Written in simple style, her lyrics were mainly concerned with Boeotian mythology.

Corinth, Greek KÓRINTHOS, an ancient and a modern city of the Peloponnesus, in south-central Greece. The remains of the ancient city lie about 50 miles (80 km) west of Athens, at the eastern end of the Gulf of Corinth, on a terrace some 300 feet (90 m) above sea level. The ancient city grew up at the base of the citadel of the Acrocorinthus—a Gibraltar-like eminence rising 1,886 feet (575 m) above sea level. The Acrocorinthus lies about 1.5 miles (2.5 km) south of the Isthmus of Corinth, which connects the Peloponnese with central Greece and which also separates the Saronic and Corinthian gulfs from each other. The citadel of the Acrocorinthus rises precipitously above the old city and commands the land route into the Peloponnese, a circumstance that gave Corinth great strategic and commercial importance in ancient times.

The site was occupied from before 3000 BC, but its history is obscure until the early 8th century BC, when the city-state of Corinth began to develop as a commercial centre. Corinth's political influence was increased through territorial expansion in the vicinity, and by the late 8th century it had secured control of the isthmus. The Corinthians established colonies at Corcyra and Syracuse, which would later assure them a dominant position in trade with the western Mediterranean.

During the 8th and 7th centuries Corinth was ruled by the Bacchiad family of nobles, but they were eventually overthrown by Cypselus, who, followed by his son Periander, ruled the city as tyrants from about 657 to 550. These tyrants founded further colonies, but

the chief source of Corinth's wealth remained its possession of the isthmus, which controlled not only the land traffic between Attica and the Peloponnese but also the traffic between the Aegean and Ionian seas by way of the Corinthian and Saronic gulfs. Periander facilitated the transit of ships and cargoes, which were hauled overland from gulf to gulf, by building a stone roadway between them, thus sparing seafarers the arduous voyage around the southern tip of the Peloponnese. By this time Corinth had harbours on both gulfs that flanked it, Lechaeum on the Gulf of Corinth and Cenchreae on the Saronic Gulf. Under the tyrants, Corinth's colonial expansion was extended along the Adriatic and into Macedonia.

The tyranny of the Cypselids was followed in about 550 BC by an oligarchical government that embarked on a major building program for the city. In the second half of the 6th century, however, Corinth was outstripped by Athens in both seamanship and commerce, and it was often the bitter commercial rivalry between Corinth and Athens that was to generate crises in Greek politics over the next 200 years. After the Greco-Persian Wars (*c.* 546–*c.* 448 BC), Corinth joined Sparta against Athens during the Peloponnesian War (431–404 BC), but, though that conflict brought about the military defeat of Athens, it did little to revive the power of Corinth, which joined with some of its former allies to defeat Sparta in the Corinthian War (395–387 BC).

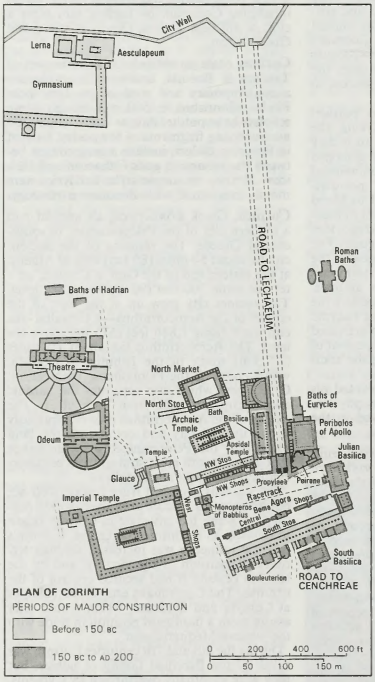
Corinth was subsequently involved in most of the political conflicts of Greece, but chiefly as a pawn in the struggles of more powerful city-states because of the strategic value of its citadel. Corinth's independence finally ended in 338 BC when Philip of Macedon garrisoned the Acrocorinthus and made the city the centre of the League of Corinth. The city remained the puppet of Macedonia and subsequently of the Achaean League until the latter involved it in a fatal conflict with Rome, and in 146 BC Corinth was destroyed by the Roman general Lucius Mummius.

In 44 BC Julius Caesar reestablished Corinth as a Roman colony. The new Corinth flourished and became the administrative capital of the Roman province of Achaea. The city is known to readers of the New Testament for the letters addressed to its Christian community by the apostle Paul. It enjoyed some prosperity under Byzantine rule but declined in the later European Middle Ages. After the Turkish conquest in 1458, it was reduced to a country town.

The remains of the ancient city of Corinth lie just north of the Acrocorinthus, with which it was joined by a circuit wall about 6 miles (10 km) in circumference. The city was connected with its principal port, Lechaeum, by two parallel walls and a paved highway which led to the propylaea, the entrance to the agora (the city's main marketplace). Most of the substantial remains in the agora are works from the Roman period, but it acquired its present extent much earlier, in the 4th century BC, with the construction of an enormous stoa (portico), 525 feet (160 m) in length, that enclosed its southern side. Immediately behind the south stoa began the road leading to the city's other port of Cenchreae, on the Saronic Gulf. On a small rise northwest of the agora stand seven Doric columns, which are the remains of the Temple of Apollo (*c.* 550 BC). The remains of other temples, villas, a theatre, shops, public baths, pottery factories, a gymnasium, a large triumphal arch, and other buildings dot the site, which since 1896 has been extensively excavated.

Modern Corinth, three miles northeast of the site of ancient Corinth, was founded in 1858 after an earthquake leveled the latter. It is primarily a hub of communications between northern and southern Greece and is the primary point of export for local fruit, raisins, and tobacco. It is also the chief town of the *nomós* (department) of Corinth and the seat of an archbishop. Pop. (1981) 22,495.





(Top) Ruins in the central area of Corinth with (left) the seven columns of the Temple of Apollo, *c.* 550 BC; (bottom) the central area of Corinth

(Top) J. Allan Cash—Rapho/Photo Researchers; (bottom) the American School of Classical Studies at Athens

Corinth, city, seat (1870) of Alcorn county, northeastern Mississippi, U.S. It is situated 85 miles (137 km) east of Memphis, Tenn., near the Tennessee border. Founded in about 1855 as the junction of the Memphis and Charleston and the Mobile and Ohio railroads, it was called Cross City until 1857, when it was renamed Corinth, for the ancient Hellenic city. The bloody American Civil War Battle of Shiloh (April 1862) took place 21 miles (34 km) north of the city. As a strategic railroad centre, Corinth itself was the scene of a battle (Oct. 3–4, 1862) in which General W.S. Rosecrans' Union troops repulsed E. Van Dorn's Confederates. Approximately 6,000 Union soldiers are buried in the Corinth National Cemetery.

Now a shipping and processing centre for agricultural products (cotton, dairy, livestock),

the city also has light manufactures, including electric motors, plastics, chemicals, and textiles. Inc. 1856. Pop. (1990) 11,820.

Corinth, Isthmus of, Modern Greek ISTHMÓS KORÍNTHOU, isthmus dividing the Saronic Gulf (an inlet of the Aegean Sea) from the Gulf of Corinth (an inlet of the Ionian Sea). The Isthmus of Corinth connects the Peloponnese with mainland Greece. It is made up of heavily faulted limestone rising from the south in terraces to a bleak, windswept central plateau almost 300 feet (90 m) above sea level. In ancient times ships were dragged over the isthmus in transit between the Saronic and Corinthian gulfs, and in AD 67 the Roman emperor Nero began a canal through it. In 1893 a 3.9-mile (6.3-kilometre) ship canal, the Corinth Canal, was opened that shortened the journey from the Adriatic Sea to Athens' port, Piraeus, by more than 200 miles (320 km). To



The Corinth Canal which crosses the Isthmus of Corinth to join the Gulf of Corinth (northwest) with the Saronic Gulf (southeast)

Sabine Weiss from Rapho/Photo Researchers

the south is the site of the Isthmian sanctuary at which the biennial Isthmian Games were celebrated in antiquity.

Corinth, League of, offensive and defensive alliance of all the Greek states except Sparta, organized in 337 BC at Corinth under the leadership of Philip II of Macedon. A "council of the Greeks," to which each state elected delegates proportionate to its military and naval strength, decided all matters of federal government, including foreign policy. At its first meeting, the league decided to conduct a war against Persia and elected Philip commander of its armed forces. When he was murdered the following year (336), his son, Alexander III (the Great), succeeded him as head of the league. The Greek contribution of soldiers to Alexander's Asian campaign was neither significant nor dependable, and the league's major action seems to have been the condemnation of the Thebans to slavery and the distribution of their territory among neighbouring states following their revolts (336 and 335 BC). The league broke up after Alexander's death (323) but was briefly restored by Demetrius I (302).

Corinth, Lovis (b. July 21, 1858, Tapiau, East Prussia [now Gvardeysk, Russia]—d. July 12, 1925, Zandvoort, Neth.), painter who introduced a variation of Impressionism into German art, influencing with his free brushwork and strong colours the subsequent course of German Expressionism.

Corinth's training was academic and was taken after 1884 in Paris under the French painter Adolphe-William Bouguereau. There, however, he was influenced both by the French Impressionists and by the work of Peter Paul Rubens, and, after he settled in Berlin in 1900 his pictures, which were sombre at first, gained brilliance from the former and vitality from the latter.

Thus equipped, Corinth headed the Sezession movement against the academic school in



"Self-Portrait with the Image of Death," oil on canvas by Lovis Corinth, 1896; in the Städtische Galerie im Lembachhaus, Munich

By courtesy of the Stadtische Galerie, Munich, photograph, Joachim Blauel

Berlin, with the collaboration of Max Slevogt and Max Liebermann. Early in the 20th century he began to devote much of his time to fighting the rise of Expressionism, a style that he unwittingly helped to foster. Subsequently he realized its merits and adopted a number of its characteristics, although he never completely divested himself of Impressionist mannerisms.

Though best known for his landscapes of the Walchensee area and for his portraits, Corinth also painted religious scenes, often violent ones such as the "Golgotha" altarpiece (1909–11). He also made etchings and lithographs, such as "Apocalypse" (1921), that reveal more than do his paintings his capacity for Expressionist power.

Corinth Canal, tidal waterway across the Isthmus of Corinth in Greece, joining the Gulf of Corinth in the northwest with the Saronic Gulf in the southeast. Opened in 1893, the canal is 3.9 miles (6.3 km) long and has a water depth of 26 feet (8 m); its width varies from a minimum of 69 feet (21 m) at the bottom to 82 feet (25 m) maximum at the water's surface. The canal has brought great economic benefits to the ports of Posithonía at its northwest end and Isthmía at its southeast end.

Corinthian order, one of the classical orders of architecture. Its main characteristic is an ornate capital carved with stylized acanthus leaves. *See* order.

Corinthians, The Letter of Paul to the, also called THE EPISTLE OF ST. PAUL THE APOSTLE TO THE CORINTHIANS, either of two New Testament letters, or epistles, addressed from the apostle Paul to the Christian community that he had founded at Corinth, Greece. The First Letter of Paul to the Corinthians and The Second Letter of Paul to the Corinthians are now respectively the seventh and eighth books of the New Testament canon.

The first letter, probably written about AD 53–54 at Ephesus, Asia Minor, deals with problems that arose in the early years after Paul's initial missionary visit (*c.* AD 50–51) to Corinth and his establishment there of a Christian community. The letter is valuable for its illuminations both of Paul's thoughts and of the problems of the early church. Saddened by reports of dissension among the converts of various Apostles, Paul begins his letter with a reminder that all are "servants of Christ and stewards of the mysteries of God" (4:1). Then, while answering questions sent from Corinth, he addresses questions of immorality, marriage and celibacy, the conduct of women, the propriety of eating meat offered to idols, and the worthy reception of the Eucharist. To members of the community quarreling about the nature and distribution of spiritual gifts, Paul replies that jealousy among those working in the Spirit of God is as irrational as jealousy between the eye and the ear—both are essential to the well-being of the body as a whole. Then, in one of the most significant of all Pauline texts (chapter 13), the apostle explains to his fellow Christians that no gift of God, whether it be the gift of tongues, faith that moves mountains, or knowledge of mysteries, has meaning unless it is accompanied by love. He also reaffirms the reality of Christ's Resurrection—doubted or denied by some—as the very foundation of Christian faith.

The Second Letter of Paul to the Corinthians (II Corinthians in the New Testament) was written from Macedonia in about AD 55. The letter, which may have been written after an actual visit by Paul to Corinth, refers to an upheaval among the Christians there, during the course of which Paul had been insulted and his apostolic authority challenged. Because of this incident, Paul resolved not to go to Corinth again in person. Instead, he evidently wrote an intervening letter (2:3–4; 7:8, 12), now lost, in which he told the Corinthians of his anguish and displeasure. Presumably, he sent a fellow-worker, Titus, to deliver the letter to the community at Corinth. In the second letter, Paul expresses his joy at the news, just received from Titus, that the Corinthians had repented, that his (Paul's) authority among them had been reaffirmed, and that the troublemaker had been punished. After expressing his happiness and relief, Paul urges the Corinthians to respond generously to his plea for contributions to assist the poor of Jerusalem.

The last four chapters of the letter, a sharp and vigorous defense of Paul's apostolic authority, differ markedly in tone from the earlier chapters, suggesting that chapters 10–13 may have been written earlier, before Paul had received Titus' message. Some scholars view these chapters as a misplaced part of another letter to the Corinthians, thus supporting the speculation about the loss of some intervening communication.

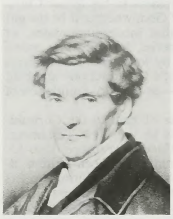
Corinto, port, northwestern Nicaragua. The country's principal port on the Pacific Ocean, Corinto is located in sheltered Corinto Bay, which lies at the southeastern end of low-lying Aserradores (Punta Icaco) Island, con-

nected by bridges with the mainland. It is the main port of entry for passengers and cargo bound for Nicaragua, and it handles most of the country's exports, chiefly coffee, cotton, sugar, timber, and hides. There are excellent connections to Nicaragua's major urban centres; the Pacific Railway and highways lead to the cities of León, Managua, the national capital, and Granada. Pop. (1980 est.) 22,400.

Coriolanus, Gnaeus Marcius, legendary Roman hero of patrician descent who was said to have lived in the late 6th and early 5th centuries BC; the subject of Shakespeare's play *Coriolanus.* According to tradition, he owed his surname to his bravery at the siege of Corioli (493 BC) in the war against the Volsci. In 491, when there was a famine in Rome, he advised that the people should not receive grain unless they would consent to the abolition of the office of tribune. For this the tribunes had him condemned to exile. Coriolanus then took refuge with the King of the Volsci and led the Volscian army against Rome, turning back only in response to entreaties from his mother and his wife. He died among the Volsci.

The legend is open to serious criticism, but it at least indicates that in the early 5th century Rome suffered from Volscian pressure and from a shortage of grain.

Coriolis, Gustave-Gaspard (b. May 21, 1792, Paris—d. Sept. 19, 1843, Paris), French engineer and mathematician who first described the Coriolis force, an effect of motion on a rotating body, of paramount importance to meteorology, ballistics, and oceanography.



Coriolis, detail of a portrait by Zéphirin Belliard, 19th century, after a painting by Jean Roller; in the Académie des Sciences, Paris

By courtesy of the Archives de l'Academie des Sciences de Paris; photograph: J. Colomb-Gerard, Paris

An assistant professor of analysis and mechanics at the École Polytechnique, Paris (1816–38), he introduced the terms work and kinetic energy in their modern scientific meanings in his first major book, *Du calcul de l'effet des machines* (1829; "On the Calculation of Mechanical Action"), in which he attempted to adapt theoretical principles to applied mechanics.

In 1835 he published a paper, "Sur les équations du mouvement relatif des systèmes de corps" ("On the Equations of Relative Motion of Systems of Bodies"), in which he showed that on a rotating surface, in addition to the ordinary effects of motion of a body, there is an inertial force acting on the body at right angles to its direction of motion. This force results in a curved path for a body that would otherwise travel in a straight line. The Coriolis force on Earth determines the general wind directions and is responsible for the rotation of hurricanes and tornadoes. His other works include *Traité de la mécanique des corps solides* (1844; "Treatise on the Mechanics of Solid Bodies") and *Théorie mathématique des effets du jeu de billiard* (1835; "Mathematical Theory of the Game of Billiards").

Coriolis force, in classical mechanics, an inertial force described by the 19th-century French engineer-mathematician Gustave-Gaspard Coriolis in 1835. Coriolis showed that, if the ordinary Newtonian laws of motion of bodies are to be used in a rotating frame of reference, an inertial force—acting to the right of the direction of body motion for counterclockwise rotation of the reference frame or to the left for clockwise rotation—must be included in the equations of motion.

The effect of the Coriolis force is an apparent deflection of the path of an object that moves within a rotating coordinate system. The object does not actually deviate from its path, but it appears to do so because of the motion of the coordinate system.

The Coriolis effect is most apparent in the path of an object moving longitudinally. On the Earth an object that moves along a north-south path, or longitudinal line, will undergo apparent deflection to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. There are two reasons for this phenomenon: first, the Earth rotates eastward; and second, the tangential velocity of a point on the Earth is a function of latitude (the velocity is essentially zero at the poles and it attains a maximum value at the Equator). Thus, if a cannon were fired northward from a point on the Equator, the projectile would land to the east of its due north path. This variation would occur because the projectile was moving eastward faster at the Equator than was its target farther north. Similarly, if the weapon were fired toward the Equator from the North Pole, the projectile would again land to the right of its true path. In this case, the target area would have moved eastward before the shell reached it because of its greater eastward velocity. An exactly similar displacement occurs if the projectile is fired in any direction.

The Coriolis deflection is therefore related to the motion of the object, the motion of the Earth, and the latitude. For this reason, the magnitude of the effect is given by $2v\omega \sin \varphi$, in which v is the velocity of the object, ω is the angular velocity of the Earth, and φ is the latitude.

The Coriolis effect has great significance in astrophysics and stellar dynamics, in which it is a controlling factor in the directions of rotation of sunspots. It is also significant in the earth sciences, especially meteorology, physical geology, and oceanography, in that the Earth is a rotating frame of reference, and motions over the surface of the Earth are subject to acceleration from the force indicated. Thus, the Coriolis force figures prominently in studies of the dynamics of the atmosphere, in which it affects prevailing winds and the rotation of storms, and in the hydrosphere, in which it affects the rotation of the oceanic currents. It is also an important consideration in ballistics, particularly in the launching and orbiting of space vehicles. In modern physics, application of a quantity analogous to Coriolis force appears in electrodynamics wherever instantaneous voltages generated in rotating electrical machinery must be calculated relative to the moving reference frame: this compensation is called the Christoffel voltage.

Corippus, Flavius Cresconius (fl. 6th century AD), important Latin epic poet and panegyrist.

Of African origin, Corippus migrated to Constantinople. His *Johannis,* an epic poem in eight books, treats the campaign conducted against the insurgent Mauretanians by John Troglita, the Byzantine commander, and is the principal source of knowledge of these events. The poem, written about 550, shows the tenacity of the classical tradition in Africa and the continuance of the poetic revival that took place under Vandal rule. *In laudem Justini,* the four books of which eulogize Justinian I's successor Justin II, was written after the arrival of Corippus in Constantinople, when he found himself in straits. This rhetorical poem contains elaborate description and excessive detail but is interesting for the account it gives of the death of Justinian and his successor's accession and of the embassy of the Avars.

Cori's disease: *see* Forbes' disease.

Corizza (Albania): *see* Korçë.

Cork, Irish CORCAIGH, county in the province of Munster, Ireland. The largest county in Ireland, with an area of 2,880 sq mi (7,460 sq km), it is bounded by the Atlantic Ocean (south), by Counties Waterford and Tipperary (east), by County Limerick (north), and by County Kerry (west). Cork has long east–west ridges forming uplands and hills. Less than three-tenths of its area is rough pasture, and farmlands climb as high as 800 ft (245 m) and fill the valleys of such east-flowing rivers as the Blackwater, the Bride, the Lee, and the Bandon. In east and central Cork are broad valleys and lowlands, which give way in the west to narrower valleys with coastal lowlands backed by high mountains. Around Bantry and Dunmanus bays are long, scenic promontories such as Beare Peninsula. At the head of Bantry Bay is Glengariff, where subtropical vegetation survives because of the mild winters.

The city of Cork, founded by the Norse, remained an independent entity for centuries; and outside the city and its immediate environs the Irish followed their traditional way of life. The kingdom of Desmond, a division of the kingdom of Munster, was controlled by the MacCarthys until the Anglo-Norman invasion in the 12th century, when most of it fell to the Fitzgeralds, who became earls of Desmond.

Large estates in Cork were allocated to English "undertakers," including Sir Walter Raleigh, under the attempted plantation of Munster in 1586; but the scheme was halted by warfare in 1598. Spanish forces attempting to assist the cause of Hugh O'Neill of Ulster were defeated at the Battle of Kinsale in 1601–02. Some of the ruined estates of the old Munster plantation were bought up by Richard Boyle, who became earl of Cork. Cork was the scene of much disturbance during the late 19th and early 20th centuries.

More than one-third of the people live in the city of Cork and its suburbs. Other large towns are Cobh, Youghal (*qq.v.*), Mallow, and Fermoy. Administration is by a county manager and county council, though Cork city has its own manager. Both the Church of Ireland and the Roman Catholic Church have three diocesan units: Cork, Cloyne, and Ross.

Many farms in the east and centre of the county are 70 ac (28 ha) or larger, growing cereals and root crops. The main cash resource, however, is livestock, either for meat or milk. In the extreme southwest the farms are far smaller, but around Skibbereen and along the south coast are good agricultural lands. There is salmon fishing in the rivers, and Kinsale has become an important sea-angling centre. Tweed is made in rural factories near Cork. There is a large oil refinery at Whitegate, on Cork harbour. Tourism is important, with notable attractions including the coast and the famous castle in Blarney (*q.v.*).

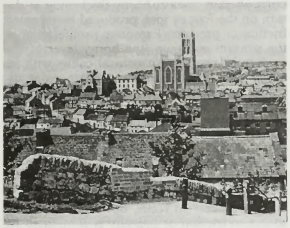
The county has railway lines from Cork through Mallow to Dublin and Limerick; at Mallow lines run east to Waterford and west to Killarney and Tralee. There is a regional technical college. Pop. (1981) excluding county borough, 266,121.

Cork, Irish CORCAIGH (Marsh), county borough, seaport, and county town (seat) of County Cork, Ireland, at the head of Cork Harbour on the River Lee. The centre of the

old city is an island in the Lee, and the original site was probably near the Cathedral of St. Fin Barr, whose 7th-century monastery attracted many students and votaries. Cork was raided and burned in 821, 846, and 1012 by Norsemen who eventually settled there and founded a trading centre on the banks of the Lee. The town was walled, and it was granted its first charter in 1172. It was subsequently held by the English for a long period. Cork supported Perkin Warbeck, the pretender to the English throne, when he visited Ireland in 1491–92. The city revolted in favour of Oliver Cromwell in 1649, and in 1690 it was taken by John Churchill, Earl of Marlborough, for William of Orange.

In 1919–20 Cork became a centre of Irish nationalist resistance to British military repression, and parts of the city were burned down by the British in retaliation for the ambush of a military convoy. Further devastation followed the conclusion of the Anglo-Irish treaty in 1921, when Irish Republican forces unwilling to accept the treaty held the city for a time.

The Protestant Cathedral of St. Fin Barr, completed in 1880, replaced a structure that had been built in 1735 on the site of the 7th-



Cork, Ire., with St. Mary's Cathedral in the background

A.G. Harkess—Bruce Coleman Inc.

century monastery. The Roman Catholic St. Mary's Cathedral was built in 1808. Queen's College, opened in the city in 1849, became a college of the National University of Ireland in 1908.

Cork is the second largest city in the Irish republic after Dublin. Cork Harbour is one of the best natural harbours in Europe, which may have led to the founding of one of the world's first yachting clubs at Cork in 1720. The port of Cobh is on Great Island at the head of the outer harbour. The Cork butter market has been famous since the early 17th century. Cork's wide variety of food-processing and manufacturing industries includes an automobile- and tractor-assembly plant on a new industrial estate, which also has grain silos, oil-storage depots, and a power station. There are other industries on the west and south of the city. Pop. (1986) 133,271.

cork, the outer bark of an evergreen type of oak tree called the cork oak (species *Quercus suber*) that is native to the Mediterranean region. Cork consists of the irregularly shaped, thin-walled, wax-coated cells that make up the peeling bark of the birch and many other trees, but, in the restricted commercial sense of the word, only the bark of the cork oak merits the designation of cork. The cork oak grows abundantly in Portugal, Spain, parts of southern France and Italy, and North Africa. The tree is usually about 18 m (60 feet) tall, with a broad, round-topped head and glossy green, hollylike leaves.

Cork is obtained from the new outer sheath of bark formed by the inner bark after the original rough outer bark is removed. The outer sheath may then be stripped and will form again. Unlike the inner bark, the outer bark,



Cork oak (*Quercus suber*) with sections of cork removed

Eric G. Carle—Shostal/E.B. Inc.

or cork, is not vital to the tree's survival and functions merely to protect it from the heat and dry winds of the Mediterranean summer. The repeated stripping of cork is possible because the inner bark of the cork oak develops an especially uniform and continuous regenerative tissue. After the outer bark has been peeled, this tissue proliferates sufficient cork cells to the outside so that, in a healthy tree, 2.5–5 cm (1–2 inches) of a uniform new cork sheathing forms in from 3 to 10 years. Stripping this regenerated layer yields commercial cork slabs.

The uniqueness of cork derives from its structure of air-filled cells, each of which consists of a watertight, flexible compartment. En masse these cells constitute a remarkably effective insulating medium that is also impervious to liquids. Because of its internal matrix of air pockets, cork is also among the lighter natural substances in weight, being only one-fifth as heavy as water. Specialized plastics and other artificial substances have supplanted cork in a number of its former uses, but cork has retained its traditional importance as a stopper for bottles of wine and other alcoholic beverages.

The cork oak lives on average for about 150 years. The tree yields hardly any cork for its first 20 years, and the bark obtained at the first stripping (at about 25 years of age) is rough and uneven and has little commercial value. The bark obtained at the second stripping (several years later) is of better quality, though, and the tree will continue to produce cork thereafter for many decades. The stripping itself is still done by hand and consists of cutting slits in the outer bark, which is then carefully pried loose from the inner bark and peeled away with the help of various levers and wedges. Care is taken not to injure the deeper regenerative layers of the inner bark. The removed peel of cork is boiled or steamed to remove soluble tannic acids from it and increase its flexibility, and its rough woody surface is scraped clean by hand. It is then ready for commercial distribution.

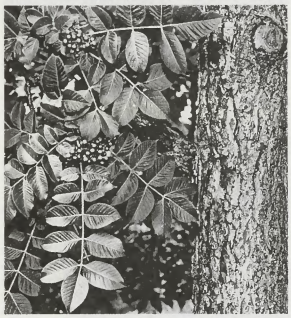
Cork, Richard Boyle, 1st Earl of (b. Oct. 13, 1566, Canterbury, Kent, Eng.—d. Sept. 15, 1643, Youghal, County Cork, Ire.), English colonizer of Munster (southwestern Ireland) who became one of the most powerful landed and industrial magnates in 17th-century Ireland.

Educated at the University of Cambridge, Boyle went to Ireland in 1588. He became subescheator under Ireland's escheator general and used his office to enrich himself, only to lose his property in the Munster rebellion in 1598. Returning to England, he was imprisoned on charges of embezzlement arising from his activities in Ireland. He was acquitted by a royal court, however, and in 1600 Queen Elizabeth I appointed him clerk of the council of Munster.

Two years later, Boyle bought Sir Walter Raleigh's estates in the counties of Cork, Waterford, and Tipperary. By employing settlers imported from England, he developed his lands and founded ironworks and other industries. The enormous wealth he accumulated brought him honours and political influence. Created Earl of Cork in 1620, he was appointed a lord high justice in 1629 and lord high treasurer in 1631. Nevertheless, soon after Sir Thomas Wentworth (afterward Earl of Strafford) went to Ireland as lord deputy in 1633, Cork was fined heavily for possessing defective titles to some of his estates. Thereafter his political influence declined.

By his wife, Catherine, Cork had eight daughters and seven sons, including the renowned chemist Robert Boyle and the statesman-dramatist Roger, 1st Earl of Orrery.

cork tree (genus *Phellodendron*), any of several eastern Asian trees in the rue family (Rutaceae) having corklike bark. Two are useful as lawn and shade trees. The Amur cork tree (*Phellodendron amurense*) may reach a height of 15 m (50 feet); the Japanese cork tree (*P. japonicum*) grows to 9 m. Greenish yellow flowers appear in summer. Female trees bear



Cork tree (*Phellodendron*)

Walter Dawn

small grapelike clusters of black fruit. The dark green, pinnately divided leaves turn yellow in fall. Cork trees are tolerant of a wide range of growing conditions.

Corleone, city, Palermo *provincia,* western Sicily, Italy. The name Qurliyūn is found in Arab sources of the 9th century AD; the city was probably an earlier Byzantine foundation. Made a military centre by the Hohenstaufen rulers of Sicily from the 10th century, it later passed under Spanish rule. Corleone took an active part in the anti-Bourbon revolutions of 1820 and 1848 and rallied to Giuseppi Garibaldi in 1861, when Sicily became part of the kingdom of Italy. Economically, Corleone is the centre of an agricultural and pastoral area and has food-processing plants. Pop. (1989 est.) mun., 11,554.

corm, vertical, fleshy, underground stem that acts as a vegetative reproductive structure in certain seed plants. It bears membranous or scaly leaves and buds. Typical corms are those of the crocus and gladiolus. Corms are sometimes called solid bulbs, or bulbo-tubers, but they are distinguished from true bulbs and tubers (*compare* bulb; tuber).

Cormack, Allan MacLeod (b. Feb. 23, 1924, Johannesburg), South African-born U.S. physicist who, with Godfrey Hounsfield, was

awarded the 1979 Nobel Prize for Physiology or Medicine for his work in developing the powerful new diagnostic technique of computerized axial tomography (CAT). Cormack was unusual in the field of Nobel laureates because he never earned a doctorate degree in medicine or any other field of science.

After graduating from the University of Cape Town in 1944 Cormack pursued advanced studies there and at the University of Cambridge. He was a lecturer at Cape Town from 1950 to 1956 and then, after a year's research fellowship at Harvard University, became assistant professor of physics at Tufts University. His main research at Tufts centred on the interaction of subatomic particles. He advanced to full professor in 1964, was chairman of the department from 1968 to 1976, and retired in 1980; he became a U.S. citizen in 1966.

A part-time position as physicist for a hospital radiology department first aroused Cormack's interest in the problem of X-ray imaging of soft tissues or layers of tissue of differing densities. By the early 1970s he had established the mathematical and physical foundations of computerized scanning (*see* tomography). Cormack became a member of the American Academy of Arts and Sciences in 1980.

cormorant, also called SHAG, any member of about 26 to 30 species of water birds comprising the family Phalacrocoracidae (order Pelecaniformes). In the Orient and elsewhere these glossy black underwater swimmers have been tamed for fishing. Cormorants dive for and feed mainly on fish of little value to man. Guano produced by cormorants is valued as a fertilizer.



Pied cormorant (*Phalacrocorax varius*)
M.F. Soper—Bruce Coleman Inc.

Cormorants inhabit seacoasts, lakes, and some rivers. The nest may be made of seaweed and guano on a cliff or of sticks in a bush or tree. The two to four chalky eggs, pale blue when fresh, hatch in three to five weeks, and the young mature in the third year.

Cormorants have a long hook-tipped bill, patches of bare skin on the face, and a small gular sac (throat pouch). The largest and most widespread species is the common, or great, cormorant, *Phalacrocorax carbo;* white-cheeked, and up to 100 cm (40 inches) long, it breeds from eastern Canada to Iceland, across Eurasia to Australia and New Zealand, and in parts of Africa. It and the slightly smaller Japanese cormorant, *P. capillatus,* are the species trained for fishing. The most important guano producers are the Peruvian cormorant, or guanay, *P. bougainvillii,* and the Cape cormorant, *P. capensis,* of coastal southern Africa.

corn, also called INDIAN CORN, or MAIZE (*Zea mays*), in agriculture, cereal plant of the tribe Maydeae of the grass family Gramineae (Poaceae), originating in the Americas, and its edible grain.

Since its introduction into Europe by Columbus and other explorers, corn has spread to all areas of the world suitable to its cultivation. Indians in the Americas taught colonists to grow the indigenous grains, which included some varieties of yellow corn that are still popular as food as well as varieties with red, blue, pink, and black kernels, often banded, spotted, or striped, that are regarded in modern times as ornamental. In the United States these variegated strains, traditionally used in autumn harvest decorations, are called Indian



Corn (*Zea mays*)
J. Horace McFarland company

corn. In Great Britain, all maize grain is called Indian corn, in allusion to its origins.

The tall, annual grass has a stout, erect, solid stem and large narrow leaves with wavy margins, spaced alternately on opposite sides of the stem. Staminate (male) flowers are borne on the tassel terminating the main axis of the stem. The pistillate inflorescence, maturing to become the ear, is a spike with a thickened axis, bearing paired spikelets in longitudinal rows, each row of paired spikelets normally producing two rows of grain. The spike is enclosed by modified leaves, called shucks or husks.

Commercial classifications, based mainly on kernel texture, include dent corn, flint corn, flour corn, sweet corn, and popcorn. Dent corn is characterized by a depression in the crown of the kernel caused by unequal drying of the hard and soft starch making up the kernel. Flint corn, containing little soft starch, has no depression. Flour corn, composed largely of soft starch, has soft, mealy, easily ground kernels. Sweet corn has wrinkled, translucent seeds; the plant sugar is not converted to starch as in other types. Popcorn, an extreme type of flint corn characterized by small, hard kernels, is devoid of soft starch, and heating causes the moisture in the cells to expand, making the kernels explode. Improvements in corn have resulted from hybridization, based on crossbreeding of superior inbred strains.

Corn is used as livestock feed, as human food, and as raw material in industry. Although it is a major food in many parts of the world, it is inferior to other cereals in nutritional value. Its protein is of poor quality, and it is deficient in niacin. Diets in which it predominates often result in pellagra (niacin-deficiency disease). Its gluten (elastic protein) is of comparatively poor quality, and it is not used to produce leavened bread. It is widely used, however, in Latin-American cuisine to make masa, a kind of dough used in such staple foods as tortillas, the round, thin cakes used as bread. In the United States, corn is boiled or roasted on the cob, creamed, converted into hominy (hulled kernels) or meal, and cooked in corn puddings, mush, polenta, griddle cakes, corn bread, and scrapple. It is also used for popcorn, confections, and various manufactured cereal preparations.

Inedible parts of the corn plant are used in industry. Stalks are made into paper and wallboard; husks are used as filling material; cobs are used for fuel, to make charcoal, and in the preparation of industrial solvents. Corn grain is processed by wet milling, in which the grain is soaked in a dilute solution of sulfurous acid; by dry milling, in which the corn is exposed to a water spray or steam; and by fermentation, in which cornstarches are changed to sugars, and yeast is employed to convert the sugars into alcohol. Corn husks also have a long history of use in the folk arts for objects such as woven amulets and corn-husk dolls.

Corn is one of the most widely distributed of the world's food plants; it is exceeded in acreage planted only by wheat. It is grown from 58° N latitude in Canada and Russia to 40° S latitude in South America, with a corn crop maturing somewhere in the world every month of the year. It is the most important crop in the United States, which produces about half the world's total. Nearly two-fifths of the U.S. crop is exported annually. China ranks second in average production, followed by Brazil, Mexico, and Argentina.

corn, in skin disease, horny thickening of the skin on the foot or toes, produced by repeated friction or pressure. Extensive proliferation of the stratum corneum, the horny layer of the epidermis, results in a conical callus with its broad end on the surface and its point directed inward; the dense centre of this cone presses on sensory nerves, causing pain when direct pressure is applied. The corn's surface is usually hard and shiny, but corns between the toes may be soft and soggy from perspiration.

Corns are treated by applying plasters of salicylic or dichloroacetic acid to the site after the core has been removed and the callus pared. They are likely to recur, however, unless the source of friction or pressure is eliminated by a change in footwear or in walking habits. Long-lasting corns may produce a bony spur that must be removed surgically.

Corn Belt, traditional area in the midwestern United States, roughly covering western Indiana, Illinois, Iowa, Missouri, eastern Nebraska, and eastern Kansas, in which corn (maize) and soybeans are the dominant crops. Soils are deep, fertile, and rich in organic material and nitrogen, and the land is relatively level. The warm nights, hot days, and well-distributed rainfall of the region during the growing season are ideal conditions for raising corn. Most farms in the area are family operated and average more than 300 acres (120 hectares). The Corn Belt area is, however, considerably diversified agriculturally, and an alternative name—feed-grains and livestock region—describes it more accurately.

corn earworm, also called COTTON BOLLWORM, or TOMATO FRUITWORM, larva of the moth *Heliothis zea* (in some classifications *H. armigera*; family Noctuidae). The smooth, fleshy green or brown caterpillars are serious crop pests before they pupate in the soil. Four or five generations of the pale brown adult moths (wingspan 3.5 cm [about 1⅓ inches]) are produced annually. The larvae feed largely on corn (maize), especially the small kernels at the tips of the ears, and also damage tomatoes, cotton, and other seasonal crops.

corn harvester, machine designed for harvesting corn and preparing it for storage. The earliest corn-harvesting devices, such as the horse-drawn sled cutter, severed the stalk at the ground. Binding of the stalks into shocks for drying, as well as the subsequent picking, husking, and shelling, were all done by hand. The mechanical binder was invented about 1850. At about the same time, a rudimentary mechanical picker was developed, though it

took nearly 30 years for a practical version to appear.

The mechanical picker snaps the ears from the stalk so that only the grain and cobs are harvested. The standing stalks are guided by shields or snouts to pass between counter-rotating rollers that pull the stalks down and through very sharply, snapping the ears free. The husking mechanism, consisting of closely spaced, counter-rotating rollers, tears the husks away. Pickers may be pulled behind a tractor and power-takeoff driven or mounted directly on the tractor, one unit on each side, to form a two-row harvester.

Field shelling attachments for mechanical pickers were introduced in the 1950s. In the late 20th century, corn-harvesting attachments for the combine were in widespread use.

Corn Islands, Spanish ISLAS DEL MAÍZ, islands located in the Caribbean Sea, Nicaragua. Great and Little Corn islands lie 50 and 59 miles (80 and 95 km), respectively, east-northeast of Bluefields.

The islands were leased to the United States by Nicaragua under the Bryan-Chamorro Treaty, signed in 1914 and ratified in 1916, for use as a naval base to protect the then-proposed Nicaraguan interoceanic canal. This lease was terminated in 1971. Except for building a lighthouse on Little Corn, the United States did not take over the land covered by the lease. Principal products of the islands are copra and coconut oil, lobsters, and frozen shrimp. Tourism is important on Great Corn Island. Pop. (1978 est.) mun., 2,463.

Corn Law, in English history, any of the regulations governing the import and export of grain. Records mention the imposition of Corn Laws as early as the 12th century. The laws became politically important in the late 18th century and the first half of the 19th century, during the grain shortage caused by Britain's growing population and by the blockades imposed in the Napoleonic Wars. The Corn Laws were finally repealed in 1846, a triumph for the manufacturers, whose expansion had been hampered by protection of grain, against the landed interests.

After 1791, protective legislation, combined with trade prohibitions imposed by war, forced grain prices to rise sharply. A bad harvest in 1795 led to food riots; there was a prolonged crisis during 1799–1801, and the period from 1805 to 1813 saw a sequence of bad harvests and high prices. From 1815, when an act attempted to fix prices, to 1822, grain prices fluctuated, and continuing protection was increasingly unpopular. The Anti-Corn Law League, founded in Manchester in 1839, began to mobilize the industrial middle classes against the landlords, and the league's leader, Richard Cobden, was able to influence the prime minister, Sir Robert Peel. The failure of the Irish potato crop in 1845 convinced Peel to support the repeal of all Corn Laws, which was achieved in 1846. Regulation again became necessary in 1902, when a minimal duty was imposed on imported grain and flour, and in 1932, when British-grown wheat was protected by statute in recognition of an increasing dependence on foreign imports.

Corn Mother, also called CORN MAIDEN, mythological figure believed, among agricultural tribes in North America, to be responsible for the origin of maize. The story of the Corn Mother is related in two main versions with many variations.

In the first version (the "immolation version"), the Corn Mother is depicted as an old woman who succours a hungry tribe, frequently adopting an orphan as a foster child. She secretly produces grains of corn by rubbing her body. When her secret is discovered, the tribe, disgusted by her means of producing the food, accuses her of witchcraft. Before being killed by the tribe—by some accounts with her consent—she gives careful instructions about how to treat her corpse. Corn sprouts from the places over which her body was dragged or, by other accounts, from her corpse or burial site.

In the second version (the "flight version"), she is depicted as a young, beautiful woman who marries a man whose tribe is suffering from hunger. She secretly produces corn, also, in this version, by means that are considered to be disgusting; she is discovered and insulted by her in-laws. Fleeing the tribe, she returns to her divine home, but her husband follows her, and she gives him seed corn and detailed instructions for its cultivation.

Similar stories of the immolation of a maternal figure or the insult to and flight of a beautiful maiden are told by the Indians in accounting for the origin of the buffalo, peyote, certain medicinal herbs, and the sacred pipe.

corn oil, edible oil obtainable from the seeds (kernels) of corn (maize), valued for its bland flavour and light colour.

The oil constitutes about half of the germ (embryo) of the corn kernel, which is separated from the rest of the kernel during the operation of milling to produce meal, animal feed, hominy, breakfast foods, or other edible solids. The corn germ is dried in a kiln, and the oil is extracted by either a hydraulic or a screw press; the pressed cake is further treated by washing it with a solvent, ordinarily hexane, and the dissolved oil is recovered by evaporating the solvent. The oil cake remaining after solvent extraction is ground and used as an animal fodder known as hominy feed.

Corn oil is used almost entirely for food. It is favoured as a salad and frying oil because it contains little cholesterol; large quantities of it are converted into margarine by hydrogenation, a process in which the oil is combined with hydrogen at high temperature and pressure in the presence of a catalyst.

corn poppy, also called FIELD POPPY, or FLANDERS POPPY (*Papaver rhoeas*), annual (rarely biennial) plant of the poppy family (Papaveraceae), native to Europe, North Africa, and Asia; it has been introduced into Australia, New Zealand, and North America.

The flowers are borne on stems some 25–90 cm (10–35 inches) long and measure some 7–10 cm across. They have four petals and are usually a brilliant red, sometimes with a black basal spot.

The corn poppy was formerly a widespread weed in cultivated fields, with seeds lying dormant for years and sprouting when the soil was turned. During and after World War I, fields that had been disturbed by battle bloomed with corn poppies, and the flower has become a symbol of that war.

One of the most commonly cultivated garden poppies, the Shirley poppy, was bred from the corn poppy. The corn poppy is also the source of a red dye used to colour some wines and medicines.

corn salad, also called LAMB'S LETTUCE (species *Valerianella olitoria*), weedy plant of the family Valerianaceae, native to southern Europe but widespread in grainfields in Europe and North America. It has been used locally as a salad green and as an herb.

Italian corn salad, *V. eriocarpa,* thrives in warmer areas. Both plants are hardier than regular lettuce.

corn smut, disease of plants caused by the fungus *Ustilago maydis,* which attacks corn (maize) plants, affecting any aboveground part. The early signs of an attack are whitish galls that later rupture to release dark spores capable of infecting other corn plants. Affected plants are often distorted. The disease is most vigorous in warm weather. Spores overwinter in soil and in corn litter and then infect the next year's planting.

corn syrup, a viscous, sweet syrup produced by breaking down (hydrolyzing) cornstarch, either by heating it with a dilute acid or by combining it with enzymes. (Cornstarch is a product of corn [maize].) Light corn syrup has been clarified and decolorized; it is used in baked goods, jams and jellies, and many other food products. Because it does not crystallize when heated, it is particularly valued as an ingredient in candies. Dark corn syrup is used in the same ways as light, when a darker colour and more distinctive flavour are desired; it is also used as a table syrup. High-fructose corn syrup is widely used in the food industry, notably in the manufacture of soft drinks, because it is considerably cheaper than sucrose.

Cornales, the dogwood order of flowering plants, belonging to the class Magnoliopsida (dicotyledons; characterized by two seed leaves).



Cornelian cherry (*Cornus mas*)
Karlene Schwartz

The order has 3 families—Cornaceae (dogwood), Alangiaceae, and Garryaceae—and fewer than 150 species. The largest family, Cornaceae (some 100 species), is only a loose grouping, and 11 of its 14 genera have been placed in single families by some authorities.

The Cornales are, with few exceptions, woody plants. The flowers usually have parts in multiples of four; petals, when present, are usually distinct. The ovary is inferior and contains several carpels; there are as many locules and ovules as carpels. The fruits are fleshy and remain closed at maturity (indehiscent).

The order is believed to be derived from the Rosales. Diversification of the order into families and genera was well under way by the Late Cretaceous Period (97.5 to 66.4 million years ago). The Garryaceae, which have the most reduced flowers in the order, are found in the fossil record beginning in the Miocene Epoch (from 23.7 to 5.3 million years ago).

The Cornaceae, or dogwood family, is distributed in temperate and warm temperate



Japanese laurel (*Aucuba japonica*)
G.E. Hyde from the Natural History Photographic Agency

zones and on tropical mountains. The family is noted for its woody ornamental species that are native to both coasts of North America and to eastern Asia. Some of its members, such as the flowering dogwood (*Cornus florida*) and the Japanese laurel (*Aucuba japonica*), are chiefly ornamental: the European *Cornus mas* (cornelian cherry), also an ornamental, has edible fruit; others, such as *Cornus macrophylla* and representatives of *Curtisia,* yield wood for furniture. In the flowering dogwoods, flowers are small and the conspicuously expanded structures are coloured bracts (specialized leaves) that surround the cluster of true flowers.

The family Alangiaceae has only one genus, *Alangium,* with some 17 species. They are native to eastern and tropical Asia, eastern Australia, the Pacific islands, Madagascar, and western Africa. Species of *Alangium* are cultivated as ornamentals.

Garryaceae also contains only one genus, *Garrya;* the family has 13 species. These are found in western North America and in Central America; one species is found in the Greater Antilles. Members of the family produce highly toxic alkaloids. Several species are planted as ornamentals.

Cornaro, Caterina (b. 1454, Venice, Venetian republic [Italy]—d. July 10, 1510, Venice), Venetian noblewoman who became queen of Cyprus by marrying James II, king of Cyprus, Jerusalem, and Armenia, supplying him with a much-needed alliance with Venice.



Caterina Cornaro, detail of a portrait by Gentile Bellini, c. 1500; in the Szépművészeti Múzeum, Budapest
By courtesy of the Szepmuveszeti Muzeum, Budapest

The marriage agreement was reached in 1468, but in the next four years James considered other possible alliances by way of marriage, especially with Naples. In 1472, Caterina finally departed for Cyprus, where the formal ceremony took place. James died in 1473, leaving her and her unborn child heirs to the kingdom. Unsuccessful plotters against James now conspired to deprive Caterina of the throne; and when she bore a son, James III (August 1473), Cyprus was seized by the archbishop of Nicosia and his Neapolitan allies. Imprisoned briefly, Caterina was restored by the intervention of Venice.

The early death of Caterina's son (1474) precipitated further conspiracies, all of which were foiled by the Venetians, who gradually usurped Caterina's power and finally forced the queen to abdicate (1489). She was received with honour at Venice and given the castle and town of Asolo, which she governed beneficently. She died after having fled Asolo when her castle was occupied by imperial troops.

cornbread, any of various breads made wholly or in part of cornmeal, corn (maize) ground to the consistency of fine granules. Cornbread is especially associated with the cuisine of the Southern and Atlantic U.S. states. Because corn lacks elastic gluten, it cannot be raised with yeast; consequently, most cornbreads are leavened with baking powder or baked unleavened, even when made partly of wheat flour. Cornbreads tend to be crumbly in texture and do not keep well.

There are numerous regional variations of cornbread. The simplest are hoecakes, a mixture of cornmeal, water, and salt, so named because they were originally baked on the flat of a hoe over a wood fire. Johnnycakes and corn pone are somewhat thicker cakes that may have added ingredients such as fat or wheat flour. Spoonbread, a misnomer, actually denotes a cornmeal pudding. The usual Southern cornbread is made from a batter containing cornmeal, wheat flour, eggs, milk or buttermilk, and shortening; the addition of sugar is generally considered inauthentic. Hush puppies are small cakes of cornbread batter, often with chopped onions, fried in deep fat, and customarily served as an accompaniment to fried fish.

Cornbury, Henry Hyde, Viscount: *see* Clarendon, Henry Hyde, 2nd Earl of.

cornea, curved transparent membrane about 12 millimetres in diameter that covers the front part of the eye. Except at its margins the cornea contains no blood vessels, but it contains many nerves and is very sensitive to pain or touch. It protects the pupil, the iris, and the inside of the eye from penetration by dust particles and is the first element in the eye's focusing system. As light passes through the cornea, it is partially refracted before reaching the lens. The curve of the cornea, which is spherical in infancy but changes with age, gives it its focusing power; when the curve becomes irregular, it causes a focusing defect called astigmatism, in which points appear elongated or distorted.

The collagen fibres that make up the cornea are of a uniform size and are arranged in a strictly regular, geometric fashion. This regular arrangement has been shown to be the essential factor resulting in the cornea's transparency. When the cornea is damaged by infection or trauma, the collagen laid down in the repair processes is not regularly arranged, with the result that an opaque patch called a leukoma may occur. If the clouded cornea is removed and replaced by a healthy one, usually taken from a deceased donor, normal vision can result. Because the cornea has few blood vessels, and because most rejection factors are carried in the bloodstream, transplantation does not require extensive tissue matching.

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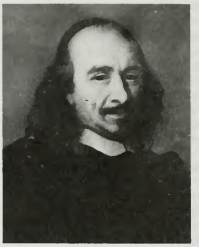
Corneille, Pierre (b. June 6, 1606, Rouen, France—d. Oct. 1, 1684, Paris), French poet and dramatist, considered the creator of French classical tragedy. His chief works include *Le Cid* (1637), *Horace* (1640), *Cinna* (1641), and *Polyeucte* (1643).

Early life and career. Pierre Corneille was born into a well-to-do, middle-class Norman family. His grandfather, father, and an uncle were all lawyers; another uncle and a brother entered the church; his younger brother, Thomas, became a well-known poet and popular playwright. Pierre was educated at the Jesuit school in his hometown, won two prizes for Latin verse composition, and became a licentiate in law. From 1628 to 1650 he held the position of king's counselor in the local office of the department of waterways and forests.

Corneille's first play, written before he was 20 and apparently drawing upon a personal love experience, was an elegant and witty comedy, *Mélite,* first performed in Rouen in 1629. When it was repeated in Paris the following year, it built into a steady (and, according to



Pierre Corneille, detail of an oil painting attributed to Charles Le Brun, 1647; in the Musée National de Versailles et des Trianons
Cliché Musees Nationaux, Paris

Corneille, surprising) success. His next plays were comedies: *Clitandre* (performed 1631), *La Veuve* and *La Galerie du palais* (1632), *La Suivant* and *La Place royale* (1634), and *L'Illusion comique* (1635). His talent, meanwhile, had come to the attention of the Cardinal de Richelieu, France's great statesman, who included the playwright among a group known as *les cinq auteurs* ("society of the five authors"), which the Cardinal had formed to have plays written, the inspiration and outline of which were provided by himself. Corneille was temperamentally unsuited to this collective endeavour and irritated Richelieu by departing from his part (Act III) of the outline for *La Comédie des Tuileries* (1635). In the event, Corneille's contribution was artistically outstanding.

During these years, support had been growing for a new approach to tragedy that aimed at "regularity" through observance of what were called the "classical" unities. Deriving from Italy, this doctrine of the unities demanded that there be unity of time (strictly, the play's events were to be limited to "the period between sunrise and sunset"), of place (the entire action was to take place in the one locus), and of action (subplots and the dramatic treatment of more than one situation were to be avoided). All this was based on a misunderstanding of Aristotle's *Poetics,* in which the philosopher attempted to give a critical definition of the nature of tragedy. The new theory was first put into dramatic practice in Jean Mairet's *Sophonisbe* (1634), a tragedy that enjoyed considerable success. Corneille, not directly involved in the call for regular tragedy of this kind, nevertheless responded to *Sophonisbe* by experimenting in the tragic form with *Médée* (1635). He then wrote *Le Cid* (performed early 1637), first issued as a tragicomedy, later as a tragedy.

Le Cid, now commonly regarded as the most significant play in the history of French drama, proved an immense popular success. It sparked off a literary controversy, however, which was chiefly conducted by Corneille's rival dramatists, Mairet and Georges de Scudéry, and which resulted in a bitter pamphlet war. Richelieu, whose motives are not entirely clear, instructed the then recently instituted Académie Française to make a judgment on the play: the resulting document (*Les Sentiments de l'Académie française sur la tragi-comédie du Cid,* 1637), drafted in the main by Jean Chapelain, a critic who advocated "regular" tragedy, was worded tactfully and admitted the play's beauties but criticized *Le Cid* as dramatically implausible and morally defective. Richelieu used the judgment of the Académie as an excuse for suppressing public performances of the play.

Corneille, indeed, had not observed the dramatic unities in *Le Cid.* The play has nevertheless been generally regarded as the first

flowering of French "classical" tragedy. For the best French drama of the "classical" period in the 17th century is properly characterized, not so much by rules—which are no more than a structural convention—as by emotional concentration on a moral dilemma and on a supreme moment of truth, when leading characters recognize the depth of their involvement in this dilemma. In *Le Cid,* Corneille rejected the discursive treatment of the subject given in his Spanish source (a long, florid, and violent play by Guillén de Castro y Bellvis, a 17th-century dramatist), concentrating instead on a conflict between passionate love and family loyalty, or honour. Thus *Le Cid* anticipated the "pure" tragedy of Racine, in whose work the "classical" concept of tragic intensity at the moment of self-realization found its most mature and perfect expression.

Major tragedies. Corneille seems to have taken to heart the criticisms levelled at *Le Cid,* and he wrote nothing for three years (though this time was also taken up with a lawsuit to prevent the creation of a legal office in Rouen on a par with his own). In 1640, however, appeared the Roman tragedy *Horace;* another, *Cinna,* appeared in 1641. In 1641 also Corneille married Marie de Lampérière, the daughter of a local magistrate, who was to bear him seven children to whom he was a devoted father. Corneille's brother Thomas married Marie's sister, and the two couples lived in extraordinary harmony, their households hardly separated; the brothers enjoyed literary amity and mutual assistance.

Le Cid, Horace, Cinna, and *Polyeucte,* which appeared in 1643, are together known as Corneille's "classical tetralogy" and together represent perhaps his finest body of work for the theatre. *Horace* was based on an account by the Roman historian Livy of a legendary combat between members of the Horatii and Curiatii families, representing Rome and Alba; Corneille, however, concentrated on the murder by one of the patriots of his pacifist sister, the whole case afterward being argued before the king (a "duplicity" of action admitted by Corneille himself, who otherwise seems by now to have decided to follow the classical rules). *Cinna* was about a conspiracy against the first Roman emperor, Augustus, who checkmates his adversaries by granting them a political pardon instead of dealing them the expected violent fate, boasting that he has strength enough to be merciful. The hero of *Polyeucte* (which many critics have considered to be Corneille's finest work), on adopting Christianity seeks a martyr's death with almost militaristic fervour, choosing this as the path to *la gloire* ("glory") in another world, whereas his wife insists that the claims of marriage are as important as those of religion.

These four plays are charged with an energy peculiar to Corneille. Their arguments, presented elegantly, rhetorically, in the grand style, remain firm and sonorous. The alexandrine verse that he employed (though not exclusively) was used with astonishing flexibility as an instrument to convey all shades of meaning and expression: irony, anger, soliloquy, repartee, epigram. Corneille used language not so much to illumine character as to heighten the clash between concepts, hence the "sentences" in his poetry which are memorable even outside their dramatic context. Action here is reaction. These plays concern not so much what is done as what is resolved, felt, suffered. Their formal principle is symmetry: presentation, by a poet who was also a lawyer, of one side of the case, then of the other, of one position followed by its opposite.

Contribution to comedy. The fame of his "classical tetralogy" has tended to obscure the enormous variety of Corneille's other drama, and his contribution to the development of French comedy has not always received its proper due. The Roman plays were followed by more tragedies: *La Mort de Pompée* (1643), *Rodogune* (1645), which was one of his greatest successes, *Théodore* (1646), which was his first taste of failure, and *Héraclius* (1647). But in 1643 Corneille had successfully turned to comedy with *Le Menteur,* following it with the less successful *La Suite du Menteur* (1643–44). Both were lively comedies of intrigue, adapted from Spanish models; and *Le Menteur* is the one outstanding French comedy before the plays of Molière, Corneille's young contemporary, who acknowledged its influence on his own work. *Le Menteur,* indeed, stands in relation to French classical comedy much as *Le Cid* does to tragedy.

In 1647 Corneille moved with his family to Paris and was at last admitted to the Académie Française, having twice previously been rejected on the grounds of nonresidence in the capital. *Don Sanche d'Aragon* (1649), *Andromède* (1650), a spectacular play in which stage machinery was very important, and *Nicomède* (1651) were all written during the political upheaval and civil war of the period known as the Fronde (1648–53), with *Don Sanche* in particular carrying contemporary political overtones. In 1651 or 1652 his play *Perharite* seems to have been brutally received, and for the next eight years Corneille wrote nothing for the theatre, concentrating instead on a verse translation of St. Thomas à Kempis' *Imitatio Christi (Imitation of Christ),* which he completed in 1656, and also working at critical discourses on his plays that were to be included in a 1660 edition of his collected works.

Years of declining power. Corneille did not turn again to the theatre until 1659, when, with the encouragement of the statesman and patron of the arts Nicolas Fouquet, he presented *Oedipe.* For the next 14 years he wrote almost one play a year, including *Sertorius* (1662) and *Attila* (1667), both of which contain an amount of violent and surprising incident.

Corneille's last plays, indeed, were closer in spirit to his works of the 1640s than to his classical tragedies. Their plots were endlessly complicated, their emotional climate close to that of tragicomedy. Other late plays include *La Toison d'or* (1660), his own *Sophonisbe* (1663), *Othon* (1664), *Agésilas* (1666), and *Pulchérie* (1672). In collaboration with Molière and Philippe Quinault he wrote *Psyché* (1671), a play employing music, incorporating ballet sequences, and striking a note of lyrical tenderness. A year earlier, however, he had presented *Tite et Bérénice,* in deliberate contest with a play on the same subject by Racine. Its failure indicated the public's growing preference for the younger playwright.

Corneille's final play was *Suréna* (1674), which showed an uncharacteristic delicacy and sentimental appeal. After this he was silent except for some beautiful verses, which appeared in 1676, thanking King Louis XIV for ordering the revival of his plays. Although not in desperate poverty, Corneille was by no means wealthy; and his situation was further embarrassed by the intermittent stoppage of a state pension that had been granted by Richelieu soon after the appearance of *Horace* in 1640. Corneille died in his house on the rue d'Argenteuil, Paris, and was buried in the church of Saint-Roch. No monument marked his tomb until 1821.

Assessment. Corneille did not have to wait for "the next age" to do him justice. The cabal that had led the attack on *Le Cid* had no effect on the judgment of the public, and the great men of his time were his fervent admirers. Balzac praised him; Molière acknowledged him as his master and as the foremost of dramatists; Racine is said to have assured his son that Corneille made verses "a hundred times more beautiful" than his own. It was left to the 18th century, largely because of the criticisms of Voltaire, to exalt Racine at Corneille's expense; but the Romantic critics of the late 18th century began to restore Corneille to his true rank.

It cannot be denied, however, that Corneille signed much verse that is dull to mediocre. Molière acknowledged this fact by saying: "My friend Corneille has a familiar who inspires him with the finest verses in the world. But sometimes the familiar leaves him to shift for himself, and then he fares very badly." But the importance of his pioneer work in the development of French classical theatre cannot be denied; and, if a poet is to be judged by his best things, Corneille's place among the great dramatic poets is beyond question.

Not only did Pierre Corneille produce, for nearly 40 years in all, an astonishing variety of plays to entertain the French court and the Parisian middle class: he also prepared the way for a dramatic theatre that was the envy of Europe throughout the 17th century. His own contribution to this theatre, moreover, was that of master as much as of pioneer. Corneille's excellence as a playwright has long been held to lie in his ability to depict personal and moral forces in conflict. In play after play, dramatic situations lead to a finely balanced discussion of controversial issues. Willpower and self-mastery are glorified in many of his heroes, who display a heroic energy in meeting or mastering the dilemma that they face; but Corneille was less interested in exciting his audiences to pity and fear through visions of the limits of man's agony and endurance than he was in stirring them to admiration of his heroes. Thus, only a few of his plays deal in tragic emotion. Nevertheless, because his most famous work, *Le Cid,* anticipated the tragic intensity of plays by Jean Racine, his younger contemporary, Corneille has often been referred to as the "father" of French classical tragedy; and his contribution to the rise of comedy has, in comparison, often been overlooked. From a 20th-century vantage point, however, it is as a master of drama that he appears, rather than of tragedy in particular. (R.J.N.)

MAJOR WORKS. *Plays. Le Cid* (published 1637); *Horace* (1641); *Cinna, ou La Clemence d'Auguste* (1643); *Polyeucte martyr* (1643); *La Mort de Pompée* (1644)—all in English in *The Chief Plays of Corneille,* trans. by Lacy Lockert, 2nd ed. (1957). *Rodogune, princesse des Parthes* (1647; *Rodogune; or, The Rival Brothers,* trans. by S. Aspinwall, 1765); *Nicomède* (1651; *Nicomede,* trans. by J. Dancer, 1671).

BIBLIOGRAPHY. The standard edition of the dramatist's work, *Oeuvres de P. Corneille,* ed. by Charles Martylaveaux, 13 vol. (1862–68), is still generally reliable, although a number of more recent editions—by Maurice Rat (1962–66), and by Jacques Maurens (1968)—have profited from extensive work by modern scholars on dating and various historical aspects. A number of convenient one- or two-volume modern editions are available, notably *Oeuvres complètes,* ed. by André Stegmann (1963). Many of the plays have also been published in critical editions (see list in Alexandre Cioranescu, *Bibliographie de la littérature française du 17e siècle,* 1965). Adequate modern translations into English have been provided by Lacy Lockert, *The Chief Plays of Corneille,* 2nd ed. (1957), and *Moot Plays of Corneille* (1959); and more recently by Samuel Solomon, *Pierre Corneille: Seven Plays* (1969). Modern criticism of Corneille has begun to reverse the monotonous, reductionist view first set forth in Voltaire's *Commentaires sur Corneille* (1751) that had cast him chiefly as Racine's precursor in the perfecting of French classical tragedy. For a comprehensive sampling of the Corneille–Racine parallels across the centuries, see *Corneille and Racine: Parallels and Contrasts,* ed. by Robert J. Nelson (1966). Bibliographies of the author and his works include Auguste-Émile Picot, *Bibliographie cornélienne . . .* (1876), and Pierre Le Verdier and Edouard Peley, *Additions à la bibliographie*

cornélienne (1908), which are both still useful. Also, a number of more recent general bibliographies, such as *A Critical Bibliography of French Literature*, vol. 3, *The Seventeenth Century*, ed. by Nathan Edelman (1961), contain extensive, updated sections on the dramatist.

Corneille, Thomas (b. Aug. 20, 1625, Rouen, Fr.—d. Dec. 8, 1709, Les Andelys), French dramatist, younger brother of the great French Classical playwright Pierre Corneille and a highly successful dramatic poet in his own right, whose works helped to confirm the character of the French Classical theatre.

Between 1656 and 1678 Corneille put on no fewer than 16 tragedies, starting with *Timocrate* (1656), which was among the dramatic successes of the century. His best play is the tragedy *Ariane* (1672; *The Labyrinth*, 1795).



Thomas Corneille, detail of an engraving by M. Desbois
J.P. Zolo

He also experimented with comedy in the then-popular Spanish style (*Le Geôlier de soi-même*, 1655), with opera, and with lyric drama.

Corneille had a sense of timing and a flair for ingenious dramatic effects. One original contribution to the drama was the extended use in his later works of stage machinery in an attempt to enlarge the range of tragedy. Elected to the Académie Française in 1685, he helped to compile an encyclopaedic dictionary.

Cornelia (fl. 2nd century BC), highly cultured mother of the late 2nd-century BC Roman reformers Tiberius and Gaius Sempronius Gracchus.

She was the second daughter of Publius Cornelius Scipio Africanus Major, the hero of the Second Punic War (Rome against Carthage, 218–201). Cornelia married Tiberius Sempronius Gracchus and bore him 12 children. In addition to the two Gracchi brothers, the only child to reach maturity was Sempronia, who married Scipio Aemilianus.

After the death of her husband in 154, Cornelia remained unmarried, refusing even the hand of Ptolemy VIII Euergetes of Egypt. She devoted herself entirely to the education of her surviving sons. Although hostile propaganda later suggested that Cornelia had encouraged her sons to initiate "radical" reforms, other stories suggest that she exercised a restraining influence over them. After Gaius' murder in 121 she retired to Misenum (now Miseno, Italy). Cicero applauded her letters for the beauty of their style; the two fragments preserved in the manuscripts of Cornelius Nepos (1st century BC) may not be genuine.

cornelian (mineral): *see* carnelian.

Cornelius, SAINT (b. Rome—d. 253, Centumcellae, Italy; feast day September 16), pope from 251 to 253.

A Roman priest, he was elected during the lull in the persecution under Emperor Decius and after the papacy had been vacant for more than a year following Pope St. Fabian's martyrdom. Cornelius' pontificate was complicated by a schism, one cause of which was the self-appointment of the Roman priest Novatian as antipope (the second in papal history); and the second, the dispute over the church's attitude toward Christian apostates. Cornelius was supported by St. Cyprian, bishop of Carthage, and many African and Eastern bishops.

When Christian persecution resumed in 253, Cornelius was exiled to Centumcellae, where he died either from hardships or decapitation. Several of his letters, including some to Cyprian, survive. His feast day is kept with Cyprian's.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Cornelius, Peter (b. Dec. 24, 1824, Mainz, Hesse-Darmstadt—d. Oct. 26, 1874, Mainz, Ger.), German composer and author, known for his comic opera *Der Barbier von Bagdad* (*The Barber of Bagdad*). The son of an actor and an actress, he acted at Mainz and at Wiesbaden in his youth. In 1845 he studied composition and was later music critic for two Berlin journals. From 1853 to 1858 he lived at Weimar in the circle of Liszt and the Princess Sayn-Wittgenstein and translated articles by Berlioz and Liszt for the *Neue Zeitschrift für Musik*. In 1857 he began *Der Barbier von Bagdad*, on a libretto of his own based on *The Thousand and One Nights*. It was conducted by Liszt at Weimar in 1858 but was a failure and led to Liszt's resignation from the Weimar opera. It was successfully revived in 1884 in a reorchestrated version by Felix Mottl. From 1859 to 1864 Cornelius lived in Vienna, where he became a friend of Wagner. In 1865 he accompanied Wagner to Munich and was reader to Louis II and professor at the royal school of music. He wrote two other operas, *Der Cid* (1865; libretto adapted by him from the play by Corneille) and *Gunlöd* (libretto adapted from the *Edda*), which was completed after his death by Carl Hoffbauer and Eduard Lassen and produced in 1891.

Cornelius was also a gifted lyric poet and set



Peter Cornelius, engraving by Franz de Rohden, 1846
G. Mandel—J.P. Zolo

many of his own poems to music—notably the *Weihnachtslieder*, the *Brautlieder*, and the posthumously published *Vätergruft* for baritone and orchestra. He also set poems by Heinrich Heine, Friedrich Hölderlin, and Annette von Droste-Hülshoff.

Cornelius, Peter von (b. Sept. 23?, 1783, Düsseldorf, Palatinate—d. March 6, 1867, Berlin), painter notable for his part in the German revival of fresco painting in the 19th century. His early works are unremarkable examples of Neoclassicism. But his style gradually changed under the influence of German Gothic art, German Romantic writers, and Dürer's marginal drawings for the prayer book of Emperor Maximilian.

In 1811 Cornelius went to Rome, where he joined a group of young German painters, the Nazarenes, or Lucas Brotherhood (Lukasbund), led by Franz Pforr and J.F. Overbeck. In 1819 Cornelius was invited to Munich by the Bavarian crown prince, later King Ludwig I, to decorate the new museum of classical sculpture (Glyptothek). In 1824 he became director of the Munich Academy. His "Last Judgment" (1829–40), filling the whole east wall of the Ludwigskirche in Munich, is notable for its clarity and didactic purpose. In 1841 Frederick William IV called Cornelius to Berlin, where his main occupation was the planning of a vast cycle of frescoes (never executed) for the walls of a cemetery, modelled on the Campo Santo in Pisa.

At heart Cornelius was always an academic artist, even if his outlook was shaped by Romantic philosophy. But he remains a notable artist by virtue of his penetrating intellect, which gave substance to his large dogmatic pictures and order to their composition.

Cornell, Ezra (b. Jan. 11, 1807, Westchester Landing, N.Y., U.S.—d. Dec. 9, 1874, Ithaca, N.Y.), businessman, a founder of the Western Union Telegraph Company, and a guiding force in the establishment of Cornell University. Settling at Ithaca (1828), he became associated with Samuel F.B. Morse (1842) and



Ezra Cornell
By courtesy of Cornell University, Ithaca, N.Y.

superintended the construction of the first telegraph line in America, opened between Baltimore and Washington, D.C. (1844). In establishing telegraph lines throughout the U.S. he accumulated a substantial fortune and, for a time, was the largest stockholder of Western Union (organized 1855).

Settled on a farm near Ithaca, Cornell became interested in agricultural development. Following passage of the Morrill Act (1862), which provided federal support for agricultural colleges, he led in the founding at Ithaca of Cornell University, opened in 1868. His endowment to the new institution, eventually in excess of $3,000,000, helped place it in the front rank of U.S. universities. He also established the Cornell library and built railway lines facilitating access to the town.

Cornell, Joseph (b. Dec. 24, 1903, Nyack, N.Y., U.S.—d. Dec. 29, 1972, New York City), U.S. artist, one of the originators of the form of sculpture called assemblage, in which unlikely objects are joined together in an unorthodox unity.

Cornell was self-taught, and in the 1930s and 1940s he associated with Surrealist artists and writers, concerned with expressing the subconscious, his works being presented in the first U.S. exhibition of Surrealists (New York City, 1932).

Many of Cornell's works take the form of glass-fronted boxes containing objects and collage elements arranged in enigmatic, often poetic juxtaposition. Recurrent themes and motifs include astronomy, music, commedia dell'arte, birds, seashells, broken crystal, and souvenirs of travel. "Chocolat Menier" (1950), for example, is a spare yet fanciful boxed collage of tattered labels and worn surfaces. *A*

Joseph Cornell Album, by Dore Ashton, was published in 1974.

Cornell, Katharine (b. Feb. 16, 1893, Berlin, Ger.—d. June 9, 1974, Vineyard Haven, Martha's Vineyard, Mass., U.S.), one of the most celebrated American actresses from the 1920s to the 1950s, sometimes called "the first lady of the American theatre."

Cornell was the only daughter of a Buffalo, N.Y., doctor who was studying surgery in Berlin when she was born and who later left medicine to become a theatre manager. She began acting in finishing school and then joined the Washington Square Players (1916–18) and toured with the Jessie Bonstelle stock company in Buffalo, N.Y., and Detroit, Mich. (1919). In 1919 she won favourable reviews in London in the role of Jo in *Little Women* and in 1921 made her first Broadway appearance in *Nice People.* In that year she married the director Guthrie McClintic (1893–1961).

The ingenue role in the 1921 production of *A Bill of Divorcement* was her first theatrical triumph, and thereafter she starred in such plays as Arthur Wing Pinero's *The Enchanted Cottage* (1923), George Bernard Shaw's *Candida* (1924), Somerset Maugham's *The Letter* (1927), Rudolf Besier's *The Barretts of Wimpole Street* (1931, 1945), Sidney Howard's *Alien Corn,* William Shakespeare's *Romeo and Juliet* (1934), Maxwell Anderson's *The Wingless Victory* (1936), Anton Chekhov's *The Three Sisters* (1942), and Jerome Kilty's *Dear Liar* (1960).

From 1931 Cornell also assumed the role of manager of her productions. Almost all of these from 1925 on were directed by her husband, who was also a producer. She retired upon the death of her husband in 1961.

Her autobiography, *I Wanted To Be an Actress,* was published in 1939.

Cornell University, American institution of higher education in Ithaca, N.Y., U.S. It is both publicly and privately supported and is situated on a 740-acre campus occupying hills that command a wide view of Lake Cayuga and the surrounding farm, conservation, and recreation land. Founded as the land-grant university of New York state under the Morrill Act of 1862, it was also privately endowed by Ezra Cornell (*q.v.*), a founder of the Western Union Telegraph Company. Cornell established the school's financial foundations, and Andrew D. White, diplomat and scholar, established the form of the new university. A charter was granted in 1865, and the university opened in 1868 with White as its first president. Nonsectarian from the beginning, it offered a much broader curriculum than was common for the day and set out to embrace any investigation and instruction deemed useful. The first university to admit women (1872)—Oberlin was the first college to do so—it offers a program in women's studies.

The study of agriculture early attracted students to Cornell and continues to account for much of the enrollment, though the university also graduates many students in the biological sciences, business management, engineering, and the social sciences. Cornell University consists of a number of colleges, schools, and graduate schools, most of which are privately supported. The largest of these latter units is the College of Arts and Sciences, which is basically a liberal-arts college. Other four-year private institutions offer instruction in architecture, art, and planning; engineering; and hotel administration. Privately supported professional and graduate schools include those for law, business management, and medicine. Cornell also operates four state-supported colleges in Ithaca that are part of the State University of New York; these schools specialize in agriculture and life sciences; human ecology; industrial and labour relations; and veterinary medicine. Cornell University Medical College is part of a complex of medical teaching and research institutions in New York City, including New York Hospital. Special programs exist in such fields as rural sociology and international relations.

Corner Brook, city on the west coast of Newfoundland, Canada. It lies at the mouth of the Humber River (there called Humber Arm in the Bay of Islands), 427 miles (687 km) northwest of St. John's. The site of the province's first industrial sawmill (1894), it developed



Corner Brook, on Humber Arm, Nfd.
By courtesy of the Canadian Government Travel Bureau, Ottawa; photograph, John de Visser

after construction there of one of the world's largest pulp and paper mills (1925), powered by a hydroelectric plant at Deer Lake. Corner Brook, the second largest city in the province (after St. John's), is now the centre of a lumbering, salmon-fishing, limestone-quarrying, and mink-farming region. In addition to pulp and newsprint production, there are cement and gypsum plants, iron foundries, and furniture factories. A planned town, incorporated in 1955 and named for a local brook, it became a city in 1956 when it amalgamated with the adjacent communities of Town site, Corner Brook East and West, Curling, and Humbermouth. The Sir Wilfred Grenfell College (1975) at Corner Brook is affiliated with Memorial University of Newfoundland at St. John's. Pop. (1991) 22,410.

corner furniture, principally cupboards, cabinets, shelves, and chairs designed to fit into the corner of a room, thus saving space. The furniture was roughly triangular in section, with more or less equal sides. Because two of the sides were intended to stand closely against two walls, they were normally undecorated. The third side, facing into the room at an angle of 45 degrees to the adjacent walls, was either straight or curved. Corner furniture was popular in the 18th and 19th centuries.

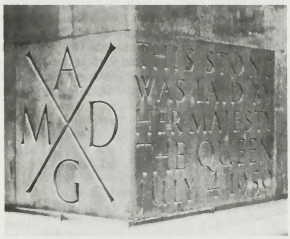


Corner cupboard, French, mid-18th century; in the Wallace Collection, London
By courtesy of the trustees of the Wallace Collection, London

In France the corner cupboard was popular at the same time as the commode, and sometimes a pair of corner cupboards was made to match a commode, forming a suite. A variation consisting of a corner cupboard topped by corner shelves (with mirror glass fitted against the wall between them) and supported on legs was introduced into England from France. William Ince and John Mayhew illustrated two such pieces in their design books *The Universal System of Household Furniture* (1759–62). This type of furniture was the forerunner of the corner whatnot. Many corner cupboards had glass doors and were used to display china, glass, and other wares. Similar pieces were used as corner bookcases.

Less common than cabinet furniture, corner chairs were introduced in the early 18th century under the term writing chairs; they fitted less closely to the walls than other types of corner furniture. The broad seat either had two straight sides and a curved front or was diamond-shaped. Both cabriole and straight legs were used, often in combination such that the front leg alone was curved. The low back formed a continuous bow with the arms. Corner furniture also includes types of continuous seating running along more than one side of a room, such as the ottoman.

cornerstone, ceremonial building block, usually placed ritually in the outer wall of a building to commemorate its dedication. Sometimes the stone is solid, with date or other inscription. More typically, it is hollowed out to contain metal receptacles for newspapers,



Cornerstone of St. Columba's Church, Pont Street, London, by Sir Edward Maufe, 1950–55
Melissa Gloyd

photographs, currency, books, or other documents reflecting current customs, with a view to their historical use when the building is remodeled or demolished.

Until the development of modern construction, the stone was usually at a corner, possibly as the first of the foundation stones, and it was a real support. The modern cornerstone need not actually support, need not be positioned at a corner, and need not be part of the foundation; often it is placed ornamentally in the facade or in an interior wall or floor.

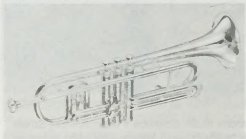
From the original position and function of the cornerstone arose figures of speech in many languages referring to cornerstones or foundation stones of character, faith, liberty, or other excellences. Early customs connected with cornerstones were related to study of the stars and their religious significance. Buildings were laid out with astronomical precision in relation to points of the compass, with emphasis on corners. Cornerstones symbolized "seeds" from which buildings would germinate and rise.

Various religious rituals and Bible references spread and perpetuated the cornerstone custom. Ceremonies have been marked with processions, sacrifices, sprinklings of blood and water, and wide participation by rulers, priests, and other dignitaries who used the mason's trowel, often made of gold or silver.

cornet, valved brass musical instrument that evolved in the 1820s from the continental

post horn (*cornet-de-poste,* which is circular in shape like a small French horn), one of the first makers being the Parisian Jean Asté, known as Halary, in 1828. The tube is conical except through the three valves, tapering gently to a narrow, detachable shank into which the brass mouthpiece is placed. The taper, coupled with the fairly deep, funnel-shaped mouthpiece, imparts a mellowness to the tone and a flexibility to the technique that quickly established the cornet in a leading position in brass and military bands, especially in the U.S. and England. It is built in the key of B♭, its music written a tone above the actual sound. The range extends from the E below middle C to the second B♭ above it. Brass bands also employ a higher pitched E♭ soprano cornet. Some older B♭ cornets built for use in theatres can be changed to the key of A by turning a rotary valve.

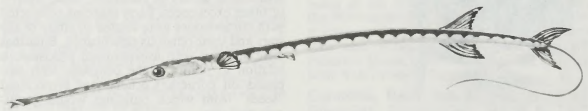
The cornet became a popular solo instrument. Many of the earliest virtuosos were horn players and employed different crooks (detachable pieces of tubing) for different tonalities (keys) or moods, the longer crooks both extending the basic pitch down to E♭ and giving a darker tone quality. Celebrated English soloists in the 19th century included Hermann Koenig and Isaac Levy. Until the 20th-century trumpet revival ousted the cornet from the orchestra, it frequently was used for trumpet parts as well as for genuine cornet parts, which became common in French orchestration from the time of Hector Berlioz (1803–69). The cornet preceded the trumpet in modern dance and jazz bands, but the increasing use of the trumpet has diminished the cornet's popularity as a solo instrument except in brass bands.



Contemporary B♭ cornet
By courtesy of Conn Corporation, Oak Brook, Ill.

A number of other instruments were developed from the cornet, drawing on its characteristics and those of the valved bugle, or flügelhorn. They include the althorn (or alto horn), baritone, and tenor horn—names applied also to other brass instruments of similar range and used differently from country to country.

cornetfish, also called FLUTEMOUTH, any of about four species of marine fishes constituting the family Fistulariidae (order Gasterosteiformes), found in tropical waters. Cornetfishes are long and slim, with a long, tubular snout and a distinctive filament (the end of the backbone) extending back, beyond the forked tail fin. The fishes are rather flattened from top to bottom and are either scaleless or have hard plates embedded in their skins. The largest cornetfishes grow to about 1.8 metres (6 feet) in length. Species include the cornetfish (*Fistularia tabacaria*), a large, blue-spotted, green or gray inhabitant of the Atlantic, and the red, or rough, flutemouth (*F. villosa*), a large, pink or reddish fish, also of the Atlantic.



Cornetfish (*Fistularia tabacaria*)
Painting by Gilbert Emerson

Corneto (Italy): *see* Tarquinia.

cornett, German ZINK, wind instrument sounded by lip vibration against a cup mouthpiece; it was one of the leading wind instruments of the period 1500–1670. It is a leather-covered conical wooden pipe about 24 inches (60 centimetres) long, octagonal in cross section, with finger holes and a small horn or ivory mouthpiece. Its compass extends two octaves upward from the G below the treble staff. Other sizes of cornett included the descant; the S-shaped tenor; and straight forms, including the mute cornett, with the mouthpiece cut in the head of the pipe itself.



Cornett
By courtesy of the Kunsthistorisches Museum, Vienna

With the trombones, to which it supplied the treble voice, it was one of the first wind instruments specifically scored for (by the Italian composer Giovanni Gabrieli, 1557–1612). Although obsolescent by 1700, the cornett continued to be played locally in Germany to support treble voices in choirs until about 1750, as well as with trombones in tower music, the religious music played in German church towers, until the 1830s. Its clear tone quality, crucial to the works of the Italian composer Claudio Monteverdi (1567–1643) and others, is essentially unmatched by any other instrument, and it began to be revived in the mid-20th century.

Cornford, Frances (Crofts) (b. March 30, 1886, Cambridge, Cambridgeshire, Eng.—d. Aug. 19, 1960, Cambridge), poet perhaps known chiefly, and unfairly, for the sadly comic poem "To a Fat Lady Seen from a Train" ("O fat white woman whom nobody loves, / Why do you walk through the fields in gloves . . ."). She was a granddaughter of Charles Darwin. Her *Collected Poems* appeared in 1954, and she was awarded the Queen's Medal for Poetry in 1959.

Cornforth, Sir John Warcup (b. Sept. 7, 1917, Sydney), chemist who was co-recipient, with Vladimir Prelog, of the 1975 Nobel Prize for Chemistry for his contributions to stereochemistry, the study of how the properties of a chemical compound are affected by the spatial arrangement of atoms in molecules and complexes.

Cornforth suffered since childhood from a progressive hearing loss which later rendered him completely deaf. He graduated from the University of Sydney in 1937 and earned his doctorate from Oxford University in 1941, and in that same year he married Rita Harradence, an organic chemist, who helped him communicate and was his constant collaborator. During World War II he worked to determine the structure of the central molecule of the antibiotic penicillin. Cornforth remained at Oxford until 1946 and then joined the staff of the National Institute for Medical Research in London, where he remained until 1962.

He was co-director (1962–68) and director (1968–75) of the Milstead Laboratory of Chemical Enzymology for Shell Research Ltd., in Sittingbourne, Kent. From 1965 to 1971 he was an associate professor at the University of Warwick and then served as visiting professor at the University of Sussex until 1975. He then became Royal Society research professor in the School of Molecular Sciences, University of Sussex, a position he held until 1982.

Cornforth's research, in collaboration with Robert Robinson, George Popják, H. Eggerer, and others, resulted in a new understanding of the stereochemistry of enzymic processes, especially the biosynthesis of sterols and terpenoids.

In 1972 he was made commander of the British Empire and in 1977 was made knight bachelor. He became a foreign member of both the American Academy of Arts and Sciences and the National Academy of Sciences, in 1973 and 1978 respectively.

cornice, in architecture, the decorated projection at the top of a wall provided to protect the wall face or to ornament and finish the eaves. The term is used as well for any projecting element that crowns an architectural feature, such as a doorway. A cornice is also specifically the top member of the entablature (*q.v.*) of a Classical order (*see* order); it is in this case divided into three parts, a bed mold, corona, and cymatium.

Corning, city, Steuben county, south central New York, U.S., on the Chemung River, near the Pennsylvania border, 18 mi (29 km) north-northwest of Elmira. Settled in 1789, it was named in 1837 for Erastus Corning, promoter of a railroad connecting Pennsylvania coal mines with the Chemung Canal. The Corning Glass Works, the city's chief industry, originated in 1868 as the Brooklyn Flint Glass Works and produces Steuben and flat glass, bulbs, tubing, fibre optics, aerospace products, and home wares. The Corning Glass Center (1951) houses a historical collection of glass (including the original 200-inch imperfect telescope disk cast in 1934 for the Palomar Observatory in California, where the second casting is now in use) and a notable library; it also operates a summer theatre. Other manufactures include foundry products and air compressors (at nearby Painted Post). Corning Community College was founded in 1956. More than 2,000 homes were destroyed when floodwaters ravaged the city in June 1972. Inc. village, 1848; city, 1890. Pop. (1990) 11,938.

Cornish language, a member of the Brythonic group of Celtic languages, formerly spoken in Cornwall in southwestern Britain; it became extinct in the 18th or early 19th century as a result of displacement by English. Cornish was most closely related to Breton, the Celtic language of Brittany in northwestern France.

Cornish was strongly influenced by English even in medieval times, and later its orthography and vocabulary showed many English elements. By 1600 it was spoken only in

the farthest western part of Cornwall; and by 1800, or shortly thereafter, it had no speakers at all. Modern revivalists have constructed a "unified Cornish," in which some works have been written. Although a few enthusiasts have learned to speak it, it shows no signs of establishing itself.

Cornish literature, the body of writing in Cornish, a Celtic language largely of southwestern England. The earliest extant literary text, written in Middle Cornish, is a fragment of a play on marriage and was found in a Latin charter of about 1400. It seems to testify to the existence in Cornwall of a tradition of composing and performing secular plays side by side with that of composing and performing religious plays. The earliest extant example of the religious plays, the *Ordinalia,* probably dates from the late 14th century. The last example, *Gwreans an Bys* (*The Creation of the World*), the earliest extant manuscript of which was written by William Jordan of Helston in 1611, was reprinted with an English translation in 1864.

Cornish wrestling, style of wrestling developed and still practiced in southwestern England. It is also known as the Cornwall



Cornish wrestling
BBC Hulton Picture Library

and Devon, or West Country, style. Cornish wrestlers wear stout, loose canvas jackets; rules allow wrestlers to take hold anywhere above the waist or by any part of the jacket, although any manipulation of the jacket collar to strangle an opponent is forbidden. A fall is gained when both hips and a shoulder or both shoulders and a hip ("three points") touch the ground simultaneously. A throw that does not secure a fall is called a hitch; after a hitch, both wrestlers return to their feet to resume the match. Wrestling on the ground is forbidden. Tripping and other uses of the legs are very important, and in Devon, wrestlers formerly wore heavy-soled shoes, with which it was legitimate to kick an adversary's shins.

Cornplanter, also called JOHN O'BAIL, O'Bail also spelled O'BEEL, or ABEEL (b. *c.* 1732, New York?—d. Feb. 18, 1836, Warren county, Pa., U.S.), Seneca Indian leader who aided white expansion into Indian territory in the eastern United States.

Cornplanter's father was a white trader of English or Dutch ancestry named John O'Bail, and his mother was a Seneca Indian. Little is known of his early life. During the U.S. War of Independence, Cornplanter fought on the side of the British and led attacks on American settlements in New York and Pennsylvania. Following the war, however, he participated in the negotiation of three principal treaties (1784, 1789, and 1794) that ceded large tracts of Indian land to the U.S. government. His advocacy of Indian nonresistance to white expansion and his acceptance of a land grant from the Commonwealth of Pennsylvania earned him the enmity of his tribe. By 1791 he had been displaced as leader of the Seneca by the more militant Red Jacket. Cornplanter retired to his lands in Pennsylvania and for a time received a yearly pension from the U.S. government. Toward the end of his life, he was reported to have renounced his close ties with whites and the U.S. government.

cornu (Latin: "horn"), large metal horn of ancient Rome, used as a military and ceremonial instrument. It was about 11 feet (slightly more than 3 m) in length and had the shape of the letter G, with a crossbar brace that supported the instrument's weight on the player's shoulder. Two specimens survive from the ruins of Pompeii. Under the name *tuba curva* a version of the instrument was revived in France during the Revolution and was used by the composer André-Ernest-Modeste Grétry in his music for Voltaire's interment in the Pantheon.

Cornu, Paul (b. 1881, Lisieux, Fr.—d. 1944), French engineer who designed and built the first helicopter to perform a manned free flight.

Cornu's twin-rotor craft, powered by a 24-horsepower engine, flew briefly on Nov. 13, 1907, at Coquainvilliers, near Lisieux. Previously, another French helicopter, the Bréguet-Richet I, had risen under its own power but had been held in position by men standing on the ground. Though historically important, Cornu's design proved impractical and soon was abandoned.

cornucopia, also called HORN OF PLENTY, decorative motif, dating from ancient Greece, that symbolizes abundance. The motif originated as a curved goat's horn filled to overflowing with fruit and grain. It is emblematic of the horn possessed by Zeus's nurse, the Greek nymph Amalthaea (*q.v.*), which could be filled with whatever the owner wished.

Cornutus, Lucius Annaeus (b. Leptis Magna [near modern Al-Khums, Libya], fl. AD 54–68), Roman stoic philosopher, best known as the teacher and friend of Persius, whose satires he helped to revise for publication after the poet's death.

Cornutus resided mostly in Rome. He was banished by Nero (in 66 or 68) for having indirectly disparaged the emperor's projected history of the Romans in heroic verse, and thereafter Cornutus disappeared from history. He wrote various rhetorical works in both Greek and Latin. His philosophical treatise *Theologiae Graecae compendium* ("Compendium of Greek Theology"), still extant, is a manual of stoic etymological interpretation of popular mythology. Simplicius and Porphyry refer to his commentary on the *Categories* of Aristotle, whose philosophy he is said to have defended against an opponent named Athenodorus in a treatise *Antigraphe pros Athenodoron.* Excerpts from his treatise *De enuntiatione vel orthographia* are preserved in Cassiodorus. In the Middle Ages several critical works were falsely attributed to him.

Cornwall, city, seat (1792) of the united counties of Stormont, Dundas, and Glengarry, southeastern Ontario, Canada. The city lies on the north bank of the St. Lawrence River at the eastern terminus of the Cornwall Canal. Founded as New Johnstown by United Empire Loyalists in 1784, it was renamed in 1797 for the Duke of Cornwall, George III's eldest son. With the completion of the canal in 1843, bypassing the Long Sault Rapids (since eliminated by the creation of Lake St. Lawrence), shipping grew and the town flourished, becoming a major port and the centre of a rich dairying and mixed-farming area. Cornwall's manufactures include paper, textiles (rayon), chemicals, furniture, and lacrosse sticks. The Seaway International Bridge (connecting it with Rooseveltown, N.Y.) and the Macdonald-Cartier Freeway serve the city. Cornwall, which is about 55 miles (90 km) southeast of Ottawa, is the headquarters of the St. Lawrence Seaway (Canadian) Authority and is the site of a large power plant, the Cornwall College (founded 1949), and a noted grammar school (founded 1803). Inc. town, 1834; city, 1945. Pop. (1991) 47,137.

Cornwall, county, southwestern England, occupying a peninsula jutting into the Atlantic Ocean. Truro is the seat of the county's administration.

Cornwall, with an area of 1,376 square miles (3,564 square km), is the most remote of English counties. Its eastern boundary, some 200 miles (320 km) distant from London, has remained unchanged for centuries, following the River Tamar. Cornwall's westernmost town, Penzance, lies another 80 miles farther from London and close by Land's End, the traditional southwestern extreme of Great Britain. The county's administration was restructured in 1974 by the creation of six districts. Except for the largest, North Cornwall, they revive traditional Cornish names—Caradon, Carrick, Kerrier, Penwith, and Restormel—that may be unfamiliar to English ears, though not to Cornishmen, for whom crossing the Tamar is to enter England.

The main upland areas inland are a series of granitic intrusions, forming distinctive moorlands (open heathlands). A geologically recent rise of sea level resulted in the drowned river valleys, or rias, of southern Cornwall, including the Tamar, Fowey, and Fal estuaries. The effect of the rias, combined with the variety of rocks, gives rise to an attractive coastal landscape that is subject to increasing pressures by the demands of recreation and tourism.



Polperro, small fishing port and resort, Cornwall, England
Paul Popper Ltd

Long stretches of the coast are now owned by the National Trust or are otherwise protected from commercial development.

The climate of Cornwall is closely affected by the proximity of the sea. High winds and sea mists are common; and rainfall is frequent and heavy, especially on high ground; temperatures are warm in summer and relatively mild in winter. As a result, the vegetation is luxuriant, especially in sheltered coastal areas.

Metal ores, especially tin, attracted prehistoric settlers to the metalliferous zones around the granite intrusions of Cornwall, and there is a wealth of stone relics such as megalithic dolmens, monoliths, and circles. Subsequent Roman and Saxon settlement in England caused an associated migration of Celtic Christians to Cornwall, which was the last part of England to submit to the Saxons. The county's isolation aided the survival of the Celtic language known as Cornish, although it has not been spoken as a living language since the 18th century. Celtic place-names are much in evidence. After the Norman Conquest (1066), the indigenous manors of Cornwall were taken over to form the basis of an earldom; since 1337 they have belonged traditionally to the eldest son of the English sovereign, who acts as duke of Cornwall.

Rural resources provide the bases of the economy. The valleys afford excellent pasture for dairy cattle, and the moorland has large areas for rough grazing. Market gardening is important in sheltered coastal districts, the mild winter encouraging cultivation of delicate and early crops. Tourism, capitalizing on the attractive physical environment, now provides the major source of income, especially along the coast, where many small fishing ports—such as St. Ives, Newquay, and Polperro—are busy resorts. Cornwall is a favourite county for second homes and retirement, which, together, are causing basic changes in the social structure of rural areas. Many coastal towns—notably Falmouth, Penzance, and Fowey—are active ports.

Tin was mined in Cornwall for at least 3,000 years; the industry became so important that in the Middle Ages the Cornish tin miners were granted special privileges and were placed by the crown under the separate legal jurisdiction of the stannary (tin mine) courts. Despite periodic depressions in the industry, Cornish tin mining continued profitably until the 20th century, when the shallow tin deposits were exhausted and the deeper and more costly workings fell victim to cheaper foreign tin production. The number of working mines dwindled, and with the world collapse of tin prices in the 1980s the last few tin mines in Cornwall were allowed by the British government to close. China clay, the product of eroded granite, is still mined around St. Austell. Owing to the loss of its tin-mining industry, Cornwall qualifies for government economic aid designed to attract investment, to diversify the economy, and to lower the unemployment rates and reduce age-selective emigration. Pop. (1986 est.) 448,200.

Cornwall, duchy of, a private estate consisting of lands, honours, franchises, rights, profits, etc., held by the eldest living son of the British sovereign. The holdings and perquisites are found not only in the modern county of Cornwall but also in Devon, Somerset, and elsewhere in the southwest of England.

The duchy (the oldest in England) was created by royal charter on March 7, 1337, by Edward III for his eldest son, Edward the Black Prince, and for such of his heirs as would become kings of England. Henry VI expressly declared that the monarch's first-begotten son at the time of his birth was to be duke of Cornwall; thus, ever since, the eldest living son has become duke automatically at birth or whenever he becomes heir apparent. Historically, the only male heir apparent not to become duke of Cornwall was George III, who was the grandson, not the son, of his predecessor, George II. In the absence of an eligible son, the duchy reverts to the crown until such time as an eligible son appears.

An act of Parliament of 1863 organized and standardized the governance of the duchy. It is administered by a council headed by the lord warden of the stannaries. The duke appoints the sheriff of Cornwall.

Cornwall, Piers Gaveston, Earl of: *see* Gaveston, Piers.

Cornwall, Richard, Earl of: *see* Richard *under* Richard (Germany/Holy Roman Empire).

Cornwallis, Charles Cornwallis, 1st Marquess and 2nd Earl, VISCOUNT BROME, BARON CORNWALLIS OF EYE (b. Dec. 31, 1738, London—d. Oct. 5, 1805, Ghāzīpur, India [now in Uttar Pradesh, India]), British soldier and statesman, probably best known



Cornwallis, detail of pencil drawing by John Smart, 1792; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

for his defeat at Yorktown, Va., in the last important campaign (Sept. 28–Oct. 19, 1781) of the U.S. War of Independence. Cornwallis was possibly the most capable British general in that war, but he was more important for his achievements as British governor-general of India (1786–93, 1805) and viceroy of Ireland (1798–1801).

A veteran of the Seven Years' War (1756–63)—during which (1762) he succeeded to his father's earldom and other titles—Cornwallis, who had opposed the British policies that antagonized the North American colonists, nonetheless fought to suppress the American Revolution. Late in 1776 he drove General George Washington's patriot forces out of New Jersey, but early in 1777 Washington recaptured part of that state. As British commander in the South from June 1780, Cornwallis won a great victory over General Horatio Gates at Camden, S.C., on August 16 of that year. Marching through eastern North Carolina into Virginia, he established his base at the tidewater seaport of Yorktown. Trapped there by U.S. and French ground forces under Washington and the Count de Rochambeau and a French fleet under the Count de Grasse, he surrendered his large army after a siege. (*See* Yorktown, Siege of.)

Although the Yorktown capitulation decided the war in favour of the colonists, Cornwallis remained in high esteem at home. On Feb. 23, 1786, he accepted the governor-generalship of India. Before leaving office on Aug. 13, 1793, he brought about a series of legal and administrative reforms, notably the Cornwallis Code (1793). By paying civil servants adequately while forbidding them to engage in private business, he established a tradition of law-abiding, incorruptible British rule in India. He disbelieved, however, in the capacity of Indians for self-government, and some of his measures—the reorganization of the courts in various regions and of the revenue system in Bengal—proved ill-advised. In the third of four Mysore Wars, he inflicted a temporary defeat (1792) on Tippu Sultan, the anti-British ruler of the Mysore state. For his services in India he was created a marquess in 1792.

As viceroy of Ireland (1798–1801), Cornwallis won the confidence of militant Protestants (Orangemen) and Roman Catholics. After suppressing a serious Irish rebellion in 1798 and defeating a French invasion force on September 9 of that year, he wisely insisted that only the revolutionary leaders be punished. As he had done in India, he worked to eliminate corruption among British officials in Ireland. He also supported the parliamentary union of Great Britain and Ireland (effective Jan. 1, 1801) and the concession of political rights to Roman Catholics (rejected by King George III in 1801, causing Cornwallis to resign).

As British plenipotentiary, Cornwallis negotiated the Anglo-French peace treaty of Amiens (March 27, 1802). He was reappointed governor-general of India in 1805 but died shortly after his arrival.

Cornwallis Code (1793), the enactment by which Governor-General Lord Cornwallis gave legal form to the complex of measures that constituted the administrative framework in British India known as the Cornwallis, or Bengal, System. Beginning with Bengal, the system spread over all of northern India by means of the issue of a series of regulations, dated May 1, 1793. On these the government of British India virtually rested until the Charter Act of 1833.

The system, as codified in these regulations, provided that the East India Company's service personnel be divided into three branches: revenue, judicial, and commercial. Private trade was forbidden to the members of the first two branches, and they were instead compensated by a new and generous scale of pay. The land revenue assessment (the major source of revenue) was fixed permanently with zamindars, or hereditary revenue collectors. These native Indians, provided they paid their land taxes punctually, were treated as landowners, but they were deprived of magisterial and police functions, which were discharged by a newly organized government police. This "permanent settlement" provided the British with an Indian landed class interested in supporting British authority. The local administration was placed in the hands of the revenue collectors of districts. The judiciary was reorganized; there were district judges with magisterial powers responsible to provincial courts in civil cases and to courts of circuit in criminal cases. The law administered was Hindu and Muslim personal law and a modified Muslim criminal code. The higher ranks of the services were restricted to Europeans, thus depriving Indians of any responsible office.

As a whole the system gave social and political stability to Bengal at the price of neglecting the rights of the lesser landholders and undertenants and of excluding Indians from any responsible share in the administration.

Cornwallis Island, one of the Parry Islands in the Arctic Ocean, Baffin region, Northwest Territories, Canada. Located north of Barrow Strait between Devon and Bathurst islands, Cornwallis Island is about 70 miles (115 km) long and 30–60 miles (50–100 km) wide and has an area of 2,701 square miles (6,996 square km). It is comparatively flat, particularly on the northwest coast, reaching a maximum elevation of 1,350 feet (411 m) on the east coast. A settlement and Canadian weather station are located at Resolute Bay (the nearest settlement to the north magnetic pole and a High Arctic air transportation hub and terminus) on the south coast. The island was discovered in 1819 by Sir William Parry and was named after Sir William Cornwallis.

Cornwell, David John Moore: *see* Le Carré, John.

Coro, city, capital of Falcón state, northwestern Venezuela. At the southern end of the isthmus linking the Península de Paraguaná to the mainland, it is 105 ft (32 m) above sea level. Founded in 1527 during an attempt by the Spanish crown to suppress slave hunting in the area, its original name was Santa Ana de Coriana, derived from the Coros Indians, who inhabited the region. The settlement was the site of the chief factory (trading station) of the Welsers, the German banking house to which the Spanish king Charles V mortgaged western Venezuela between 1528 and 1546. It became the base for expeditions in search of Eldorado, the legendary country of gold. In 1806 it witnessed the first attempt, by Francisco Antonia Gabriel Miranda, the "precursor of independence," to free the colony from Spanish domination. Coro's many churches include the nation's oldest, and it was the seat of the first bishopric (1531) in Venezuela.

In Coro's irrigated hinterland, tobacco, coffee, cocoa, and castor beans are cultivated. Hammocks, soap, shoes, and cigars are manufactured in the city. Salt deposits and coal mines are nearby, and the city's commercial activities have grown with the development of oil refineries on the peninsula. Coro is linked by highway and railroad with its Caribbean port, La Vela, 7 mi (11 km) to the east-northeast, and by highway and air with Venezuela's major urban centres. Pop. (1981 est.) 71,000.

Coroado (people): *see* Purí and Coroado.

Coromandel Coast, broad coastal plain in eastern Tamil Nādu state, southern India. Extending over an area of about 8,800 sq mi (22,800 sq km) and bounded by the Bay of Bengal on the east, the Eastern Ghāts on the west, the Cauvery delta on the south, and the Utkal Plains on the north, the region derives its name from the Tamil Cōḷa Mandalam (Land of the Cōḷa, an ancient dynasty that ruled the region from the middle of the 9th century AD to 1279). The coast has an average elevation of 264 ft (80 m) and is backed by the Eastern Ghāts, a chain of low, flat-topped hills. The shoreline is relatively straight, with several sandbars and an offshore chain of coral islands. The lower courses of the Pālār, Ponnaiyār, and Cheyyār rivers and their tributaries, the Pāmban and Ponnāi, which rise in the Ghāts, remain dry during most of the year. There is little forest cover, but marshes, swamps, scrub woodlands, and thorny thickets are common.

Agriculture is the mainstay of the coastal economy; rice, pulse (legumes), sugarcane, cotton, and peanuts (groundnuts) are grown. Bananas and betel nuts are grown together with rice in the low-rainfall region of the interior. There are casuarina and coconut plantations along the coast. Large-scale industries produce fertilizers, chemicals, film projectors, amplifiers, trucks, and automobiles. There is a heavy vehicle and armoured car factory at Āvadi and a nuclear power station at Kalapakkam. Roads and railways linking Madras, Cuddalore, Chidambaram, Chingleput, and Pondicherry run parallel to the coast. The region has been known since ancient times as the "land of the temples" for the many temples that are located at such places as Mahābālipuram and Mamallapuram.

Coromandel Peninsula, peninsula, east central North Island, New Zealand. Extending into the South Pacific Ocean for 70 mi (110 km) and averaging 20 mi in width, the promontory is bordered by the Firth of Thames and Hauraki Gulf to the west and the Bay of Plenty to the east. The Coromandel Range (90 mi long) rises to 2,926 ft (892 m) at Mt. Moehau (on the peninsula) and to 3,126 ft at Mt. Te Aroha further south. Capt. James Cook landed on the east coast's Mercury Bay to observe the transit of that planet in 1769. One of the area's largest settlements, Whitianga, lies on the Bay of Plenty. Coromandel, the second major settlement and site of gold discovery in 1852, lies to the west. In the second half of the 19th century the peninsula's dense forests were systematically cut down. The promontory supports sheep and dairy farms and is a favourite area for tourists from Auckland (40 mi northwest).

Coromandel screen, ebony folding screen with panels of incised black lacquer, often painted gold or other colours and frequently decorated by the application of jade and other semiprecious stones, shell, or porcelain. These screens, having as many as 12 leaves, were of considerable size. Scenes of Chinese life or landscape were usually depicted, but European hunting or nautical scenes were sometimes represented. Although these screens were probably made in northern or central China during the K'ang-hsi period (1661–1722) of the Ch'ing dynasty, they received their name from India's Coromandel coast, where they were transshipped to Europe in the late 17th and early 18th centuries by merchants of the English and French East India companies. Dutch traders also transshipped these screens from Bantam in Java, and in early accounts they were frequently called Bantam screens as well as Coromandel screens. In the 18th century many of the imported Coromandel screens were cut up to make panels for the decoration of various kinds of cabinet furniture.

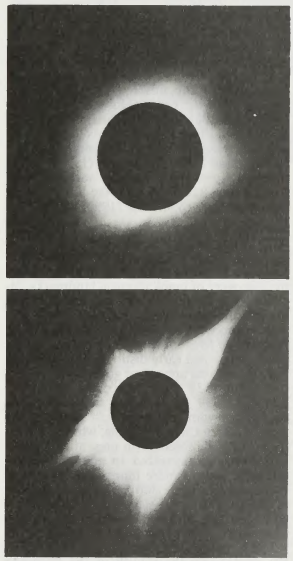


Coromandel screen, Chinese, K'ang-hsi period, mid-17th century; in Ham House, Richmond upon Thames, London

By courtesy of Ham House, Richmond, Surrey; photograph, A.C. Cooper Ltd.

Corona, city, Riverside county, southwestern California, U.S., at the east end of the Santa Ana Canyon. Originally part of the Rancho La Sierra, it was laid out as South Riverside when Queen Colony, a citrus growers' organization, was established (1886). In 1896 it was incorporated and renamed Corona ("circle") for the 3-mi (5-km) circular drive (now around the central city), which was the scene of free-for-all auto races, 1913–16. It developed as a citrus processing-shipping centre. Light manufacturing has aided the economy. Prado Dam to the north, in the Santa Ana River, impounds Lake Mathews. Hot springs are in the vicinity. Pop. (1990) 76,095.

corona, outermost region of the Sun's atmosphere, consisting of plasma (hot ionized gas). It has a temperature of approximately 2,000,000 K and an extremely low density. The corona extends more than 13,000,000 kilometres (8,000,000 miles) from the photosphere (solar surface). It has no definite boundaries, continually varying in size and shape as it is affected by the Sun's magnetic field. The solar wind (*q.v.*), which flows radially outward through the entire solar system, is formed by the expansion of the coronal gases.



Solar corona at (top) minimum and (bottom) maximum sunspot activity

(Top) By courtesy of Yerkes Observatory, Wisconsin; (bottom) Lick Observatory Photograph

In spite of its high temperature, the corona yields relatively little heat because of its low density—*i.e.,* the constituent gas molecules are so sparse that the energy content per cubic centimetre is substantially lower than that of the interior region of the Sun. The

corona shines only about half as brightly as the Moon and is normally not visible to the unaided eye because its light is overwhelmed by the brilliance of the solar surface. During a total solar eclipse, however, the Moon blocks out the light from the photosphere, permitting naked-eye observations of the corona. The corona can also be studied under noneclipse conditions with a special telescopic instrument called a coronagraph (*q.v.*).

corona de Jesus (plant): *see* crucifixion thorn.

coronach, in Celtic tradition, choral lament or outcry for the dead; also, a funeral song sung or shrieked by Celtic women. Though observers have frequently reported hearing such songs in Ireland or in the Scottish Highlands, no such songs have been recorded. The Scottish border ballad "The Bonny Earl of Murray" is supposedly composed in the tradition of the coronach. It begins:

> Ye Highlands, and ye Lawlands,
> Oh where have you been?
> They have slain the Earl of Murray,
> And they layd him on the green.

Coronado, city, San Diego county, southern California, U.S. It lies on a peninsula between San Diego Bay and the Pacific and is linked to San Diego by the San Diego Coronado Bay Bridge. Named after Los Coronados, a group of Mexican offshore islands, it developed around the ornate Hotel del Coronado (completed 1888) as a residential beach resort. Silver Strand Beach State Park is to the south. Key elements in the city's economy are the North Island Naval Air Station (1917), on the northern tip of the peninsula, and the Naval Amphibious Base (1943) on the Silver Strand Peninsula. Inc. 1890. Pop. (1990) 26,540.

Coronado, Francisco Vázquez de (b. *c.* 1510, Salamanca, Spain—d. Sept. 22, 1554, Mexico), Spanish explorer of the North American Southwest whose expeditions resulted in the discovery of many physical landmarks, including the Grand Canyon, but failed to find the treasure-laden cities he sought.

Coronado went to New Spain (Mexico) with Antonio de Mendoza, the Spanish viceroy, in 1535 and earned early distinction in pacifying Indians. He was appointed governor of Nueva Galicia in 1538. Fray Marcos de Niza, sent north in 1539 by Mendoza to explore, had come back with reports of vast riches in the Seven Golden Cities of Cíbola, which were actually the Zuni Pueblos (in present New Mexico). Mendoza organized an ambitious expedition to make a more thorough exploration. It consisted of some 300 Spaniards, hundreds of Indians and native slaves, horses, and herds of sheep, pigs, and cattle, in addition to two ships under the command of Hernando de Alarcón, who sailed up the Gulf of California to discover the mouth of the Colorado River on Aug. 26, 1540. In February 1540 the main force under Coronado left Compostela and proceeded up the west coast of Mexico to Culiacán. A smaller unit moved north from there and captured the Pueblos of Zuni, July 1540, but found no great wealth or treasure. Another side exploration made García López de Cárdenas the first white man to view the Grand Canyon of the Colorado River (in modern Arizona). The groups united to spend the winter on the Rio Grande at Kuana (near modern Santa Fe). Several Indian groups attempted to attack them there but were beaten back with severe reprisals.

In the spring of 1541, the force moved into Palo Duro Canyon in Texas. There Coronado left most of his men and proceeded north with 30 horsemen to another supposedly fabulously wealthy country, Quivira (Kansas), only to find a seminomadic Indian village and disillusionment again. In 1542 Coronado returned to Mexico, reported his disappointing findings to Mendoza, and resumed his governorship of Nueva Galicia.

An official inquiry, or residencia, normally called after an expedition, brought Coronado an indictment for his conduct; but the Mexican audiencia (a governing body in the Spanish colonies) found him innocent in February 1546. In his residencia following his governorship he was also indicted, and in this instance he was fined and lost a number of Indians from his landed estate. He retained his seat, however, on the Council of Mexico City until his death.

Coronado Bay, Spanish BAHÍA DE CORONADO, bay of the Pacific Ocean, bounded on the north, east, and southeast by southwestern Costa Rica. The bay, which measures approximately 25 miles (40 km) from northeast to southwest, extends from the town of Quepos southeastward for approximately 60 miles (100 km) to San Pedro (Llorona) Point on the Osa Peninsula. At the mouth of the Grande de Térraba (Diquis) River are numerous islands; farther offshore lies Caño Island. Dominical, on Dominical Point, which protrudes into Coronado Bay, is the principal port.

coronagraph, telescope that produces an artificial total eclipse of the Sun inside the instrument so that the Sun's corona and prominences may be observed. It was invented in 1930 by the French astronomer Bernard Lyot and first used by him at the Pic du Midi Observatory in the Pyrenees.

A round metal screen blocks the overwhelming brightness of the Sun's central disk, or photosphere. Other screens and diaphragms block reflections of the photospheric image. The coronagraph must be used at high altitudes and on very clear days, when the atmospheric diffusion of light is at a minimum; imperfect lenses or dust inside the instrument will scatter enough photospheric light to obscure the dim corona.

coronary artery, one of two blood vessels that branch from the aorta close to its point of departure from the heart and carry oxygen-rich blood to the heart muscle. Both arteries supply blood to the walls of both lower chambers (ventricles) and to the partition between the chambers. The right coronary artery supplies blood to the right upper chamber (atrium), while the left supplies the left atrium. Blockage of any branch of the coronary arteries causes death of a portion of the heart tissue when it is deprived of oxygen-rich blood (*see* coronary heart disease).

coronary bypass, also called CORONARY ARTERY BYPASS, surgical treatment for coronary heart disease, especially to relieve the pain of angina pectoris. Angina is caused by cardiac ischemia, an insufficient flow of blood through the coronary arteries into the heart musculature. This insufficiency is usually caused by atherosclerotic plaque, which builds up in the coronary arteries, gradually diminishing the flow of blood through them. In addition to causing angina, such occlusion of the arteries is thought to increase the risk of heart attack. The coronary bypass entails transplanting one or more veins to create new paths for arterial blood to flow from the aorta through the coronary arteries, circumventing the obstructed sections of the arteries. The grafts are usually saphenous veins taken from one or both of the patient's legs. Coronary bypass surgery became widely used after its safety and usefulness in relieving the pain of angina were demonstrated in the late 1960s. Opinions differ, however, as to the procedure's efficacy in extending the life span of the coronary patient, and newly developed drugs, available to the public in the early 1980s, were believed by some clinicians to be equally effective in the treatment of angina.

coronary circulation, part of the systemic circulatory system that supplies blood to and provides drainage from the tissues of the heart. In the human heart, two coronary arteries arise from the aorta just beyond the semilunar valves; during diastole, the increased aortic pressure above the valves forces blood into the coronary arteries and thence into the musculature of the heart. Deoxygenated blood is returned to the chambers of the heart via coronary veins; most of these converge to form the coronary venous sinus, which drains into the right ventricle below the tricuspid valve.

The heart normally extracts 70 to 75 percent of the available oxygen from the blood in coronary circulation, which is much more than the amount extracted by other organs from their circulations—*e.g.*, 40 percent by resting skeletal muscle and 20 percent by the liver. Obstruction of a coronary artery, depriving the heart tissue of oxygen-rich blood, leads to death of part of the heart muscle (myocardial infarction) in severe cases, and total heart failure and death may ensue.

coronary heart disease, also called ISCHEMIC HEART DISEASE, the effect of an inadequate supply of oxygen-rich blood to the heart muscle (myocardium) because of narrowing or blocking of a coronary artery by fatty and fibrous tissue (*see* arteriosclerosis). If the oxygen depletion is extreme, the effect may be the death of a section of heart muscle (*see* myocardial infarction); if the deprivation is insufficient to cause infarction, the effect may be angina pectoris (*q.v.*). Progressive destruction of the myocardium occurs with repeated attacks. Both conditions can be fatal because they can cause left ventricular failure or ventricular fibrillation—an uncontrolled and uncoordinated twitching of the ventricle muscle (the ventricles are the lower chambers of the heart) that induces sudden cardiac death. Coronary bypass surgery or balloon angioplasty are indicated if medication and diet do not control progressive coronary heart disease and if the myocardial damage is not too extensive.

coronation, ceremony whereby a sovereign is inaugurated into his office by receiving upon his head the crown, which is the chief symbol of his regal authority. From earliest historical times, a king or chieftain was inaugurated by some public ceremony: he might be raised upon a shield, presented with a spear, or invested with a distinctive robe or headdress. When Europe became Christianized in the Middle Ages, some of these older pagan customs were grafted onto a religious service derived from Old Testament descriptions of the anointing and crowning of Saul and other Israelite kings. In the typical Christian coronation service, the sovereign is anointed with holy oil and receives the crown and other royal insignia from the clergy.

Coronation Carpet, 17th-century Persian court-loomed floor covering, 12 feet 2 inches by 17 feet 1 inch (371 by 521 cm). It is made of silk and enriched by gold and silver filigree, with a gold ground and an overall pattern of flowers, cloud bands, and arabesques.

It belongs to the Danish crown and remains in a perfect state of preservation, having been used only at coronations. It is on display at Rosenborg Palace, Copenhagen.

Coronel, city, Concepción *provincia,* Bío-Bío *región,* south-central Chile. It lies along the Gulf of Arauco of the Pacific Ocean, just south of Concepción. Founded in 1851, it received city status in 1875 and developed with the coal mines in the vicinity, becoming a primary coal-bunkering port and functioning as a shipping as well as commercial centre. Most of Chile's coal comes from the modernized mines of Coronel and adjacent Lota, making Coronel the nation's chief coaling station. Company-owned pine and eucalyptus plan-

tations supply mine and construction timber and some lumber for commerce. There are also foundries, shops, and planned company housing areas. The port was the scene of a British naval defeat in 1914, for which the British took vengeance against the German navy at the Falkland Islands later in the year. Pop. (1985 est.) 51,770.

Coronel, María Fernández (Spanish mystic): *see* Agreda, María de.

Coronel Oviedo, city, east-central Paraguay. Founded in 1758, the city is situated in the westward extension of the Brazilian Highlands. Its economic base is varied. Oranges, tobacco, sugarcane, and timber are grown in the surrounding area, and livestock is raised and processed. There are sawmills and plants for fruit-oil extraction. The city has a Catholic cathedral and schools, a hospital, and a branch of the Paraguay Bank. It is on a paved highway that links Asunción with Puerto Presidente Stroessner. Pop. (1985 est.) 22,711.

coroner, a public official whose principal duty in modern times is to inquire, with the help of a jury, into any death that appears to be unnatural.

The office originated in England and was first referred to as *custos placitorum* ("keeper of the pleas") in the Articles of Eyre of 1194, although there is some evidence that it may have existed earlier. The name was originally "crowner," or "coronator," derived from *corona,* meaning "crown." The coroner, elected by the freeholders of the county, was originally charged with the duty of safeguarding the king's property and served as a check on the powerful office of the sheriff in the royal interest.

During the 19th century, legislation did away with all the vestiges of the coroner's early powers, many of which were already obsolete. The Coroners Amendment Act of 1926 limited his duties to conducting an inquest into all deaths occurring within his district by violent or unnatural means or from some unknown cause, or into the death of a person in prison or under circumstances that require an inquest in accord with other legislation. The act also set up the qualifications for office, requiring that a coroner be a barrister, solicitor, or legally qualified medical practitioner. In practice, persons possessing both legal and medical qualifications have been appointed.

In Canada all coroners are appointed by a provincial order in council, signed by the lieutenant governor. As a judge of a court of record, the coroner is not liable in civil action for anything done by him in his judicial capacity if he acts indiscreetly or erroneously.

In the United States the office is usually elective, but in some states it may be appointive. About half of the states have a coroner's system; in some of the others the sheriff or the justice of the peace performs his functions, while in still others the coroner's office has been replaced by a medical examiner. In a few states the coroner's staff is composed of persons skilled in pathology, toxicology, and chemistry.

In some states coroners must be pathologists, while in others a layman may be authorized as coroner, with the power to employ a physician to conduct the autopsy. In most states the coroner has the power to issue a warrant for the arrest of persons who may have caused the death of another by criminal means and possesses all the powers of a magistrate to hear testimony. *See also* inquest.

coroner's jury, a group summoned from a district to assist a coroner in determining the cause of a person's death. The number of jurors ranges from 6 to 20. The coroner's jury, which originated in medieval England, is a disappearing form, even in countries where the jury system is strong.

The coroner's jury resembles the grand jury in that it does not try cases but rather reviews evidence that may be relevant at trial. The jury's verdict states how, when, and where the deceased died. If the jury concludes that the deceased died by murder or manslaughter, they can name suspects, and the coroner can order arrest and detainment, pending grand jury action.

When it is publicly known that the deceased was killed by a person in custody, the coroner need not summon a jury. When he does so, however, jurors cannot refuse to serve. In some jurisdictions the jury must be sworn in the presence of the deceased person's body and must view the body for the inquest (*q.v.*) to be valid.

The verdict of a coroner's jury is admissible only as evidence of the fact of death, which is occasionally an issue in cases of mass accidents or deaths in which the body is difficult to identify.

Those who argue for the abolition of the coroner's jury assert the inability of the jurors to understand complex medical questions, the tendency of jurors to rubber-stamp the coroner's opinion, and the costs of maintenance. Prosecutors suspecting foul play in a case often proceed with investigations even after a verdict of death from natural or accidental causes.

coronet, in Great Britain, ceremonial headdress of a peer or peeress, still worn with robes at a coronation and adorned along its rim with ornaments varying with the rank of the wearer: 8 strawberry leaves for a duke; 4 leaves and 4 silver balls for a marquess; 8 balls on tall points with strawberry leaves between for an earl; 16 small, close-set balls for a viscount; and 6 larger balls, more widely spaced, for a baron. The coronet is silver gilt and has an inner cap of crimson velvet with a gilt tassel and a narrow border of ermine.

The prince of Wales (heir apparent) has a special coronet, or demi-crown, of gold crossed by a single arch from front to back, and the coronets of other near relatives of the sovereign bear alternate crosses and fleurs-de-lis. At a coronation the coronets are carried by pages and are put on at the moment when St. Edward's Crown is set on the head of the sovereign; when there is a queen consort, the peeresses wait for the moment of her coronation before doing the same. Coronets of various forms are depicted over the armorial bearings of continental European noblemen, but they have not been made and worn as in Great Britain. The word coronet signifies a small or lesser crown.

Corot, (Jean-Baptiste-)Camille (b. July 16, 1796, Paris—d. Feb. 22, 1875, Paris), French painter, noted primarily for his landscapes, who inspired and to some extent anticipated the landscape painting of the Impressionists. His oil sketches, remarkable for their freedom and clear colour, have come to be as highly regarded as the finished pictures that were based upon them.

Early life and career. Corot was born of prosperous bourgeois parents. His mother, who was Swiss-born, had a fashionable milliner's shop, which Corot's father—a draper by trade—helped to manage. Camille was a poor scholar and even less adept when he tried to follow his father's trade. Finally, at the age of 25, he was given a small allowance by his father and allowed to become what he had always dreamed of being: a painter.

Like every young French artist, Corot spent much time studying the paintings in the Louvre, and he had some private instruction from Achille-Etna Michallon and Jean-Victor Bertin, both followers of the Neoclassical landscape painter Pierre-Henri de Valenciennes. From the beginning, however, Corot preferred to sit outdoors, sketching what he saw and learning by firsthand experience.

In the autumn of 1825 Corot went to Rome, and the three years that he spent there were the most important of his life. He painted the city and the Campagna, the countryside around Rome; he made a trip to Naples and Ischia; and he returned to Paris by way of Venice. He was very happy. He told a friend in August 1826: "All I really want to do in life . . . is to paint landscapes. This firm resolve will stop me forming any serious attachments. That is to say, I shall not get married." He was as good as his word and never married. Female companionship played no part in his life, which was entirely devoted to painting.



Corot, photographed by Eugène Dutilleux at Arras, Fr., 1871

By courtesy of the Gernsheim Collection, Humanities Research Center, the University of Texas at Austin

Back in France, Corot settled into a routine to which he kept for the whole of his life. He always spent the spring and summer months painting outside, making small oil sketches and drawings from nature. He acquired a mastery of tonal relationships that formed the basis of his art, for the balance and gradation of light and dark tones was always more important to him than the choice of colour. In the winter Corot would retire to his Paris studio to work on some much larger pictures, which he liked to have ready for exhibition at the annual Salon when it opened in May.

His first important work, "Le Pont de Narni," was shown at the Paris Salon in 1827, when he was still in Italy. In 1833 he exhibited a large landscape of the forest of Fontainebleau, which was awarded a second-class medal: this gave Corot the right to show his pictures without submission to the jury for their approval.

From May to October of 1834 Corot made his second visit to Italy. He painted views of Volterra, Florence, Pisa, Genoa, Venice, and the Italian lake district. He collected enough material in small sketches to last him the rest of his life, although he returned to Italy briefly in the summer of 1843, for the last time.

Apart from these visits to Italy, Corot had an exceptionally uneventful life. As a young man he had traveled widely in the provinces of France, sketching wherever he went. When he grew older he moved around less. Important trips were made to Avignon and the south of France in 1836, to Switzerland in 1842 and on several other occasions, to The Netherlands in 1854, and to London in 1862. His favourite regions of France were the forest of Fontainebleau, Brittany, the Normandy coast, the family property at Ville-d'Avray near Paris, and, later in life, Arras and Douai—in the north of France—where close friends lived.

Throughout his life Corot liked occasionally

to paint straightforward topographical landscapes, depicting buildings such as the cathedral at Chartres (1830) or the belfry at Douai (1871) exactly as they appeared to him. But the basic division in his work was between the sketch made from nature—small, direct, spontaneous—and the large finished picture done for the Salon. In the early 19th century the sketch was thought to be unsuitable for public exhibition, and there were only a few connoisseur collectors who would buy such pictures. The finished landscapes were preferred. These were considered even more dignified if they included a few small figures who could be identified with the heroic characters of legend, literature, or the Bible. Thus, Corot exhibited pictures with such titles as "Hagar in the Wilderness" (Salon 1835), "Diana Surprised by Actaeon" (Salon 1836), "Homer and the Shepherds" (Salon 1845), and "Christ in the Garden of Olives" (Salon 1849).

He was not really very interested in such subject matter, and, as tastes changed in the middle of the century, he bothered less about it. He was happy to introduce pretty young girls into the landscape, showing them as shepherdesses or sometimes, more daringly, as nude or half-dressed bathers, dipping their delicate feet in a pool. In the 1860s he invented a new kind of landscape, the "Souvenirs," in which he made compositions out of standardized elements—usually a lake with diaphanous trees painted in an overall silvery tonality—to evoke a mood of gentle melancholy. At the end of his life, he also painted a number of portraits and figure studies, especially of young women posed in his studio holding a flower or a musical instrument or looking at a landscape on the easel. These more private pictures Corot almost never exhibited.

During the 1830s Corot showed regularly at the Paris Salon and had some critical success. Yet he sold very few pictures and was glad of his father's allowance. Then, in 1840, the state purchased one of his exhibits, "The Little Shepherd" ("Le Petit Berger"), and, five years later, the poet and art critic Charles Baudelaire could write in his review of the 1845 Salon that "Corot stands at the head of the modern school of landscape." In 1846 he was made a member of the Legion of Honour, and, when his father died, in 1847, Corot was able to feel that he had justified the family's support of his ambition to be a painter.

Years of success. By the 1850s collectors and dealers were eagerly seeking his pictures, and Corot henceforth had no material worries. He went on sending big pictures to the salons, where they fetched high prices. At the 1855 Paris Universal Exhibition he was awarded a first-class medal for painting, and Emperor Napoleon III bought a picture from him. In 1867 he was promoted to officer of the Legion of Honour. But taste was changing, and private collectors, especially in the United States, began to buy Corot's smaller, sketchier work. Though he was a prolific artist and painted more than 3,000 pictures, demand outran supply, and Corot was much imitated and faked. In the 20th century, appreciation of Corot has shifted again to show a marked preference for the earlier, more naturalistic sketches over the later, more self-consciously poetic ones. Corot's self-consciously poetic and idyllic landscapes with their sensitive tonal effects and delicate range of silvery colours won him great popularity late in his life; but these pearly gray, mist-enveloped twilight scenes now appear artificial and formulaic compared with Impressionist landscape painting. The portraits and figure studies of the last 20 years of Corot's life, such as "L'Atelier" (several versions, *c.* 1865) and "La Perle" (1868–70), are much less artificial and bear witness to Corot's innate classicism and his absolute mastery of tonal painting.

Success made little difference to Corot, who was a man of extremely conservative habits. He always worked very hard because he loved his work, and this left him little time for other things. He liked to talk about the harmonies of his painting, and his late work in particular aspires to the qualities of music. He kept the modern world firmly out of his pictures: the people in his landscapes are timeless peasant figures or characters from myth and literature. There is never a sign of the vast railway network that covered France in his lifetime or of the industrial and commercial development that transformed the country.

Corot enjoyed the company of fellow painters and was a close friend of the Barbizon group of artists, especially Jean-François Millet, Théodore Rousseau, and Charles-François Daubigny. He used his money to give unostentatious help to less successful friends, such as the cartoonist Honoré Daumier. Without going out of his way to support them in public, Corot was sympathetic to younger painters. He gave lessons to the later Impressionists Camille Pissarro and Berthe Morisot and had many pupils and disciples. "Papa Corot" was universally loved for his unfailing kindness and generosity during his last years.

Corot's place in the history of 19th-century painting is an assured one. He is no longer regarded as a major master, but his contribution was essential. If his larger pictures often look empty and rhetorical, his unpretentious paintings are a constant delight because of the freshness of their observation and the effortless ease of technique. When he started painting, the landscape sketch was regarded primarily as raw material for more considered work and was of no great artistic consequence in itself. Corot was one of the first to show that the sketch had qualities of vitality and spontaneity, a basic truth to nature that a more finished picture lacked. At the time of his death the sketch had triumphed, and any artificiality or contrivance in landscape painting was regarded with suspicion. Corot had helped to prepare the way for the Impressionist landscape painters, who learned much from him and who looked upon him with respect and veneration. (Al.Bo.)

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Corowa, town on the Murray River, New South Wales, Australia. Immediately on the opposite side of the Murray River, in Victoria, is the twin town of Wahgunyah. Corowa was established in 1858. The Corowa Conference in 1893 marked an important point in the movement for federation of the Australian colonies. Situated in a section of the Riverina that produces wool, wheat, cattle, and fruits, Corowa has flour mills, timber mills, malt and stock-feed processing plants, and wineries. Lying just off the Murray Valley and Riverina highways, the town has air and rail connections with Sydney (312 miles [502 km] northeast) and Melbourne. Corowa was proclaimed a town in 1885; it became a shire in 1955 and a municipality in 1963. Pop. (1991), including Wahgunyah, 5,064.

Corozal, town, northern Belize. It is a port on Chetumal Bay (Caribbean Sea) across from the southeast corner of Mexico. Economic activities include sugar refining, rum distilling, and fish processing. Coconuts, sugar, and corn (maize) are exported. Pop. (1992 est.) 7,104.

corporal punishment, the infliction of physical pain upon a person's body as punishment for a crime or infraction. Corporal punishments include flogging, beating, branding, mutilation, blinding, and the use of the stock and pillory. In a broad sense, the term also denotes the physical disciplining of children in the schools and at home.

Early Babylonian law developed the principle of *lex talionis,* which asserted that criminals should receive as punishment precisely those injuries they had inflicted upon their victims. Many subsequent societies applied this "eye-for-an-eye and tooth-for-a-tooth" principle quite literally in dealing with offenders. From ancient times through the 18th century, corporal punishments were commonly used in those instances that did not call for the death penalty or for exile or transportation. But the growth of humanitarian ideals during the Enlightenment and afterward led to the gradual abandonment of corporal punishment, and by the later 20th century it had been almost entirely replaced by imprisonment or other nonviolent penalties.

Corporal punishment no longer exists in the legal systems of most developed nations of the world. The last floggings in the United States, for example, were carried out in the state of Delaware in 1952 (the practice was abolished there in 1972). British criminal law stood as a rare exception in its legal prescription of whipping as punishment for some offenses, but the infliction of this penalty was severely limited by the Criminal Justice Act of 1948 and was abolished in 1967. Whipping and even amputation remain prescribed punishments in several Middle Eastern nations that strictly observe Islāmic law, however. Beatings and other corporal forms of disciplinary action are still administered, whether legally or covertly, in the prison systems of many countries. Corporal punishment is explicitly prohibited by several international conventions on human rights, including the European Convention on Human Rights and the United Nations' "Standard Minimum Rules for the Treatment of Prisoners."

An important rationale for the use of corporal punishment has historically been that the pain, injury, humiliation, and degradation it inflicted would deter the offender from committing similar offenses in the future. It was also maintained that, for instance, the amputation of a pickpocket's right hand would lessen his physical ability to commit similar crimes in the future or that the branding of a telltale mark upon his forehead would alert his potential victims in a crowd to take special precautions while they were in his vicinity. The claim that corporal punishment is an especially effective deterrent has been refuted by empirical evidence, however, which shows that offenders who are punished by corporal means are actually slightly more likely to commit further crimes than are those punished by imprisonment. Although there have been some calls for the reinstitution of corporal punishment in response to rising crime rates in the United States and other countries in the post-World War II era, corporal punishment continues to be regarded as an inhumane and barbaric relic of the criminal-justice systems of bygone eras. *See also* flogging.

corporate finance, the acquisition and allocation of a corporation's funds, or resources, with the objective of maximizing shareholder wealth (*i.e.,* stock value). In the financial management of a corporation, funds are generated from various sources (*i.e.,* from equities and liabilities) and are allocated (invested) for desirable assets.

The first function of corporate finance, resource acquisition, refers to the generation of funds from both internal and external sources at the lowest possible cost to the corporation. Two main categories of resources are equity (*i.e.,* owners' equity) and liability. Examples of equity are proceeds from the sale of stock, returns from investments, and retained earn-

ings. Liabilities include bank loans or other debt, accounts payable, product warranties, and other types of commitments from which an entity derives value.

Resource allocation, the second function of corporate finance, is the investment of funds with the intent of increasing shareholder wealth over time. Two basic categories of investments are current assets and fixed assets. Current assets include cash, inventory, and accounts receivable. Examples of fixed assets are buildings, real estate, and machinery. In addition, the resource allocation function is concerned with intangible assets such as goodwill, patents, workers, and brand names.

It is the job of a corporation's financial manager or managers to conduct both of the aforementioned functions in a manner that maximizes shareholder wealth, or stock price. Financial managers must balance the interests of owners, or shareholders; creditors, including banks and bondholders; and other parties, such as employees, suppliers, and customers. For example, a corporation may choose to invest its resources in risky ventures in an effort to offer its shareholders the potential for large profits. However, risky investments may reduce the perceived security of the company's bonds, thus decreasing their value in the bond market and increasing the rate of interest that the firm must pay to borrow money in the future. Conversely, if the corporation invests too conservatively, it could fail to maximize the value of its equity. If the firm performs better than other companies, its stock price will rise, in theory, enabling it to raise additional funds at a lower cost, among other benefits.

Practical issues and factors influenced by corporate finance include employee salaries, marketing strategies, customer credit, and the purchase of new equipment. *See also* business finance.

corporate income tax, a tax imposed by public authorities on the incomes of corporations. *See* income tax.

corporate state, society governed by and composed of economic units of employers and employees in certain broad industries, all of which are subordinate to the state. *See* corporatism.

corporation, also called LIMITED LIABILITY COMPANY, a specific legal form of organization of persons and material resources, chartered by the state, for the purpose of conducting business.

A brief treatment of business corporations follows. For full treatment, *see* MACROPAEDIA: Business Organization.

As contrasted with the other two major forms of business ownership, the sole proprietorship and the partnership, the corporation is distinguished by a number of characteristics that make it a more flexible instrument for large-scale economic activity, particularly for the purpose of raising large sums of capital investment. Chief among these features are: (1) limited liability, meaning that capital suppliers are not subject to losses greater than the amount of their investment; (2) transferability of shares, whereby rights in the enterprise may be transferred readily from one investor to another without reconstituting the organization under law; (3) juridical personality, meaning that the corporation itself as a fictive "person" has legal standing and may thus sue and be sued, may make contracts, and may hold property in a common name; and (4) indefinite duration, whereby the life of the corporation may extend beyond the participation of any of its incorporators. The owners of the corporation in a legal sense are the shareholders, who purchase with their investment of capital a share in the proceeds of the enterprise and who are nominally entitled to a measure of control over the financial management of the corporation.

The form of the modern business corporation originated in a fusion of the type of commercial association known as the joint-stock company, which was in fact a partnership, and the traditional legal form of the corporation as it had been developed for medieval guilds, municipalities, monasteries, and universities. Although business corporations were formed in England as early as the 16th century, these early enterprises were monopolies chartered by the crown for the pursuit of strict mercantilist policies and were thus closer, in some respects, to the form of the modern public corporation than to that of the private business corporation.

The fusion of the two forms took place gradually over the first two-thirds of the 19th century in Great Britain, the United States, France, and Germany with the passage of general incorporation laws, which gradually made incorporation a more or less routine matter for business enterprises. Particularly influential for this development in the United States was the fact that powers of incorporation were largely reserved to the individual states under the Constitution, which led in the late 19th century to a competition among the states for liberalization of their respective incorporation laws. Given the freedom of interstate commerce guaranteed under the Constitution, would-be incorporators could choose the state in which they wished to incorporate without compromising their freedom to transact business in any other state.

Strong impetus for this fusion of the two forms arose from, and was intensified by, the spread of new capital-intensive technologies of production and transportation. In particular, the construction of railroads, a matter of pressing national importance for all industrializing nations in the late 19th century, required large sums of capital that could be secured only through the corporate form and, in fact, only with many innovations in the development of financial and debt instruments within the corporate form. Moreover, the railroads made possible, and in some cases made necessary, an enormous expansion of existing industries (notably steel and coal) that the corporate form alone could support. By the final third of the 19th century the last legal obstacles to the corporate form were removed, and the ensuing period (*c.* 1870–1910) saw an unprecedented expansion of industrial production and the concomitant predominance of the corporate form. With these developments came new problems. Industrial behemoths such as the Standard Oil Company and United States Steel came to exercise monopolistic powers in their respective economic spheres, often apparently at the cost of the public interest. Antitrust legislation, aimed at preserving competition, was the chief result of public concern over such abuses. Control of the enterprise by its nominal owners, the shareholders, became impossible when the number of shareholders for the largest companies grew to the tens of thousands and as the practice of proxy voting (*i.e.,* the voting of shares of absent stockholders by management in the annual shareholders' meetings) was legalized and adopted. Salaried managers came to exercise virtually proprietary discretion over the corporation and its assets, giving rise to debates that continue today over the nature of ownership and the social responsibility of corporations.

The contemporary social and economic importance of business corporations is beyond dispute. The millions of corporations throughout the world dominate the mining, manufacturing, and service-industry sectors of most developed and many developing nations.

Corporation of Lloyd's: *see* Lloyd's of London.

corporatism, also called CORPORATIVISM, Italian CORPORATIVISMO, the theory and practice of organizing the whole of society into "corporations" subordinate to the state. According to the theory, workers and employers would be organized into industrial and professional corporations serving as organs of political representation and controlling to a large extent the persons and activities within their jurisdiction. In actual practice, however, as the "corporate state" was put into effect in Fascist Italy between World Wars I and II, it reflected the will of the dictator rather than the adjusted interests of economic groups.

Although the corporate idea was intimated in the Congregationalism of colonial Puritan New England and in mercantilism, its earliest theoretical expression came after the French Revolution and was strongest in eastern Germany and Austria. The chief spokesman for this corporatism, or "distributism" (as it was later called in Germany), was Adam Müller, court philosopher for Prince Metternich. His attacks on French egalitarianism and on the economics of Adam Smith were vigorous attempts to find a modern justification for traditional institutions and led him to conceive a modernized *Ständestaat* ("class state"), which might claim sovereignty and divine right because it would be organized to regulate production and to coordinate class interests. Its classes, or estates (*Stände*), though roughly equivalent to the feudal classes, were to operate as guilds, or corporations, each controlling a specific function of social life. Müller's theories were buried with Metternich, but after the end of the 19th century they regained life. On the European continent they served movements analogous to guild socialism, which flourished in England and had many features in common with corporatism, though its sources and aims were largely secular. In France, Germany, Austria, and Italy, Christian syndicalists revived the theory of corporations in order to combat the revolutionary syndicalists on the one hand and the socialist political parties on the other. The most systematic exposition of such theory was made by the Austrian economist Othmar Spann and by the Italian leader of Christian Democracy, Giuseppe Toniolo.

The advent of Italian Fascism gave an opportunity to put the theories of the corporate state into practice, for in order to gain power Benito Mussolini and his associates in 1919 at Milan needed the support of the syndicalist wing of the Nationalist Party. The Fascists viewed corporations as a useful form of social organization that could provide the vehicle for a broad-based and socially harmonious class participation in economic production.

The practical work of creating Italian Fascist syndicates and corporations began immediately after Mussolini's march on Rome in 1922 and resulted in the creation of 22 distinct corporations (1934) and a national Council of Corporations (1936). However, the autonomous corporations had barely begun to function, and the national council had barely begun to sit, when World War II broke out and the system broke up.

To make the best use of the Britannica, consult the INDEX *first*

Corps Législatif, English LEGISLATIVE CORPS, the legislature in France from 1795 to 1814. In the period of the Directory (*q.v.*) it was the name of the bicameral legislature made up of the Council of Five Hundred and the Council of Ancients. Under Napoleon's consulate, legislative powers were nominally divided among three bodies: the Tribunate (Tribunat), which proposed and debated; the Corps Législatif, comprising about 300 members, which enacted or rejected proposed legislation; and the Conservative Senate (Sénat

Conservateur), which "guarded the constitution." At first the legislature did enjoy powers of legislation, within limits, but gradually Bonaparte found the process too slow and went over the heads of the legislature by means of direct orders to his ministers. After enactment of the Constitution of Year XII (1804), which established the empire, the Corps Législatif, like the other bodies, lost power and persisted only in form and name. In 1814, under Louis XVIII, the system was abolished.

corpse gate (architecture): *see* lych-gate.

corpse plant (herb): *see* Indian pipe.

corpulence: *see* obesity.

Corpus Christi, city, seat (1846) of Nueces county, southern Texas, U.S., port on Corpus Christi Bay at the mouth of the Nueces River, 145 mi (233 km) southeast of San Antonio; it is sheltered from the Gulf of Mexico by Mustang and Padre islands. Founded in 1838 by Col. Henry Lawrence Kinney as a trading post, it was named (1846) after the bay. It was the scene of Mexican War operations and Civil War blockade skirmishes. The railroads arrived (1881–1909), stimulating a land boom. The exploitation of gas (1923), development of the deepwater port (1926), and the discovery of the Saxtet oil field (1939) laid the economic foundation for a modern city. The port, on the Gulf Intracoastal Waterway, handles bulk cargoes, including grain, cotton, ores, petroleum, and raw materials. The city's economy also embraces petrochemicals, aluminum, glass, agriculture, the seafood industry, and tourism. Resort facilities (fishing and water sports) are based on the bay and the coastal barrier islands, including the Padre Island National Seashore, stretching 113 mi southward almost to Brownsville. The huge Corpus Christi Naval Air Station (1941) and an Army depot also contribute to the economy. The city is the home of Corpus Christi State University (1973) and Del Mar College (1935). Inc. 1852. Pop. (1990) city, 257,453; Corpus Christi MSA, 349,894.

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Corpus Christi, Feast of, festival of the Western Christian Church in honour of the Real Presence of the body (*corpus*) of Jesus Christ in the Eucharist. A movable observance, it is observed on the Thursday (or, in some countries, the Sunday) after Trinity Sunday. It originated in 1246 when Robert de Torote, bishop of Liège, ordered the festival celebrated in his diocese. He was persuaded to initiate the feast by Blessed Juliana, prioress of Mont Cornillon near Liège (1222–58), who had experienced a vision. It did not spread until 1261, when Jacques Pantaléon, formerly archdeacon of Liège, became pope as Urban IV. In 1264 he ordered the whole church to observe the feast. Urban's order was confirmed by Pope Clement V at the Council of Vienne in 1311–12. By the mid-14th century the festival was generally accepted, and in the 15th century it became, in effect, the principal feast of the church.

The procession became the feast's most prominent feature and was a pageant in which sovereigns and princes took part, as well as magistrates and members of guilds. In the 15th century the procession was customarily followed by the performance by guild members of miracle plays and mystery plays.

After the doctrine of transubstantiation was rejected during the Reformation, the festival was suppressed in Protestant churches.

Corpus Christi Bay, inlet of the Gulf of Mexico, forming a deepwater harbour for the city of Corpus Christi, in southern Texas, U.S. The bay is 25 mi (40 km) long and 3–10 mi wide and is sheltered on the east from the Gulf by Mustang Island. It is linked to Aransas Bay (north) and Laguna Madre (south) by the Gulf Intracoastal Waterway. The entrance to the Gulf is through Aransas Pass, north of Mustang Island. A western extension, Nueces Bay,



Corpus Christi, Texas, on Corpus Christi Bay
By courtesy of the Corpus Christi Area Tourist Bureau

receives the Nueces River. The bay supplies oyster shells for use in chemical plants, and its shipping serves the petroleum, chemical, and agricultural industries. The area is popular for sport fishing, waterfowl hunting, and boating. The bay was entered on the feast day of Corpus Christi in 1519 by Alonso de Pineda, who claimed the region for Spain.

Corpus Juris Canonici, English CORPUS OF CANON LAW, set of six compilations of law in the Roman Catholic Church that provided the chief source of ecclesiastical legislation from the Middle Ages until it was superseded in 1917 by the *Codex Juris Canonici* (*Code of Canon Law*). The *Corpus* included four official collections: the *Decretum Gratiani* ("Decree of Gratian"), written between 1141 and 1150; the *Decretals* of Pope Gregory IX (1234); the *Liber Sextus* ("Book Six") of Pope Boniface VIII (1298); and the *Clementinae* of Pope Clement V (1317); and two private collections: the *Extravagantes* of Pope John XXII (1325) and the *Extravagantes communes* ("Decretals Commonly Circulating")—the decretals, or replies of the pope to particular questions of church discipline, from Pope Boniface VIII to Pope Sixtus IV—both of which were compiled at the beginning of the 16th century by Jean Chappuis, a canonist at the University of Paris. The title *Corpus Juris Canonici* was first applied to the six collections by Pope Gregory XIII in the document *Cum pro munere* (1580), which approved an edition of the works as textually authentic.

These collections did not form a closed body of ecclesiastical law, prohibiting any new laws from being added, but, in fact, no new official collections of church law were promulgated between the *Clementinae* and the Council of Trent (1545–63). The bishops at the Council of Trent requested new critical editions of Sacred Scripture, of liturgical books, and of the *Corpus Juris Canonici.* In response to this request, a commission of cardinals and canonists prepared a scientific critical edition of the *Corpus* between 1560 and 1582. In 1582 Gregory XIII issued the revised text of the *Corpus* and ordered its use in schools of canon law and in church courts. It remained the preponderant influence in Roman Catholic Church law until 1918.

Corpus Juris Civilis (Roman law): *see* Justinian, Code of.

corpus luteum, yellow, hormone-secreting body in the female reproductive system. It is formed in an ovary at the site of a follicle, or sac, that has matured and released its ovum, or egg. The "yellow body" secretes progesterone, a hormone that causes changes in the uterus that make it more suitable for implantation of the fertilized ovum and the nourishment of the embryo. If the egg is not fertilized, the corpus luteum becomes inactive after 10–14 days and menstruation occurs. *See also* ovary; ovulation.

Corrado (Italian personal name): *see under* Conrad, except as below.

Corrado DI SUBURRA: *see* Anastasius IV *under* Anastasius (Papacy).

corrale: *see* courtyard theatre.

Correggio, byname of ANTONIO ALLEGRI (b. August 1494, Correggio, Modena—d. March 5, 1534, Correggio), most important Renaissance painter of the school of Parma, whose late works influenced the style of many Baroque and Rococo artists. His first important works are the convent ceiling of S. Paolo (*c.* 1519), Parma, depicting allegories on Humanist themes, and the frescoes in S. Giovanni Evangelista, Parma (1520–23), and the cathedral of Parma (1526–30). The "Mystic Marriage of St. Catherine" (*c.* 1526) is among the finest of his poetic late oil paintings.

Early life and career. His father was Pellegrino Allegri, a tradesman living at Correggio, the small city in which Antonio was born and



"Jupiter and Io," oil painting by Correggio, *c.* 1530; in the Kunsthistorisches Museum, Vienna
By courtesy of the Kunsthistorisches Museum, Vienna

died, and whose name he took as his own. He was not, as it is often alleged, a self-taught artist. His early work refutes the theory, for it shows an educated knowledge of optics, perspective, architecture, sculpture, and anatomy. His initial instruction probably came from his uncle, Lorenzo Allegri, a painter of moderate ability, at Correggio. About 1503 he probably studied in Modena and then went to Mantua, arriving before the death in 1506 of the famed early Renaissance painter Andrea Mantegna. It has traditionally been said that he completed the decoration of Mantegna's family chapel in the church of S. Andrea at Mantua after the artist's death. It seems certain the two round

paintings, or tondi, of the "Entombment of Christ" and "Madonna and Saints" are by the young Correggio. Although his early works are pervaded with his knowledge of Mantegna's art, his artistic temperament was more akin to that of Leonardo da Vinci (1452–1519), who had a commanding influence upon almost all of the Renaissance painters of northern Italy. Where Mantegna uses tightly controlled line to define form, Correggio, like Leonardo, prefers chiaroscuro, or a subtle manipulation of light and shade creating softness of contour and an atmospheric effect. It is also fairly certain that early in his career he visited Rome and came under the influence of the Vatican frescoes of Michelangelo and Raphael.

Leaving Mantua, Correggio's time was divided between Parma and his hometown. His first documented painting, an altarpiece of the "Madonna of St. Francis," was commissioned for S. Francesco at Correggio in 1514. The best known works of his youth are a group of devotional pictures that became increasingly luscious in colour. They include the "Nativity" (Brera, Milan), "Adoration of the Kings," and "Christ Taking Leave of His Mother."

Mature works. Correggio's mature style emerged with his first commission for Parma, the ceiling of the abbess' parlour in the convent of S. Paolo, which was probably executed about 1518–19. Although there are echoes in this work of Mantegna's murals in the Castello at Mantua (1494), it was wholly original in conception. The abbess Giovanna de Piacenza secured for Correggio another important appointment, to decorate the dome of the church of S. Giovanni Evangelista at Parma. The dome fresco of the "Ascension of Christ" (1520–23) was followed by the decoration of the apse of the same church, of which only the segment entitled "Coronation of the Virgin" survives (Galleria Nazionale, Parma), the remainder having been destroyed in 1587. This work was still in the High Renaissance tradition and owed much to Michelangelo.

The fresco of the "Assumption of the Virgin" in the dome of the cathedral of Parma marks the culmination of Correggio's career as a mural painter. This fresco (a painting in plaster with water-soluble pigments) anticipates the Baroque style of dramatically illusionistic ceiling painting. The entire architectural surface is treated as a single pictorial unit of vast proportions, equating the dome of the church with the vault of heaven. The realistic way the figures in the clouds seem to protrude into the spectators' space is an audacious and astounding use for the time of foreshortening.

The remainder of Correggio's most famous works, the dates of few known with certainty, fall into three groups: the great altarpieces (and a few other large religious compositions); exquisite small works of private devotion; and a handful of mythological subjects of a lyrically sensuous character. Many of the altarpieces became so well known that they acquired nicknames. The "Adoration of the Shepherds" (*c.* 1530; Gemäldegalerie, Dresden, Ger.) is called "Night" ("La Notte"), and the "Madonna of St. Jerome" (Galleria Nazionale, Parma) is popularly known as "Day" ("Il Giorno"). The late altarpieces are generally characterized by an intimate and domestic mood sustained between idealized figures. This intimate and homely poetry also distinguishes the small devotional works, such as "The Madonna of the Basket" or "The Virgin Adoring the Child Jesus" (Uffizi, Florence), while the "Mystic Marriage of St. Catherine" is a visual essay in the mid-16th-century aesthetic of ideal feminine beauty. In these late works Correggio fully exploited the medium of oil painting. He was intrigued with the sensual beauty of paint texture and achieved his most remarkable effects in a series of mythological works, including the "Danae" (Borghese Gallery, Rome), "The Rape of Ganymede," and "Jupiter and Io" (both in the Kunsthistorisches Museum, Vienna). The sensuous character of the subject matter is enhanced by the quality of the paint, which seems to have been lightly breathed onto the canvas. These pictures carry the erotic to the limits it can go without becoming offensive or pornographic.

Although his influence can be detected in later Parmese painting, especially in the Mannerist style of Parmigianino (1503–40), Correggio had many imitators but no direct pupils who deserve mention. His decorative ideas were taken up by the Baroque painters of the 17th century, particularly in the ceiling painting of Giovanni Lanfranco (1582–1647), himself a native of Parma. Correggio became almost a tutelary deity of the French Rococo style, and his great altarpieces were among the works most abundantly copied by the travelling artists of the 18th century during their years of study in Italy. (E.K.W.)

MAJOR WORKS. *Paintings.* "The Mystic Marriage of St. Catherine" (1510–14; National Gallery of Art, Washington, D.C.; Detroit Institute of Arts); "Madonna of St. Francis" (1514; Gemäldegalerie, Dresden, Ger.); "Adoration of the Kings" (*c.* 1514; Brera, Milan); "Madonna" (Art Institute of Chicago); "Four Saints" (1514–17; Metropolitan Museum of Art, New York City); "Christ Taking Leave of His Mother" (1514–17; National Gallery, London); "Campori Madonna" (1514–17; Galleria e Museo Estense, Modena, Italy); frescoes (1517–20; Camera di S. Paolo, Parma, Italy); frescoes (1520–23; cupola of S. Giovanni Evangelista, Parma); "Mystic Marriage of St. Catherine" (1520–26; Louvre, Paris); "The Sojourn in Egypt" (1520–26; Uffizi, Florence); "The Madonna of the Basket" (1520–26; National Gallery, London); "Noli Me Tangere" (1520–26; Prado, Madrid); "Ecce Homo" (1520–26; National Gallery, London); "Madonna of St. Sebastian" (1520–26; Gemäldegalerie, Dresden); "Madonna of St. Jerome," "Il Giorno" (1523; Galleria Nazionale, Parma); "Madonna of the Bowl" (*c.* 1525; Galleria Nazionale, Parma); "Holy Family with St. James" (*c.* 1525; Hampton Court, Middlesex); "Assumption of the Virgin" (1526–30; cupola of cathedral, Parma); "The School of Love" (*c.* 1532; National Gallery, London); "The Virtues" (*c.* 1530; Galleria Doria-Pamphili, Rome); "The Virtues" (*c.* 1530s; Louvre); "Leda" (*c.* 1530s; Staatliche Museen Preussischer Kulturbesitz, Berlin).

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Correggio FAMILY, Italian feudal family who were lords of Correggio, near Reggio Emilia, from the 11th to the 17th century. During the 13th century, as leaders of the Guelfs, they came to dominate the politics of Parma; and in 1303 Ghiberto da Correggio was acclaimed lord of the city, which he ruled until 1316. In 1341 his son Azzo, a friend of Petrarch, who dedicated to him the *De remediis utriusque fortunae*, recovered control of Parma, only to sell it again three years later to the Este family of Ferrara. Correggio itself, however, remained independent, being raised to the rank of countship in 1452 and to that of principality in 1616. Shortly afterward, in 1630, Siro da Correggio was condemned by the Holy Roman emperor Ferdinand II to pay a heavy fine for minting bad coin; unable to raise the sum he was forced to cede Correggio to the Este of Modena in 1634. The family came to an end with the death of Camillo in 1711.

corregidor (Spanish: "magistrate," literally "corrector"), Spanish government official, first appointed by King Alfonso XI of Castile in the 14th century and later extended to Spanish colonies in America. The *corregidores* were administrators of cities and districts with both administrative and judicial powers. The Catholic Monarchs used them wherever local potentates tended to override the electoral process, and *corregidores* served to strengthen royal authority rather than revive local responsibility. They were replaced in the mid-18th century by *alcaldes mayores* ("mayors"). In Spanish America the *corregidor de Indios* was the magistrate who ruled Indian communities, generally obtaining his post by purchase and often regarded as oppressive. Pedro Antonio de Alarcón's *El sombrero de tres picos* ("The Three-Cornered Hat"), a novel published in 1874, satirized the overbearing and intriguing official.

Corregidor Island, rocky island, strategically located at the entrance of Manila Bay, just south of Bataan province, Luzon, Philippines. It is a national shrine commemorating the battle fought there by U.S. and Filipino forces against overwhelming numbers of Japanese during World War II.

The small (2-sq-mi [5-sq-km]) island, part of the province of Cavite, has long been considered a natural fortress. The Spanish fortified it in the 18th century, when it was used as a registration (corregidor) site for ships entering the bay. After the Spanish–American War, the island became a U.S. military station, and an elaborate system of tunnels and emplacements was constructed. When Japan invaded the Philippines (December 1941), Gen. Douglas MacArthur chose Bataan and Corregidor Island as his major defense positions. Bataan fell on April 9, 1942, and Corregidor Island became the last outpost of organized resistance in the islands. Lieut. Gen. Jonathan Wainwright and his forces repelled the invaders for 27 days, until May 6, 1942, when they were forced to surrender Corregidor Island to Lieut. Gen. Homma Masaharu. U.S. forces regained the island in 1945.

On Corregidor Island are the Pacific War Memorial, numerous gunneries, and the Malinta Tunnel, which served as a supply depot, hospital, and MacArthur's headquarters. Since the mid-1950s, the island has been the site of a military training camp in counterguerrilla tactics.

Correia Garção, Pedro Antônio: *see* Garção, Pedro Antônio Correia.

Correns, Carl Erich (b. Sept. 19, 1864, Munich—d. Feb. 14, 1933, Berlin), German botanist and geneticist who in 1900, independent of, but simultaneously with, the biologists Erich Tschermak von Seysenegg and Hugo de Vries, rediscovered Gregor Mendel's historic paper outlining the principles of heredity. In attempting to ascertain the extent to which Mendel's laws are valid, he undertook a classic study of non-Mendelian heredity in variegated plants, such as the four-o'clock (*Mirabilis jalapa*), which he established (1909) as the first conclusive example of extrachromosomal, or cytoplasmic, inheritance (cases in which certain characteristics of the progeny are determined by factors in the cytoplasm of the female sex cell).

While an instructor of botany at the University of Tübingen (1892–1902), Correns conducted research with garden peas, from which he drew the same conclusions that Mendel had. Surveying the literature on the subject, he discovered the paper that Mendel had published 34 years earlier. Working at the universities of Leipzig (1902–09) and Münster (1909–14), Correns helped provide the overwhelming body of evidence in support of Mendel's thesis, anticipating the U.S. geneticist Thomas Hunt Morgan's development of the concept of linkage when he postulated a

physical coupling of genetic factors to account for the consistent inheritance of certain characters together. In 1914 he was appointed first director of the Kaiser Wilhelm Institute for Biology, Berlin, where he remained until his death.

corrente (dance): *see* courante.

Correr, Angelo (pope): *see* Gregory XII.

Correspondence, Committees of, groups appointed by the legislatures in the 13 British American colonies to provide colonial leadership and aid intercolonial cooperation. Samuel Adams organized the first group at Boston in November 1772, and within three months 80 others had been formed locally in Massachusetts. In March 1773 Virginia organized legislative standing committees for intercolonial correspondence, with Thomas Jefferson and Patrick Henry among their 11 members. The committees played a major role in promoting colonial unity and in summoning in September 1774 the First Continental Congress (*see* Continental Congress), a majority of whose delegates were committee members.

correspondence education, method of providing education for nonresident students, primarily adults, who receive lessons and exercises through the mails or some other device and, upon completion, return them for analysis, criticism, and grading. It is extensively used by business and industry in training programs, by men and women in the armed forces, and by the governments of many nations as part of their educational program. It supplements other forms of education and makes independent study programs readily available.

The correspondence movement evolved in the mid-19th century, fuelled by the need for an educated trade and working class brought on by industrial and urban development, and facilitated by the development of improved printing and postal services. Correspondence courses were first offered in Great Britain, Germany, and the United States but spread rapidly throughout the world.

Originally correspondence courses were largely confined to vocational subjects; now, however, private correspondence schools, industry, government agencies, and universities offer such courses in virtually any field from the elementary school to the postgraduate level. Many of the subjects are not generally given in residence schools: camera repair, horology (clock-making and repair), floristry, locksmithing, gemology, and safety, for example.

Instruction may be wholly by correspondence or by a combination of home study and resident seminars or laboratory work. It may include sound records or tapes, slides, films, videotapes or videodisks, teaching machines, computers, and the use of telephone, radio (including a two-way radio with each student using a transceiver, as in the Australian outback), and television. In the late 20th century the advent of electronic mail (correspondence delivered by means of electronic printing or display devices) is expected to increase the speed of response to student work.

Courses often include kits of tools or instruments and materials to be processed, as well as texts and study guides. Courses in Braille and on records or cassettes are available for the visually handicapped.

Many schools offer guidance and placement services, though the U.S. Federal Communications Commission in 1981 cracked down on some schools for implying more in the way of future employability or placement help than they actually delivered. Programs sponsored by schools and other public agencies often include special provisions for periodic home visits by teachers, occasional student get-togethers at local centres, or series of short-term residential school sessions for school-age children, as in New Zealand, or for discussion groups or study circles, as in Romania.

correspondence principle, philosophical guideline for the selection of new theories in physical science, requiring that they explain all the phenomena for which a preceding theory was valid. Formulated in 1923 by the Danish physicist Niels Bohr, this principle is a distillation of the thought that had led him in the development of his atomic theory, an early form of quantum mechanics.

Early in the 20th century, atomic physics was in turmoil. The results of experimentation presented a seemingly irrefutable picture of the atom: tiny electrically charged particles called electrons continuously moving in circles around an oppositely charged and extraordinarily dense nucleus. This picture was, however, impossible in terms of the known laws of classical physics, which predicted that such circulating electrons should radiate energy and spiral into the nucleus. Atoms, however, do not gradually lose energy and collapse. Bohr and others who tried to encompass the paradoxes of atomic phenomena in a new physical theory noted that the old physics had met all challenges until physicists began to examine the atom itself. Bohr reasoned that any new theory had to do more than describe atomic phenomena correctly; it must be applicable to conventional phenomena, too, in such a way that it would reproduce the old physics: this is the correspondence principle.

The correspondence principle applies to other theories besides quantum theory. Thus the mathematical formulations for the behaviour of objects moving at exceedingly high speeds, described by relativity physics, reduce for low values of speed to the correct descriptions of the motions of daily experience.

Corrèze, *département*, Limousin region, south central France, on the western fringe of the Massif Central, in the southern part of the historic province of Limousin (*q.v.*). Occupying 2,263 sq mi (5,860 sq km), it is watered by several rivers, including the Dordogne, which drains its southwestern section. The Corrèze River, 55 mi (90 km) long, flows through Tulle (*q.v.*), the departmental capital, and Brive-la-Gaillarde (*q.v.*), the principal town. The Plateau de Millevaches, in the north, where many points rise above 3,000 ft (900 m), separates the basin of the Loire and the Garonne. The climate is damp and cold in the northeastern area, which is used for pasture, particularly for sheep; in the southwest, intersected by numerous fertile valleys, it is mild and agreeable.

A basic rural economy prevails. Cattle, pigs, and poultry are raised; and there are extensive chestnut forests. Brive-la-Gaillarde has an important agricultural market. Industry includes the manufacture of mechanical and electrical appliances and food processing, and there is a firearms factory at Tulle. Lace-making, once a thriving industry, has practically disappeared. The *département* has three *arrondissements*, Tulle, Brive-la-Gaillarde, and Ussel. It is in the educational division of Limoges. Pop. (1982) 241,448.

corrida de toros: *see* bullfighting.

Corrientes, province, northeastern Argentina, bounded by the Río Paraná (north and west), which forms the border with Paraguay (north), and by the Río Uruguay (southeast), which borders Uruguay and Brazil. Its area of 34,054 sq mi (88,199 sq km) forms part of a region known as the Argentine Mesopotamia. Corrientes is a low-lying subtropical province of plains, channels, lakes, and marshes ascending to slightly higher elevations in the east. A dominating feature is the expansive Esteros (marshes) del Iberá in the north centre.

The area was settled by Jesuits who established *reducciones* (work missions) in the 16th century. In 1865 Paraguayan forces invaded the province and were defeated at the city of Corrientes (*q.v.*), the provincial capital.

Economic activities are based on agriculture (rice, cotton, citrus fruits, tobacco, and cattle raising), and logging is also important. Tourism, based on hunting and fishing facilities throughout the province, is an additional source of income. There is little industry. Rivers provide the chief means of communication in the northeast, but the chief towns are connected by rail and road. Pop. (1983 est.) 697,000.

Corrientes, city, capital of Corrientes province, northeastern Argentina, and river port on the east bank of the Río Paraná, opposite Resistencia. It originated in 1588 when Juan Torres de Vera y Aragón, governor of the Río de la Plata viceroyalty, built a fort there named San Juan de Vera de las Siete Corrientes (meaning "seven currents") for the seven rapids upstream. In 1865 the city was the site of the decisive defeat of a Paraguayan invasion force. The city's economy is based on the processing and exporting of agricultural products, including cotton, rice, tobacco, firewood, and citrus fruits. Its river port is one of the most important for steamers between Buenos Aires and the upper reaches of the Río Paraguay.

Corrientes has retained much of its colonial architecture, including the Church of La Cruz, a pilgrimage centre where the 16th-century cross of Torres de Vera is venerated; it is located on the Plaza Juan Torres de Vera y Aragón, which was established as a national monument in 1945. The National University of the North-East (founded 1957) is located there. The city was the setting for Graham Greene's *The Honorary Consul* (1980). Pop. (1980 prelim.) 179,590.

Corrientes, Cape, Spanish CABO CORRIENTES, cape on the Pacific Ocean, southwestern Jalisco state, west central Mexico. The headland, rising to an elevation of 505 ft (154 m) above sea level, is formed by the western extremity of the Sierra del Cuale, in the southern portion of the Sierra Madre Occidental. A lighthouse stands on the cape, signalling the entrance to Bahía (bay) de Banderas, just to the north.

Corriere della Sera (Italian: "Evening Courier"), morning daily newspaper published in Milan, long one of Italy's leading newspapers, noted for its foreign coverage and its independence. It was Italy's preeminent daily for many years following World War II.

Established in 1876 as an evening paper, it later became a morning daily but retained the name. It was acquired in 1885 by a wealthy textile family, the Crespis, who gave it complete editorial independence. Except during the years of Fascist rule in Italy, *Corriere della Sera* followed an independent-centrist editorial policy until the 1970s. In that decade, which was marked at *Corriere della Sera* by labour disputes, changes in editors, and a change of owners, the paper's editorial position moved steadily to the left, prompting a group of editorial employees to move to *Corriere della Sera*'s centrist rival, *Il Giorno*.

The paper has appealed to both the upper and the middle classes with its serious and literary style. Using special travelling correspondents and authoritative writers, it has offered finely written, personalized reports and many special departments. The paper also uses such unusual features as an entire page devoted to one subject. Its national coverage is substantial; it has some 600 correspondents throughout Italy, and bureaus in 20 foreign cities.

Corrigan, Sir Dominic John, BARONET (b. Dec. 1, 1802, Dublin—d. Feb. 1, 1880, Dublin), Irish physician and author of several

reports on diseases of the heart. His paper on aortic insufficiency (1832) is generally regarded as the classic description of the condition. Many eponyms (Corrigan's respiration, Corrigan's cirrhosis, Corrigan's pulse) came into general use as a result of his diverse studies.

Corrigan was educated at the school of Maynooth College, near Dublin, and received his first instruction in medicine from a local physician. In 1825 he received his M.D. from the University of Edinburgh. He became a physician at Jervis Street Hospital in Dublin, where he began his clinical-pathological work. In 1829 Corrigan joined the Sick-Poor Institution of Dublin and lectured in the institutes (*i.e.*, theory) and practices of medicine. From 1840 to 1866 he was physician to the House of Industry hospitals. He also represented Dublin in the House of Commons from 1870 to 1874. He was created a baronet in 1866.

Corrigan's published material, including his report on the causes and treatment of aortic insufficiency, was based on observation of patients at various Dublin hospitals. His better-known studies were on cirrhosis of the lung (1838), aortitis as a cause of angina pectoris (1837), and mitral stenosis (1838). "Corrigan's respiration" refers to a shallow respiration in fever, and "Corrigan's pulse," also called waterhammer pulse, to a jerking pulse-beat associated with aortic regurgitation. Corrigan also supported the emerging distinction being made by physicians between typhus and typhoid fever.

Consult the INDEX *first*

Corrigan-Maguire, Mairéad (b. Jan. 27, 1944, Belfast, N.Ire.), Northern Irish social worker who, with Betty Williams, founded the Community of Peace People, also known as the Peace People Organization, a grass-roots movement of both Roman Catholic and Protestant citizens dedicated to ending the sectarian strife in Ulster. For their work the two women shared the 1976 Nobel Prize for Peace.

Corrigan-Maguire was from her youth a member of the Legion of Mary, a lay Catholic welfare organization, and through it she became deeply involved in social work among children and teenagers in various Catholic neighbourhoods of Belfast. She was stirred to act against the the growing violence in Northern Ireland after witnessing in August 1976 an incident in which a car being driven by an Irish Republican Army (IRA) terrorist went out of control when the IRA man was shot by British troops; the car struck and killed three children of Corrigan-Maguire's sister. Betty Williams was also a witness. Within days each woman had publicly denounced violence and called for mass opposition to it. Marches of Catholic and Protestant women, numbering in the thousands, were organized, and shortly afterward the Community of Peace People was founded based on the conviction that genuine reconciliation and prevention of future violence were possible primarily through the integration of schools, residential areas, and athletic clubs. The Community published a biweekly paper, *Peace by Peace*, and provided a bus service for families of prisoners to and from Belfast's jails. Although Betty Williams broke away from the Community of Peace People in 1980, Corrigan-Maguire remained an active member of the group.

Corriverton, town, northeastern Guyana. It is situated on the estuary of the Courantyne (Corentyne) River, separating Guyana from Suriname to the east. The town is a small port, connected by ferry with Nieuw Nickerie, Suriname, across the Courantyne estuary. Corriverton is the southeastern terminus of a paved road connecting it with Georgetown, the national capital, via which the agricultural products of the surrounding coastal lowlands (sugarcane, rice, and cattle) are transported to more distant markets. The population is predominantly East Indian. Pop. (1980) 13,718.

Corrora (Caroline Islands): *see* Koror.

corrosive sublimate, mercury(II) chloride, an odourless, colourless, water-soluble compound of mercury (*q.v.*).

Corse (island, Mediterranean Sea): *see* Corsica.

Corse-du-Sud, *département,* a portion of metropolitan France consisting of southern Corsica. The *département* was created in 1976, and its capital is Ajaccio. High mountains run northwest to southeast, dividing Corse-du-Sud into the crystalline igneous rocks of the ranges to the west and the intensely folded sedimentary peaks of the east. Annual precipitation is high, frequently exceeding 60 inches (1,500 mm). One-half of the population lives in Ajaccio, which has grown at the expense of the hinterland. Many householders in Ajaccio, however, also own houses in the countryside. Services are poorly developed outside the capital and the secondary centres of Sartène, Propriano, and Vico. Agriculture dominates the economy, producing wheat and olives. Animal husbandry is of particular importance; ewe's milk from the region is used to make Roquefort cheese. Corsu, which is the insular language, shows strong Tuscan influences and continues to be spoken by nearly three-quarters of the inhabitants of Ajaccio. The Corsu of Corse-du-Sud is distinguishable from that of northern Corsica. Ajaccio commemorates Napoleon's birthday in August. Area 1,550 square miles (4,014 square km). Pop. (1991 est.) 119,300.

corset, article of clothing worn to shape or constrict the torso, whether as underclothing or as outer decoration. A garment of great antiquity, the corset goes back at least to the 2nd millennium BC, when it was worn by Cretans of the Minoan Bronze Age. Minoan women wore them as an outer garment to clinch the waist and raise the breasts; they were worn as well by Minoan men, who appeared wasp-waisted in consequence.

The *guêpière,* or waspie, as a modern article of underclothing for clinching the waist, is only one form the female corset has taken; it has varied with the changing concepts of the ideal figure. Between about 1550 and 1660, corsets had the purpose of flattening the upper part of the body, including the breasts; they were reinforced by busks, made generally of wood. The much-embroidered and sometimes jeweled stomacher was a kind of outer corset. After 1660 the corset became shorter and was so shaped as to support and accentuate the breasts. It went out of fashion briefly after the French Revolution during the ascendancy of Directory and Empire fashions, which were Grecian, diaphanous, and body-clinging; but it returned about 1810 and changed throughout the 19th century with the ever-changing shape of dresses. By that time, corsets were reinforced with whalebone and metal.

Although polemics against tight corsets are common in literature from the late 17th century onward, no one seriously tried to abolish them until 1908, when clothes with fluid lines began to be designed to be worn without corsets. As early as about 1870, women in the artistic coterie promoting Aestheticism wore dresses with an uncorseted look. Neither of those designs became high fashion, however, and corsets continued to be worn until the 1920s, with the advent of straight, unwaisted clothes. In the late 1930s there was an attempt by designers to bring back the boned corset, but World War II cut short most stylish innovations.

The corset was greatly modified at the beginning of the 20th century: it was shorter and no longer supported the breasts, leading to the invention of the brassiere (*c.* 1912 by a Paris couturiere, Madame Cadolle). That garment and the Cavalieri maillot (a topless corset made of elastic material, *c.* 1913) were the prototypes of the brassiere and girdle (in England called the belt) of the 1930s. The main innovations (especially since the 1960s) incorporated improved synthetic-elastic materials. The corselette, a one-piece garment combining brassiere and girdle, was developed in the 1930s and is still worn.



An advertisement for Warner Bros. corsets, lithograph, *c.* 1880; in the Missouri Historical Society, St. Louis, Mo.
By courtesy of the Missouri Historical Society, St. Louis, Mo.

Corsica, French CORSE, *collectivité territoriale* of France and island in the Mediterranean Sea, embracing (from 1976) two *départements* of France, Haute-Corse and Corse-du-Sud.

Corsica is the fourth largest island (after Sicily, Sardinia, and Cyprus) in the Mediterranean. It lies 105 miles (170 km) from southern France and 56 miles (90 km) from northwestern Italy, and it is separated from Sardinia by the 7-mile (11-kilometre) Strait of Bonifacio. The island has an area of 3,352 square miles (8,681 square km).

Remains of human occupation dating from at least the 3rd millennium BC are evident in the many dolmens, menhirs, and other megalithic monuments that still stand on the island. The recorded history of Corsica begins about 560 BC, when Greeks from Phocaea in Asia Minor founded the town of Alalia on the east coast. Carthaginian domination followed in the early 3rd century BC, until the whole of the island was conquered by the Romans in a series of campaigns from 259 to 163 BC. Together with Sardinia, Corsica formed a province of the Roman Empire, under which the island's economy flourished. The Romans also implanted their language, which became the foundation of the present-day Corsican dialect.

A series of invasions and partial occupations by the Vandals, Lombards, and Arabs followed between AD 450 and 1050, during which time the island's towns were destroyed, their inhabitants driven inland, and the coastal agricultural lands abandoned. The Byzantine Empire's nominal suzerainty over Corsica from the mid-6th century AD was followed by

the titular rule of the papacy from the mid-8th century onward.

In 1077 the bishop of Pisa was entrusted by the papacy with the administration of Corsica, and over the next two centuries more than 300 churches were built in Corsica under the Pisans' direction. Corsica then became a bone of contention between Pisa and Genoa (until 1284) and between Genoa and Aragon (from 1297 to 1434). Bitter struggles between the Genoese and Corsica's native feudal aristocracy further decimated the population in the period 1434–53, after which Genoa was able to reassert its authority. A brief French occupation (1553–59) and a Corsican nationalist rebellion led by Sampiero Corso ended (1567) in renewed Genoese rule that lasted until 1729. Genoese rule, though by no means the worst in the island's history, was notorious for its corrupt administration of justice, thereby encouraging Corsicans to resort to the private form of vengeance known as the vendetta.

A rebellion against Genoese rule in 1729 ushered in a period of turbulence and unrest that culminated in the establishment (1755) of a Corsican republic by the nationalist leader Pasquale Paoli. With Genoese control now confined to only a few coastal towns, Paoli organized the rest of Corsica as an independent democratic state and gave it a remarkably liberal constitution. During his 14 years of rule (until 1769) Paoli led the Corsicans in a great regenerative effort, repressing the vendetta, founding a university and printing press, and building a Corsican navy. In 1768, however, the despondent Genoese sold their rights on Corsica to France, and French troops subsequently invaded the island in overwhelming numbers. Some weeks after Paoli had fled to England, Napoleon Bonaparte was born at Ajaccio on Aug. 15, 1769. Corsica became a province of France that same year. Except for brief periods of occupation by the British (1794–96) and the Italians and Germans (1942–43), Corsica remained a French province thereafter.

The terrain of Corsica is largely mountainous. About two-thirds of it consists of an ancient crystalline massif that divides the island on a northwest-to-southeast axis and has a cluster of 20 peaks exceeding 6,500 feet (2,000 m). Mount Cinto attains an elevation of 8,890 feet (2,710 m). The mountain silhouettes are everywhere dramatic, and their granite rocks display many vivid colours. The mountains descend steeply in parallel ranges to the west, where the coast is cut into steep gulfs and is marked by high cliffs and headlands. To the east the mountain massif falls in broken escarpments to extensive alluvial plains bordering a lagoon-indented coast. In the northeast, a separate and less spectacular mountain formation reaches heights not exceeding 5,790 feet (1,765 m).

Both the eastern and western watersheds are drained by seasonally torrential rivers that rise in the mountainous centre and cleave their way through impressive gorges in their upper reaches. The island's principal rivers are the Golo, Tavignano, Liamone, Granove, Tarova, and Profiano. A Mediterranean climate prevails on the coasts, where the average temperature is 60° F (15.5° C) throughout the year and 51° F (10.5° C) in winter, though it is cooler at higher elevations. The average summer temperature at the southern coastal city of Ajaccio is 70° F (21° C). Precipitation is abundant, averaging 35 inches (880 mm) a year, though higher elevations receive somewhat more.

Corsica's vegetation is luxuriant. Much of the island is covered with a scrubby underbrush, or maquis, that is composed of aromatic shrubs, together with holm oak and cork oak in the south. The flowers of the maquis produce a fragrance that carries far out to sea and has earned for Corsica the name "the scented isle." Chestnut forests occur at slightly higher elevations, while the laricio pine (*Pinus corsicanus*) dominates the higher elevations. In all, forests cover one-fifth of the island.

Though Corsica's coastal plains were freed of malaria in 1943, their development remains uneven. While some stretches of the seaboard are being built up to accommodate tourists, others are almost deserted. Only the east coast is continuously cultivated and inhabited. The island's traditional rural villages are mostly situated in areas lying between 650 and 2,600 feet (200 and 800 m) in elevation, and emigration to the coast and to continental France has depleted their population. By contrast, the coastal towns of Bastia and Ajaccio have drawn to themselves about one-third of the island's population. They lack significant industries, though, and serve mainly as commercial and distribution centres.

French, the official language, is spoken by virtually all Corsicans, most of whom also use the Corsican dialect, which is akin to Tuscan. Roman Catholicism is the dominant religion. Corsicans emigrate at an annual rate of about 2,000, although many retire to the island. As a result, the population older than 64 years of age is about one-quarter larger than on the mainland. About two-thirds of Corsica's population was urban in the late 20th century, and rural depopulation continues owing partly to a stagnant agriculture.

In spite of recent progress, Corsica's standard of living, particularly in the interior, is still somewhat below that of continental France. The island's economic life is based on tourism, the raising of sheep for ewe's milk from which to make fine-quality cheeses, and the cultivation of fruits, cork, and tobacco. Cheese, wine, citrus fruit, and olive oil are the main exports. The need to import fuel and machinery has prevented significant industrial development. Corsica has outstanding assets in its climate, scenery, and its magnificent coastline, but the island's tourist industry has yet to be fully developed. The French government provides advice and subsidies, and it has taken the lead in large-scale investment in the Corsican economy since 1957. The island's network of tarred roads is adequate, and a railway links Ajaccio, Bastia, and Calvi. Corsica is connected by air and sea with continental France.

Modern cultural life has suffered from the emigration of the most gifted Corsicans. Traditional folk music is performed by groups in the towns, and traditional handicrafts are being revived. Corsica also has many minor museums. Pop. (1990) 249,737.

Corsican National Liberation Front, French FRONT DE LIBÉRATION NATIONALE DE LA CORSE (FLNC), largest and most violent of a number of Corsican nationalist movements. It was formed in 1976 from two smaller groups that sought autonomy for Corsica through armed struggle.

The main method of the FLNC was bomb attacks, and the main targets were the property of non-Corsican settlers. The group also targeted police stations, government offices (in both Corsica and France), banks, and other such buildings. In 1980 more than 375 bombings in Corsica alone were attributed to or claimed by the FLNC. For most of 1981, during the establishment of the socialist administration of François Mitterrand in France, the FLNC abstained from its activities, but the group soon resumed bombings in Corsica, dissatisfied with the measures taken. In 1982 the number of attacks rose, and in 1983 the FLNC resumed sporadic attacks on the French mainland. The organization continued its activities into the 1990s.

Corsini FAMILY, a Florentine princely family, whose first recorded ancestors rose to wealth as wool merchants in the 13th century. As typical members of the *popolo grasso* (rich merchants) that ruled Florence during the later European Middle Ages, they regularly served as priors and ambassadors of the commune.

Filippo Corsini (1334–1421) was created count palatine by the emperor Charles IV in 1371. Two Corsinis were bishops of Fiesole, Andrea (1349) and Neri (1374); and two were bishops of Florence, Piero (1363) and Amerigo (1411). Though some of the Corsini opposed the Medici, the family as a whole continued to flourish in business and politics under Medici rule, acquiring titles, lands, and offices. Thus another Filippo (1578–1636), who managed affairs in Rome, was created by Pope Urban VIII Marchese di Sismano, Casigliano, and Civitella. (His father, Bartolomeo, had earlier purchased the lordships.) Bartolomeo di Filippo (1622–85) was in turn made Marchese di Laiatico and Orciatico by Grand Duke Ferdinand II, and Marchese di Giovagallo and Tresana by the king of Spain.

Further titles followed the election of Lorenzo Corsini as Pope Clement XII in 1730; his nephew Bartolomeo (1683–1752) was made prince of Sismano and a grandee of Spain (1732). Lorenzo began the Corsiniana Library, now in the Lincei Academy at Rome. During the Napoleonic period and down to the unification of Italy, the Corsini remained active and influential in Tuscan affairs. The family continued through the 20th century.

Corso, Gregory, in full GREGORY NUNZIO CORSO (b. March 26, 1930, New York, N.Y., U.S.), American poet, a leading member in the mid-1950s of the Beat movement (*q.v.*).

Corso lived in an orphanage and with foster parents until he was 11, when his remarried father took him to live with him. A repeated runaway, he was placed in juvenile institutions. At 17 he was sentenced to three years in Clinton Prison in Dannemora, N.Y., for theft. While there, he was introduced to literature. He met the poet Allen Ginsberg in Greenwich Village in 1950 and through him continued his education as a writer and a "noninstitutionalized" man. He worked in 1951–52 for the *Los Angeles Examiner* and then traveled to South America and Africa. In 1955 Corso's first volume of verse, *The Vestal Lady on Bratile,* was published.

In 1956 Corso went to San Francisco, where Ginsberg was residing, and the Beat movement was born at public readings in the bars and coffeehouses there. Of all Corso's poems, those in *Gasoline* (1958) are the most typical, using the rhythmic, incantatory style effective in spoken verse. In *The Happy Birthday of Death* (1960) he returned to an easier, conversational tone. *Long Live Man* (1962), *Selected Poems* (1962), *The Mutation of the Spirit* (1964), *Elegiac Feelings American* (1970), *Herald of the Autochthonic Spirit* (1981), and other books of poetry followed. He also wrote plays and a novel.

Cort, Henry (b. 1740, Lancaster, Lancashire, Eng.—d. 1800, London), British discoverer of the puddling process for converting pig iron into wrought iron.

Having accumulated capital by serving 10 years as a civilian official of the Royal Navy, Cort bought an ironworks near Plymouth in 1775. In 1783 he obtained a patent for grooved rollers that were capable of producing iron bars more quickly and economically than the old methods of hammering or of cutting strips from a rolled plate. The following year he patented his puddling process, which consisted of stirring molten pig iron on the bed of a reverberatory furnace (one in which the flames and hot gases swirling above the metal provide the heat, so that the metal does not come in contact with the fuel). The circulating air removed carbon from the iron. Exactly how Cort's process differed from the processes that had been developed by earlier ironmas-

ters along the same lines is not known, but his two inventions together had a tremendous effect on the iron-making industry in Britain: in the next 20 years British iron production quadrupled.

The discovery that his partner had invested stolen funds in the enterprise led to Cort's being deprived of his patents and forced into bankruptcy, though he was eventually granted a modest pension.

Cort van der Linden, Pieter, in full PIETER WILHELM ADRIAAN CORT VAN DER LINDEN (b. May 14, 1846, The Hague, Neth.—d. July 15, 1935, The Hague), Dutch Liberal statesman whose ministry (1913–18) settled controversies over state aid to denominational schools and extension of the franchise, central issues in Dutch politics since the mid-19th century.



Cort van der Linden, oil painting by Antoon van Welie, 1926; in Peace Palace, The Hague

By courtesy of the Iconographisch Bureau, The Hague

After having been employed as a solicitor in The Hague until 1881, Cort van der Linden was a teacher of economics at the universities of Groningen and Amsterdam and began to reunite Liberals with a program of social reform. Key planks of his platform included workmen's compensation and educational and public-health reforms, enacted under the Liberal ministry of 1897–1901, in which he served as minister of justice. He became a member of the state council in 1902. In 1913, when the Liberals proved unable to form a government, Cort van der Linden assembled a distinguished extraparliamentary administration and became prime minister.

Cort van der Linden gained passage in 1914 of an unemployment-insurance program and began implementing a policy of neutrality and economic austerity to deal with wartime conditions. His ministry sponsored revisions of the constitution in 1917, by which extension of the franchise and at-large elections were granted by the religious parties in exchange for enactment of equal state aid to public and denominational schools. After the Calvinist-Roman Catholic victory in the 1918 elections, Cort van der Linden resigned and was again appointed to the state council.

Cortazar, city, south-central Guanajuato *estado* ("state"), north-central Mexico. It is situated in the Bajío region, at an elevation of 5,643 feet (1,720 m) above sea level on the Laja River. From its founding in 1721 until it was given its present name in 1857, Cortazar was known as San José de los Amoles. It is a commercial and manufacturing centre for the surrounding farmlands. Crops of beans, wheat, chick-peas, and peaches thrive in the cool, dry climate. The main railroad and highway linking Mexico City and Ciudad Juárez pass within 2.5 miles (4 km) of the city. Pop. (1980) 35,330.

Cortázar, Julio, pseudonym JULIO DENIS (b. Aug. 26, 1914, Brussels, Belg.—d. Feb. 12, 1984, Paris, Fr.), Argentinian novelist and short-story writer who combined existential questioning with experimental writing techniques in his works.

Cortázar was the son of Argentine parents and was educated in Argentina, where he taught secondary school and worked as a translator. *Bestiario* (1951; "Bestiary"), his first short-story collection, was published the year he moved to Paris, an act motivated by dissatisfaction with the Perón government and what he saw as the general stagnation of the Argentine middle class. He remained in Paris, where he received French citizenship in 1981, though he kept his Argentinian citizenship as well. He also traveled widely.

Another collection of short stories, *Final del juego* (1956; "End of the Game"), was followed by *Las armas secretas* (1958; "Secret Weapons"). Some of those stories were translated into English as *End of the Game, and Other Stories* (1967). The main character of "El perseguidor" ("The Pursuer"), one of the stories in *Las armas secretas,* embodies many of the traits of Cortázar's later characters. The metaphysical anguish that he feels in his search for artistic perfection and in his failure to come to grips with the passage of time, coupled with his rejection of 20th-century values, was among Cortázar's central preoccupations. Another story, "Las babas del diablo" (1958; "The Devil's Drivel"), served as the basis for Michelangelo Antonioni's motion picture *Blow-Up* (1966).

Cortázar's masterpiece, *Rayuela* (1963; *Hopscotch,* 1966), is an open-ended novel, or antinovel; the reader is invited to rearrange the different parts of the novel according to a plan prescribed by the author. A series of playful and humorous stories written between 1952 and 1959 were published in *Historias de cronopios y de famas* (1962; *Cronopios and Famas,* 1969). His other works include *Todos los fuegos el fuego* (1966; *All Fires the Fire*) and *Libro de Manuel* (1973; *A Manual for Manuel*).

Cortes (Spanish and Portuguese), Catalan CORTS ("courts"), a representative assembly, or parliament, of the medieval Iberian kingdoms and, in modern times, the national legislature of Spain and of Portugal.

The Cortes developed in the European Middle Ages when elected representatives of the free municipalities acquired the right to take part in the deliberations of the Curia Regis ("King's Court") on certain matters. They were admitted because of the crown's need for financial aid beyond that provided by its customary levies and because of the crown's lack of legal right to impose extra taxation without the consent of the municipalities.

In both Leon and Castile the Cortes were in existence by the early 13th century. Their functions and procedures were similar and, after the union of the two crowns in 1230, they often held joint meetings—a normal procedure after 1301. Parliaments also functioned in Catalonia from 1218, Valencia (1283), Aragon (1274), and Navarre (1300). The Cortes of Leon and Castile were composed of three estates: nobles, clergy, and the *procuradores* (attorneys or town clerks) of the fortified municipalities (*concejos*), who bore written instructions (*poderes*) from their electors. The king convoked the Cortes' meetings when and where he pleased. During the 14th century the *procuradores* dominated the Cortes because they, and only they, could authorize the special taxation needed by the crown; but the meetings consisted of negotiations, not true debates.

In Castile, after the failed revolt of the townsmen known as *comuneros* (1520–21), the lower nobility (hidalgos) were the only surviving force in the Cortes, and even they ceased to exercise much real power. In Portugal the Cortes ratified the succession of the House of Avis (1385) and of Philip II (1580) and was active after the restoration of independence (1640). But in Spain the Cortes of Catalonia did not meet after the revolt of 1640; nor did that of Valencia after 1645 or that of Castile after 1685. In 1709 the Cortes of Aragon and Valencia were merged with that of Castile, as was that of Catalonia in 1724. But the meetings were solely to recognize the heir to the crown. In the 18th century Portugal's Cortes did not meet at all.

In 1812 the Spanish Cortes met at Cádiz and adopted the first liberal constitution. Although it was overthrown in 1814, the Cortes was restored in 1820 and was adopted by Portugal in the same year. In both countries the word was henceforth applied to the national parliament.

Cortés, Hernán, MARQUÉS DEL VALLE DE OAXACA, Cortés also spelled CORTÉZ (b. 1485, Medellín, near Mérida, Extremadura, Castile [Spain]—d. Dec. 2, 1547, Castilleja de la Cuesta, near Seville), Spanish conquistador who overthrew the Aztec empire (1519–21) and won Mexico for the crown of Spain.

Cortés was the son of Martín Cortés de Monroy and of Doña Catalina Pizarro Altamarino—names of ancient lineage. "They had little wealth, but much honour," according to Cortés' secretary, Francisco López de Gómara, who tells how, at the age of 14, the young Hernán was sent to study at Salamanca, in west-central Spain, "because he was very intelligent and clever in everything he did." Gómara went on to describe him as ruthless, haughty, mischievous, and quarrelsome, "a source of trouble to his parents." Certainly he was "much given to women," frustrated by provincial life, and excited by stories of the Indies Columbus had just discovered. He set out for the east coast port of Valencia with the idea of serving in the Italian wars, but instead he "wandered idly about for nearly a year." Clearly Spain's southern ports, with ships coming in full of the wealth and colour of the Indies, proved a greater attraction. He finally sailed for the island of Hispaniola (now Santo Domingo) in 1504. He was then 19.



Cortés, detail of an oil painting by an unknown artist, 1530; in the Hospital de Jesús, Mexico City

By courtesy of the Hospital de Jesus, Mexico City

Years in Hispaniola and Cuba. In Hispaniola he became a farmer and notary to a town council; for the first six years or so, he seems to have been content to establish his position. He contracted syphilis and, as a result, missed the ill-fated expeditions of Diego de Nicuesa and Alonso de Ojeda, which sailed for the South American mainland in 1509. By 1511 he had recovered, and he sailed with Diego Velázquez to conquer Cuba. There Velázquez was appointed governor, and Cortés clerk to the treasurer. Cortés received a repartimiento (gift of land and Indian slaves) and the first house in the new capital of Santiago. He was

now in a position of some power and the man to whom dissident elements in the colony began to turn for leadership.

Cortés was twice elected alcalde ("mayor") of the town of Santiago and was a man who "in all he did, in his presence, bearing, conversation, manner of eating and of dressing, gave signs of being a great lord." It was therefore to Cortés that Velázquez turned when, after news had come of the progress of Juan de Grijalba's efforts to establish a colony on the mainland, it was decided to send him help. An agreement appointing Cortés captain general of a new expedition was signed in October 1518. Experience of the rough-and-tumble of New World politics advised Cortés to move fast, before Velázquez changed his mind. His sense of the dramatic, his long experience as an administrator, the knowledge gained from so many failed expeditions, above all his ability as a speaker gathered to him six ships and 300 men, all in less than a month. The reaction of Velázquez was predictable; his jealousy aroused, he resolved to place leadership of the expedition in other hands. Cortés, however, put hastily to sea to raise more men and ships in other Cuban ports.

The expedition to Mexico. When Cortés finally sailed for the coast of Yucatán on Feb. 18, 1519, he had 11 ships, 508 soldiers, about 100 sailors, and—most important—16 horses. In March 1519 he landed at Tabasco, where he stayed for a time in order to gain intelligence from the local Indians. He won them over and received presents from them, including 20 women, one of whom, Marina ("Malinche"), became his mistress and interpreter and bore him a son, Martín. Cortés sailed to another spot on the southeastern Mexican coast and founded Veracruz, mainly to have himself elected captain general and chief justice by his soldiers as citizens, thus shaking off the authority of Velázquez. On the mainland Cortés did what no other expedition leader had done: he exercised and disciplined his army, welding it into a cohesive force. But the ultimate expression of his determination to deal with disaffection occurred when he burned his ships. By that single action he committed himself and his entire force to survival by conquest.

Cortés then set out for the Mexican interior, relying sometimes on force, sometimes on amity toward the local Indian peoples, but always careful to keep conflict with them to a strict minimum. The key to Cortés' subsequent conquests lay in the political crisis within the Aztec empire; the Aztecs were bitterly resented by many of the subject peoples who had to pay tribute to them. The ability of Cortés as a leader is nowhere more apparent than in his quick grasp of the situation—a grasp that was ultimately to give him more than 200,000 Indian allies. The nation of Tlaxcala, for instance, which was in a state of chronic war with Montezuma, ruler of the Aztec empire of Mexico, resisted Cortés at first but when defeated became his most faithful ally. Rejecting all of Montezuma's threats and blandishments to keep him away from Tenochtitlán or Mexico, the capital (rebuilt as Mexico City after 1521), Cortés entered the city on Nov. 8, 1519, with his small Spanish force and only 1,000 Tlaxcaltecs. Montezuma, believing him to incarnate the Aztec god Quetzalcoatl, received him with great honour. Cortés soon decided to seize Montezuma in order to hold the country through its monarch and achieve not only its political conquest but its religious conversion. Marina worked on the complicated, enigmatic mind of Montezuma so subtly that he finally became the voluntary prisoner of her master. With this stroke Cortés became the master of Tenochtitlán.

Spanish politics and envy, however, were to bedevil Cortés throughout his meteoric career. Cortés soon heard of the arrival of a Spanish force from Cuba, led by Pánfilo Narváez, to deprive Cortés of his command at a time (mid-1520) when he was holding the Aztec capital of Tenochtitlán by little more than the force of his personality. Leaving a garrison in Tenochtitlán of 80 Spaniards and a few hundred Tlaxcaltecs commanded by his most reckless captain, Pedro de Alvarado, Cortés marched against Narváez, defeated him, and enlisted his army in his own forces. On his return, he found the Spanish garrison in Tenochtitlán besieged by the Aztecs after Alvarado had massacred many leading Aztec chiefs during a festival. Hard pressed and lacking food, Cortés decided to leave the city by night. The Spaniards' retreat from the capital was performed, but with a heavy loss in lives and most of the treasure they had accumulated. After six days of retreat Cortés won the battle of Otumba over the Aztecs sent in pursuit (July 7, 1520).

Cortés eventually rejoined his Tlaxcalan allies and reorganized his forces before again marching on Tenochtitlán in December 1520. After subduing the neighbouring territories he laid siege to the city itself, conquering it street by street until its capture was completed on Aug. 13, 1521. This victory marked the fall of the Aztec empire. Cortés had become the absolute ruler of a huge territory extending from the Caribbean Sea to the Pacific Ocean.

In the meantime, Velázquez was mounting an insidious political attack on Cortés in Spain through Bishop Juan Rodríguez de Fonseca and the Council of the Indies. Fully conscious of the vulnerability of a successful conqueror whose field of operations was 5,000 miles (8,000 km) from the centre of political power, Cortés countered with lengthy and detailed dispatches—five remarkable letters to the Spanish king Charles V. His acceptance by the Indians and even his popularity as a relatively benign ruler was such that he could have established Mexico as an independent kingdom. Indeed, this is what the Council of the Indies feared. But his upbringing in a feudal world in which the king commanded absolute allegiance was against it.

Later years. In 1524 his restless urge to explore and conquer took him south to the jungles of Honduras. The two arduous years he spent on this disastrous expedition damaged his health and his position. His property was seized by the officials he had left in charge, and reports of the cruelty of their administration and the chaos it created aroused concern in Spain. Cortés' fifth letter to the Spanish king attempts to justify his reckless behaviour and concludes with a bitter attack on "various and powerful rivals and enemies" who have "obscured the eyes of your Majesty." But it was his misfortune that he was not dealing simply with a king of Spain but with an emperor who ruled most of Europe and who had little time for distant colonies, except insofar as they contributed to his treasury. The Spanish bureaucrats sent out a commission of inquiry under Luis Ponce de León, and, when he died almost immediately, Cortés was accused of poisoning him and was forced to retire to his estate.

In 1528 Cortés sailed for Spain to plead his cause in person with the king. He brought with him a great wealth of treasure and a magnificent entourage. He was received by Charles at his court at Toledo, confirmed as captain general (but not as governor), and created Marqués del Valle. He also remarried, into a ducal family. He returned to New Spain in 1530 to find the country in a state of anarchy and so many accusations made against him—even that he had murdered his first wife, Catalina, who had died that year—that, after reasserting his position and reestablishing some sort of order, he retired to his estates at Cuernavaca, about 30 miles (48 km) south of Mexico City. There he concentrated on the building of his palace and on Pacific exploration.

Finally a viceroy was appointed, after which, in 1540, Cortés returned to Spain. By then he had become thoroughly disillusioned, his life made miserable by litigation. All the rest is anticlimax. "I am old, poor and in debt . . . again and again I have begged your Majesty. . . ." In the end he was permitted to return to Mexico, but he died before he had even reached Seville. (R.H.I./Ed.)

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Cortés, Sea of (Pacific Ocean): *see* California, Gulf of.

cortex, in plants, tissue of unspecialized cells lying between the epidermis (surface cells) and the vascular, or conducting, tissues of stems and roots. Cortical cells may contain stored food or other substances such as resins, latex, essential oils, and tannins. In roots and in some herbaceous stems but not usually in woody stems, the innermost layer of cortical cells is differentiated into a cell layer called the endodermis. The cell walls of the endodermis possess a woody and corky band, called the casparian strip, around all the cell walls except those facing toward the axis and the surface of the root or stem. The endodermis with its casparian strips may function in regulating the flow of water between outer tissues and the vascular cylinder at the centre of the root. Within an inch or two of shoot tips, some flowering plants have a starch sheath (a layer of cells with much stored starch) in the same position as an endodermis.

The cortex often develops into a type of tissue called aerenchyma, which contains air spaces produced by separation, tearing, or dissolution of the cortex cell walls. Cortical cells in herbaceous stems, young woody stems, and stems of succulents (cacti and other fleshy plants) contain chloroplasts and can therefore make food by photosynthesis. Food, usually in the form of starch, in edible roots, bulbs, and tubers is mostly stored in the cortex.

Cortéz, Hernán: *see* Cortés, Hernán.

Corti, Luigi, Count (Conte) (b. Oct. 24, 1823, Gambarana, Lombardy [Italy]—d. Feb. 19, 1888, Rome, Italy), diplomat, minister of foreign affairs in the cabinet of Benedetto Cairoli (1878–88), and Italian representative at the Congress of Berlin (1878–79), for which he received much criticism, probably undeserved.

Corti interrupted his diplomatic career, begun in the Piedmontese service (*i.e.,* that of the kingdom of Sardinia) in 1846, to volunteer in the war between Piedmont and Austria (1848). After the war he was appointed secretary of the Piedmontese, later Italian, legation in London (1850), where he remained until his appointment as minister in Stockholm (1864). He then held a succession of diplomatic posts until March 1878, when he reluctantly accepted the post of minister of foreign affairs in Cairoli's leftist cabinet, with which Corti was not entirely sympathetic.

Just before the Congress of Berlin, called by the European powers to revise a punitive treaty forced on Turkey by Russia, Corti undertook some profitless negotiation with England about Balkan affairs. At Berlin, he and his colleagues could not prevent Austrian oc-

cupation of Bosnia-Hercegovina; nor did they take steps that might have prevented the later French occupation of Tunisia. Censured by their countrymen, their actions were largely the result of poor communication with Cairoli's cabinet.

Corti resigned his post (October 1878) but was appointed ambassador to Turkey in 1880. Transferred to London in 1886, he was recalled in October 1887 to Rome, where he died a few months later.

corticoid, any of a group of more than 40 organic compounds belonging to the steroid family and present in the cortex of the adrenal glands. Of these substances, about six are hormones, secreted into the bloodstream and carried to other tissues, where they elicit physiological responses. (The other corticoids, inactive as hormones, appear to be intermediates in the biosynthesis of the hormones from cholesterol.) The hormones are categorized, according to their principal effects on the target organs, as either glucocorticoids or mineralocorticoids.

Glucocorticoids, particularly cortisol, promote the conversion of fats to carbohydrates and the deposition of glycogen (a storage form of glucose) in the liver and participate in maintaining normal blood-sugar concentrations. The production of glucocorticoids is regulated by adrenocorticotropic hormone, secreted by the pituitary gland. They also play a minor part in regulating the excretion of mineral salts and water, but the most powerful of the hormones exerting this mineralocorticoid effect is aldosterone: it controls sodium metabolism in mammals and promotes the excretion of magnesium in the urine.

The chemical investigation of cortisone (a glucocorticoid) and the demonstration of its effectiveness in the treatment of rheumatoid arthritis were recognized by the award of the Nobel Prize for Physiology or Medicine in 1950 to E.C. Kendall, Phillip S. Hench, and Tadeus Reichstein. The success of cortisone led to the development of numerous synthetic variants of corticoids that have come into wide use in chemotherapy.

corticotropin: *see* adrenocorticotropic hormone.

cortile, internal court surrounded by an arcade, characteristic of the Italian palace, or *palazzo,* during the Renaissance and its aftermath. Among the earliest examples are those of the Palazzo Medici-Riccardi and the Palazzo Strozzi in Florence, both of the late 15th century. The cortile of the Pitti Palace (1560) is one of the most important examples of Mannerist architecture in Florence.

The cortile reached the peak of its development in Rome. Here the earliest example of a pure Renaissance cortile is the Palazzo della Cancelleria (begun in 1486), designed by Donato Bramante; the most monumental example is the Palazzo Farnese (completed in 1547), in the design of which Michelangelo had a hand.



Cortile of the Palazzo Medici-Riccardi, Florence, by Michelozzo, 1444–59

Alinari—Art Resource/EB Inc.

Consult the INDEX *first*

Cortina d'Ampezzo, resort town, Belluno *provincia,* Veneto *regione,* northern Italy, in a scenic basin in the centre of Ampezzo Valley, 25 miles (40 km) north of Belluno city. It lies at the junction of the Boite and Bigontina rivers and is surrounded by spectacular peaks of the Dolomite Alps. The town is dominated by its modern Gothic-style church, whose tall bell tower plays chimes identical to those of Westminster Abbey, London. The huge Olympic ice stadium and the two artificial ice tracks were built for the Seventh Winter Olympic Games, held there in 1956, and at nearby Zuel is the Olympic ski-jumping chute. One of the most popular summer and winter resorts in the Dolomites, Cortina has many large hotels and villas as well as belvederes in the Dolomite and Austrian Alps, accessible by chair lifts and cable cars. There is much local work in wrought iron, filigree, and inlaid wood, especially cuckoo clocks.



Cortina d'Ampezzo, Italy

By courtesy of the Italian Government Travel Office, Chicago

Cortina is one of the towns constituting the Great Community of Ampezzo (medieval autonomous region), and the people still retain their national costumes and Raetic, or Ladin, language. Pop. (1988 est.) mun., 7,645.

cortisol, also called HYDROCORTISONE, an organic compound belonging to the steroid family, the principal hormone secreted by the adrenal glands. It is a potent anti-inflammatory agent and is also used for the palliative treatment of rheumatoid arthritis.

In the blood the amounts of cortisol and corticosterone, another adrenal hormone, are monitored by the hypothalamus, a regulatory organ located at the forebrain. Low levels of these substances induce secretion of a releasing hormone, CRF (corticotropin-releasing factor), which acts upon the anterior pituitary, causing the release of ACTH (adrenocorticotropic hormone). ACTH controls the secretion of cortisol from the adrenal cortex. High cortisol levels inhibit CRF-induced ACTH release. Cortisol is rapidly metabolized to several products that are excreted in the urine.

Use of cortisol in therapy produces the same undesirable side effects as cortisone. Both drugs have been largely superseded by such synthetic steroids as prednisolone.

cortisone, an organic compound belonging to the steroid family, a hormone of the adrenal cortex. Introduced in 1948 for its anti-inflammatory effect in the treatment of rheumatoid arthritis, it has been largely replaced by related compounds that do not produce certain undesirable side effects.

Cortisone and numerous other steroids were isolated during the period 1935–48, following earlier observations that the secretions of the adrenal cortex are essential to life. Amounts of these substances available from natural sources were too small for clinical evaluation, but a useful amount of cortisone was produced from deoxycholic acid, a bile constituent. Clinical trials were dramatically successful, and refinements of the preparative process reduced the cost of the drug from $200 per gram in 1949 to 50 cents in 1965.

Cortisone is active primarily as an agent for the rapid conversion of proteins to carbohydrates (a glucocorticoid) and to some extent regulates the salt metabolism of the body (a mineralocorticoid). The therapeutic dose, however, when used as an anti-inflammatory drug is much larger than the amount normally present in the body, and the minor functions of the hormone become exaggerated, leading to edema (swelling), increased gastric acidity, and imbalances in metabolism of sodium, potassium, and nitrogen. Continued research has resulted in drugs in which the glucocorticoid activity is enhanced and undesirable actions are practically eliminated.

Cortland, city, seat (1808) of Cortland county, central New York, U.S., on the Tioughnioga River, 30 miles (48 km) south of Syracuse. Settled in 1791 and named for a prominent New York family, it is located in one of the state's richest farming areas. Manufactures include typewriters, clothing, metal, wood, paper products, and sporting equipment. The State University College at Cortland originated as a normal school in 1863. Elmer Ambrose Sperry (1860–1930), who is credited with many inventions including a compass, gyroscope, and stabilizer, was born there. Nearby popular ski areas include Greek Peak, Intermont, and Labrador and Snow mountains. The reconstructed birthplace (cabin) of President Millard Fillmore (1800–74) is in Fillmore Glen State Park, 14 miles northwest. Inc. village, 1853; city, 1900. Pop. (1990) 19,801.

Cortona, city, Arezzo *provincia,* Toscana (Tuscany) *regione,* central Italy, on the southern slope of San Egidio Hill just north of Lake Trasimeno. The Roman Corito, it was probably of Umbrian origin but was later an important Etruscan magisterial centre. It emerged from a long period of obscurity in 1202 as a free commune. Sacked by the forces of nearby Arezzo city in 1258, Cortona recovered and had its own mint and became

an episcopal see in 1325. After a long period of peace, it was besieged in 1529 by the armies of Pope Clement VII and the emperor Charles V; thereafter, it was joined to the grand duchy of Tuscany.

Remnants of the Etruscan walls are incorporated in the medieval town walls, and the 4th-century BC Etruscan tomb erroneously said to be that of the Greek philosopher and mathematician Pythagoras also survives. The 13th-century Palazzo Pretario houses the Etruscan museum. Notable medieval churches include the originally Romanesque cathedral, much altered; the church of the Gesù, now housing the diocesan museum; and the Gothic churches of S. Domenico, S. Francesco, Sta. Margherita, and Madonna del Calcinaio. The museum and many of the churches house fine paintings by Fra Angelico and Luca Signorelli, a native of Cortona.

Agriculture and stock raising are the main occupations. Pop. (1981 prelim.) mun., 22,281.

Cortona, Luca da: *see* Signorelli, Luca.

Cortona, Pietro da: *see* Pietro da Cortona.

Cortot, Alfred-Denis (b. Sept. 26, 1877, Nyon, Switz.—d. June 15, 1962, Lausanne), conductor, teacher, and one of the outstanding French pianists of the 20th century, known especially for his interpretations of the later Romantic composers.

Cortot studied piano at the Paris Conservatoire. After gaining experience as an assistant conductor at Bayreuth, in 1902 he conducted the first French performance of Wagner's music drama *Götterdämmerung* (*The Twilight of the Gods*). He founded the Société des Concerts and the Paris Orchestre Philharmonique and introduced many works of contemporary French composers. In 1905, with violinist Jacques Thibaud and cellist Pablo Casals, he formed a trio, which earned international renown for its superb ensemble playing. In 1918 he founded the École Normale de Musique in Paris, where his piano classes had a wide influence. He published works on piano technique and a historical survey of French piano music and edited the works of Schumann and Chopin. He also assembled one of the finest private collections of musical autographs. About 1950 he retired to Lausanne.

Çorum, city, capital of Çorum *il* (province), north central Turkey, on the edge of a fertile plain.

A historic town on old trade routes from central Anatolia to the Black Sea coast, it became famous for its hand-spinning and weaving cottage industries, the manufacture of copper utensils, and leather products. It is also the main trading centre for the surrounding plain; the plain, watered by the Kızıl River (the ancient Halys), produces cereals, fruits, tobacco, and sugar beets.

Çorum *il,* 5,124 sq mi (13,271 sq km) in area, once part of the Hittite Empire, contains several important excavated sites. Hattusas, the Hittite capital until *c.* 1500–1200 BC, has been unearthed at Boğazköy in the Sungurlu *ilçe* (district). Nearby is the sculptured rock shrine of Yazılıkaya (*c.* 2nd millennium BC). At Alacahöyük, north of Boğazköy, Turkish archaeologists have found tombs dating to *c.* 3000 BC. Small industries include textiles, cement, and copper products. Pop. (1980) city, 75,726; (1983 est.) *il,* 585,400.

Corumbá, city, Mato Grosso do Sul state, southwestern Brazil, on the Paraguay River, at 381 ft (116 m) above sea level, near the border with Bolivia. Founded by the Jesuit procurator Luís de Albuquerque de Melo Pereira e Cáceres as a military outpost and colony in 1778, it became, after the opening of the river to international commerce following the Paraguayan War (1865–70), a port terminus for rivercraft from Buenos Aires and Asunción. The chief commercial centre of southern Mato Grosso do Sul, the city handles manganese and iron ore from the buttes of Morro do Urucum, to the south. In the late 1970s a factory started production of ferromanganese and silicomanganese from Urucum deposits. Factories process animal hides and *xarque* (dried beef). The city is a junction of air routes and has railroad connections with São Paulo and Santa Cruz, Bolivia. Pop. (1980 prelim.) 66,014.

Articles are alphabetized word by word, not letter by letter

Coruña, La, province, in the autonomous community (region) of Galicia, northwestern Spain, formed in 1833 from part of the captaincy general and former kingdom of Galicia. With an area of 3,041 sq mi (7,876 sq km), it is bordered by the Atlantic Ocean (west) and the Cantabrian Sea (north) and has the highest rainfall of any Spanish province. Its interior is crossed by the Galician mountains; the coastline, rocky and with deep indentations, is formed by drowned valleys or inlets known as *rías,* such as Santa María, El Ferrol del Caudillo, La Coruña, Corcubión, and Arosa, all of which afford sites for sheltered ports. Cabo (Cape) Finisterre (Promunturium Nerium of the Romans), a huge granitic mass on the Atlantic coast, is one of Europe's chief headlands.

La Coruña's chief economic activity is fishing and fish processing, much of which, along with other light industry, is concentrated around the provincial capital of La Coruña (*q.v.*). Grain, fruit, potatoes, and vegetables are cultivated, and livestock raising, lumbering, and limited mining (tin, copper, lignite) are carried on. The principal ports are La Coruña and El Ferrol del Caudillo, and the chief inland town is Santiago de Compostela. Pop. (1982 est.) 1,068,088.

Coruña, La, also called CORUNNA, French LA COROGNE, formerly THE GROYNE, city, capital of La Coruña province, in the autonomous community (region) of Galicia, extreme northwestern Spain, on Ría (inlet) de la Coruña, an inlet of the Atlantic. Under the Romans, La Coruña was the port of Brigantium, but its present name is probably derived from Coronium, by which it was known in the Middle Ages. It was held by the Moors during the 8th, 9th, and 10th centuries, by the Portuguese during the 14th century, and was reconquered definitively by the Spanish in the 15th century. In 1386 John of Gaunt, the English duke of Lancaster, landed there in pursuit of his claim to the throne of Castile. On July 26, 1588, the Spanish Armada sailed from La Coruña against England after taking refuge in the port from squalls. The next year a British fleet under Sir Francis Drake and Sir John Norris burned the shipping at La Coruña and sacked the lower part of the port. The city suffered heavily when Spain lost Cuba and Puerto Rico in the Spanish–American War of 1898, for it had enjoyed a thriving trade with those colonies.

Because of its position near a great sea route between northwest Europe and South and Central America, La Coruña is one of the chief ports of northern Spain, exporting farm produce (especially onions and potatoes) and importing coal, salt, and manufactured goods. It is also the nation's second largest fishing centre and has salting and canning industries. There is a state tobacco factory in the southern suburb of Santa Lucía and shipyards for building fishing vessels. La Coruña also has growing beach resort facilities.

The city comprises an old section (Ciudad Vieja), on a peninsula between Orzán and La Coruña bays; a new section (Ciudad Nueva or La Pescadería) on the mainland and a narrow isthmus; and expanding residential suburbs. A characteristic feature of the houses is their *miradores,* or window balconies, glazed for protection against the wind. Isla de San Antón (east) formerly contained a fort and military prison but is now the site of the city's archaeological museum. Notable landmarks include the Roman Tower of Hercules, a lighthouse dating from the reign of the emperor Trajan (AD 98–117) but regarded in popular legend as having been built by the Phoenicians, and the churches of Santiago (12th century), Santa María del Campo (13th century), and Santo Domingo (in 18th-century Galician baroque). South of the latter in the Jardín de San Carlos overlooking the harbour is the granite tomb of Sir John Moore (about whose death in 1809, in the Peninsular War, the Irish poet Charles Wolfe wrote "The Burial of Sir John Moore"). The city has schools of navigation and agriculture and is the site of an arsenal and army garrison. It was the birthplace of the Spanish novelist Emilia Pardo Bazán. Pop. (1982 est.) 226,697.

corundum, aluminum oxide mineral (Al_2O_3), next to diamond the hardest known natural substance; its finer varieties are the gemstones sapphire and ruby (*qq.v.*), and its mixtures with iron oxides and spinel are called emery (*q.v.*). Corundum is widespread in nature and is found as barrel-shaped crystals, large blocks, or rounded grains in igneous, sedimentary and metamorphic rocks. Rich deposits exist in Burma, Sri Lanka, Thailand, India, Madagascar, South Africa, Canada, the Urals, and the United States. Corundum readily weathers to other aluminous minerals; *e.g.,* margarite, zoisite, sillimanite, and kyanite. For detailed physical properties, *see* oxide mineral (table).

In addition to its use as a precious gem, corundum is used for bearings in fine machinery such as watches and motors. It is a prominent constituent of many refractories. Most industrial corundum is produced artificially.

Artificial corundum, also called *β*-alumina, fused bauxite, or fused alumina, has the same hardness and strength as natural corundum (*α*-alumina) and is an important industrial abrasive. In addition to its use as free grains in grinding and polishing, it is used extensively to make grinding and polishing wheels, coated paper, cloth, and disks. As the grinding work continues, artificial corundum crystals fracture in such a way that new, sharp cutting points are continually formed. Artificial corundum is employed in the manufacture of special heat-resistant materials, such as refractory concrete. Its crystals are used as fine bearings and as record-player needles.

Corundum is manufactured from bauxite, which consists chiefly of aluminum oxide, by passing an electric current through the ore in an electric arc furnace. This transmission results in an intense heat, melting the bauxite and purifying it. As it solidifies, the purest crystals are large and snow white; the less pure are fine and nearly black. The usual product may be a translucent reddish brown. Lump abrasive is ground and graded. Artificial corundum may also be produced as a specialty product, as for gem use, by slow accretion and controlled growth on a boule in an oxyhydrogen flame (Verneuil process).

Corunna (city, Spain): *see* La Coruña.

Corvallis, city, seat (1851) of Benton County, western Oregon, U.S., at the head of navigation of the Willamette Valley, 85 mi (137 km) south of Portland. Laid out in 1851 as Marysville, it was renamed Corvallis (Latin for "heart of the valley") in 1853. For a short period in 1855 the state legislature met there. Oregon State University (founded as Corvallis College in 1868) is the city's major



Memorial Union on the campus of Oregon State University, Corvallis, Ore.
Ray Atkeson—EB Inc.

economic asset; other employers include engineering consultants and producers of business machines. Agriculture, sawmilling, and truck farming are regional activities. Corvallis is headquarters for Siuslaw National Forest. The university's Horner Museum houses a historic Pacific Northwest collection. Inc. 1857. Pop. (1990) 44,757.

corvée, unpaid labour that a European vassal owed a lord or that a citizen in later times owed the state, either in addition to or in lieu of taxes. *See* statute labour.

corvette, small, fast naval vessel ranking in size below a frigate. In the 18th and 19th centuries, corvettes were three-masted ships with square rigging similar to that of frigates and ships of the line, but they carried only about 20 guns on the top deck. Frequently serving as dispatchers among ships of a battle fleet, corvettes also escorted merchantmen and showed a nation's flag in distant parts of the world.

In the early U.S. Navy, corvettes were known as ship sloops, or sloops of war. They fought with great distinction against superior British foes in the Atlantic Ocean and on the Great Lakes during the War of 1812.

Corvettes disappeared as a class after the shift to steam power in the mid-19th century, but during World War II the Royal Navy applied the term to small antisubmarine vessels escorting convoys in the Atlantic. Modern corvettes, generally displacing from 500 to 1,000 tons and armed with missiles, torpedoes, and machine guns, perform antisubmarine, antiaircraft, and coastal-patrol duties in the world's small navies.

Corvidae, songbird family, of the order Passeriformes, that includes crows, jays, and magpies. The 100 species occur throughout



Eurasian jay (*Garrulus glandarius*)
R.J.C. Blewitt—Ardea, London

the world; most are nonmigratory. Corvids are strongly built, stout-billed birds 23–71 cm (9–28 inches) long, some being the largest passerines. They have plain, often glossy plumage that may be monochromatic or contrastingly patterned. The sexes look alike. Corvids have harsh, loud voices, and most are gregarious at times. Social organization is highly developed, mutual aid being a strong feature. Individual birds may show exceptional intelligence. The pair bond is strong, lifelong in some species. The male helps to build the nest, which is a mass of twigs in a tree or on a ledge, sometimes in large colonies; he feeds the female while she incubates the two to nine eggs.

Some corvids are notorious nest-robbers, and others damage grain crops; they also eat quantities of noxious insects, however, and are useful scavengers. A few cold-country species store acorns and pine nuts for winter use; the caches they overlook are important in reforestation.

The larger, shorter-tailed species, of sombre appearance, occur worldwide except in South America. *See* chough; crow; jackdaw; nutcracker; raven; rook.

The smaller, more colourful species, often long-tailed or crested, are most numerous in South America and southeastern Asia. *See* jay; magpie.

Corvinus, Jakob: *see* Raabe, Wilhelm.

Corvinus, Matthias: *see* Matthias I *under* Matthias (Hungary).

Corvo, Baron: *see* Rolfe, Frederick William.

Corvo Island, Portuguese ILHA DO CORVO, volcanic island, northernmost of the Azores, east-central North Atlantic. With an area of 6.8 square miles (17.6 square km), it rises to 2,549 feet (777 m) at Mount Gordo. Lying only 10 miles (16 km) north of Flores, it is isolated for nine months of the year by bad weather, which makes ship landings difficult. Part of the Horta district of Portugal, the island has only one town, Vila Corvo (southeast). Wool is produced on the island. Corvo is the Portuguese word for "raven." Pop. (1987 est.) 400.

Corwin, Edward Samuel (b. Jan 19, 1878, near Plymouth, Mich., U.S.—d. April 29, 1963, Princeton, N.J.), American political scientist and authority on U.S. political and constitutional law.

Corwin earned an A.B. from the University of Michigan (1900) and a Ph.D. from the University of Pennsylvania (1905). He then joined the faculty of Princeton University, where he taught jurisprudence until 1946. He began his studies of constitutional law at Princeton and helped form the new department of politics. He subsequently wrote seminal studies of such legal doctrines as due process, vested rights, higher law, and judicial review. One of the first scholars to emphasize the historical context of constitutional development, he was also known as an influential critic of the U.S. Supreme Court.

Many of Corwin's writings are considered to be classic works; they include *The Doctrine of Judicial Review* (1914), *The Constitution and What It Means Today* (1920), *Twilight of the Supreme Court* (1934, with Jack W. Peltason), *Understanding the Constitution* (1949), and *The Presidency Today* (1956, with Louis Koenig).

Corwin, Thomas (b. July 29, 1794, Bourbon county, Ky., U.S.—d. Dec. 18, 1865, Washington, D.C.), politician who foresaw the impending conflict between the U.S. North and South over slavery; his efforts to help avert it, however, were in vain.

Corwin served three years in the Ohio Assembly before turning to national politics in 1831. Identified with the Whig Party, he was a member of the House of Representatives (1831–40), governor of Ohio (1840–42), and U.S. senator (1845–50).

In 1847 Corwin made a memorable speech denouncing the Mexican War (1846–48) as unjust and predicting a civil war in the United States as one of its effects. After serving as secretary of the Treasury (1850–53) under President Millard Fillmore, he returned to the House of Representatives (1859) as a Republican. During the secession crisis of 1861 he acted as chairman of the congressional Committee of Thirty-Three, which sought a compromise between North and South. In his last public office, as U.S. minister to Mexico (1861–64), he was instrumental in preventing



Thomas Corwin
By courtesy of the Library of Congress, Washington, D.C.

Southern agents from gaining support from the Mexican government.

Corybant, any of the wild, half-demonic beings who were mythical attendants of the ancient Oriental and Greco-Roman deity the Great Mother of the Gods (*q.v.*). They were often identified or confused with the Cretan Curetes (attendants of the Greek god Zeus) and were distinguished only by their Asiatic origin and by the more pronouncedly orgiastic nature of their rites. Accounts of the origin of the Corybantes vary, and their names and number differ from one authority to another. They apparently had a mystic cult, and a prominent feature of their ritual was a wild dance, which was claimed to have powers of healing mental disorder. It is possible that they originally were priests or medicine men of ancient times, later thought of as superhuman.

Corydalis, genus of about 300 species of plants in the fumitory family (Fumariaceae) native to North Temperate areas and southern Africa. Most are weak-stemmed perennial garden plants with underground tubers and lobed or finely dissected leaves, although the climbing corydalis (*C. claviculata*) of Great Britain is an annual with short sprays of cream-coloured, tubular flowers. Yellow corydalis (*C. lutea*) of southern Europe is a popular garden perennial with 22-centimetre- (about 9-inch-) tall sprays of yellow tubular blooms. Native North American species include pale or pink corydalis, or Roman wormwood (*C. sempervirens*), a 60-centimetre-tall annual with pink, yellow-tipped flowers; and golden corydalis (*C. aurea*), a 15-centimetre annual.

Corydon, town, seat (1808) of Harrison county, southern Indiana, U.S., 25 miles (40 km) west of Louisville, Ky. It was settled in about 1805 on land originally owned by General William Henry Harrison, governor of Indiana Territory (1800–12), who named the town for a shepherd in a popular song of the times, "Pastoral Elegy." It was the capital of

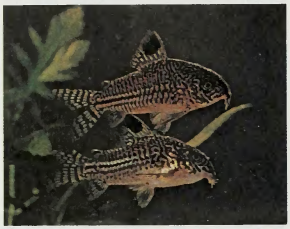


Corydon Capitol State Memorial, Corydon, Ind.
Robert McCullough

the Indiana Territory (1813–16) and of the state from 1816 until the capital was moved to Indianapolis in 1825. The convention that drafted the first constitution for Indiana met there in June 1816, and the first statehouse is preserved as the Corydon Capitol State Memorial.

The city is the shipping-processing point for an agricultural area producing poultry, eggs, beef and dairy cattle, and burley tobacco. Manufactures include furniture and glassware. The Harrison County Fair, held in Corydon each summer, is the state's oldest county fair. Wyandotte Cave, one of the nation's largest limestone caverns, is 12 miles (19 km) west. Nearby are the Squire Boone Caverns, discovered (1790) by Daniel Boone's brother, Squire, while he was hiding from Indians; he is buried there. Inc. 1817. Pop. (1990) 2,661.

corydoras, any of numerous small South American catfishes of the genus *Corydoras,* family Callichthyidae, commonly kept as attractive scavengers in tropical aquariums. The species, identified by two rows of overlapping armour plates on each side, are hardy, unaggressive fishes commonly about 7.5 cm (3 inches) or less in length.



Leopard corydoras (*Corydoras julii*)
Gene Wolfsheimer

There are more than 100 species. Popular aquarium pets include: the bronze corydoras (*C. aeneus*), a common, metallic brown or green fish with a large dark patch on its body; the dwarf, or pygmy, corydoras (*C. hastatus*), an active, 4-centimetre-long species with a black band on each side; the leopard corydoras (*C. julii*), a silvery catfish patterned in black with stripes, short lines, and numerous small spots; and the peppered corydoras (*C. paleatus*), a pale, yellowish brown fish marked with dark spots and streaks.

Corylaceae (plant family): *see* Betulaceae.

Coryphodon, genus of extinct primitive hoofed mammals known from Late Paleocene and Early Eocene deposits (those that date from about 63.5 to 52 million years ago) in North America and Early Eocene deposits in Europe and eastern Asia (the Paleocene epoch, which preceded the Eocene epoch, ended about 54,000,000 years ago). *Coryphodon,* representative of an archaic group, the pantodonts, was a clumsily built animal about as large as a modern tapir. The skeleton was heavy and the limbs strongly constructed to support the animal's bulk. The feet were broad and had five toes. The skull was broad and relatively flat; no horns or other protuberances were present, except in the back or occipital region, where powerful neck muscles were attached. *Coryphodon* had large upper canines; the presence of 44 teeth represents the primitive mammalian condition. *Coryphodon* was not a swift animal; it probably was a browser, feeding much like the modern tapirs.



Coryphodon, restoration painting by Charles R. Knight, 1898
By courtesy of the American Museum of Natural History, New York

coryza (medicine): *see* common cold.

Cos, Modern Greek KOS, Italian COO, Turkish İSTANKÖY, island off the southwestern coast of Turkey, the third largest of the Dodecanese Islands, Greece.

A ragged limestone ridge runs along the southern coast. The highest point of the island, Mount Dhíkaios (2,776 feet [846 m]), divides the island near its centre. A fertile lowland stretches along the north coast that is irrigated by the deep springs of the Priónridge, which also provides water for the capital, Kos, on the northeast coast. The regular coastline finds its only suitable harbour at Mandráki, the port of Kos.

The island's principal resources are vineyards, figs, and olives; vegetables are also grown, especially around the village of Andimákhia, the corn (maize) centre of the central lowland. Melons, grapes, and other fruits are exported, and tobacco and sesame are other products. There are mineral springs and modern bathing installations in the mountains in the south.

The Cos of antiquity, inhabited from prehistory, was resettled by Dorian colonists from Epidaurus (Peloponnesus) and became a mi-



Ruins of the sanctuary of Asclepius at Cos, Greece
Charles Walker—Barbara Heller Archive

nor member of the Delian League in the 5th century BC. The sanctuary of Asclepius became a health resort and the first school of scientific medicine in Greece. Among its most famous citizens were the physician Hippocrates, the painter Apelles, and the poets Philetas and Theocritus. Cos was occupied by Alexander III the Great (336 BC) and subsequently (323) passed to the Ptolemies, who used its schools extensively. Annexed to the Roman province of Asia, in AD 53 it was declared a free city. It became a Byzantine bishopric, and many early Christian basilicas have been unearthed. In the 11th century it was ravaged by the Saracens and was occupied in 1215 by the Knights of St. John, who built a fortress to help guard the approaches to the island of Rhodes. In 1523 it passed to the Ottomans after three sieges. Occupied by Italy (1912), which restored the sanctuary destroyed in the earthquake of AD 554, the island was ceded to Greece by Italy in 1947. In 1933 the town of Kos was destroyed by an earthquake but rebuilt over the old Turkish quarter. Pop. (1981) city, 11,851; island, 20,350.

Cosamaloapan, in full COSAMALOAPAN DEL CARPIO, city, southern Veracruz *estado* ("state"), south-central Mexico. It lies at 315 feet (96 m) above sea level in the Papaloapan River valley in the Gulf lowlands and is 91 miles (147 km) southeast of Veracruz. The hot, humid hinterland is Mexico's greatest sugarcane region; corn (maize), bananas, and mangoes also thrive. Livestock are raised in the vicinity, and charcoal is manufactured. The Papaloapan Basin has been under development by the government since 1947, and around Cosamaloapan there are several sugar refineries, including Mexico's largest, San Cristobal. Products are exported by highway and railroad. Pop. (1980) 29,457.

Cosenza, Latin COSENTIA, city, capital of Cosenza *provincia,* Calabria *regione,* southern Italy, on the Crati River at its confluence with the Busento, north-northeast of Reggio di Calabria. The ancient Cosentia, it was the capital of the Bruttii (an Italic tribe) before it was taken by the Romans in 204 BC. Alaric, king of the Visigoths, died there in 410 and is said to have been buried, together with his treasure looted from Rome, in the riverbed of the Busento. Subsequently occupied by the Byzantines, Saracens, Normans, Angevins (house of Anjou), and Spanish, the town was proclaimed a republic in 1799. Under the Bourbon Kingdom of the Two Sicilies, it was the scene of numerous uprisings for Italian independence, culminating in the unsuccessful expedition of the Bandiera brothers in 1844. The town was damaged by earthquakes in 1783, 1854, 1870, and 1905 and by Allied bombs in World War II. Many of the chief monuments of its archiepiscopal see have been restored, including the Romanesque cathedral (1185–1222) and the Norman castle, extended by the Holy Roman emperor Frederick II and the Angevins. Several medieval churches house rich art treasures, and there is a civic museum.

Railways run to Paola, Sibari, Crotone, and Catanzaro. Agriculture (cereals, wine, olive oil, raw silk, and fruit) and the production of furniture, woolens, and tannic acid are carried on. Pop. (1988 est.) mun., 105,913.

Cosgrave, Liam (b. April 1920, Templeogue, County Dublin, Ire.), Irish politician, prime minister from February 1973 to July 1977.

His father, W.T. Cosgrave, was president of the Executive Council and head of the government of the Irish Free State during the first 10 years of its existence (1922–32). Liam, the elder son, was educated at Castlenock College, Dublin, and King's Inns, studied law, and was called to the Irish bar in 1943. In that same year he entered the Dáil (Irish parliament), and he retained his seat until his retirement from politics in 1981. In 1948, when the first interparty government replaced Eamon De Valera's Fianna Fáil regime, which had been in power for the previous 16 years, Cosgrave became parliamentary secretary to the *taoiseach* (prime minister) and to the minister for industry and commerce. It was a short-lived administration, going out of power after three years, in 1951. But it was back again in 1954 for another three years, at which time Cosgrave became minister for external affairs and led the first Irish delegation to the United Nations General Assembly in 1956.

Cosgrave succeeded James Dillon as leader of the Fine Gael party in 1965 and eight years later, in coalition with the Labour Party, secured the prime ministry. His National Coalition was defeated in the general elections of June 1977, largely on the economic issues of inflation and unemployment.

Cosgrave, William Thomas (b. June 6, 1880, Dublin, Ire.—d. Nov. 16, 1965, Dublin), Irish statesman and first president (1922–32) of the Irish Free State.

At an early age, Cosgrave was attracted to the Irish nationalist movement Sinn Féin. He became a member of the Dublin Corporation in 1909 and was subsequently reelected in the Sinn Féin interest. When Britain entered World War I, he joined the Irish Volunteers; but when this group split in 1914, Cosgrave sided with a radical Sinn Féin minority against the moderates led by John Redmond.

Cosgrave took part in the Easter Rising (1916) and was afterward interned by the British for a short time. In 1917 he was elected to Parliament for the city of Kilkenny. In the sweeping election victory of the Sinn Féin in 1918, he became a member of the first Dáil Éireann, or Irish Assembly. He was made minister for local government in the first republican ministry; and, during the struggle with the British, his task was to organize the refusal of local bodies to cooperate with the British in Dublin.

Cosgrave was a supporter of the 1921 treaty settlement with Great Britain, and he became minister of local government in Ireland's newly formed provisional government. When, on Aug. 12, 1922, Arthur Griffith suddenly died and Michael Collins was chosen president in his place, Cosgrave became acting chairman of the provisional government. Ten days later Collins was shot, and Cosgrave found himself at the head of a state fighting for existence. As president of the executive council of the Irish Free State, Cosgrave represented Ireland at the Imperial Conference in October 1923; and a month earlier he was welcomed as Ireland's first spokesman at the assembly of the League of Nations.

Cosgrave restored settled government in Ireland. In the Dáil there was no serious opposition, since the party headed by Eamon De Valera, which refused to take the oath prescribed in the treaty, abstained from attendance. But neither Cosgrave nor his ministry enjoyed much popularity. Order required drastic measures, and taxation was heavy and sharply collected. Cosgrave seemed sure of a long tenure only because there was no alternative in sight. In July 1927, shortly after the general election, the assassination of Kevin O'Higgins, the vice president, produced a crisis. Very severe legislation against political associations of an unconstitutional character was introduced, and a bill declaring that no candidature for the Dáil should be accepted unless the candidate declared himself willing to sit and to take the oath of allegiance. The result of this measure was that De Valera and his party decided to attend sessions in the Dáil, and, since this greatly altered the parliamentary situation, Cosgrave obtained leave to dissolve the assembly and hold a general election. The election in September 1927 left his party numerically the largest in the Dáil but without an overall majority. He continued in office until De Valera's decisive victory at the general election of 1932. In 1944 Cosgrave resigned from the leadership of the United Ireland Party (Fine Gael).

Cosimo, name of grand dukes of Tuscany, grouped below chronologically and indicated by the symbol •.

• **Cosimo I,** in full COSIMO DE' MEDICI, byname COSIMO THE GREAT, Italian COSIMO IL GRANDE (b. June 12, 1519—d. April 21, 1574, Castello, near Florence [Italy]), second duke of Florence (1537–74) and first grand duke of Tuscany (1569–74).

Cosimo was the great-great-grandson of Lorenzo the Elder, the son of Giovanni di Bicci and brother of Cosimo the Elder, and was thus a member of a branch of the Medici family that had taken an active part in Medici affairs but had played no political role. Nevertheless, when he heard of the assassination of his distant cousin, Alessandro, duke of Florence, he immediately made for Florence. There, in January 1537, Cosimo was elected head of the republic, in the government of which he was to be assisted by the senate, the assembly, and the council. This election was approved by the Holy Roman emperor, Charles V, and on August 2 the emperor's general Alessandro Vitelli, at Montemurlo, defeated an army that a band of exiles had raised against Cosimo. Cosimo then had the principal captives beheaded and began, with Charles V's approval (September 1537), to style himself duke. The Florentine senate, assembly, and council were soon powerless.

Cosimo married Eleanora de Toledo in 1539. As the emperor's protégé, he was able to withstand the hostility of Pope Paul III and Francis I of France. He was shrewd and unscrupulous, and, with Florence under his control, he turned his ambition to territorial aggrandizement. His plans for annexing Lucca and Piombino in the 1540s were frustrated, but his enterprise against the republic of Siena, which sheltered exiles from Florence and pursued a pro-French policy, was successful. Cosimo launched an attack on Siena in 1554; a French army under Piero Strozzi was defeated at Scannagallo, near Marciano; and in 1555, after a long siege, the city capitulated. Philip II of Spain, as the successor of Charles V in Italy, had to agree to enfief Cosimo with the lordship of Siena in July 1557. The accession of Pius IV to the papacy in 1559 strengthened Cosimo still further, since Pius was a Medici of Milan and was well disposed toward the Florentine Medici. He gave a cardinal's hat to Cosimo's son Giovanni in 1560 and, after Giovanni's death, one to another son, Ferdinand, in 1563.

Having brought nearly all Tuscany under his control, Cosimo used his despotic power to promote the country's well-being. His passion for efficiency inspired him with the idea, extremely advanced for the times, of uniting all public services into a single building, the Uffizi ("Offices"), which was built for him according to Giorgio Vasari's grandiose yet practical design. In order to satisfy his taste or, better said, his Medici passion for buildings, he made Vasari his superintendent of buildings and had him redecorate the interior of the Palazzo Vecchio. He then adopted as his residence the Pitti Palace, which Eleonora had purchased unfinished in 1549. Here he entrusted the extensive work of enlargement to the architect and sculptor Bartolomeo Ammannati. In 1564 Cosimo and Vasari boldly built the gallery that permits convenient passage from one palace to the other by utilizing the Ponte Vecchio. Behind the Pitti Palace, the vast expanses of the hill of Boboli enabled Cosimo to indulge still another of his hereditary passions in designing, with Tribolo's help, the plan of the famous gardens.

Yet in his patronage of the arts, Cosimo was increasingly frustrated, for the great period of the *officina,* the workshop of Florentine masterpieces, was drawing to its close. Michelangelo could no longer be induced to stay on. In 1534 he departed for Rome, leaving the Sagrestia Nuova tombs and the Laurentian Library unfinished. But Cosimo had the artist's body brought back in 1564 and buried it himself with great pomp at Santa Croce. On the other hand, he was able to retain Jacopo Pontormo and Bronzino, the official court portraitists, and Ammannati, who was also an engineer and who had rebuilt the bridge of Santa Trinità after the disastrous flood of 1557. Cosimo, an archaeologist by temperament, was a true forerunner in this field. He opened up excavations on Etruscan sites from which such world-renowned pieces of ancient statuary as the "Orator" and the "Chimera" were taken. Finally, he established the Florentine Academy, which engaged in serious linguistic studies.

Cosimo was deeply afflicted when his wife, two of his daughters, and two of his sons all died within six years (1557–62); his enemies exploited these misfortunes to spread calumnies against the dynasty. On March 1, 1564, he resigned the actual government of his dominions to his eldest son, Francis, though he retained his ducal title and certain prerogatives; and in December 1565 Francis was married to the Austrian archduchess Joanna (Joan), a diplomatic achievement celebrated with great festivity.

Finally on Aug. 27, 1569, Pope Pius V conferred the title of grand duke (*granduca*) of Tuscany on Cosimo. This title, however, was not recognized by the Habsburg powers or by the other Italian duchies. To gratify Pius, Cosimo in 1570 married Camilla Martelli, who had long been his mistress.

• **Cosimo II,** in full COSIMO DE' MEDICI (b. May 12, 1590—d. Feb. 28, 1621), fourth grand duke of Tuscany (1609–20), who closed down the Medici family's practice of banking and commerce, which it had pursued for four centuries.

Cosimo II succeeded his father, Ferdinand I, in 1609; and, guided by his mother, Christine of Lorraine, and by Belisario Vinta, he followed his father's example and sought to establish a balance between France and Spain. He used his influence to promote the Franco-Spanish negotiations of 1611–12, which led to the marriages of 1615 (between Louis XIII of France and Anne of Austria and between the future Philip IV of Spain and Elizabeth of France). His fleet, under the admirals Jacopo Inghirami and Giulio di Montauto, checked the Turks in the Mediterranean; and his friendly relations with the Druze emir Fakhr ad-Dīn secured commercial advantages in the Levant for Tuscans.

It was Cosimo who appointed Galileo "first professor of philosophy and mathematics" at Pisa (1610); in the same year Galileo discovered four satellites of Jupiter and named them the Medicea Sidera. Under Cosimo also the architect Matteo Nigetti worked on the funeral chapel of the Medici (according to designs by Cosimo I's brilliant natural son, the younger Giovanni, who also won fame as a soldier and as a diplomat); and the sculptor Pietro Tacca began his bronzes for the monument to Ferdinand I. Cosimo abandoned all banking and commerce on his own account, for he considered it demeaning and distracting from the course of political governance.

• **Cosimo III,** in full COSIMO DE' MEDICI (b. Aug. 14, 1642—d. Oct. 31, 1723), sixth grand duke of Tuscany, who reigned for 53 years (1670–1723), longer than any other Medici, but under whom Tuscany's power declined drastically.

Though Cosimo III traveled widely and spent money generously (in particular for the benefit of the church), he had a reserved manner aggravated by conjugal, political, and dynastic disillusionments, and he took refuge more and more in devout practices. After continually trying to represent her marriage as invalid, his frivolous consort, Marguerite-Louise d'Orléans, finally abandoned him in 1675 and went back to France. The humiliations that he had to endure in order to keep Tuscany neutral in the European conflicts of the age of Louis XIV were barely compensated by his navy's share in Francesco Morosini's victories over the Turks (1684).

When his brother and his two sons proved childless, Cosimo and his brilliant minister Carlo Rinuccini had to envisage the extinction of his dynasty and even proposed, at one point, that a republican form of government should be restored in Tuscany. The European powers, however, coveted his succession and

ignored his remonstrances; and by the Treaty of London (1718) the Quadruple alliance—namely, the alliance of Great Britain, France, the United Provinces of the Netherlands, and the Holy Roman emperor Charles VI—decided that, on the extinction of the male line of the Medici, the grand duchy, together with Parma and Piacenza, should pass to Don Carlos de Borbón (the future Charles III of Spain). When Cosimo III's son and successor, Gian Gastone, died in 1737, the grand duchy of Tuscany in fact, however, passed to the dukes of Lorraine.

Cosimo THE ELDER (Florentine ruler): *see* Medici, Cosimo de'.

Cosmas, also called INDICOPLEUSTES (fl. 6th century AD, Alexandria, Egypt), merchant, traveler, theologian, and geographer whose treatise *Topographia Christiana* (*c.* 535–547; "Christian Topography") contains one of the earliest and most famous of world maps. In this treatise, Cosmas tried to prove the literal accuracy of the Biblical picture of the universe, asserting in particular that the Earth is flat and trying to refute Ptolemy's concept of a spherical universe.

Probably a Nestorian Christian, Cosmas sailed around the shores of the Indian Ocean and for some time was engaged in trade in Ethiopia and Asia. His variant name is Latin, meaning the Indian Navigator. He later became a monk and wrote several geographical treatises, but only the *Topographia* and fragments of his commentaries on the Psalms and Gospels have survived.

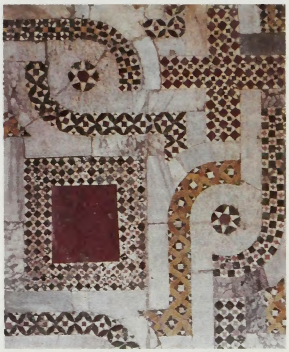
Cosmas viewed the Tabernacle of Moses as a model of the universe, the Earth being a rectangular plane surmounted by the sky, above which was heaven. In the centre of the plane was the inhabited Earth, surrounded by ocean, and beyond this the paradise of Adam. The Sun, much smaller than the Earth, revolved around a conical mountain to the north. Though Cosmas was scornful of Ptolemy and others who believed in a spherical Earth, his idiosyncratic work is not representative of the general state of cosmographic theory among Christian philosophers of his day and had small influence on later writers.

Cosmas and Damian, SAINTS (both b. traditionally Cilicia region, Asia Minor [Turkey]—d. *c.* 303, Cilicia; feast day, Eastern church, October 27; Western church, September 27), martyrs and patron saints of physicians. They were brothers, perhaps twins, but little is known with certainty about their lives or martyrdom.

According to Christian tradition, Cosmas and Damian were educated in Syria and became distinguished physicians in Cilicia, where their charity converted many to Christianity. Because they refused payment for their services, they were called the "silverless ones." Imprisoned during the persecution of Christians by the Roman emperor Diocletian, they were tortured and finally beheaded, their bodies being taken to Syria for burial. By the mid-5th century their cult had become so widespread that churches were erected in their honour in various Eastern cities, including Constantinople (now Istanbul). Pope Symmachus (498–514) dedicated an oratory to them, and by 530 Pope Felix IV had erected a church in their honour at Rome. Various early accounts of their lives and martyrdom gave rise to many legends.

Cosmati work, type of mosaic technique that was practiced by Roman decorators and architects in the 12th and 13th centuries, in which tiny triangles and squares of coloured stone (red porphyry, green serpentine, and white and other coloured marbles) and glass paste were arranged in patterns and combined with large, stone disks and strips to produce geometric designs. Cosmati work was applied to architectural surfaces and to church furniture.

The word Cosmati comes from the name Cosma, which belonged to a number of members of the several families involved in the art.



Cosmati mosaic, detail of the floor in the choir of the Church of San Nicola (*c.* 1085–1132), Bari, Italy
SCALA—Art Resource/EB Inc

Cosmati work differs from the several similar mosaic techniques that flourished in Italy at about the same time mainly by its design, which balances areas of busy, intricate pattern with smooth areas of plain stone following the ancient Roman tradition of clarity, simplicity, and monumentality. The production of Cosmati work was interrupted in the 14th century by the temporary transferral of the papal seat to Avignon, Fr., and subsequently reappeared only in a debased form.

cosmetic, any of several preparations (excluding soap) that are applied to the human body for beautifying, preserving, or altering the appearance or for cleansing, colouring, conditioning, or protecting the skin, hair, nails, lips, eyes, or teeth. *See also* makeup; perfume.

The earliest cosmetics known to archaeologists were in use in Egypt in the fourth millennium BC, as evidenced by the remains of artifacts probably used for eye makeup and for the application of scented unguents. By the start of the Christian era, cosmetics were in wide use in the Roman Empire. Kohl (a preparation based on lampblack or antimony) was used to darken the eyelashes and eyebrows and to outline the eyelids. Rouge was used to redden the cheeks, and various white powders were employed to simulate or heighten fairness of complexion. Bath oils were widely used, and various abrasives were employed as dentifrices. The perfumes then in use were based on floral and herbal scents held by natural resins as fixatives.

Along with other cultural refinements, cosmetics disappeared from much of Europe with the fall of the Roman Empire in the 5th century AD. A revival did not take place until the Middle Ages, when crusaders returning from the Middle East brought cosmetics and perfumes back from their travels. Cosmetics reappeared in Europe on a wide scale in the Renaissance, and Italy (15th–16th centuries) and France (17th century on) became the chief centres of their manufacture. At first makeup was used only by royalty, their courtiers, and the aristocracy, but by the 18th century cosmetics had come into use by nearly all social classes. During the conservative Victorian era of the 19th century, the open use of cosmetics was frowned upon by respectable society in the United States and Britain. French women continued to use makeup, however, and France pioneered in the scientific development and manufacture of cosmetics during that time. After World War I any lingering Anglo-American prejudices against makeup were discarded, and new products and techniques of manufacture, packaging, and advertising have made cosmetics available on an unprecedented scale.

Skin-care preparations. Preparations for the care of the skin form a major line of cosmetics. The basic step in facial care is cleansing, and soap and water is still one of the most effective means. Cleansing creams and lotions are useful, however, if heavy makeup is to be removed or if the skin is sensitive to soap. Their active ingredient is essentially oil, which acts as a solvent and is combined in an emulsion (a mixture of liquids in which one is suspended as droplets in another) with water. Cold cream, one of the oldest beauty aids, originally consisted of water beaten into mixtures of such natural fats as lard or almond oil, but modern preparations use mineral oil combined with an emulsifier that helps disperse the oil in water. Emollients (softening creams) and night creams are heavier cold creams that are formulated to encourage a massaging action in application; they often leave a thick film on the face overnight, thus minimizing water loss from the skin during that period.

Hand creams and lotions are used to prevent or reduce the dryness and roughness arising from exposure to household detergents, wind, sun, and dry atmospheres. Like facial creams, they act largely by replacing lost water and laying down an oil film to reduce subsequent moisture loss while the body's natural processes repair the damage.

Foundations, face powder, and rouge. The classic foundation is vanishing cream, which is essentially an oil-in-water emulsion that contains about 15 percent stearic acid (a solid fatty acid), a small part of which is saponified (converted to a crystalline form) in order to provide the quality of sheen. Such creams leave no oily finish, though they provide an even, adherent base for face powder, which when dusted on top of a foundation provides a peach-skin appearance. Many ingredients are needed to provide the characteristics of a good face powder: talc helps it spread easily; chalk or kaolin gives it moisture-absorbing qualities; magnesium stearate helps it adhere; zinc oxide and titanium dioxide permit it to cover the skin more thoroughly; and various pigments add colour.

Heightened colour can be provided with rouge, which is used for highlighting the cheekbones; the more modern version is the blusher, which is used to blend more colour in the face. Small kits of compressed face powder and rouge or blusher are commonly carried by women in their handbags.

Eye makeup. Eye makeup, which is usually considered indispensable to a complete maquillage (full makeup), includes mascara to emphasize the eyelashes; eye shadow for the eyelids, available in many shades; and eyebrow pencils and eyeliner to pick out the edges of the lids. Because eye cosmetics are used adjacent to a very sensitive area, innocuity of ingredients is essential.

Lipstick. Lipstick is an almost universal cosmetic since, together with the eyes, the mouth is a leading feature, and it can be attractively coloured and textured. Lipstick has a fatty base that is firm in itself and yet spreads easily when applied. The colour is usually provided by pigment—usually reds but also titanium dioxide, a white compound that gives brightness and cover. Because lipsticks are placed on a sensitive surface and ultimately ingested, they are made to the highest safety specifications.

Other cosmetics. Hair preparations include soapless shampoos (soap leaves a film on

the hair) that are actually scented detergents; products that are intended to give gloss and body to the hair, such as resin-based sprays, brilliantines, and pomades, as well as alcohol-based lotions; and hair conditioners that are designed to treat damaged hair. Permanent-wave and hair-straightening preparations use a chemical, ammonium thioglycolate, to release hair from its natural set. Hair colorants use permanent or semipermanent dyes to add colour to dull or mousy-coloured hair, and hydrogen peroxide is used to bleach hair to a blond colour.

Perfumes are present in almost all cosmetics and toiletries. Other products associated with grooming and hygiene include antiperspirants, mouthwashes, depilatories, nail polish, astringents, and bath crystals.

cosmic ray, a high-speed particle—either an atomic nucleus or an electron—that travels throughout the Milky Way Galaxy, including the solar system. Some of these particles originate from the Sun, but most come from sources outside the solar system and are known as galactic cosmic rays (GCRs). Cosmic-ray particles that arrive at the top of the Earth's atmosphere are termed primaries; their collisions with atmospheric nuclei give rise to secondaries.

About 85 percent of the GCRs are protons (nuclei of hydrogen atoms), with approximately 12 percent consisting of alpha particles (helium nuclei). The remainder are electrons and nuclei of heavier atoms. Because most cosmic-ray primaries are strongly influenced by the Earth's magnetic field and the interplanetary magnetic field, most of those detected near the Earth have kinetic energies in excess of about 1 GeV (gigaelectron volts, or one billion electron volts). This energy corresponds to speeds greater than about 87 percent the speed of light. The number of particles drops rapidly with increasing energy, but individual particles with energies as high as 10^{20} eV have been detected.

Because of their deflection by magnetic fields, primary GCRs follow convoluted paths and arrive at the top of the Earth's atmosphere nearly uniformly from all directions. Consequently, identification of cosmic-ray sources cannot be based on direction of arrival but rather must be inferred from their abundances (or charge spectrum). This can be done by comparing cosmic-ray abundances with those deduced spectroscopically for stars and interstellar regions. The relative abundances of different elements among cosmic-ray nuclei have been well studied for particles with energies from roughly 100 MeV (megaelectron volts, or one million electron volts) to several tens of GeV. Isotopic abundances have been measured for the more abundant elements as well. From such data it has been possible to reconstruct much of the history of cosmic-ray particles' journey through the Milky Way Galaxy. The light elements lithium, beryllium, and boron are rare throughout the universe but are surprisingly abundant among the primary GCRs. It is accepted that these light nuclei are produced when heavier primaries (*e.g.*, carbon and oxygen) are fragmented during collisions with the thin interstellar gas composed mostly of hydrogen. The GCRs would have to have been traveling for about 10 million years to produce enough interstellar collisions to yield the observed number of light nuclei. The time scale for this travel is based in part on the observation of such radioactive fragments as beryllium-10. This radionuclide has a half-life of 1.6 million years, and the number of such particles that can survive to be detected on Earth depends on their total travel time.

After correcting for interstellar fragmentation, one finds that the composition of the inferred source is similar in some ways to general solar-system matter; however, too little hydrogen and helium are present, and significant differences exist among certain isotopes. It is thought that the cosmic rays represent a mixture of interstellar material enriched with matter from evolved stars, such as supernovas and perhaps Wolf-Rayet stars.

In collisions between primary cosmic rays and interstellar hydrogen, charged mesons (mostly pions) are produced. These pions have half-lives of about two hundred-millionths of a second and decay through muons to produce electrons and neutrinos. The electrons travel along spiral paths in the galactic magnetic field and so generate synchrotron radiation (*q.v.*), which is detected by radio telescopes. There is general agreement between the radio observations and calculated intensities. Synchrotron radiation has been detected from supernova remnants such as the Crab Nebula, confirming their identification as potential cosmic-ray sources. Interstellar cosmic-ray collisions also yield neutral pions, which decay quickly to produce high-energy gamma rays. Gamma-ray surveys (conducted by Earth-orbiting satellites) indicate that cosmic rays are strongly concentrated in the disk of the Milky Way Galaxy with a much smaller percentage in the surrounding halo. The measured intensity of the gamma rays is in general agreement with calculated values.

With an average life of 10 million years, GCRs must be replenished at an average power level of about 10^{41} ergs per second. Supernova explosions can supply this much power as they occur about every 50 years in the galaxy. Details of the processes involved in cosmic-ray production and acceleration remain unclear, but it appears that particle acceleration can be accomplished by expanding shock waves from supernovas.

A small anisotropy has been detected among the highest energy particles—*i.e.*, those with energies above about 10^{18} eV. The galactic magnetic field is not strong enough to confine such energetic primary particles within the galaxy, and it is thought that they are the only significant extragalactic component among cosmic rays. These extremely high energy particles are so rare that they can be detected only through the extensive air showers (EAS) that they produce in the atmosphere. An extensive air shower may consist of billions of secondaries (mostly electrons and muons) that arrive at ground level over areas of many square kilometres.

Energetic particles emerge from solar flares where they have been accelerated by strong magnetic fields. Most of these particles are protons, with a decreasing number of helium and heavier nuclei. Observations of the helium-oxygen ratio among energetic solar particles have contributed significantly to solar studies, because the Sun's helium abundance is difficult to estimate by means of conventional spectroscopy. The energy spectrum of solar particles, as compared with that of galactic cosmic rays, generally decreases more rapidly with increasing energy, but there is great variability in the shape of the spectrum from one solar-flare event to another, and the energy spectrum rarely extends above about 10 GeV.

Cosmic-ray studies have been carried out from far below the Earth's surface to outer space. Pioneering studies were conducted atop mountains where only secondary particles were detectable. Some secondary muons have such high energies that they are able to penetrate the Earth to depths of more than 3.2 km (2 miles). To study primary cosmic rays directly, high-altitude balloons (typically reaching altitudes of 37 km [about 120,000 feet]) have been extensively used. Rockets can reach greater heights but with smaller payloads and for only a few minutes. Cosmic-ray observations also have been made from Earth-orbiting satellites and from long-range probes.

From the early 1930s to the 1950s, cosmic rays played a critical role in the scientific study of the atomic nucleus and its components, for they were the only source of high-energy particles. Short-lived subatomic particles were discovered through cosmic-ray collisions. The field of particle physics was in fact established as a result of such discoveries, beginning with those of the positron and the muon. Even with the advent of powerful particle accelerators in the 1950s, investigators in the field have continued to study cosmic rays, albeit on a more limited scale, because they contain particles with energies far beyond those attainable under laboratory conditions.

(M.W.Fr.)

cosmic tree (mythology): *see* world tree.

cosmogonic myth: *see* creation myth.

cosmogony, in astronomy, study of the evolutionary behaviour of the universe and the origin of its characteristic features. For scientific theories on the unsolved problem of the origin of the solar system, *see* planetesimal; protoplanet; solar nebula. For an outline of the development of astronomical ideas regarding the structure of the universe, *see* cosmology; for theories on the origin of the universe, *see* big-bang model; steady-state theory.

cosmology, field of study that brings together the natural sciences, particularly astronomy and physics, in a joint effort to understand the physical universe as a unified whole.

A brief treatment of cosmology follows. For full treatment, *see* MACROPAEDIA: Cosmos.

Three great ages of scientific cosmology can be distinguished. The first began in Greece in the 6th century BC when the Pythagoreans introduced the concept of a spherical Earth and, unlike the Babylonians and Egyptians, postulated a universe in which the motions of heavenly bodies were governed by the harmonious relations of natural laws. The infinite atomist universe of Leucippus and Democritus followed, wherein countless worlds, teeming with life, were the result of chance aggregations of atoms. The geocentric Aristotelian universe arose in the 4th century BC. It consisted of a central Earth surrounded by revolving, translucent spheres to which were attached the Sun and the planets; the outermost sphere supported the fixed stars. Various developments culminated in the Ptolemaic model of the 2nd century AD, and in the 13th century the Aristotelian universe was adapted to Christian theology by Thomas Aquinas.

The Copernican revolution ushered in the second great age. In the 16th century, Nicolaus Copernicus revived ancient ideas and proposed a heliocentric universe, which during the following century was transformed into the mechanistic, infinite Newtonian universe that flourished until the early 1900s. In the mid-18th century, Thomas Wright proposed the influential notion of a universe composed of numerous galaxies, and William Herschel, followed by many other astronomers, made rapid strides in the study of stars and of the Milky Way Galaxy, of which the Earth is a component.

The third great age began in the early years of the 20th century, with the discovery of special relativity and its development into general relativity by Albert Einstein. These years also saw momentous developments in astronomy: extragalactic redshifts were detected by Vesto Slipher; extragalactic nebulae were shown to be galaxies comparable with the Milky Way; and Edwin Hubble began to estimate the distances of these galactic systems. Such discoveries and the application of general relativity to cosmology by Wilhelm de Sitter, Alexander Friedmann, and Georges Lemaître eventually gave rise to the view that the universe is expanding. The basic premise of modern cosmology is the principle that asserts that

the universe is homogeneous in space (on the average all places are alike at any time) and that the laws of physics are everywhere the same. The principle is plausible because of the observed isotropy of the universe (on the average, all directions are alike).

The essence of general relativity, when applied to cosmology, is that space has dynamic properties and may be uniformly curved. If the curvature is negative (hyperbolic) or zero (flat), the universe is open and space is infinite; if the curvature is positive (spherical) the universe is closed and space is finite. Space itself expands, and the galaxies, stationary in space, recede from one another; all recession velocities, relative to any co-moving observer, obey the Hubble law (*see* Hubble's constant), and their increase with distance is not limited by the velocity of light. Light rays, while propagating through expanding space, have their wavelengths progressively stretched; the light emitted by a distant galaxy is thus received at longer wavelengths, and this is the origin of cosmological redshifts. Expansion indicates that the universe originated in a congested state (*i.e.*, the big bang) some 10,000,000,000 years ago. The steady-state theory—an attempt to eliminate the big bang—has been disproved by the existence of microwave background radiation that is believed to be the afterglow of the big bang. Such thermal radiation (with a temperature of nearly 3 K) was predicted by George Gamow in the early 1950s and discovered by Arno A. Penzias and Robert W. Wilson in 1965. Since then considerable progress has been made in the study of the early universe that lasted for a period of approximately 100,000 years.

cosmopolitanism, in Stoic philosophy, position taken by the Stoics against the traditional (Greek) distinction between Greeks and barbarians, made by applying to themselves the term cosmopolitans, thereby implying that their polis, or city-state, was the entire cosmos, or the whole world. Alexander the Great discouraged this distinction by allowing his generals to marry women native to the lands that they had conquered, but his policy met with resistance in the field and shock at home. The Stoics (from the 4th–3rd century BC) broke through the Greek assumption of their own racial and linguistic superiority and considered the new cosmopolitanism on a philosophical basis.

The earlier Greeks had felt that it was a dictate of nature itself (or the providence of Zeus) that humanity had been divided into Greeks and barbarians. The Stoic argued, on the contrary, that all people share one common reason and are subject to the one divine *logos;* therefore, the true Stoic sage is not a citizen of any one state but of the whole world.

The later Stoics implemented this idea by stressing acts of kindness even for defeated enemies and slaves. There were also exhortations to extend the characteristic Stoic love of self (*oikeiōsis*) in an ever widening circle from self to family, to friends, and, at last, to humanity as a whole. Many historians have argued that this Stoic principle helped to prepare for the acceptance of Christianity, in which, according to the Apostle Paul, there is neither Jew nor Gentile, freeman nor slave.

Epictetus, another of the later Stoics (1st–2nd century AD), reminded his followers that all men are by nature brothers and exhorted them to remember who they are and whom they rule; for the ruled, too, are kinsmen, brethren by nature, and all are children of Zeus.

Cosmos, genus of garden plants of the family Asteraceae, containing about 20 species native to tropical America. They have leaves opposite each other on the stem and heads of



Common garden cosmos (*Cosmos bipinnatus*)
E. Lastovica

flowers that are borne along on long flower stalks or together in an open cluster.

The disk flowers are red or yellow; the ray flowers, sometimes notched, may be white, pink, red, purple, or other colours. The common garden cosmos, from which most annual ornamental varieties have been developed, is *C. bipinnatus.*

Cosmos, in astronomy, the entire physical universe consisting of all objects and phenomena observed or postulated.

A brief treatment of the universe follows. For full treatment, *see* MACROPAEDIA: Cosmos, The.

The principal constituents of the universe are the galaxies, stars and stellar groupings, and nebulae (clouds of interstellar gas and dust). Substantially smaller components include the solar system and any other assemblage of planets, satellites, comets, and meteoroids revolving around a central stellar body that may exist among the millions of galaxies. In addition to such objects and scattered matter, the universe contains gravitational fields and various forms of radiation. For a discussion of these and other significant components of the universe, *see* galaxy; star; star cluster; nebula; solar system; infrared source; radio source; and X-ray source.

Throughout the centuries numerous theories have been proposed for the origin and structure of the universe. In ancient Greece, the Milesian school of pre-Socratic thinkers, including Thales, Anaximander, and Anaximenes of the 6th century BC, developed the view that the formation of the world occurred as a natural, rather than supernatural, sequence of events. This view was elaborated by the Pythagorean school of that era, which stressed the concept of an ordered cosmos governed by mathematical relations, and which culminated in the work of Leucippus and Democritus of the Atomist school. The Atomist view is expressed by the Roman poet Lucretius in *De rerum natura* (*On the Nature of Things*). He describes a boundless universe in which the interplay of atoms creates endless worlds in various stages of development and decay. These early pictures of the physical world were supplanted by the geocentric, finite cosmologies of Plato, Aristotle, and Ptolemy, which later were embodied in medieval theology.

From the 16th century, the Copernican theory that the Sun is the centre of the universe, the meticulous celestial measurements of Tycho Brahe, the mathematical discoveries of Kepler, the observations and arguments of Galileo, and the theories of Newton, in a period of about 200 years, opened minds to the possibility of an apparently infinite universe whose centre has no specific location. The realization that stars may be arranged into a system of "island universes," now known to be galaxies, emerged in the middle of the 18th century largely as a result of suggestions by such scientists and philosophers as Emanuel Swedenborg, Thomas Wright, Immanuel Kant, and Johann Heinrich Lambert. Such conjectures were supported by the observations of the English astronomer William Herschel. A qualitative picture of the Milky Way Galaxy as a flattened system of stars and nebulae, isolated in space, arose about 1785; however, it was not until the early 20th century that Harlow Shapley succeeded in assigning reliable dimensions to the system and estimating the location of the Sun. During the early 1920s another astronomer, Edwin Powell Hubble, determined conclusively that galaxies exist beyond the Milky Way system. Furthermore, Hubble's discovery (in 1929) that these external galaxies are apparently receding at speeds increasing with distance and Albert Einstein's general theory of relativity together established modern cosmology.

According to the prevailing theoretical position, the universe originated from an explosion—the big bang—about 10,000,000,000 years ago. Immediately after the big bang, the universe consisted primarily of radiation, but as it expanded matter came to dominate—roughly 1,000 years after the explosive beginning. Hubble's discovery and other more recent findings seem to suggest that the universe is still expanding and that it will continue to do so indefinitely (*see also* big-bang model; expanding universe).

Cosmos, any of a series of unmanned Soviet satellites launched from the early 1960s. Cosmos satellites were used for a wide variety of purposes, including scientific research, navigation, and military reconnaissance. Cosmos 26 and 49 (both launched in 1964), for example, were equipped to measure the Earth's magnetic field. Others were employed to study certain technical aspects of spaceflight as well as physical phenomena in the Earth's upper atmosphere and in deep space. A number of them such as Cosmos 597, 600, and 602 were apparently used to collect intelligence information on the Yom Kippur War between the Arab states and Israel in October 1973. Some Cosmos spacecraft may have had the ability to intercept satellites launched by other nations.

Cospicua, town, eastern Malta, one of the Three Cities (the others being Senglea and Vittoriosa), at the head of Dockyard Creek, just south of Valletta across Grand Harbour. It developed as a suburb of Vittoriosa in the mid-16th century and was a thriving settlement (known as Bormla) before it was severely damaged by the Turks in the Great Siege of Malta in 1565. It was rebuilt and refortified after 1565 and benefitted economically from the shipping activities of the Hospitallers (Knights of St. John of Jerusalem). Although many old buildings and most residential sections were destroyed in World War II, the Galley Houses of the knights, the parish church (1637), and a nearby oratory (1731) survived. There are ship-repair yards. Pop. (1990 est.) 7,838.

Cossa, Baldassare: *see* John (XXIII) *under* John (Papacy).

Cossa, Francesco del (b. 1436, Ferrara, Duchy of Ferrara—d. 1478, Bologna, Emilia), early Renaissance painter of the Ferrarese school who, through his seven years' residence in Bologna, exercised a profound influence on the course of Bolognese painting. Cossa's style is characterized by stiff, heavy drapery folds and a sharply linear rendering of complex surfaces.

In his best-known work, the frescoes in the Schifanoia Palace at Ferrara (probably commissioned in 1469), Cossa developed a personal style of great coherence and vitality. Illustrating a humanist program, these frescoes represent in three tiers allegorical scenes, astrological symbols of the months, and scenes representing the daily life of Borso d'Este, the ruler of Ferrara. Cossa was solely responsible for the frescoes representing March, April, and May on the east wall.

A polyptych that Cossa painted for the Griffoni altar in S. Petronio at Bologna has been disassembled. The later panels (*c.* 1474), now in the Brera, Milan, are Cossa's most successful panel paintings.

Cossack, Russian KAZAK (from Turkic *kazak*, "adventurer," or "free man"), member of a people dwelling in the northern hinterlands of the Black and Caspian seas. They had a tradition of independence and finally received privileges from the Russian government in return for military services. Originally (in the 15th century) the term referred to semi-independent Tatar groups, which formed in the Dnepr region; the term was also applied (by the end of the 15th century) to peasants who had fled from serfdom in Poland, Lithuania, and Muscovy to the Dnepr and Don regions, where they established free, self-governing military communities. In the 16th century there were six major Cossack hosts: the Don, the Greben (in Caucasia), the Yaik (on the middle Ural River), the Volga, the Dnepr, and the Zaporozhian (mainly west of the Dnepr).

Polish kings in the early 16th century began to organize the Zaporozhian Cossacks into military colonies to protect Poland's borders. Throughout the 16th century and the first half of the 17th, these Cossacks retained their political autonomy, briefly forming a semi-independent state under Bohdan Khmelnytsky (*c.* 1649). But, threatened by Polish domination, the Zaporozhian Cossacks signed a treaty with Russia in 1654, under which their autonomy was to be respected. The Russians likewise used the Cossacks first as defenders of the Russian frontier and later as advance guards for the territorial extension of the Russian Empire. Internally, the Cossacks regained a greater degree of their cherished liberties under the Russians than they had known under the Poles. The Russian throne reserved the right to approve Cossacks' negotiations with the Poles and the Turks, the peoples with whom Russian relations were the most sensitive. Otherwise the chief ruler, or hetman (ataman), of the Cossack army had a free hand in foreign policy. Thus, in exchange for some military obligations, the Cossacks had restored some of their autonomy—in the short term. Over the years, however, Russia increasingly came to dominate the Cossacks.

Under the Russian umbrella, the Cossacks expanded eastward from their home in the Don and were early colonizers of Siberia. By the end of the 19th century the number of Cossack groups had expanded to 11, including the Don, Kuban, Terek, Orenburg, and Ussuri Cossacks.

When their privileges were threatened, the Cossacks revolted, their most famous rebel leaders of the 17th and 18th centuries being Stenka Razin, Kondraty Bulavin, and Yemelyan Pugachov. As a result, they gradually lost their autonomous status. By the late 18th century, all Cossack males were required to serve in the Russian army for 20 years; and, although each Cossack village (stanitsa) continued to elect its own assembly, the hetman was appointed by the central government. The Cossacks' social structure, which had traditionally been based on equality and communal landholding, deteriorated, particularly after 1869, when Cossack officers and civil servants were allowed to own land privately and rent it to outsiders.

In the 19th and 20th centuries, the Russians used Cossacks extensively to suppress revolutionary activities. During the Russian Civil War (1918–20), the Cossacks were divided. Those in southern Russia formed the core of the White armies there, and about 30,000 fled Russia with the White armies. Under Soviet rule Cossack communities ceased to function as administrative units.

cost, in common usage, the monetary value of goods and services that producers and consumers purchase. In a basic economic sense cost is the measure of the alternative opportunities foregone in the choice of one good or activity over others. This fundamental cost is usually referred to as opportunity cost. For a consumer with a fixed income, the opportunity cost of purchasing a new home appliance may be, for example, the value of a vacation trip foregone, or of several suits of clothes unbought.

More conventionally, cost has to do with the relationship between the value of production inputs and the level of output. Total cost refers to all the expense incurred in reaching a particular level of output; if such total cost is divided by the quantity produced, average or unit cost is obtained. A portion of the total cost known as fixed cost—*e.g.*, the costs of building rental or of heavy machinery—does not vary with the quantity produced and, in the short run, cannot be altered by increasing or decreasing production. Variable costs, like the costs of labour or raw materials, change with the level of output.

An aspect of cost important in economic analysis is marginal cost, or the addition to the total cost resulting from the production of an additional unit of output. A firm desiring to maximize its profits will, in theory, determine its level of output by continuing production until the cost of the last additional unit produced (marginal cost) just equals the addition to revenue obtained from it.

Lastly, a distinction can be made between social and private costs. Only private costs are registered through the price system; for example, a producing firm pays the costs of such inputs as labour and machinery, but society bears the costs of damage done to the environment by the production process.

cost–benefit analysis, in governmental planning and budgeting, the attempt to measure the social benefits of a proposed project in monetary terms and compare them with its costs. The procedure, which is equivalent to the business practice of cost-budgeting analysis, was first proposed in 1844 by the French engineer A.-J.-E.-J. Dupuit. It was not seriously applied until the 1936 U.S. Flood Control Act, which required that the benefits of flood-control projects exceed their costs.

A cost–benefit ratio is determined by dividing the projected benefits of a program by the projected costs. In general, a program having a high benefit–cost ratio will take priority over others with lower ratios. Determining this ratio is a difficult task, however, because of the wide range of variables involved. Both quantitative and qualitative factors must be taken into account, especially when dealing with social programs. For instance, the monetary value of the presumed benefits of a given program may be indirect, intangible, or projected far into the future. The time factor must be considered in estimating costs, especially in long-range planning. Variable interest rates, tying-up of funds, and the disruption of normal cash flow must be factors in the analysis if an accurate cost–benefit ratio is to be determined.

Since the 1960s, cost–benefit analyses have been used in all aspects of government planning and budgeting, from programs that can be analyzed with a fairly high degree of accuracy, such as waterworks, to programs that involve a great degree of subjective data, such as military outlays. Critics of cost–benefit analysis argue that reducing all benefits to monetary terms is impossible, and that a quantitative, economic standard is inappropriate to political decision making.

cost of living, monetary cost of maintaining a particular standard of living, usually measured by calculating the average cost of a number of specific goods and services required by a particular group. The goods and services used as indexes may be the minimum necessary to preserve health or may be what is considered average for a given income group, depending on the purposes of the index.

Measurement of the cost of a minimum standard of living is essential in determining relief payments, social-insurance benefits, family allowances, tax exemptions, and minimum wages. Measurements of change in the cost of living are important in wage negotiations. It is difficult, however, to make precise comparisons over time, because consumer tastes and the availability of products change.

Cost-of-living measurements are also used to compare the cost of maintaining similar living standards in different areas. *See also* consumer price index.

Costa, Gabriel da: *see* Acosta, Uriel.

Costa, Isaäc da (b. Jan. 14, 1798, Amsterdam—d. April 28, 1860, Amsterdam), Dutch writer and poet, best-known as a leading figure in the conservative Calvinist political and literary group called the Réveil movement.

Although poetry written in Latin by da Costa had previously been published, it was his first Dutch-language poetry, *De lof der dichtkunst* (1813; "In Praise of Poetry"), that came to the attention of the influential poet Willem Bilderdijk. Under Bilderdijk's influence, da



Isaäc da Costa, engraving by P. Blommers after a painting by A.J. Ehnle

By courtesy of the Iconographisch Bureau, The Hague

Costa, who was of Portuguese-Jewish descent, converted to Calvinism. Thereafter he was dedicated to the suppression of liberal and revolutionary thought.

He soon published *Bezwaren tegen den geest der eeuw* (1823; "Objections to the Spirit of the Age"), which attacked the moral climate of the times as expressed in the principles of the French Revolution. He settled in Amsterdam and began lecturing in theology and other subjects. From 1834 to 1840 da Costa served as editor of the *Nederlandsche Stemmen.* Religious and political argument comprise the bulk of da Costa's writing. He spent the later years of his life writing the biography of Willem Bilderdijk and editing 15 volumes of Bilderdijk's poetry.

Costa, Lorenzo (b. *c.* 1460, Ferrara, Duchy of Ferrara [Italy]—d. March 5, 1535, Mantua, Duchy of Mantua [Italy]), painter of the school of Ferrara-Bologna, notable as one of the first Ferrarese artists to adopt a soft, atmospheric style of painting.

Costa was trained at Ferrara, probably un-

der Cosmè Tura, who was the first important native-born Ferrarese painter. From at least 1485 he worked at Bologna in close connection with Francia, the major Bolognese artist of the period, who led him to soften his style and eliminate his native robustness. His best works are several altarpieces in the churches of Bologna.

In 1506, soon after the expulsion of the ruling Bentivoglio family from Bologna, he was summoned as court painter to Mantua to succeed Andrea Mantegna. He had already painted (1504–06) one elaborate allegory for the Marchesa of Mantua. He spent his last years in the service of the Gonzagas, doing religious and historical pictures.

Costa, Lúcio (b. Feb. 27, 1902, Toulon, Fr.), French-born Brazilian architect best known as the creator of the master plan for Brazil's new capital at Brasília.

After graduating from the National School of Fine Arts, Rio de Janeiro, in 1924, Costa entered into a partnership with Gregori Warchavchick, a Russian-born architect and early advocate of modern architecture in Brazil. In 1931, following the Getúlio Vargas revolution, Costa was appointed director of the School of Fine Arts, which included the School of Architecture. The Ministry of Education and Health building, Rio de Janeiro (1937–43), for which Costa received the commission, was designed by a team that included him and Oscar Niemeyer and had the Swiss-born French architect Le Corbusier as a consultant. This structure, notable for its system of movable sun-shade louvers, was a milestone in the introduction of modern architecture into Brazil and is considered one of the finest modern structures in Latin America. Costa and Niemeyer designed the Brazilian pavilion for the New York World's Fair of 1939. From the time of its formation in 1937, Costa was active in the National Institute for Historical and Artistic Patrimony in Rio de Janeiro, carrying out the restoration of artistic monuments.

Costa's plan for the city of Brasília was selected in a competition held in 1956. The plan took the form of a straight line of administrative and public buildings intersected by a curved strip of residential blocks and houses.

Costa Alegre, Caetano da (b. April 26, 1864, São Tomé, Portuguese Africa—d. April 18, 1890, Alcobaça, Port.), first significant black African poet writing in Portuguese to deal with the theme of blackness. He was the literary ancestor to the later, more vehement modern poets.

Costa Alegre was born into a creole family but moved in 1882 to Portugal, where he enrolled in the Medical School of Lisbon. Before he could graduate and fulfill his desire to become a doctor in the navy, however, he died of tuberculosis at the age of 26. It was not until 1916 that his friend, the journalist Cruz Magalhães, collected and published Costa Alegre's poetry as *Versos.*

Colour dominates the poetry of Costa Alegre. Rejected by a Portuguese woman whom he loved, he laments his blackness, yet he exalts black women. In one of his more famous poems, he confesses "My colour is black / It stands for mourning and grief." He misses his island home and his African heritage. Time and again he expresses his racial alienation and his personal suffering, but at times he does so with ironic self-mockery. Technically, Costa Alegre's poetry is rooted in the Romantic mode that dominated much 19th-century Portuguese verse. Using traditional imagery of the time, the lyrical poet in his works compares love to a rose and his beloved to a dove. He chooses the sonnet form in such poems as "Aurora" and "Longe," and his personal, confessional style is far removed from traditional African oral poetry. Nevertheless, Costa Alegre is an African poet who contributed greatly to the development of the literature of São Tomé in particular and Portuguese-speaking Africa in general. His psychological insight, his willingness to see blackness as a serious literary subject, and his remembering of happy times in the tropical land of his birth are qualities that have been adopted by later novelists and poets.

Costa Brava, coastal region of the *comunidad autónoma* ("autonomous community") of Catalonia, northeastern Spain, extending for about 75 miles (120 km) along the Mediterranean Sea from the French border at Port-Bou to the Spanish bathing resort of Blanes, thus coinciding with the coast of Gerona province. This part of the Spanish coast was almost unknown to tourists until the 1920s,



Puerto de la Selva, a resort on the Costa Brava, Spain
Hans Huber

when the rugged grandeur of its rocky shores, deeply indented by small sandy bays, bathed in warm seas, and with a temperate climate, began to win recognition. Picturesque villages, now busy resorts, include Lloret de Mar (which has more than 100 hotels), San Feliu de Guixols, Palamós, and Port-Bou. Agriculturally, the area is one of the richest in Spain, and it is also the most important cork-growing region, supplying the wine producers of the world.

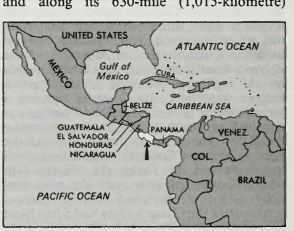
Costa-Gavras, byname of KONSTANTIN GAVRAS (b. Feb. 12, 1933, Loutra-Iraias, Greece), Greek-born naturalized French motion-picture director noted for films that have been both political arguments and entertainments (usually as mysteries or thrillers). He was perhaps more overtly political than any other major filmmaker in history.

The son of a Russian-born father and a Greek mother, Costa-Gavras left Athens in 1952 to go to Paris, where he enrolled in the Sorbonne. After taking a degree in literature with the intention of becoming a writer, he followed another long-held ambition—to make films—and entered the Institute of Higher Cinematographic Studies (Institut des Haut Études Cinématographiques). He became an assistant to such filmmakers as Yves Allégret, René Clair, René Clément, and Jacques Demy.

Costa-Gavras' first film, *Compartiment tueurs* (1966; *The Sleeping Car Murders*), was a detective thriller. His second, *Un Homme de trop* (1966; "One Man Too Many," *Shock Troops*), a World War II drama, had good reviews; but it was his next film, *Z* (1968), a powerfully dramatic description of political assassination in Greece, that won him an Academy Award Oscar for best foreign-language film and brought him international acclaim. It was followed by *L'Aveu* (1970; *The Confession*), on the persecution of a communist by communists in an East European police state, and then by *L'État de siège* (1972; *State of Siege*), on the kidnapping of a right-wing American by Uruguayan revolutionaries. Other successful films include *Missing* (1982), on the *desaparecidos* ("disappeared persons") in army-ruled Chile, *Betrayed* (1988), on the rise of a white-supremacist group in America's heartland, and *Music Box* (1989), on the prosecution of a Nazi war criminal in the United States. Although he included antifascist political messages, his films appealed not merely to intellectuals or ideologues but also to a wide film-going public because they usually were excitingly suspenseful or otherwise entertaining.

Costa Mesa, city, Orange county, southern California, U.S., on a coastal plateau overlooking the Pacific, at the mouth of the Santa Ana River. With Newport Beach it forms Orange county's "Harbor Area." The site, once part of Rancho Santiago de Santa Ana and the Irvine Ranch, became the hot springs resort of Fairview. Laid out as the town of Harper in 1906, it was renamed in 1921 for its coastal location. In the 1950s, construction of expressways stimulated residential growth. There has been planned light-industrial development, and the Orange County Fair is an annual event. The city is the seat of Orange Coast (junior) College (1947) and Southern California College (founded 1920 at Pasadena, relocated 1950). The Estancia (1818), a station of Mission San Juan Capistrano, has been restored as a historical monument. The Orange County Performing Arts Center opened in 1986. The Briggs Cunningham Automotive Museum is in the city. Inc. city, 1953. Pop. (1990) 96,357.

Costa Rica, officially REPUBLIC OF COSTA RICA, Spanish REPÚBLICA DE COSTA RICA, country of Central America, covering an area of 19,730 square miles (51,100 square km). The capital is San José. Extending from northwest to southeast, Costa Rica is bounded on the north by Nicaragua, along its 185-mile (300-kilometre) northeastern coastline by the Caribbean Sea, on the southeast by Panama, and along its 630-mile (1,015-kilometre)



Costa Rica

southwestern coastline by the Pacific Ocean. The population in 1990 was estimated to be 3,015,000.

A brief treatment of Costa Rica follows. For full treatment, *see* MACROPAEDIA: Central America.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Costa Rica has a narrow Pacific coastal region that rises abruptly into central highlands. The highlands, forming the rugged backbone of the country, descend much more gradually toward the generally wider Caribbean (Atlantic) Plain. The Pacific coast is generally lowland in character, and, like the Caribbean coast, it is lined with white sandy beaches. About one-fifth of the country lies less than 400 feet (120 m) above sea level. The Cordillera de Guanacaste, the Cordillera de Tilarán, and the Cordillera Central form a continuous volcanic mountain chain (called the Cordillera Volcánica) stretching from the Nicaraguan border in the northwest to form the Meseta Central (Valle Central) heartland of the country. Rising southeastward from the

intermontane basin (the Meseta Central), the nonvolcanic Cordillera de Talamanca reaches 12,529 feet (3,819 m) at Mount Chirripó, the country's highest peak. Although it lies in one of the most geologically active regions in the world, Costa Rica has not suffered as greatly from volcanic eruptions and earthquakes as have some of its northern neighbours. The country's densely populated Meseta Central, however, has active and potentially dangerous volcanoes and experiences periodic earthquakes; the worst earthquake in modern times occurred in April 1910, near Cartago, leaving 1,750 dead.

Costa Rica receives between 180 and 200 inches (4,500 and 5,000 mm), average annual rainfall in its heavily forested lowland areas along the Caribbean and in the southwest along the Pacific; average temperature is 77° F (25° C). San José on the Meseta Central receives 75 inches (1,900 mm) of rainfall annually (less than 1 inch [25 mm] falls in February). The temperate climate of the Meseta Central supports Costa Rica's coffee production. At elevations above 7,500 feet (2,300 m) average annual temperature is less than 60° F (15° C). Because of its large tropical areas, Costa Rica contains a wide variety of animal life that includes uncounted species of insects, birds, and reptiles and many mammals, some North American (deer, otter, and fox) and some South American (monkey, sloth, and anteater).

Costa Rica, generally poor in natural resources, does have substantial deposits of gold and silver ores, as well as reserves of bauxite, manganese, and magnetite.

The people. The Meseta Central, with more than half of Costa Rica's population, is predominantly Spanish in both its manner of living and its ancestry. Roman Catholicism is the majority religion in the Meseta Central; evangelical Protestant activity is also strong, although only a small minority of the Costa Rican people are Protestants. About one-twelfth of the population is found in the Pacific northwest, also called the Guanacaste region. The people there are a mixture of colonial Spanish, Indian, and black ancestry; their adherence to Roman Catholicism is often nominal. African ancestry is strongest in the eastern Caribbean lowlands. The blacks who live there are descendants of those brought from the West Indies to build railroads and raise bananas. Most speak both Spanish and a Jamaican dialect of English, and Protestantism is the most widespread religion. In the Pacific south and on the San Carlos Plain, part of the northern lowlands, language and religious preferences are mixed. A few thousand American Indians are left in the far south.

Birth and death rates are low in comparison with other Central American countries. More than one-third of the population is less than 15 years of age. Urban dwellers make up more than half of the total population.

Economy. Costa Rica has a developing market economy largely based on coffee and banana exports. Large gains in economic growth were interrupted in the mid-1970s, when plummeting coffee prices and substantial increases in oil prices resulted in a significant decline in agricultural production. The 1980s and early '90s were marked by economic stagnation and inflation. The gross national product (GNP), nonetheless, has continued to grow more rapidly than the population. The GNP per capita is one of the highest in Central America.

Agriculture accounts for approximately one-fifth of the gross domestic product (GDP) and employs more than one-fourth of the work force. Coffee is the single largest export item; other cash crops include bananas, beef, sugar, and cocoa. Staples such as corn (maize), beans, and rice are also widely grown. The government has distributed high-yield varieties of coffee to growers and has provided farmers of other crops with improved seeds. Poor market conditions and bad weather, however, occasionally affect production.

Significant quantities of bauxite have been discovered in the General and Coto Brus river valleys in southern Costa Rica. Timber resources are used domestically and have considerable commercial potential.

Growth of the industrial sector, which accounts for more than one-fifth of the GDP and employs about one-sixth of the work force, has been slowed by lack of demand. Manufacturing is almost entirely located within the Meseta Central. The principal industries are food products, alcoholic and nonalcoholic beverages, petroleum products, apparel, textiles, chemicals, and wood products. Government investment in the energy sector has involved the construction of several hydroelectric plants, which produce almost all of the country's electricity. Service industries account for approximately one-half of the GDP and employ a similar proportion of the work force.

Expenditures have steadily outpaced revenues as taxable production has declined. Food, machinery, consumer goods, and mineral fuels are imported. Important trade partners outside Central America include the United States, Japan, and Germany.

Government and social conditions. Costa Rica is a democratic republic. Its constitution, adopted in 1949, establishes independent legislative, executive, and judicial branches. There is a unicameral Legislative Assembly of 57 members who are elected to four-year terms by universal adult suffrage. The assembly can pass laws over presidential veto. Executive power rests with a popularly elected president, who chooses the cabinet, and two elected vice presidents. The president serves a four-year term and may not succeed himself. The judicial system is headed by the Supreme Court of Justice, which has the power to rule on the constitutionality of legislation. The Supreme Electoral Tribunal, an independent body elected by the Supreme Court, oversees Costa Rican elections. There are two major political organizations: the National Liberation Party (Partido de Liberación Nacional), a social-democratic party; and the Social Christian Unity Party (Partido Unidad Social Cristiana), a loose alliance of several small political parties.

The social-welfare system provides employed people and their dependents with work-injury, sickness, maternity, old-age, and disability benefits. The Ministry of Health carries out a preventive health program through a network of health facilities. Diseases such as amoebic and bacillary dysentery and typhoid and paratyphoid fever, however, still infect a number of rural people. These health problems are aggravated in that most doctors and health facilities are located in the San José area. The life expectancy at birth is about 72 years for males and 77 years for females.

Primary education is free and compulsory for all Costa Rican children. It is estimated that about 90 percent of children between the ages of 6 and 11 years are enrolled in primary schools. The educational system's success at reaching such a high proportion of the young population has helped produce a literacy rate of more than 90 percent, one of the highest among Central American countries.

The news media in Costa Rica are free to express a variety of political views. Costa Rica's largest newspaper, *La Nación*, is considered to be the most prominent in Central America.

Cultural life. Costa Rica is rich in pre-Columbian art, which includes large statues from the Pacific northwest, smaller examples of carved relief in stone from other districts, and small objects of gold. Samples are displayed in the National Museum in San José. Costa Rica also has a developing literature. The magazine *El Repertorio Americano*, edited in San José from 1919 to 1958 by Joaquín García Monge, was highly regarded for its intellectual and literary value. Roberto Brenes Mesén and Ricardo Fernández Guardia were well known in the fields of education and history, respectively. The novelist Fabián Dobles attracted international attention for his themes of social protest. Costa Rican paintings and drawings from the 19th and 20th centuries are displayed at the Art Gallery in San José.

History. Christopher Columbus was the first European to reach Costa Rica. In 1502 he landed at what is now Puerto Limón, an area inhabited by a number of small, independent Indian tribes, including the Boruca, the Carib, the Chorotega, the Corobici, and the Nahua. These peoples were not easily dominated, and it took almost 60 years for the Spaniards to establish a permanent settlement.

Costa Rica grew very slowly. The lack of a large source of native labour led to the creation of small, isolated farms; hence, no landed aristocracy developed. The colony was never rich and most Costa Ricans were largely ignored by the Spanish crown because of the region's lack of mineral wealth. In the late 18th century, when Spain elevated its other Central American colonies to *intendencias*, Costa Rica remained subordinate to Nicaragua.

When Mexico declared its independence from Spain in 1821, Costa Rica, with other parts of Central America, joined the short-lived Mexican Empire. In 1823 Costa Rica helped create the United Provinces of Central America, but the country became disenchanted with the strife in the other four states of the federation and severed its ties in 1838; already a pattern of isolationism had been formed.

Coffee exports improved Costa Rica's economy in the 19th century. The construction of a rail line between Cartago and Limón in the late 19th century opened up lands that were then devoted to the cultivation of bananas. Public education became compulsory in 1886, and religious toleration was guaranteed in 1871. In 1890 Costa Ricans elected José Joaquín Rodríguez to the presidency in what is considered to be the first entirely free and honest election in Central America. This election started a tradition of democracy for which Costa Rica has been renowned throughout Latin America.

A revolution in 1917 was short-lived, as was one in 1948. In 1949 the army was proscribed and replaced by a Civil Guard.

Peaceful Costa Rica came into international prominence in the 1980s and '90s in its attempts to mediate the civil wars in neighbouring Nicaragua and El Salvador. For his efforts, President Óscar Arias Sánchez won the Nobel Prize for Peace in 1987.

To make the best use of the Britannica, consult the INDEX *first*

Costain, Thomas B(ertram) (b. May 8, 1885, Brantford, Ont., Can.—d. Oct. 8, 1965, New York, N.Y.), Canadian-born American historical novelist.

A journalist for many years on Canadian newspapers and a *Saturday Evening Post* editor (1920–34), Costain was 57 when he published his first romance, *For My Great Folly* (1942), dealing with the 17th-century rivalry between England and Spain. An immediate success, it was followed almost yearly by historical adventure tales, the best known of which are *The Black Rose* (1945), whose medieval English hero ranges as far as Kublai Khan's China, and *The Silver Chalice* (1952), about the early Christians in Rome.

Costanoan, any of several dialectally related California Indian peoples speaking a Penu-

tian language and originally living in an area stretching from the San Francisco Bay region southward to Point Sur. The people were scattered in villages, and groupings were only later identified on the basis of proximity to the Franciscan missions established among them (*see* Mission Indians). Hence, the Indians were named Soledad, Monterey, San Juan Bautista, Santa Cruz, Santa Clara (linked with San José), and San Francisco. There were also the Indians named San Pablo, who had no mission.

The Costanoan were relatively poor. The sea and streams were their chief source of food, providing mussels, salmon, sea mammals, and seaweed. Rabbits were hunted, and acorns and seeds were gathered. Housing consisted of poles covered with tules, or brush. For clothing, women wore aprons front and back, but men usually went naked.

Costanoan culture was radically transformed by the establishment of missions. This caused the mixing of members of alien Indian groups and brought about the destruction of most Costanoan institutions. Today there are few identifiable Costanoan Indians remaining.

Costantino (Italian personal name): *see under* Constantine.

Costanza (Italian personal name): *see under* Constance.

Coste, Robert de: *see* Cotte, Robert de.

Costello, John A(loysius) (b. June 20, 1891, Dublin—d. Jan. 5, 1976, Dublin), prime minister (taoiseach) of Ireland from 1948 to 1951 and from 1954 to 1957.

A prosperous lawyer who had served as attorney general, he owed his selection as prime minister to a coalition of several parties (including his own Fine Gael) and prominent independent politicians united in opposition to Eamon De Valera's Fianna Fáil (Republican Party). During his first term as prime minister, he introduced into the Dáil Éireann (Irish Assembly) the Republic of Ireland Act (1948), by which Ireland withdrew from the Commonwealth of Nations. His second government was marked by a sharp increase in acts of terrorism by the unlawful Irish Republican Army (IRA). He resigned as opposition leader in 1959, when De Valera became president and Sean Lemass prime minister.

Costello, Lou: *see* Abbott, Bud; and Costello, Lou.

Coster, Charles(-Théodore-Henri) de (b. Aug. 20, 1827, Munich, Bavaria [Germany]—d. May 17, 1879, Brussels), Belgian novelist, writing in French, who stimulated Belgian national consciousness and prepared the ground for an original native literature.

De Coster lived most of his life in poverty and obscurity and took 10 years to write his masterpiece, *La Légende et les aventures héroïques, joyeuses, et glorieuses d'Ulenspiegel et de Lamme Goedzak au pays de Flandres et ailleurs* (1866; *The Glorious Adventures of Tyl Ulenspiegl*). Freely adapting the traditional tales of the folk heroes Till Eulenspiegel (Ulenspiegel) and Lamme, he set his story in the 16th century, at the height of the Inquisition; the hero's father is burned at the stake as a heretic, and Ulenspiegel swears an oath to avenge him. De Coster presents his characters as combining heroic qualities with a typically Belgian realism. His literary style is highly coloured and archaistic, being derived from François Rabelais, from Michel de Montaigne, and from 16th-century historical chroniclers. With its theme of resistance against oppression, the book has been called "the Bible of Flanders" and "the breviary of freedom"; yet neither the gruesome death scenes and the



Charles de Coster, ink drawing by A.-L.-A. Rassenfosse; in the Bibliothèque royale Albert 1er, Brussels

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shrieks of the tortured nor, on the other hand, a certain tendency to philosophize prevent its being, as the author describes it, "a merry, jovial book, a work of art and of literature." The contrast between *La Légende* and the commonplace Belgian novels of the period is sharp and striking.

Coster, Laurens Janszoon, Coster also spelled KOSTER (b. *c.* 1370, Netherlands—d. 1440?, Haarlem?), Dutch rival of Johannes Gutenberg as the alleged inventor of printing.

Little is known of this early printer, whose last name means "sacristan," his title as an official of the Great Church of Haarlem. He is mentioned several times in records between 1417 and 1434 as alderman, tax assessor, and treasurer and is presumed to have died in a plague that struck Haarlem in 1440, when his wife is recorded as a widow.

Coster is said to have printed with movable type as early as 1430, but definite proof of this claim is lacking. None of the surviving specimens attributed to him bears his name, a form of documentation that is also missing in the case of Gutenberg. Coster, however, is a far more shadowy figure than Gutenberg, and his printing achievement was not recorded until a century after his death. His method of typecasting, consisting of casting in sand from wooden molds, was distinctly more primitive than that of Gutenberg.

Costermansville (Zaire): *see* Bukavu.

Costilla, Miguel Hidalgo y (father of Mexican independence): *see* Hidalgo y Costilla, Miguel.

costmary, also called BIBLE LEAF, or ALE COST (*Chrysanthemum balsamita*), aromatic herb of the aster family (Asteracae) with yellow, button-shaped flowers. Its bitter, slightly lemony leaves may be used fresh in salads and fresh or dried as a flavouring, particularly for meats, poultry, and English ale. The dried leaves are also used as a tea and in potpourris.

costumbrismo (from Spanish *costumbre,* "custom"), a trend in Spanish literature that emphasized the depiction of the everyday manners and customs of a particular social or provincial milieu. Although the origins of *costumbrismo* go back to the Golden Age of Spanish literature in the 16th and 17th centuries, it grew into a major force in the first half of the 19th century, first in verse and then in prose sketches called *cuadros de costumbres* ("scenes of customs") that stressed detailed descriptions of typical regional characters and social conduct, often with a satirical or philosophical intent.

Among early *costumbristas* were Mariano José de Larra and Ramón de Mesonero Romanos, both of whom wrote about Madrid, and Serafín Estébanez Calderón, who wrote about Andalusia. Significant *costumbrista* writers of the last half of the 19th century included Fernán Caballero and Pedro Antonio de Alarcón, both of whom wrote novels set in Andalusia, and José María de Pereda, who wrote about the mountainous region of northern Castile.

Costumbrismo's lasting importance lies in its influence on the development of the regional novel in Spain and Latin America.

costume: *see* dress.

cot death: *see* sudden infant death syndrome.

Cotabato City, city, southern Mindanao, Philippines. The city is located in a swampy area near the southern banks of the Cotabato River (a tributary of the Mindanao River) and just inland of the Moro Gulf. Cotabato City is the primary trade and commercial centre for all of southwestern Mindanao. Rice, corn (maize), coconuts, sugarcane, coffee, and bananas are grown in the region. Transportation facilities include a minor interisland port and airport; the city is also a highway terminus. Pop. (1988 est.) 102,192.

Cotabato River (Philippines): *see* Mindanao River.

Cotán, Juan Sánchez: *see* Sánchez Cotán, Juan.

Côte d'Azur (French: "Coast of Azure"), cultural region in southeastern France encompassing the French Riviera (*see* Riviera) between Menton and Cannes in Alpes-Maritimes *département* and extending into southern Var *département*. The population is predominantly urban. Traditional inland towns in Alpes-Maritimes include Gourdon, Èze, Utelle, and Peille; many such towns are perched on cliffs. Their streets are narrow and paved with flagstones or cobbles; houses are built of stone and roofed with rounded tiles. The doors of larger houses feature elaborate bronze knockers and hinges of wrought iron. The *mas* is the traditional farmstead of the plains and houses living quarters and sheds under one roof; windows are narrow to admit little summer heat. Farmsteads in the plains tend to be dispersed. Retirees have immigrated to the coast of Alpes-Maritimes, with the result that the population of the *département* is aging. Repatriates from former French colonies are concentrated around Nice.

Roman Catholicism predominates. Signes, in Var, commemorates Saint Eligius during the fourth week in June, and the sailors of Antibes honour Saint Peter late in June. Menton hosts a festival of lemons in February; floats are decked with lemons and oranges.

The region's cuisine relies heavily on garlic and olive oil. Mayonnaise is made with olive oil and seasoned with garlic. *Pissaladiera* comes from Nice; this is an onion flan spiced with anchovies and black olives. *Ratatouia* (ratatouille), a vegetable stew of tomatoes, eggplant, and green peppers, also comes from Nice.

Côte d'Ivoire, officially REPUBLIC OF CÔTE D'IVOIRE, French RÉPUBLIQUE DE CÔTE D'IVOIRE, also called in English (until 1986) IVORY COAST, republic of western Africa, covering an area of 123,847 square miles (320,-



Côte d'Ivoire

763 square km). The capital is Abidjan. It is bounded to the southwest by Liberia, to the northwest by Guinea, to the north by Mali and Burkina Faso (formerly Upper Volta), to the east by Ghana, and to the south by the Gulf of Guinea. Pop. (1993 est.) 13,459,000.

A brief treatment of Côte d'Ivoire follows. For full treatment, *see* MACROPAEDIA: Western Africa.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. Côte d'Ivoire may be divided from south to north into four general regions: a narrow coastal region, an equatorial forest region, a cultivated forest zone, and a savanna region. The coastal region, never exceeding 40 miles (64 km) in width, has a generally smooth coastline. The rain forests of the equatorial forest region have been greatly reduced during the past century and now form a triangular area with the base at the Liberian border and the apex north of Abidjan. To the east of this triangle lies the cultivated forest area, now largely cleared for plantation crops such as coffee, cacao, and palm kernels. The northern savanna region consists of a sparsely populated plateau, with open ground favourable for stockbreeding.

Côte d'Ivoire has two distinct climatic zones lying to the north and south of about 8° N latitude. Average monthly temperature variation is small, and average annual temperatures lie between about 79° and 82° F (26° and 28° C) in both zones. The northern area is drier, averaging 55 inches (1,400 mm) of rainfall annually and receiving only about 2 percent of that rainfall during the dry season from December to February. The southern area is wetter, with annual precipitation ranging between 60 and 80 inches (1,500 and 2,000 mm), and the dry season there is less pronounced.

The rain forest contains valuable timber species, including African mahogany and iroko (African teak). Among the wildlife are such exotic creatures as the giant forest hog, the bongo (a reddish brown antelope), and the manatee, or sea cow. To the north the savanna woodlands have about 10 species of antelope, as well as lion and elephant.

Côte d'Ivoire's diamond deposits are an important minable resource. Exploitation of offshore petroleum reserves has begun, and reserves of offshore natural gas are under development.

The people. Of the more than 60 traditionally independent tribes in the Côte d'Ivoire, the major groups are the Beti, Senufo, Baule, Anyi, Malinke, Dan, and Lobi. The Beti speak a language of the Kru branch of the Kwa linguistic subfamily, and the Baule and Anyi speak languages of the Twi branch of the Kwa; these groups are located mostly in the southern part of the country. The Voltaic- (Gur-) speaking group in the northern part of the country comprises the Senufo as well as the Lobi and Bobo subgroups. The Malinke and the Dan, located mostly in the west-central part of the country, speak Mande languages. Each of these groups has tribal affiliations with more numerous groups living outside the borders of the republic.

Traditional animistic beliefs continue to predominate among the people of Côte d'Ivoire, but in recent years adherents to Islām have increased to make up about two-fifths of the population. Roman Catholics constitute approximately one-fourth of the population, while Methodists are the largest Protestant group. Côte d'Ivoire's birth and death rates are much higher than world averages, and its annual rate of population growth is the highest in western Africa. Almost half of the total population is younger than 15 years of age, and two-fifths of the total population is urban. Immigration, particularly from impoverished Burkina Faso, Mali, and Guinea, is likely to continue for some time. The largest non-African population comprises peoples of French and Lebanese or other Arab extraction; French is the country's official language.

Economy. Côte d'Ivoire has a developing market economy based largely on its productive tropical agriculture. It is the world's largest producer of cocoa and one of the largest producers of coffee. The nation's economy is one of the most developed in black Africa, having experienced almost continuous growth since independence. Following a downturn in export prices for coffee and cocoa in the late 1980s, however, the gross national product (GNP) was no longer growing as rapidly as the population. The GNP per capita is relatively low by world standards.

Agriculture accounts for more than one-fourth of the gross domestic product (GDP) and employs more than three-fifths of the workforce. Cocoa is the most valuable export, followed by coffee. Together with timber, these commodities provide three-fifths of export earnings, but increasing production of bananas, cotton, rubber, and palm products has lessened somewhat the country's dependence on such a limited range of goods. The main subsistence crops are yams, plantains, cassava, rice, corn (maize), and millet.

Mining, manufacturing, and public utilities account for one-sixth of the GDP but employ only about one-tenth of the workforce. Output, largely from light industries, has undergone phenomenal growth since independence, but the government is encountering a lack of private investment funds and business skills in its attempts to Ivoirianize industry. Major enterprises include flour mills; a petroleum refinery; canning, brewing, cigarette, textile, and plastic factories; sawmills; and vehicle-assembly plants. Offshore petroleum production, begun in 1980, is the most important extractive industry. Electricity is generated largely from hydroelectric sources.

Ambitious development programs have led to a growing public debt and heavy borrowing abroad by state corporations and agricultural enterprises. Inflation has risen, and, as the population has also expanded rapidly, unemployment has become increasingly serious.

Côte d'Ivoire's main trading partners are France, The Netherlands, Germany, and Italy.

Government and social conditions. Côte d'Ivoire is a multiparty republic governed by the politically moderate Democratic Party of Côte d'Ivoire (PDCI). The country's 1960 constitution vests predominant political power in a president, who is elected to a five-year term by universal adult suffrage. The president has the power to appoint the prime minister and the cabinet, and he may veto legislation passed by the National Assembly. Legislative responsibility rests with the National Assembly, whose members are elected to five-year terms by universal adult suffrage. The PDCI was the only political party until 1990, when opposition parties were legalized and allowed to participate in elections. Côte d'Ivoire's political life was long dominated by Félix Houphouët-Boigny, founder of the PDCI and president of the country from independence in 1960 until his death in 1993.

Health and sanitary conditions in Côte d'Ivoire are generally poor, though somewhat better than in other western African countries. Significant numbers of people still suffer from malaria, dysentery, yaws, tuberculosis, and venereal disease. Life expectancy at birth is only 54 years.

Primary school is compulsory in Côte d'Ivoire, but only about three-fourths of all primary-school-age children are actually enrolled in classes. The educational system's major problems have been overcrowded classrooms and a lack of Ivoirian teachers (much of the secondary-school teaching is done by French nationals).

History. The indigenous coastal settlements of Côte d'Ivoire were politically isolated within the region, and the European powers, attracted by ivory and slaves, were able to make some inroads beginning in the 15th century. The French established trading posts at Assini and Grand Bassam at the end of the 17th century. During the 19th century the French concluded treaties with local chiefs, and in 1893 Côte d'Ivoire was created as a French colony. Full French occupation took place militarily between 1908 and 1918. The railway, begun from the coast in 1903, reached Bobo Dioulasso (now in Burkina Faso) in 1935. The port at Abidjan was constructed between 1950 and 1954.

During World War II, Côte d'Ivoire remained under the Vichy regime from 1940 to 1942. In 1946 it became a territory in the French Union, and one year later the inhabitants of the north separated and created the nation of Upper Volta (now Burkina Faso). Under the leadership of Félix Houphouët-Boigny, Côte d'Ivoire peacefully achieved autonomy in 1958 and independence in 1960. In the latter year Houphouët-Boigny was elected president, an office he consistently held thereafter. Under his leadership, Côte d'Ivoire retained close economic ties with France and concentrated on the export of coffee, cocoa, and other tropical cash crops grown by private farmers. The country's economy grew steadily in the first three decades after independence, despite fluctuating world prices for its major export crops. Houphouët-Boigny won reelection to a seventh term as president in the country's first multiparty presidential elections in 1990. His death in 1993 was followed by a peaceful transfer of power to his constitutional successor.

Côte-d'Or, *département.* Bourgogne *région,* east-central France. It derives its name, meaning "golden ridge," from the vine-growing range of hills, with heights averaging 1,500 feet (460 m), in its southern sector. The Seine River has its source in the Langres Plateau, in the north of the *département,* and part of the plain of the upper Saône River is in the southeast. France's most important motorway, the Autoroute du Soleil, passes through Beaune, 22 miles (35 km) southwest of Dijon (*q.v.*), the departmental capital. Along the lower slopes of the Côte-d'Or is the great wine-producing district of Bourgogne; the vineyards, comprising the two main groups of Beaune and Nuits, produce the most celebrated Burgundy wines, including Clos-Vougeot, Gevrey-Chambertin, Nuits-Saint-Georges, and Pommard. The wine sales of the Hospices de Beaune, one of the world's greatest annual charity auctions, take place in November. Most of the *département* is agricultural (cereals, potatoes, sugar beets, and some tobacco); but Dijon, where almost one-third of the population is concentrated, has a brisk industrial activity. Places of historical interest include Fontenay, the best preserved of the great Cistercian houses. The *département* has three *arrondissements,* Dijon, Beaune, and Montbard; it is in the educational division of Dijon. Area 3,383 square miles (8,763 square km). Pop. (1992 est.) 499,100.

Côte-d'Or, Prieur de la: *see* Prieur-Duvernois, Claude-Antoine.

Côte-Saint-Luc, city, Montréal region, southern Quebec province, Canada, on Île-de-Montréal (Montreal Island). It is a western (mainly residential) suburb of Montreal city. The place-name was applied in the 17th century to hunting land that was held by the seigneurs of Île de Montréal. A farming settlement of 209 people was recorded in 1818. Inc. village, 1903; town, 1951; city, 1958. Pop. (1991) 28,700.

Cotentin, Anne-Hilarion de: *see* Tourville, Anne-Hilarion de Cotentin, comte de.

Côtes-d'Armor, formerly CÔTES-DU-NORD, maritime *département,* Bretagne *région,* northwestern France, comprising the northern part of the historic province of Brittany. It has an area of 2,656 square miles (6,878 square km). The Noires Mountains, crossing its southern half from west to east with heights of more than 1,000 feet (300 m), form the watershed divide between rivers flowing northward to the English Channel and southward to the Bay of Biscay. The interior plateaus, swept by strong Atlantic rain-bearing winds, are used to pasture cattle and horses. Wheat and oats are the chief crops on the coastal belt, which also produces pigs, cattle, potatoes, and fruit. Fishing, once important, has declined. Slate and building stone are quarried. Industrial activity (tanning, boatbuilding, and sawmilling) is slight. The rocky, indented coast, embracing most of the picturesque Émeraude Coast, is dotted with seaside resorts, and tourism is significant. Most of the interior towns date from the European Middle Ages. Saint-Brieuc, the departmental capital, has a fortified cathedral. The four *arrondissements* of Côtes-d'Armor take their names from Dinan, Guingamp, Lannion, and Saint-Brieuc. The *département* is in the educational division of Rennes. Pop. (1990 prelim.) 537,700.

cotillion, original name COTILLON, late 18th-century and 19th-century French court dance,



"The Cotillion Dancers," engraving by James Caldwall after a painting by John Collet, 1771

By courtesy of the Dance Collection, the New York Public Library at Lincoln Center, Astor, Lenox and Tilden Foundations

popular also in England. A precursor of the quadrille, the cotillion was danced by four couples standing in a square set. The first and third, then the second and fourth, couples executed various series of geometric figures.

During the 19th century cotillion patterns became more varied, and the dancing was combined with the giving of presents. The word finally came to denote ballroom dancing for couples that had little relation to the original form.

Cotingidae, bird family, of the order Passeriformes, collectively often called cotingas and including about 90 species, as presently classified. Many species are given common names pertaining to their voice or food habits or derived from native names: fruiteater, berryeater, mourner, bellbird, chatterer, piha, tityra. Many forms (*Attila* and relatives) are flycatcher-like in appearance and habits and are considered by some authorities to belong in the family Tyrannidae. The Cotingidae include some of the most bizarre and vivid examples of male ornamentation found among birds. Many species have odd calls—some sound like the ringing of a bell, the lowing of a calf, or the tapping of a hammer—that by constant repetition have given them the name chatterers. All Contingidae have a broad bill with slightly hooked tip, rounded wings, and



Orange-breasted cotinga (*Pipreola jucunda*)

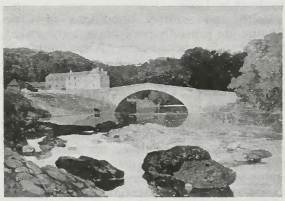
Richard L. Capps

short legs. Many have peculiar wing feathers that are curly, twisted, or narrowed. Most are solitary forest birds that feed on fruit or insects, mainly in treetops. Because of their elusiveness, few species of Cotingidae have been adequately studied.

Examples of the more colourful Cotingidae are the light blue *Cotinga amabilis,* found from Mexico to Costa Rica, and the reddish lavender *Xipholena punicea* of the Guiana Highlands and Brazil. The *Carpodectes nitidus* of Central America is one of the few white tropical birds.

For information about other members of the family, *see* becard; bellbird; cock-of-the-rock; tityra; umbrellabird.

Cotman, John Sell (b. May 16, 1782, Norwich, Norfolk, Eng.—d. July 24, 1842, London), English landscape watercolourist and etcher of the Norwich school. He saw in nature the classic effect of precise, austere pattern and expressed this effect by the elimination of detail through controlled, flat washes of cool colour.



"Greta Bridge," watercolour by John Sell Cotman, *c.* 1805; in the British Museum

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Cotman was sent in about 1798 to study in London, where he met the painters J.M.W. Turner and Thomas Girtin. From 1800 to 1806 he exhibited watercolours at the Royal Academy, and some of his works of this period are considered among the finest English landscape paintings. "Greta Bridge" (*c.* 1805), probably his best-known work, is typical of the work he produced while he lived at Greta in Yorkshire. It is composed almost entirely of broad planes of colour, avoiding chiaroscuro and linear design. Late in 1806 Cotman left London and returned to Norwich, where he worked as a drawing master and exhibited regularly with the Norwich Society of Artists. In 1812 he moved to Yarmouth and began a long period of work as an archaeological draftsman. In 1823 he returned to Norwich and in 1834 to London. In his last years his style changed completely, and he mixed rice paste with his watercolours to get a rich impasto effect. Most of his etchings were soft-ground etchings that simulate chalk and pencil drawings.

Coto Doñana National Park, national park on the southwestern coast of Spain, at the mouth of the Guadalquivir River. A hunting ground of royalty from the 14th century, it was made a reserve in 1963 and a national park in 1969. Its natural habitats encompass some 196 square miles (507 square km) of coastal dunes, succeeded inland by pine woods, scrubland, and the marshland of the Guadalquivir delta. The park is chiefly important as the confluence of bird migration routes between Africa and Europe; including seasonal visitors, nearly half the bird species of Europe can be seen there.

cotoneaster (genus *Cotoneaster*), any of about 50 species of shrubs or small trees, of the rose family (Rosaceae), native to temperate Eurasia. Many species have been introduced into other temperate regions. Cotoneasters are widely cultivated for their attractive growth habit, small white to pink flowers, and small but showy red to black fruit. The leaves are alternate and smooth-edged. The flowers have five petals and sepals and are usually borne in



Cotoneaster (*Cotoneaster multiflorus*)

Clarence E. Lewis

clusters. The fruit is about 8 mm (0.25 inch) in diameter and contains two to five stones.

Cotoneasters are important for landscape use, providing many ornamental species. Low-growing species, usually less than 1 m (3 feet) in height, include rock cotoneaster (*Cotoneaster horizontalis*), bearberry cotoneaster (*C. dammeri*), and cranberry cotoneaster (*C. apiculatus*); *C. adpressus,* less than 30 cm (1 foot), is a useful ground cover. Spreading co-

toneaster (*C. divaricata*), Peking cotoneaster (*C. acutifolius*), many-flowered cotoneaster (*C. multiflorus*), and *C. integerrimus* are shrubs in the height range of 1 to 4 m. A few warm zone species, such as *C. affinis, C. cooper's,* and *C. frigidus,* attain heights of 4.5 to 6 m.

Cotonou, port city and de facto capital of Benin (formerly Dahomey), situated along the Gulf of Guinea. It is the starting point of the so-called Benin-Niger Railway, which extends 273 miles (439 km) into the interior but ends in the middle of Benin at Parakou. Goods can be moved another 200 miles (322 km) by road to the navigable Niger River. Modern artificial deepwater port facilities at Cotonou to serve both Benin and Togo were completed in 1965.

Cotonou is the economic hub of Benin and is the nation's largest urban centre. Its industries include brewing, textile production, and palm-oil processing. The country's president and most government ministers reside in Cotonou. The National University of Benin (1970) is also located in the city. Pop. (1992 est.) 533,212.

Cotopaxi, volcanic peak, in the Cordillera (mountains) Central of the Andes, central Ecuador. Rising to 19,347 feet (5,897 m), it is the world's highest continuously active volcano. Cotopaxi has an almost perfectly symmetrical cone, interrupted only by one minor cone—the Cabeza del Inca (Inca's Head). The mountain has a long record of violent eruption and has seldom remained quiescent for more than 15 years. The terrain around the mountain's base has many times been devastated by earthquakes or been buried in pumice and



Cotopaxi volcano, Ecuador
Shostal

ash blown out of the crater. Lava that boils constantly in its crater emits plumes of steam. The mountain itself is built up of alternating flows of dark-coloured trachytic lava and falls of lighter-coloured ash. The crater at the top is 2,300 feet (700 m) in diameter from north to south and 1,650 feet (500 m) from east to west. Its depth is 1,200 feet (366 m).

Much of the time the cone of Cotopaxi is hidden by clouds that are lighted up at night by the fires in the crater. The base of the volcano stands on open mountain grassland, but the whole upper part of the mountain is covered with permanent snow.

The first European to attempt an ascent of Cotopaxi was Alexander von Humboldt in 1802. He failed to reach the top and pronounced the mountain unclimbable. Other failures in 1831 and 1858 seemed to confirm this verdict. But in 1872 the German scientist and traveler Wilhelm Reiss succeeded in reaching the top on November 28, and in May of the following year A. Stübel was also successful.

Cotswold, district, county of Gloucestershire, south-central England, in the eastern part of the county. It spans most of the eastern slopes of the Cotswolds (Cotswold Hills), a limestone tableland that gradually descends from 1,083 to about 600 feet (330 to 180 m). From the 14th through the 18th century the grazing of the Cotswold breed of sheep (now nearly extinct) brought great prosperity to the wool traders and cloth merchants of the district; this former prosperity is still evident in the churches and other buildings that grace the villages and market towns strung along the lower easterly edge of the undulating tableland of the Cotswolds. Among the district's villages and towns are Bourton-on-the-Water, Stow-on-the-Wold, Bibury, Lower Slaughter, and Northleach in the central part of the district, Chipping Campden in the north, and Cirencester, the district seat, in the south. Old homes in these towns were often built of the local limestone and have gabled roofs of stone or tile. Market halls, Tudor houses, and churches, particularly of the Perpendicular-Gothic architectural style of the 14th–16th century, reflect the district's former wealth; the 28 15th- and 16th-century painted glass windows in the parish Church of St. Mary at Fairford, 8 miles (13 km) east of Cirencester, were designed by Flemish artisans and are excellent examples of the period.

The thin but fertile loams of Cotswold district are primarily used to grow barley, wheat, and corn (maize). Cattle have replaced sheep as the principal livestock. Dairy cattle graze the headwaters area of the River Thames and its associated clay valley (300 feet [90 m] high) along the southern border of the district. In the extreme north, the district extends into the Vale of Evesham, a market-gardening region particularly known for its brussels sprouts, asparagus, and peas. Area 441 square miles (1,143 square km). Pop. (1992 est.) 76,200.

Cotswolds, also called COTSWOLD HILLS, ridge of limestone hills extending for about 50 miles (80 km) across the western Midlands region of England. The Cotswolds are part of the Jurassic uplands that cross the country from southwest to northeast. The Cotswolds escarpment rises steeply from the clay vale of the lower River Severn and its tributary, the River Avon (Upper Avon), and slopes gradually eastward toward the clay vale of Oxford. Its crest is generally 600 to 700 feet (180 to 210 m) high but reaches 1,083 feet (330 m) in Cleeve Cloud above Cheltenham. The oolitic limestones provide fine building stone, which is much in evidence in the district. In the Middle Ages the Cotswolds were open sheep runs. The wealth obtained from the sale of wool and later from the domestic cloth industry is evident in the substantial buildings, especially the churches, that grace the villages and market towns. Enclosure of the sheep walks, typically by dry-stone walls, subsequently accompanied the change to arable farming.

Cotta FAMILY, family of German publishers, the most notable of whom, Johann Friedrich Cotta, Baron von Cottendorf, is celebrated for his connection with J.W. von Goethe and other writers of the period.

Johann Georg Cotta (1631–92), the founder of the publishing house, settled in Württemberg and in 1659 acquired by marriage the bookseller's business of Philipp Brunn at Tübingen, thereby establishing the J.G. Cotta'sche Buchhandlung. On his death the firm passed to his son Johann Georg (2) and after him to his eldest son Johann Georg (3). Christoph Friedrich Cotta (1730–1807), son of Johann Georg (3), established a printing house to the court at Stuttgart. It was his son, Johann Friedrich, who restored the fortunes of the family firm, then in decline, and who became the best known of the Cottas.

Johann Friedrich Cotta, Baron von Cottendorf (b. April 27, 1764—d. Dec. 29, 1832), studied at Tübingen and qualified as a barrister but, learning that the family business at Tübingen was to be sold, took upon himself the task of restoration. In 1794 he planned with Friedrich von Schiller *Die Horen,* a periodical that, although it ran only until 1797, has a place in the history of German literature. Through Schiller, Cotta met Goethe, and his connection with other literary men increased. He became in time the publisher not only for Goethe but also for such writers as Johann Gottfried von Herder, Christoph Martin Wieland, A.W. Schlegel, Ludwig Tieck,



Johann Friedrich Cotta, detail of a lithograph; in the Schiller National Museum, Marbach am Neckar, Ger.
By courtesy of the Schiller-Nationalmuseum, Marbach am Neckar, Ger.

Jean Paul, and Heinrich von Kleist. He also published for the brothers Humboldt and for such philosophers as Johann Gottlieb Fichte and G.W.F. Hegel. In 1798 Cotta began to publish the *Allgemeine Zeitung.* (Censorship difficulties caused the editorial office of the newspaper to be transferred from Tübingen to Stuttgart, in 1803 to Ulm, in 1810 to Augsburg, and in 1882 to Munich. It ceased publication in its traditional form in 1912.) In 1811 the firm moved to Stuttgart, and in 1823 Cotta started a branch in Augsburg and in 1827 one in Munich. By that time he had made his publishing house one of the foremost in Germany. He attended the Congress of Vienna to make, among other commissions, a plea for freedom of the press on behalf of German booksellers. He also had scientific interests, introducing in 1824 the first steam printing presses in Bavaria into his Augsburg branch.

His son Johann Georg Cotta (4), Baron von Cottendorf (1796–1863), extended the firm by buying in 1839 the business of G.J. Göschen in Leipzig and in 1845 that of Vogel in Landshut. In the same year, Bible branches were started at Stuttgart and Munich.

Johann Georg (4) was succeeded by his son Karl and by his nephew Hermann Albert von Reischach. They preserved the Stuttgart branch and the *Allgemeine Zeitung* office in Augsburg, but the other branches gradually broke away. In 1889 the firm was bought by Adolf and Paul Kröner. The buildings were badly damaged in World War II, but the firm was subsequently reestablished.

cottage cheese, also called DUTCH CHEESE, or SCHMIERKASE, fresh, soft, unripened cheese consisting of curds of varying sizes, usually mixed with some whey or cream. It is white and mild but faintly sour in taste. In commercial cheese making, the curds are derived from pasteurized skim milk or reconstituted, low-fat milk products. The whey is drained—but not pressed—from the curds, thus leaving a certain amount of liquid. In this form, cottage cheese has a low-fat content and is a popular food in low-fat diets. If cream is added and the product contains four percent or more fat, it is sold as creamed cottage cheese.

A similar soft fresh cheese, usually called pot cheese, is produced in the same manner, but the curds are strained to remove most of the whey; thus, it is drier and less creamy than cottage cheese. The name pot cheese is sometimes used to refer to cottage cheese.

Also derived from cottage cheese is farm, or

farmer, cheese, which is made by pressing the curd, thereby eliminating most of the liquid. It is drier than either cottage cheese or pot cheese and is crumbly in texture.

Cottage cheese is commonly eaten plain or mixed with fruit, vegetables, or seasonings; it also is used in baking, especially of cheesecakes (sometimes known as curd cakes), and as filling for pancakes or blintzes. Farmer and pot cheese are used in cooking in similar ways.

Ricotta, a fresh Italian cheese that resembles cottage cheese but is smoother in texture, is also used in baking and in fillings for lasagna, ravioli, and other pasta dishes.

Cottbus, also spelled KOTTBUS, city, Brandenburg *Land* (state), eastern Germany, on the Spree River, at the southeastern edge of the Spree Forest, near the Polish border. First mentioned in 1156 and chartered in the early 13th century, Cottbus became an exclave of Brandenburg in 1445–55 in Niederlausitz (Lower Lusatia) and part of Saxony in 1807–13. It has 14th- and 15th-century churches and remains of the old fortifications, notably the Spremberg Tower. A railway junction and industrial centre, Cottbus manufactures textiles, leather, machinery, building materials, and electrotechnical equipment. Pop. (1993 est.) 122,883.

Cotte, Robert de, Cotte also spelled COSTE (b. 1656, Paris, France—d. July 15, 1735, Passy), influential French architect who created mansions now regarded as the epitome of early Rococo residential design.

De Cotte was a pupil and assistant of the architect Jules Hardouin-Mansart and became his brother-in-law about 1683. After Mansart's death in 1708, de Cotte succeeded him as first architect to the king. Preceding this appointment, de Cotte had designed or decorated several city and country mansions, including the Hôtel des Mousquetaires Noirs (1699), and had worked closely with Mansart on additions to the Hôtel des Invalides. De Cotte's later designs for houses include those of the Hôtel de Lude (1710; now destroyed), the Hôtel d'Estrées (1713), and the Hôtel du Maine (1718; now destroyed). As his reputation grew, de Cotte was called upon to design important ecclesiastical residences, notably the episcopal palaces at Verdun (completed 1735) and the Palais de Rohan at Strasbourg (completed 1735). In these buildings he created varied interior spaces but preserved an elegantly symmetrical facade. These buildings are considered striking examples of the Rococo palace; they combine interior comfort with noble, simple, and elegant facades that have an impressive public grandeur.

De Cotte decorated the Chapel of Versailles (1708–10; according to Mansart's design) and the choir of Notre-Dame de Paris (1708–14), designed the acclaimed portal of the Church of Saint-Roch, Paris (1731–42), and reconstructed the Abbey of Saint-Denis (1700–35). In his later years he received many commissions from abroad, including palaces and castles at Brühl, Frankfurt am Main, and Bonn, and the royal hunting lodge in Turin, Italy.

Cottian Alps, French ALPES COTTIENNES, Italian ALPI COZIE, segment of the Western Alps extending along the French-Italian border between Maddalena Pass and the Maritime Alps (south) and Mont Cenis and the Graian Alps (north). Mount Viso (12,602 feet [3,841 m]) is the highest point. The western spurs are known as the Dauphiné Alps. The main activities in the mountains include climbing and skiing.

Cottington (of Hanworth), Francis Cottington, Baron (b. *c.* 1579, Pitcombe, Somerset?, Eng.—d. June 19, 1652, Valladolid, Spain), English lord treasurer and ambassador who was leader of the pro-Spanish, pro-Roman Catholic faction in King Charles I's court during the decade preceding the English Civil Wars (1642–51).



Baron Cottington, detail of a portrait by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Cottington was ambassador to Spain in 1616–17 under King James I. In 1629 James's successor, Charles I, made him chancellor of the exchequer and again sent him to Spain as ambassador. In 1631 Cottington signed a secret treaty with Spain. As a reward he was made a baron. His prominence in Charles's council and his Roman Catholic and Spanish sympathies earned him the enmity of Puritans in Parliament. He opposed their attack on Thomas Wentworth, Earl of Strafford, unsuccessfully urging the king not to yield to demands for the earl's execution. Cottington was ousted from his chancellorship in January 1642.

After Charles went to war with the Parliamentarians, Cottington was made lord treasurer (October 1643). He fled to the European continent upon the surrender of Charles's forces in 1646. In 1649 Cottington attempted, without success, to obtain Spanish aid for the Royalist cause. He then settled in Valladolid, where he died. All his children predeceased him, and the barony became extinct.

BIBLIOGRAPHY. Martin Havran, *Caroline Courtier: The Life of Lord Cottington* (1973), is a well-documented detailed biography.

Cottius, also called MARCUS JULIUS COTTIUS (fl. late 1st century BC), king and then prefect of the Ligurian tribes living in the area now called the Cottian Alps, centred on Mount Cenis and the Montgenèvre Pass.

Cottius was the son of King Donnus, who had initially opposed but eventually entered into friendly relations with Julius Caesar. After succeeding his father, Cottius maintained his independence while the emperor Augustus subdued other Alpine tribes. Finally, Augustus secured submission by naming him prefect (*praefectus*) of about 12 of the tribes. Later (about 8 BC), Cottius showed his gratitude by erecting a triumphal arch in honour of Augustus (which still stands in Susa [ancient Segusio]). He also improved the road over the Montgenèvre Pass.

Cottius' authority was transmitted to his son of the same name, Marcus Julius Cottius, on whom the emperor Claudius conferred the title of king; but, after this king's death, the emperor Nero reduced the area to a Roman province, Alpes Cottiae.

Cottolengo, Saint Giuseppe, in full SAINT GIUSEPPE BENEDETTO COTTOLENGO (b. May 3, 1786, Bra, kingdom of Sardinia [Italy]—d. April 30, 1842, Chieri; canonized 1934; feast day April 29), founder of the Societies of the Little House of Divine Providence and of 14 religious congregations.

A canon in Turin, Cottolengo was called (1827) to administer last rites to a dying woman. Shocked to discover that there was no hospital nearby, he began a successful series of charitable enterprises. The few rooms in Valdocco that he rented for care of the sick soon grew into a hospital called Piccola Casa, or the Little House of Divine Providence. He subsequently founded the Brothers and Sisters of St. Vincent de Paul to nurse in the hospital; the Sisters of Thais to serve as a refuge for penitent women; and the Congregation of Priests of the Holy Trinity to minister to homes he established for epileptics, the deaf and dumb, orphans, the aged, and the mentally ill. His congregations, all affiliated with the Piccola Casa, include the Daughters of Compassion, the Hermits of the Holy Rosary, and the Daughters of the Good Shepherd.

cotton, seed-hair fibre of a variety of plants of the genus *Gossypium,* belonging to the Malvaceae family, native to most subtropical countries. The shrubby plant, growing up to 6 m (20 feet) high in the tropics, characteristically ranges from 1 to 2 m in height when it is under cultivation. It produces creamy-white flowers, which soon turn deep pink and fall off, leaving the small green seedpods, known as cotton bolls, which contain the seeds. Seed hairs, or fibres, growing from the outer skin of the seeds, become tightly packed within the boll, which bursts open upon maturity, revealing soft masses of the fibres. These are white to yellowish white in colour, ranging from about 2 to 4 cm (0.75 to 1.5 inches) in length. They are composed of about 87 to 90 percent cellulose (a carbohydrate plant substance), 5 to 8 percent water, and 4 to 6 percent natural impurities.



Cotton (*Gossypium hirsutum*)

Rod Heinrichs—Grant Heilman

Cotton fibres may be classified roughly into three large groups, based on staple length (average length of the fibres making up a sample or bale of cotton) and appearance. The first group includes the fine, lustrous fibres with staple length ranging from about 2.5 to 6.5 cm and includes types of the highest quality—such as Sea Island, Egyptian, and pima cottons. Least plentiful and most difficult to grow, long-staple cottons are costly and are used mainly for fine fabrics, yarns, and hosiery. The second group contains the standard medium-staple cotton, such as American Upland, with staple length from about 1.3 to 3.3 cm. The third group includes the short-staple, coarse cottons, ranging from about 1 to 2.5 cm in length, used to make carpets and blankets, coarse and inexpensive fabrics, and blends with other fibres.

Cotton is harvested when the bolls open. If it is to be mechanically picked, the leaves are usually chemically removed, encouraging uniform opening of the bolls. Most of the seeds (cottonseed; *q.v.*) are separated from the fibres by a mechanical process called ginning.

Ginned cotton is shipped in bales to a textile mill for yarn manufacturing. A traditional yet common processing method is ring spinning, by which the mass of cotton may be subjected to opening and cleaning, picking, carding, combing, drawing, roving, and spinning. The

cotton bale is opened and its fibres are raked mechanically to remove foreign matter (*e.g.*, soil and seeds). A picker (picking machine) then wraps the fibres into a lap. A card (carding) machine brushes the loose fibres into rows that are joined as a soft sheet, or web, and forms them into loose untwisted rope known as card sliver. For higher quality yarn, card sliver is put through a combing machine, which straightens the staple to a finer degree and removes unwanted short lengths, or noils. In the drawing (drafting) stage, a series of variable-speed rollers attenuates and reduces the sliver to firm uniform strands of usable size. Thinner strands are produced by the roving (slubbing) process, in which the sliver is converted to roving by being pulled and slightly twisted. Finally, the roving is transferred to a spinning frame, where it is drawn further, twisted on a ring spinner, and wound on a bobbin as yarn.

Faster production methods include rotor spinning (a type of open-end spinning), in which fibres are detached from card sliver and twisted, within a rotor, as they are joined to the end of the yarn. For the production of cotton blends, air-jet spinning may be used; in this high-speed method, air currents wrap loose fibres around a straight sliver core.

Blends (composites) are made during yarn processing by joining drawn cotton with other staple fibres, such as polyester or casein.

The procedure for weaving cotton yarn into fabric is similar to that for other fibres. Cotton looms interlace the tense lengthwise yarns, called warp, with crosswise yarns called weft, or filling. Warp yarns often are treated chemically to prevent breaking during weaving.

Cotton, one of the world's leading agricultural crops, is plentiful and economically produced, making cotton products relatively inexpensive. The fibres can be made into a wide variety of fabrics ranging from lightweight voiles and laces to heavy sailcloths and thick-piled velveteens, suitable for a great variety of wearing apparel, home furnishings, and industrial uses. Cotton fabrics can be extremely durable and resistant to abrasion. Cotton accepts many dyes, is usually washable, and can be ironed at relatively high temperatures. It is comfortable to wear because it absorbs and releases moisture quickly. When warmth is desired, it can be napped, a process giving the fabric a downy surface. Various finishing processes have been developed to make cotton resistant to stains, water, and mildew; to increase resistance to wrinkling, thus reducing or eliminating the need for ironing; and to reduce shrinkage in laundering to not more than 1 percent. Nonwoven cotton, made by fusing or bonding the fibres together, is useful for making disposable products to be used as towels, polishing cloths, tea bags, tablecloths, bandages, and disposable uniforms and sheets for hospital and other medical uses. The world's leading producers of cotton are China, the United States, India, Pakistan, Uzbekistan, Brazil, Turkey, Australia, Turkmenistan, and Egypt.

Cotton, Sir Arthur Thomas (b. May 15, 1803, Woodcote, Oxfordshire, Eng.—d. July 14, 1899, Dorking, Surrey), British irrigation engineer whose projects averted famines and stimulated the economy of southern India.

Cotton entered the Madras engineers in 1820, served in the First Burmese War (1824–26), and began his irrigation work in 1828. He constructed works on the Cauvery, Coleroon, and Godavari rivers. His dams on the Coleroon (1836) and the Godavari (1847–52) rivers irrigated wide areas.

Before Cotton began his work on the Godavari River, Tanjore (now Thanjāvūr) and the adjoining districts were threatened with ruin from lack of water. After his project's completion these areas became the richest part of Madras (now the state of Tamil Nadu), and Tanjore returned a larger revenue than any other district in India. Cotton also founded an Indian school of hydraulic engineering. He was knighted in 1861 and retired from government service in 1862.

Cotton, Charles (b. April 28, 1630, Beresford Hall, Staffordshire, Eng.—d. Feb. 16, 1687, London), English poet and country squire, chiefly remembered for his share in Izaak Walton's *The Compleat Angler*.

Cotton made a number of translations from the French, including, in 1685, the often-reprinted *Essays of Michael Seigneur de Montaigne,* Corneille's *Horace* (1671), and several historical and philosophical works. Following the French fashion, he wrote *Scarronides* (1664, 1665), which is a coarse burlesque of the *Aeneid,* books 1 and 4, and the *Burlesque upon Burlesque . . . Being some of Lucians Dialogues newly put into English fustian* (1675).

His original writings include *The Compleat Gamester* (1674); *The Planter's Manual* (1675); and the second part, on fly fishing, which he added at Walton's suggestion, to the 5th edition of *The Compleat Angler* (1676). *The Wonders of the Peake* (1681), a long topographical poem popular throughout the 18th century, and his other poetry, published in the posthumous and unauthorized *Poems on several occasions* (1689), reflect Cotton's enjoyment of life.

Cotton, Sir Henry, in full SIR THOMAS HENRY COTTON (b. Jan. 26, 1907, Holmes Chapel, Cheshire, Eng.—d. Dec. 22, 1987, London), preeminent British golfer in the decades following World War I.

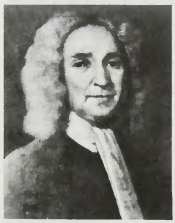
Cotton was encouraged to play golf by his father, and after being coached by J.H. Taylor he became a full-time professional golfer in 1926. His first win of the British Open in 1934 ended a decade of American victories in that major tournament. He won the British Open again in 1937 and 1948. He also won 11 European Open championships, and he represented Great Britain in Ryder Cup competition four times.

Conspicuously ambitious and intelligent, Cotton was a compelling personality who contributed enormously to elevating the status of the professional golfer in Great Britain. After his retirement he taught and wrote numerous books and articles on golf, including *Studying the Golf Game* (1964), *A History of Golf* (1973), and *Thanks for the Game* (1980). He was awarded a knighthood posthumously.

Cotton, John (b. Dec. 4, 1585, Derby, Derbyshire, Eng.—d. Dec. 23, 1652, Boston, Mass. [U.S.]), influential New England Puritan leader who served principally as "teacher" of the First Church of Boston (1633–52) after escaping the persecution of Nonconformists by the Church of England.

Educated at Trinity College, Cambridge, Cotton became vicar of the parish church of St. Botolph's in Boston, Lincolnshire, in 1612 and remained in that post for 21 years. During this time he gradually became more Puritan in his outlook, and he ceased to observe certain Anglican religious rituals in his performance of his duties. In 1632 legal action was taken against him for his Nonconformism, and in July 1633 he emigrated to the Massachusetts Bay Colony, where he became "teacher" of the First Church of Boston, remaining so until his death. His popularity in the colony was unbounded, and his influence in both civil and ecclesiastical affairs was probably greater than that of any other minister in theocratic New England.

Cotton wrote several works that constitute an invaluable exposition of New England Congregationalism, including *The Way of the Churches of Christ in New England* (1645) and *The Way of Congregational Churches Cleared* (1648). The catechism he wrote, *Milk for Babes, Drawn out of the Breasts of Both Testaments* (1646), was widely used for many years in New England for the religious instruction of children.



John Cotton, detail from a portrait in *The Beginnings of New England,* by John Fiske

By courtesy of the Library of Congress, Washington, D.C.

Articles are alphabetized word by word, not letter by letter

Cotton, Sir Robert Bruce, 1ST BARONET (b. Jan. 22, 1571, Denton, Lancashire, Eng.—d. May 6, 1631, London?), English antiquarian, the founder of the Cottonian Library, and a prominent Parliamentarian in the reign of Charles I. The collection of historical documents that he amassed in his library eventually formed the basis of the manuscript collection of the British Museum (founded 1753).

Graduating from Jesus College, Cambridge, in 1585, Cotton took a house near Old Palace Yard, Westminster, and there began to assemble a collection of manuscripts, books, and coins, which he supplemented throughout his life. It became a meeting place for scholars, who were allowed to use the library freely. Cotton was knighted upon the accession of King James I. In 1611 he presented to the king a historical *Inquiry into the Crown Revenues,* in which he supported the creation of the order of baronets as a means of raising money. In the same year, he himself received the title.



Sir Robert Bruce Cotton, detail of an engraving by G. Vertue after a portrait by Paul van Somer

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

After this, however, Cotton's favour at court began to decline. His acquisition of so many public documents had aroused misgivings, and in 1615 he was involved in the disgrace of his patron, Robert Carr, the Earl of Somerset, and was arrested. Cotton received no formal trial and was pardoned eight months later, but he never regained his standing at court. Moreover, he began increasingly to oppose Stuart methods of taxation. The circulation in the House of Commons of his notes during the debate on supply in 1625 materially contributed to the decision to grant Charles I that tax for one

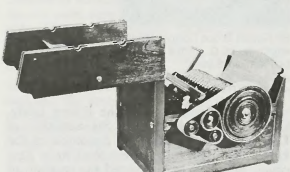
year only. His *The Reign of Henry III* was published in 1627 in the face of a government threat to prosecute the printers, and in 1628 the opposition leaders, Sir John Eliot, John Pym, and Sir Simonds D'Ewes, used his house as their headquarters. Cotton himself had entered Parliament in 1601.

Finally, the publication of his political tract, entitled *The Danger wherein the Kingdome now standeth and the Remedie* (1628), and the circulation of another, a *Proposition to Bridle Parliament,* caused his imprisonment in 1629 and the sealing up of his library. His trial fortunately coincided with the birth of the future Charles II, and he was released in honour of the event, but his library was not restored, and his zest for life was destroyed. After his death, his son, Sir Thomas (1594–1662), regained possession of the library and greatly enlarged it. Sir John, the 4th baronet, presented it to the nation in 1700.

cotton bollworm: *see* corn earworm.

Cotton Bowl, post-season U.S. collegiate football game played on New Year's Day in Dallas, Texas, between the champion of the Southwest Conference and a leading team from outside the conference. The only bowl game controlled and operated by a single athletic conference, the Cotton Bowl was conceived by Dallas oilman J. Curtis Sanford. The first game was played in 1937. After the 1940 game, a group of Dallas citizens acquired control of the game and named themselves the Cotton Bowl Athletic Association (CBAA), which later that year became an agency of the Southwest Conference.

cotton gin, machine for cleaning cotton of its seeds, invented in the United States by Eli Whitney in 1793. The cotton gin is an example of an invention directly called forth by an immediate demand; the mechanization of spinning in England had created a greatly expanded market for American cotton, whose production was inhibited by the slowness of manual removal of the seeds from the raw fibre. Whitney, a Massachusetts Yankee visiting a friend in the South, learned of the problem and quickly solved it with a device that pulled the cotton through a set of wire teeth mounted on a revolving cylinder, the fibre passing through narrow slots in an iron breastwork too small to permit passage of the seed. The simplicity of the invention—which could be powered by man, animal, or water—caused it to be widely copied despite Whitney's patent;



Replica of Eli Whitney's 1793 cotton gin
The Bettmann Archive

it is credited with fixing cotton cultivation, virtually to the exclusion of other crops, in the U.S. South and so institutionalizing slavery.

cotton harvester, machine for harvesting cotton bolls. Mechanical cotton harvesters are of two basic types, strippers and pickers. Stripper-type harvesters strip the entire plant of both open and unopened bolls along with many leaves and stems. The unwanted material is then removed by special devices at the gin. Strippers work most satisfactorily after frost has killed the green vegetative growth.



Cotton picker
By courtesy of the National Cotton Council

Picker machines, often referred to as spindle-type harvesters, remove the cotton from open bolls and leave the bur on the plant. The spindles, which rotate on their axes at a high speed, are attached to a drum that also turns, causing the spindles to enter the plant. The cotton fibre is wrapped around the moistened spindles and then taken off by a special device called the doffer, from which the cotton is delivered to a large basket carried above the machine. Although a cotton harvester was patented in the U.S. in 1850, economic and social conditions prevented further development and full acceptance until the 1940s.

cotton rat (*Sigmodon*), any of about 13 species of rodents, family Cricetidae (order Rodentia), found from the southern United States to northern South America. Cotton rats



Cotton rat (*Sigmodon*)
John H. Gerard—EB Inc.

are stout-bodied, with small ears and with coarse coats of intermingled dark and buffy hairs. The most common species is the hispid cotton rat (*S. hispidus*), a large species 25 to 36 centimetres (10 to 14 inches) long including the thin, scaly, sparsely haired tail.

Cotton rats are numerous and exceedingly prolific, producing several litters of 2 to 10 young each year. Their habitat varies, but a preference is shown for weedy fence rows, tall grass, and ditch banks. The nest, in a shallow runway or tunnel, is built of any available fibrous material. Aggressive animals, cotton rats eat almost anything edible. They often become serious agricultural pests and sometimes destroy the eggs and young of game birds. They are kept in laboratories for use in research.

cottonseed, seed of the cotton plant, important commercially for its oil and other products. Cottonseed oil is used in salad and cooking oils and, after hydrogenation, in shortenings and margarine. The cake, or meal, remaining after the oil is extracted is used in poultry and livestock feeds. Linters, the short cellulose fibres left on the seed after the staple cotton is removed by ginning, are used to make coarse yarns and many cellulose products. The hulls, or outer seed coverings, are used in ruminant animal feed as roughage.

The ancient Chinese and Hindus had crude methods for recovering cottonseed oil and used it as medicine and in lamps, but large-scale commercial use of cottonseed is a relatively modern development. In the mid-19th century cottonseed was used mainly for planting cotton, and the leftover seed was considered a pollution and health problem. In 1833, however, the first successful cottonseed-oil mill was established in Natchez, Miss., and the industry expanded after the American Civil War. Cottonseed is now used either for oil production, for planting, or as animal feed. The United States has continued as the largest consumer, but cottonseed is also produced in quantity by India, China, Mexico, Egypt, Pakistan, and Brazil.

Following cleaning to remove extraneous matter, the linters are removed by machines similar to gins but with circular saws and finer teeth. Linters removed in the first cut are used to make high-quality mattresses and in the manufacture of coarse cotton yarns. Subsequently cut linters are purified and used in the production of explosives, cellulose acetate, rayon, ethyl cellulose, lacquers, and many plastic and other products requiring high-quality cellulose as the raw material.

The delintered seed is hulled, and the hulls ground for incorporation as roughage in beef and dairy cattle feed. The seed kernels are flaked between steel rollers and cooked at about 113° C (235° F) to facilitate recovery of the oil, by pressing or by solvent extraction or both.

The pressed cake is sometimes broken and sold as cottonseed cake, but most is ground and sold as meal. The principal use of both is as high-protein and supplements in feed for cattle; swine and poultry can also eat it after processing to reduce the influence of gossypol, a toxic cotton plant pigment. Cottonseed meal is also used in making starch-free flour for human consumption.

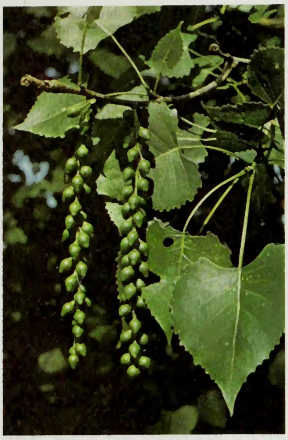
The crude, dark-coloured cottonseed oil contains constituents that must be removed to produce edible oil. After filtration, the oil is refined by means of treatment with an alkaline solution that reacts with free fatty acids to form soap, which settles. The oil is separated from the soap stock by drawing off or centrifuging and then is washed with water to remove remaining soap particles.

For salad and cooking purposes, the oil is further purified by bleaching agents such as fuller's earth and acid-activated bleaching clays. Then it is winterized—that is, made to stay liquid at ordinary refrigeration temperatures—by removing the saturated glycerides; this is done commercially by chilling and then separating the clear oil from the solidified portion. Odoriferous components are removed by heating the oil in a vacuum.

For shortening and margarine, the oil is partially hardened by hydrogenation (combining hydrogen with the oil to chemically convert part of the unsaturated fatty acids to saturated acids).

cottontail, any of several North American rabbit species. *See* rabbit.

cottonwood, several fast-growing trees of North America, members of the genus *Populus,* in the family Salicaceae, with triangular, toothed leaves and cottony seeds. The dangling leaves clatter in the wind. Eastern cottonwood (*P. deltoides*), nearly 30 metres (100 feet) tall, has thick glossy leaves. Perhaps natural hybrids between this and Eurasian black poplar (*P. nigra*) are the Carolina poplar (*P. angulata*), and *P. eugenei.* Alamo, or Fremont cottonwood (*P. fremontii*), tallest of the group, is found in southwestern North Amer-



Eastern cottonwood (*Populus deltoides*)
Kitty Kohout from Root Resources—EB Inc.

ica. Great Plains cottonwood (*P. sargentii*), of North America, has thick coarse-toothed leaves.

cottony-cushion scale (*Icerya purchasi*), a scale insect pest (order Homoptera), especially of California citrus trees. The adult lays bright



Cottony-cushion scales (*Icerya purchasi*, magnified)
Robert C. Hermes—The National Audubon Society Collection/Photo Researchers

red eggs in a distinctive large white mass that juts out from a twig. In summer the eggs hatch in a few days; in winter several months are required.

The insect, worldwide in distribution, is found on many plants, including acacia, pittosporum, and willow. It is particularly destructive to citrus trees and once threatened the southern California citrus industry. Imported Australian ladybird beetles, a natural enemy, brought the scale under control in California in a short time.

Cottrell, Frederick Gardner (b. Jan. 10, 1877, Oakland, Calif., U.S.—d. Nov. 16, 1948, Berkeley, Calif.), U.S. educator, scientist, and inventor of the electrostatic precipitator, a device that removes suspended particles from streams of gases.

Cottrell taught chemistry at the University of California, Berkeley, from 1902 to 1911 and began his work on electrostatic precipitators in 1906. In 1912 he founded the Research Corporation, a nonprofit organization that supports basic research in colleges and universities, and he assigned his precipitator patents to the corporation as an endowment.

From 1911 to 1920 Cottrell was associated



Cottrell
By courtesy of the U.S. Department of Agriculture

with the United States Bureau of Mines as chief physical chemist, chief metallurgist, and finally director. He helped develop the process of separating helium from natural gas and participated in the creation of the bureau's mine-safety division. He was director (1922–27) of the Fixed Nitrogen Research Laboratory of the U.S. Department of Agriculture, where he helped develop the synthetic ammonia industry in the U.S. on the basis of the Haber–Bosch process.

Cotuí, city, capital of Sánchez Ramírez province, central Dominican Republic. Situated in the fertile La Vega Real region on the Yuna River, it was founded in 1505 as a mining centre. Early in the colonial era, gold, silver, and copper were mined in the vicinity; iron pyrites, amber, and graphite deposits were later discovered nearby. The surrounding agricultural lands are utilized primarily to grow rice and cacao. Cotuí is accessible by secondary highway from Santo Domingo, the national capital, and from nearby urban centres. Pop. (1981) 16,688.

Coty, François (-Marie-Joseph-Spoturno) (b. May 3, 1874, Ajaccio, Corsica—d. July 25, 1934, Louveciennes, Fr.), French perfume manufacturer who acquired newspaper interests to advance his right-wing political and social views.

By 1900 Coty's small perfume business had become highly successful. In 1905 he opened a plant near Paris and during World War I became one of the wealthiest men in France. He gained control in 1922 of *Le Figaro*, a conservative Paris daily. To check the growth of French Socialism and Communism, he founded two other daily papers in 1928. Subsidized by the perfume business, both papers



François Coty
H. Roger-Viollet

sold at half the price of other dailies and enjoyed wide circulation. In later years his wealth was much reduced.

Coty, René (-Jules-Gustave) (b. March 20, 1882, Le Havre, Fr.—d. Nov. 22, 1962, Le Havre), last president of the Fourth French Republic, from 1954 to 1959.

After taking degrees in law and philosophy and pursuing a local political career, Coty was elected to the Chamber of Deputies in 1923. He sat with the left Republicans and specialized in matters of merchant shipping and government reform.

In December 1930 Coty served briefly as undersecretary of the interior and then left the Chamber for the Senate. He remained relatively inactive during World War II and returned to the Chamber in 1945. The next year he joined the Robert Schuman government as minister of reconstruction and urban affairs. He then returned to the Senate and was its vice president until his election to the presidency on Dec. 23, 1953, on the 13th ballot.

Coty served with dignity but was less active in trying to influence policy than his predecessor, Vincent Auriol, had been. In the crisis of



René Coty, *c.* 1949
H. Roger-Viollet

May 1958 his threat to resign helped to induce the national assembly to elect Gen. Charles de Gaulle as prime minister. He retired on Jan. 8, 1959, when de Gaulle was installed as the first president of the Fifth Republic.

cotyledon, seed leaf within the embryo of a seed. Flowering plants whose embryos have a single cotyledon are grouped as monocots, or monocotyledonous plants; embryos with two cotyledons are grouped as dicots, or dicotyledonous plants. The number of cotyledons in the embryos of seeds of gymnosperms is highly variable, ranging from 8 to 20 or more.

Cotys, also called COTYTTO, Thracian goddess worshipped with orgiastic rites, especially at night. Her worship was apparently adopted publicly in Corinth (*c.* 425 BC) and perhaps privately in Athens about the same time; it then included a baptismal ceremony. Later relief sculptures from Thrace showed her as a huntress-goddess similar to Artemis, but in literature she was instead compared with the Oriental-Greek-Roman Cybele (Great Mother of the Gods).

coua, any of about 10 species of terrestrial birds of the genus *Coua*, of the cuckoo family



Crested coua (*Coua cristata*)
Painting by H. Jon Janosik

(Cuculidae) found in Madagascar. Couas are long-tailed, weak-flying birds 45 to 60 cm (18 to 24 inches) in length, of rather soft coloration, often bluish or grayish. They eat insects and, unlike other cuckoos, some fruit.

Coubert, Samuel Bernard, comte de (count of): *see* Bernard, Samuel.

Consult the INDEX *first*

Coubertin, Pierre, baron de (b. Jan. 1, 1863, Paris, Fr.—d. Sept. 2, 1937, Geneva, Switz.), French educator who was primarily responsible for the revival of the Olympic Games in 1894, after nearly 1,500 years of abeyance.

Breaking a long family tradition of military service, Coubertin toured the United States and Europe to study educational methods and visited Greece, where excavators were uncovering the ancient Olympic site. He first proposed the modern Olympic Games in 1892 at a meeting of the Athletic Sports Union, a French group he had helped organize. Two years later, at an international athletic congress in Paris, the delegates voted unanimously to hold a revived Olympic competition in Athens in 1896. Coubertin was the second president (1896–1925) of the International Olympic Committee.

One of the first French advocates of physical education, Coubertin wrote many books on the subject. It was his belief that international competition among amateur athletes, such as that which he had proposed, would diminish world tensions.

coucal, any of about 27 species of medium to large birds of the genus *Centropus* of the cuckoo family (Cuculidae). They are found from Africa and Madagascar across southern Asia to Australia and the Solomon Islands.



Senegal coucal (*Centropus senegalensis*)
Painting by John P. O'Neill

About 30 to 90 cm (12 to 36 inches) long, coucals are loose-plumaged birds with rather stout, down-curved bills, short wings, and long, graduated tails. Weak fliers, they feed chiefly on large insects but can run down small rodents and reptiles. Three to five eggs are placed in a domed grass nest built on the ground or in a low bush.

The following are among the best-known coucals:

The black, or black-chested, coucal (*C. toulou*) is 33 cm (13 inches) long. All black except for brown wings, it is whitish streaked in nonbreeding plumage (the only cuckoo to have seasonal coloration change). It ranges from eastern Africa to Southeast Asia.

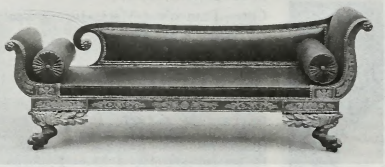
The great, or common, coucal (*C. sinensis*), called crow pheasant in India, is 48 to 56 cm (19 to 22 inches) long. It is black with brown mantle and wings. Its range is from India to southern China and Malaysia.

The pheasant coucal (*C. phasianinus*), or swamp pheasant, 33 cm (13 inches) long, is dark brown, finely barred with white. It occupies Australia and New Guinea.

The senegal coucal (*C. senegalensis*), 40 cm (16 inches) long, is brown above with black crown and white underparts. It is found in tropical Africa, as is a similar species, *C. superciliosus,* the white-browed coucal.

couch, in modern usage a sofa or settee, but in the 17th and 18th centuries a long, upholstered seat for reclining, one end sloping and high enough to provide a back rest and headrest. It was a more comfortable form of the 17th-century daybed.

Some late 18th-century versions had an arm running partly down one side, and this type continued to be made in England in the Regency period. Based on Greek prototypes, such flowing designs, of which there were many variations, were among the most elegant and successful interpretations of the classical revival. Many had scrolled ends and short, scimitar-shaped legs. Because of the Victorian quest for comfort, the couch was superseded by the overstuffed sofa.



Empire style couch, painted and gilded cherry wood with black horsehair upholstery, probably from the workshop of Duncan Phyfe, New York, c. 1815; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, gift of Mrs. Bayard Verplanck, 1940

couch grass: *see* quack grass.

Coucy, in full COUCY-LE-CHÂTEAU-AUFFRIQUE, village in the Aisne *département,* Picardie *région,* northern France, 18 miles (29 km) west-southwest of Laon. It was important in the European Middle Ages for its castle and for the family of the sires de Coucy. A commune from 1196, the town itself was strongly fortified, the most remarkable feature in its wall being the great Porte de Laon. The castle, begun in the 10th century and rebuilt in the 13th, was restored in the 19th century, but the Germans dynamited it in World War I.

Enguerrand de Boves (d. 1115), founder of the house of Coucy, distinguished himself as a crusader. His son Thomas de Marle was a brigand and rebel against whom Louis VI of France had to undertake two expeditions. Enguerrand III fought for Philip II Augustus at Bouvines. In the 14th century, as Enguerrand IV left no heirs, Coucy passed to a nephew, Enguerrand de Guynes. Enguerrand VI was killed at Crécy in 1346; and his son Enguerrand VII, who joined the Hungarian crusade against the Turks, was captured at Nicopolis and died in Turkey in 1397. His daughter Marie sold Coucy to Louis de France, Duke d'Orléans, in 1400. After three more changes of ownership, it passed to Philippe, Duke d'Orléans, in 1673 and remained with the house of Orléans until the Revolution. Pop. (1982) 1,011.

Coué, Émile (b. Feb. 26, 1857, Troyes, Fr.—d. July 2, 1926, Nancy), French pharmacist who in 1920 at his clinic at Nancy introduced



Coué
EB Inc.

a method of psychotherapy characterized by frequent repetition of the formula, "Every day, and in every way, I am becoming better and better." This method of autosuggestion came to be called Couéism.

An apothecary at Troyes from 1882 to 1910, Coué in 1901 began to study under Ambroise-Auguste Liébeault and Hippolyte Bernheim, leading exponents of hypnosis. Although stressing that he was not primarily a healer but one who taught others to heal themselves, Coué claimed to have effected organic changes through autosuggestion.

Coues, Elliott (b. Sept. 9, 1842, Portsmouth, N.H., U.S.—d. Dec. 25, 1899, Baltimore, Md.), American ornithologist who advanced the study and classification of North American birds.

An army physician (1864–81), Coues served also as a naturalist for the U.S. Northern Boundary Commission (1873–76) and for the U.S. Geological and Geographical Survey of the Territories (1876–80). During that time he published his most valuable studies. His monumental *Key to North American Birds* (1872) was the first work of its kind to present a taxonomic classification of birds according to an artificial key. Other important works by Coues include *A Check List of North American Birds* (1873), *Field Ornithology* (1874), and two monographs: one on birds of the northwestern United States and one on birds of the Colorado River valley.

cougar: *see* puma.

cough, an expulsive reflex initiated when the respiratory tract is irritated by infection, noxious fumes, dust, or other types of foreign bodies. The reflex results in a sudden expulsion of air from the lungs that carries with it excessive secretions or foreign material from the respiratory tract. Cough is beneficial; pneumonia

frequently results when an effective cough reflex is lost as a result of chest injury, disease, or oversedation. Repeated and severe coughing, however, is physically exhausting and interferes with rest. Under these circumstances drugs may be used to suppress the reflex.

Cough occurs in many of the acute infectious diseases, including the common cold, in the majority of chronic pulmonary diseases, and frequently in heart disease. Any cough that persists longer than a few weeks should receive medical attention because it may be the first warning of serious disease.

Coughlin, Charles E(dward), byname FATHER COUGHLIN (b. Oct. 25, 1891, Hamilton, Ont., Can.—d. Oct. 27, 1979, Bloomfield Hills, Mich., U.S.), U.S. Roman Catholic "radio priest" who in the 1930s developed one of the first deeply loyal mass audiences in radio broadcast history.

Coughlin was the son of a Great Lakes seaman and a seamstress. He was raised in the port town of Hamilton and educated at St. Michael's College in Toronto. He seriously considered entering politics but finally chose the priesthood, and he was ordained in Detroit in 1923. In 1926 he became pastor of the Shrine of the Little Flower in Royal Oak, Mich., and in 1930 experimented with the new medium of radio, broadcasting sermons and talks to children in 1930. His political and economic interests began to appear and he soon was attacking Pres. Herbert Hoover and supporting Pres. Franklin D. Roosevelt upon his election in 1932. Coughlin rapidly gained listeners. Gradually he began expressing reactionary views which were increasingly anti-New Deal and larded with anti-Semitic rhetoric. He turned on Roosevelt, and a magazine he had founded, *Social Justice,* carried shrill attacks on Communism, Wall Street, and Jews. The magazine was banned from the mails for violating the Espionage Act and ceased publication in 1942. In the same year the Catholic hierarchy ordered him to stop broadcasting.

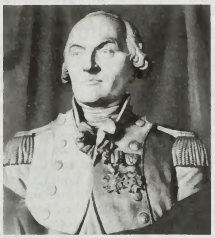
He wrote the books *Christ or the Red Serpent* (1930), *By the Sweat of Thy Brow* (1931), and *The New Deal in Money* (1933). He remained pastor of the Shrine of the Little Flower until his retirement in 1966.

coulee: *see* arroyo.

Coulee Dam, town on the Columbia River, northeast central Washington, U.S., at a point where Grant, Douglas, and Okanogan counties meet, 80 mi (129 km) west-northwest of Spokane. Founded in 1934 by the U.S. Bureau of Reclamation as a construction town for workers on the Grand Coulee Dam (completed 1942), its incorporation in 1959 required a special enactment of the state legislature. With the communities of Elmer City, Grand Coulee, and Electric City, it is the home for service employees of the huge gravity dam, focus of the multipurpose Columbia Basin Project. Coulee Dam also serves as headquarters of the Coulee Dam National Recreational Area, which encompasses over 100,000 ac (40,500 ha) and includes Franklin D. Roosevelt Lake extending northeastward with a 660-mi shoreline. The Grand Coulee Reservoir runs southwestward for 50 mi past Coulee City to Soap Lake, noted for its medicinal waters. Pop. (1990) 1,087.

coulomb, unit of electric charge in the metre-kilogram-second-ampere system, the basis of the SI system of physical units. The coulomb is defined as the quantity of electricity transported in one second by a current of one ampere. Named for the 18th–19th-century French physicist Charles-Augustin de Coulomb, it is approximately equivalent to 6.24×10^{18} electrons. *See* electric charge.

Coulomb, Charles-Augustin de (b. June 14, 1736, Angoulême, Fr.—d. Aug. 23, 1806, Paris), French physicist best known for the formulation of Coulomb's law, which states that the force between two electrical charges is proportional to the product of the charges and inversely proportional to the square of the distance between them. Coulombic force is one of the principal forces involved in atomic reactions.



Coulomb, detail of a bronze bust
H. Roger-Viollet

Coulomb spent nine years in the West Indies as a military engineer and returned to France with impaired health. Upon the outbreak of the French Revolution, he retired to a small estate at Blois and devoted himself to scientific research. In 1802 he was appointed an inspector of public instruction.

Coulomb developed his law as an outgrowth of his attempt to investigate the law of electrical repulsions as stated by Joseph Priestley of England. To this end he invented sensitive apparatus to measure the electrical forces involved in Priestley's law and published his findings in 1785–89. He also established the inverse square law of attraction and repulsion of unlike and like magnetic poles, which became the basis for the mathematical theory of magnetic forces developed by Siméon-Denis Poisson. He also did research on friction of machinery, on windmills, and on the elasticity of metal and silk fibres. The coulomb, a unit of electric charge, was named in his honour.

Coulomb force, also called COULOMB INTERACTION, attraction or repulsion of particles or objects because of their electric charge. One of the basic physical forces, the electric force is named for a French physicist, Charles-Augustin de Coulomb, who in 1785 published the results of an experimental investigation into the correct quantitative description of this force.

Two like electric charges, both positive or both negative, repel each other along a straight line between their centres. Two unlike charges, one positive, one negative, attract each other along a straight line joining their centres. The electric force is operative between charges down to distances of at least 10^{-16} metre, or approximately one-tenth of the diameter of atomic nuclei. Because of their positive charge, protons within nuclei repel each other, but nuclei hold together because of another basic physical force, the strong interaction, or nuclear force, which is stronger than the electric force. Massive, but electrically neutral, astronomical bodies such as planets and stars are bound together in solar systems and galaxies by still another basic physical force, gravitation, which though much weaker than the electric force, is always attractive and is the dominant force at great distances. At distances between these extremes, including the distances of everyday life, the only significant physical force is the electric force in its many varieties along with the related magnetic force.

The magnitude of the electric force F is directly proportional to the amount of one electric charge, q_1, multiplied by the other, q_2, and inversely proportional to the square of the distance r between their centres. Expressed in the form of an equation, this relation, called Coulomb's law, may be written by including the proportionality factor k as $F = kq_1q_2/r^2$. In the centimetre–gram–second system of units, the proportionality factor k in a vacuum is set equal to 1 and unit electric charge is defined by Coulomb's law. If an electric force of one unit (one dyne) arises between two equal electric charges one centimetre apart in a vacuum, the amount of each charge is one electrostatic unit, esu, or statcoulomb. In the metre–kilogram–second and the SI systems, the unit of force (newton), the unit of charge (coulomb), and the unit of distance (metre), are all defined independently of Coulomb's law, so the proportionality factor k is constrained to take a value consistent with these definitions, namely, k in a vacuum equals 8.98×10^9 newton square metre per square coulomb. This choice of value for k permits the practical electrical units, such as ampere and volt, to be included with the common metric mechanical units, such as metre and kilogram, in the same system.

coulometry, in analytical chemistry, method for determining the quantity of a substance, based on the strict proportionality between the extent of a chemical change and the quantity of electricity involved (Faraday's law). The quantity of the material to be analyzed can be determined directly by depositing the substance on an electrode or by generating electrolytically in the solution a known amount of a substance that will react with the test material. The latter method is analogous to volumetric titration.

Coulommiers, Henri II d'Orléans, duc de (duke of): *see* Longueville, Henri II d'Orléans, duc de.

coumarin, an organic compound having the characteristic odour of new-mown hay, obtainable from the tonka tree (native to Guyana) or by chemical synthesis. It is used in perfumes and flavourings and for the preparation of other chemicals.

Coumarin belongs to the heterocyclic class of organic compounds, because its molecule contains a ring of atoms of more than one element. The presence of coumarin in the tonka bean, in which it occurs combined with the sugar glucose, was observed in 1820; its synthesis in 1868 by the English chemist Sir William Henry Perkin was the first application of a general chemical reaction now known by his name.

Several other compounds present in plants, either free or combined with glucose, possess the coumarin structure. One of these is dicoumarol, first isolated from spoiled sweet clover hay; it is used in medicine to reduce the tendency of the blood to clot.

council, in the Christian Church, a meeting of bishops and other leaders to consider and rule on questions of doctrine, administration, discipline, and other matters. An ecumenical or general council is a meeting of bishops of the whole church; local councils representing such areas as provinces or patriarchates are often called synods. According to Roman Catholic doctrine, a council is not ecumenical unless it has been called by the pope, and its decrees are not binding until they have been promulgated by the pope. Decrees so promulgated have the highest authority.

Whereas the Eastern Orthodox churches recognize only seven councils as ecumenical, the Roman Catholic Church adds an eighth before the Schism of 1054, which permanently divided Eastern and Western Christianity. It is the fourth Council of Constantinople (869–870), which excommunicated Photius,

the patriarch of Constantinople. The Roman Catholic Church also considers 13 later councils as ecumenical.

Within Protestantism, synods, councils, and conferences on a small scale have played a part and, in times of crises, have sometimes achieved more than local or temporary significance. Examples of such are the Westminster Assembly (1643), the purpose of which was the reformation of the English Church, and the Synod of Barmen (1934), at which the major German Protestant churches declared their opposition to Nazism. In the 19th century national and world consultative organizations were established by many Protestant denominations, and in 1948 the World Council of Churches, an ecumenical association of Protestant churches, was organized.

In the very early church the name council was applied to any church meeting and even to buildings where services were held. During the 3rd century, however, the word council came to have the special sense of meetings of bishops, though not only bishops were present, for the administration of the church. The earliest known provincial councils were held in the 2nd century, and by the year 300 the meetings of bishops in the provinces had become the habitual mode of church government.

After Constantine I proclaimed toleration for the Christians (313) and persecution ended, it was possible for bishops from many provinces to convene in a general council. The idea of an ecumenical council and its special authority, however, was slow to develop. The term ecumenical council was first used by the historian Eusebius (died *c.* 340) in his life of Constantine to describe the Council of Nicaea (325), which was summoned by Constantine. Such imperially summoned councils and ordinary provincial councils differed sharply, but the distinction was more of size and practice than of defined authority. The decisions of such a council were obviously more binding than were those of earlier provincial councils because the emperor made them effective in secular law. It was not at first evident, however, that there might be a peculiar sacredness about the decisions of such a council because all councils were believed to be under the guidance of the Holy Spirit. After the Council of Nicaea (325), the idea developed that its decisions could not be reformed, and Athanasius argued that Nicaea was an especially sacred council because it was attended by bishops from all parts of the church. The councils of Ephesus (431) and of Chalcedon (451) declared that the decisions of Nicaea were unalterable. But it was assumed, rather than formally stated, that ecumenical councils, once recognized to be such, could not err. In practice, the idea of irreformable canons was often confined to matters of faith. In matters of discipline later councils continued to alter the decisions of earlier ecumenical councils, for changing circumstances often made the old canons irrelevant or unenforceable.

Ecumenical councils recognized by both Eastern Orthodox and Roman Catholics are:

First Council of Nicaea (325)
First Council of Constantinople (381)
Council of Ephesus (431)
Council of Chalcedon (451)
Second Council of Constantinople (553)
Third Council of Constantinople (680–681)
Second Council of Nicaea (787)

Those recognized by Roman Catholics are:

Fourth Council of Constantinople (869–870)
First Lateran Council (1123)
Second Lateran Council (1139)
Third Lateran Council (1179)
Fourth Lateran Council (1215)
First Council of Lyon (1245)
Second Council of Lyon (1274)
Council of Vienne (1311–12)
Council of Constance (1414–18)
Council of Ferrara-Florence (1438–*c.* 1445)
Fifth Lateran Council (1512–17)
Council of Trent (1545–63)
First Vatican Council (1869–70)
Second Vatican Council (1962–65)

council, order in (English law): *see* order in council.

Council Bluffs, city, seat (1851) of Pottawattamie county, southwestern Iowa, U.S., on the Missouri River across from Omaha, Neb. The Lewis and Clark Expedition passed there in 1804 and held a powwow with the Indians at a place called Council Hill or Council Bluff; a monument commemorates this meeting. The original site against the bluffs along the riverbank was settled by Mormons in 1846 and was variously called Miller's Hollow and Council Point. In 1848, upon Brigham Young's petition, it was renamed Kanesville to honour Col. Thomas Kane, who had aided the Mormons in their migrations. After the Mormons left for Utah, the name was changed to Council Bluffs at its incorporation in 1853. Abraham Lincoln designated the city as the eastern terminus of the Union Pacific Railroad after his visit in 1859 (the spot where he made this declaration is marked by a granite monument), and by 1870 eight railroads had converged there. A railroad–agricultural economy prevails, augmented by some industrial (cast-iron pipe, furniture, and playground equipment) development. River transportation is a developing factor. Iowa Western Community College-Council Bluffs Campus opened in 1966. Pop. (1990) 54,315.

Council Grove, city, seat (1871) of Morris county, east central Kansas, U.S., on the Neosho River. The settlement started as an Indian campground in a grove of oaks near the river, where a treaty was concluded (1825) between the federal government and the Kansa and the Osage Indians to permit the surveying of the Santa Fe Trail (from the Missouri River to Santa Fe, then in Mexican territory). The following year the first of many wagon trains rested at Council Grove, the last supply point before Santa Fe. After the arrival of the railroad in 1883, it became a shipping point for livestock and farm produce. The city remains an agricultural processing and shipping centre dealing primarily in grain, poultry, and livestock. Frontier landmarks include the Pioneer Jail (1849; the only one on the Santa Fe Trail), the Madonna of the Trail Monument, honouring pioneer women, and Hays Tavern (1847). The Kaw Indian Mission (1851) is now a museum. Custer's Elm, 100 ft (30 m) tall and 16 ft in circumference, supposedly sheltered Lieut. Col. George A. Custer's troops in 1867 during an expedition against the Indians. The Council Grove Reservoir, 3,000 ac (1,200 ha), is nearby. Inc. 1858. Pop. (1990) 2,228.

Council of ——: *see under* substantive word or words (*e.g.*, Trent, Council of).

counsel, assigned: *see* assigned counsel.

counseling, also called GUIDANCE, the process of helping an individual discover and develop his educational, vocational, and psychological potentialities and thereby to achieve an optimal level of personal happiness and social usefulness. The concept of counseling is essentially democratic in that the assumptions underlying its theory and practice are, first, that each individual has the right to shape his own destiny and, second, that the relatively mature and experienced members of the community are responsible for ensuring that each person's choice shall serve both his own interests and those of the society to which he belongs. It is implicit in the philosophy of counseling that these objectives are complementary rather than conflicting. The function of those who guide children and young people is not to effect a compromise between the requirements of individuals on the one hand and the demands of the community on the other. It is rather to orient the individual toward those opportunities afforded by his environment that can best guarantee the fulfillment of his personal needs and aspirations.

Guidance, in this sense, is a pervasive activity in which many persons and organizations take part. It is afforded to individuals by their parents, relatives, and friends and by the community at large through various educational, industrial, social, religious, and political agencies and, particularly, through the press and broadcasting services. A part of such guidance may be the giving of information that enables the person to increase the scope of his exploratory behaviour. The guidance counselor, for example, may give him information about his own abilities and interests as determined by psychological tests or about educational opportunities and the requirements of various occupations. The competent counselor does not attempt, however, to solve the person's problems for him. Adjustment is an individual matter that each person must discover for himself, and the counselor tries mainly to clarify the person's own thinking.

Professional counselors and counseling psychologists are commonly found in institutional settings such as high schools and colleges, private industry, community agencies, prisons, and the military, as well as in private practice.

count, English EARL, feminine COUNTESS, a European title of nobility, ranking in modern times after a marquess or a duke (in countries without marquesses). The Roman *comes* was originally a household companion of the emperor; under the Franks he was a local commander and judge. The counts were later slowly incorporated into the feudal structure, some becoming subordinate to dukes, although a few countships, such as those of Flanders, Toulouse, and Barcelona, were as great as duchies. The reassertion of royal authority over the feudatories, which took place at different times in the different kingdoms and led to the formation of centralized states of the modern type, meant that the counts as such lost their political authority, though they retained their privileges as members of the nobility.

France. French counts became vassals of dukes by 900 at the latest; but, as the process of feudalization continued, the counts tended to lose their official character and to become the hereditary lords of little territories. In France this development is already discernible in the 11th century, and with it there grew up the practice of applying the title of count very loosely. By the 12th century any lord of moderate status might style himself count, no less than the great feudatories of Flanders and Toulouse; and even in the 13th, when the organization of the French kingdom became more stable, the title might mean much or comparatively little.

The development of the system of royal *bailliages* from the beginning of the 13th century onward served to restrict the counts' rights of legislation, judiciary, and private war. Next the counts lost the rights of minting money (in the 16th century). Moreover, gradually the great fiefs were reunited under the French crown, after which they were granted only in apanage (the territory itself being administered as a province of the kingdom); counts simply retained various privileges. Later countships, under the First Empire and the subsequent monarchies and empire, had no territorial significance but were made hereditable in order of primogeniture.

Germany. Although in Germany the title of count had become hereditary in most cases as early as the 10th century, the counts re-

tained something of an official character rather longer than in France. In the 12th century, however, apparently by the emperor Frederick I Barbarossa, they were given authority to maintain the public peace in the district under their control—an authority that until 1100 had belonged to the dukes. Thenceforward the term countship signified the territory within which the count had powers of life and death.

From the beginning of the 12th century, a number of counts appeared in western Germany taking their titles simply from the castles held by them—with no apparent connection with any official status. In Frederick Barbarossa's time certain freemen of the higher class, such as *Vögte* or "advocates," began to style themselves as counts. In the 13th and 14th centuries there are instances of new countships received as fiefs from dukes.

Within the Holy Roman Empire there gradually developed distinctions between ordinary counts and counts of the empire (*Reichsgrafen*), who became members of the college of counts (*Grafenkollegium*), a component of the Diet of the empire. After the dissolution of the Holy Roman Empire in 1806 the counts of the empire were mediatized—*i.e.,* made subject to the sovereigns of the various German states instead of being "immediate" subjects of the emperor alone. The federal Diet, in 1829, however, recognized their right to the special style of *Erlaucht* ("Illustrious Highness").

Italy. With the decay of Carolingian authority, a system of countships based on cities grew up in Italy. Probably none were dependent on dukes; in any event, the ducal title was rare, at least in northern Italy. The rise of communes meant the end of the countship's former significance. However, as a mark of privilege, the title of count was quite liberally bestowed by the popes and other sovereigns of the peninsula well into modern times.

Spain. In Spain the countship developed under Visigothic influence in the kingdom of Asturias-León and under Frankish influence in Catalonia and in the country immediately south of the Pyrenees. By uniting the Catalan countships, the counts of Barcelona made themselves into practically sovereign princes, comparable at least to the counts of Flanders and Toulouse; and the Carolingian countship of Aragon was the nucleus of the kingdom of that name. The countship of Castile, on the other hand, from which the kingdom of Castile emerged, was originally a frontier district of the kingdom of Asturias-León. In the latter kingdom the official character of the counts as district administrators appointed by the kings was preserved until the end of the 11th century, when the principle of hereditary lordships of one sort or another began to prevail. Under the Spanish monarchies of the Renaissance and later, the title of count was infrequently conferred.

England. The title of earl (the English equivalent of count, from Danish *jarl*) was first introduced into England under the Danish king Canute (king of England 1016–35) and thus is the oldest title and rank of English nobles; it was also the highest until as late as 1337, when Edward the Black Prince was created Duke of Cornwall by Edward III.

In early times, earls wielded administrative authority over several counties, but, after the Norman Conquest in 1066, the earl's sphere was restricted to a single county. Later, the territorial association of earldoms was abandoned, and from the 18th century the practice developed of simply adding the grantee's surname, so that besides, for example, the earl of Leicester there may be Earl Temple. Originally the rules of succession to earldoms were those of inheriting fiefs in feudal law; thus, an earldom might pass to a woman, her husband receiving the title in her right. From the later Middle Ages, earldoms were created in which succession was restricted to male heirs. By the 1963 Peerage Act, an earl, in common with other British peers, might, within one year of inheriting his title, renounce it for life; then, during his lifetime, it remains dormant.

Russia and Poland. In Russia, where the title of count was not introduced until Peter the Great's time, it came to be given usually to officials of a certain rank in the government service. In Poland there were no counts before the partitions of the late 18th century, when the title was introduced by the Russians, Austrians, and Prussians.

Count or earl, countess
foreign-language equivalents

	masculine	feminine
Czech	hrabě	hraběnka
Danish	greve	grevinde
Dutch	graaf	gravin
French	comte	comtesse
German	Graf	Gräfin
Hungarian	gróf	grófnö
Italian	conte	contessa
Japanese	hakushaku	hakushaku-fujin
Latin	comes	comitissa
Norwegian	greve	grevinne
Polish	hrabia	hrabina
Portuguese	conde	condêssa
Romanian	conte	contesă
Russian	graf	grafinya
Serbo-Croatian	grof	grofica
Spanish	conde	condesa
Swedish	greve	grevina

Counter-Reformation, also called CATHOLIC REFORMATION, or CATHOLIC REVIVAL, in the history of Christianity, the Roman Catholic efforts directed in the 16th and early 17th centuries both against the Protestant Reformation and toward internal renewal; the Counter-Reformation took place during roughly the same period as the Protestant Reformation, actually (according to some sources) beginning shortly before Martin Luther's act of nailing the Ninety-Five Theses to the church door (1517).

Early calls for reform grew out of criticism of the worldly attitudes and policies of the Renaissance popes and many of the clergy. New religious orders and other groups were founded to effect a religious renewal—*e.g.,* the Theatines, the Capuchins, the Ursulines, and especially the Jesuits. Later in the century, John of the Cross and Teresa of Ávila promoted the reform of the Carmelite order and influenced the development of the mystical tradition. Francis of Sales had a similar influence on the devotional life of the laity.

There was little significant papal reaction to the Protestants or to demands for reform from within the Roman Catholic Church before mid-century. Pope Paul III (reigned 1534–49) is considered to be the first pope of the Counter-Reformation. It was he who in 1545 convened the Council of Trent. The council, which met intermittently until 1563, responded emphatically to the issues at hand. Its doctrinal teaching was a reaction against the Lutheran emphasis on the role of faith and God's grace and against Protestant teaching on the number and nature of the sacraments. Disciplinary reforms attacked the corruption of the clergy. There was an attempt to regulate the training of candidates for the priesthood; measures were taken against luxurious living on the part of the clergy, the appointment of relatives to church office, and the absence of bishops from their dioceses. Prescriptions were given about pastoral care and the administration of the sacraments.

The Roman Inquisition, an agency established in 1542 to combat heresy, was more successful in controlling doctrine and practice than similar bodies in those countries where Protestant princes had more power than the Roman Catholic Church. Political and military involvement directed against Protestant growth is most clearly reflected in the policies of Emperor Charles V and in those of his son Philip II, who was associated with the Spanish Inquisition.

Various theologians—especially the Jesuit Robert Bellarmine—attacked the doctrinal positions of the Reformers, but there was no one to rival the theological and moral engagement evident in the writings of Luther or the eloquence and passion characteristic of the works of John Calvin. Roman Catholics tended to emphasize the beliefs and devotional subjects that were under direct attack by the Protestants—*e.g.,* the Real Presence of Christ in the Eucharist, the Virgin Mary, and St. Peter.

A major emphasis of the Counter-Reformation was an ongoing missionary endeavour in parts of the world that had been colonized by predominantly Roman Catholic countries. The work of such men as Francis Xavier and others in Asia and of missionaries in the New World was rewarded with millions of baptisms, if not true conversions. There were also attempts to reconvert areas of the world that had once been Roman Catholic—*e.g.,* England and Sweden.

Counter-Remonstrant (Calvinist movement): *see* Gomarist.

countercurrent distribution, in chemistry, a multistage solvent-extraction process, one of many separation methods that can be employed in chemical analysis.

Substances are separated by this method on the basis of their different solubilities in two immiscible liquids. These two liquids, flowing in opposite directions, are brought into contact, mixed, and allowed to separate. The upper layer is transferred off in one direction and the lower in another; this cycle of operations may be repeated as many times as necessary to effect the desired separation.

A sample of a substance in contact with two solvents that do not dissolve in one another seeks an equilibrium condition in which it is distributed between them; the ratio of the concentrations in the two solvents, called the distribution coefficient, is characteristic of the compound and of the solvent pair. Compounds that have dissimilar molecular structures usually have widely different distribution coefficients, and mixtures of such compounds can be separated satisfactorily by one or a few transfers between a suitable solvent pair in simple equipment. Closely similar substances, however, such as proteins, have very similar distribution coefficients, and hundreds of transfers may be required to produce a complete separation.

The principle of countercurrent distribution is similar to that of chromatography; both procedures are used for analysis and purification of mixtures of similar compounds.

counterespionage, espionage directed toward detecting and thwarting enemy espionage. *See* intelligence (in government operations).

counterfeiting, manufacture of false money for gain, a kind of forgery in that something is copied so as to defraud by passing it for the original or genuine article. Because of the value conferred on money and the high level of technical skill required to imitate it, counterfeiting is singled out from other acts of forgery and is treated as a separate crime.

Laws against counterfeiting are relatively uniform from country to country, mostly as a consequence of the diplomatic conference held in Geneva in 1929 that produced a convention signed by 32 major powers. This convention has since been recognized by most of the states gaining independence after 1929.

These states punish counterfeiters of both their own and other currencies. Offenders may be extradited so as not to escape punishment by moving from country to country. Although

counterfeiting itself is generally recognized as a felony requiring imprisonment, less severe penalties are generally reserved for the mere participation in counterfeiting, the possession of counterfeiting equipment, the passing of false money, or the possession of such money. The international police organization Interpol was established primarily to organize the fight against counterfeiting.

In addition to stringent legal measures, many governments have undertaken a number of physical measures to prevent the counterfeiting of money. In the United States both printed bills and struck coins have been given characteristic features that, when closely examined, will prove the money to be genuine or counterfeit.

One of the more obvious traits of a counterfeit bill is the poor resolution of lines in the engraving of the bill. The line-intaglio process used for the printing of bills produces a distinctive sharpness of fine lines and readily discernible differences in ink thickness. Genuine bills have another element that is difficult to imitate: the use of a distinctive cotton and linen paper specially made for the government printing office and characterized by tiny blue and red silk fibres. A third feature of government-printed bills is a border design composed of a lacelike network of fine white lines created by a geometric lathe. Close examination of this feature for clear, unbroken lines will aid in the detection of counterfeit money. The test of rubbing a bill on a piece of paper to prove its genuineness is not an accurate one, because a genuine bill will give off ink as readily as a counterfeit.

In the United States, coins generally are not counterfeited as often as are bills, partially because of their lesser value. Another reason that coins are less often counterfeited is that, since 1965, the use of silver in coin production (10- and 25-cent pieces) was reduced 50 percent. Because counterfeit coins are usually cast rather than struck, they exhibit a lack of definition, thin plating, and sometimes even tiny globules that indicate where the metal penetrated porous areas of the mold.

counterglow (astronomy): *see* gegenschein.

counterintelligence, in government operations, the information and activity related to protecting a nation's own information and the secrecy of its intelligence operations. It is a police and security function that is concerned primarily with defensive, protective activities. *See* intelligence.

counterpoint, in musical composition, art of combining two or more melodic strands according to certain technical and aesthetic criteria. It is a Western phenomenon and does not occur in the music of the Orient or in that of the so-called nonliterate cultures.

A brief treatment of counterpoint follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

Counterpoint and harmony are commonly equated, respectively, with the horizontal and vertical aspects of music, the former evident mainly in imitative, canonic, or fugal textures, and the latter in chordal writing, where vertically conceived harmonies provide support for a single melodic line. Counterpoint, however, is not simply the antithesis of harmony. In practice, patterns of interwoven melodic lines, however complex, almost inevitably postulate underlying harmonic schemes, while primarily chordal structures (such as the chorale harmonizations of J.S. Bach) frequently display, through the independence of their part-writing, much of the essential character of counterpoint. The distinction between counterpoint and harmony depends, therefore, not solely upon the amount of obvious linearity within a composition but also upon the degree of internal tension and contrast that it contains—melodic, rhythmic, and harmonic.

The word contrapunctus, which was first used in the 14th century, was derived from the Latin *punctus contra punctum* ("point against point"), signifying originally a rudimentary harmonic process whereby a second vocal or instrumental line was added to a section of plainsong, moving in step with it, and usually in parallel consonances. From this modest beginning there ensued, over several centuries, an extended evolution through which counterpoint gradually acquired the supple, multilinear features that are typical of its mature forms. The first major climax to this development was reached in the late 16th century in the polyphonic vocal works of such composers as the Italian Giovanni Pierluigi da Palestrina, the Fleming Orlando di Lasso, the Englishman William Byrd, and the Spaniard Tomás Luis de Victoria. During this period, also, the first significant theoretical writings on counterpoint began to appear, by such authors as the Fleming Johannes Tinctoris (*Liber de arte contrapuncti,* 1477), the Italian Nicola Vicentino (*L'antica musica ridotta alla moderna prattica,* 1555), and, most notably, the Venetian Gioseffo Zarlino (*Le istitutioni harmoniche,* 1558).

After 1600 the emergence of a continuo-based monodic style radically affected the status of counterpoint. Deprived of its former role as the basis of a common musical language, the traditional technique became the preserve of church musicians and learned theoreticians. Composers of the newly developing theatre and chamber genres at first shunned counterpoint entirely but later readmitted it in various altered forms, most of which showed the invigorating influence of contemporary instrumental idioms. The crowning point of this development was reached in the vocal and instrumental works of Bach.

Early in the 18th century, in a reaction against the supposedly unnatural complexity of the Bach style, the contrapuntal tendency began again to lose ground. Nevertheless, the ancient polyphonic medium, appropriately updated, retained a foothold in church music, and its technical principles, codified by the Austrian composer Johann Joseph Fux, in his *Gradus ad Parnassum* (1725), continued to provide an important element in the teaching of composition. It required, however, the genius of Joseph Haydn and Wolfgang Amadeus Mozart to rescue counterpoint from the constraints of academicism and to reveal its vast new potentialities when joined with the dramatic sonata style. Subsequently, counterpoint became closely equated with strenuous intellectual endeavour, with the expression of reason and logic, and even, in some cases (such as the late works of Ludwig van Beethoven), with philosophical speculation. Thus the technique, in one form or another, was rarely absent for long from the most exalted branches of musical composition throughout the Classical and Romantic periods.

During the 20th century, with tonal harmony decreasing in influence, counterpoint achieved new significance. Particular importance was attached to dissonant linear styles of writing, propelled by rhythmically energetic individual strands, which featured prominently in the works of the Hungarian Béla Bartók, the Russian-born Igor Stravinsky, the Austrian Arnold Schoenberg, the German Paul Hindemith, and the Englishman Sir Michael Tippett. Notable among more recent developments was the aleatoric (random) counterpoint of the Pole Witold Lutosławski, involving a complex of freely metred melodic patterns, controlled only by the intermittent downbeat of a conductor to indicate moments of coincidence.

counterpoise, in electronics, portion of an antenna system that is composed of wires or other types of conductor arranged in a circular pattern at the base of the antenna at a certain distance above ground. Insulated from the ground, it forms the lower system of antenna conductors. It is used in places where it is difficult to obtain a good ground (*e.g.,* where there is extremely rocky soil). A combination of counterpoise and buried-wire grounds is also possible.

countertenor, also spelled CONTRA TENOR, in music, adult male alto voice, either natural or falsetto. In England the word generally refers to a falsetto alto rather than a high tenor. Some writers reserve the term countertenor for a naturally produced voice, terming the falsetto voice a male alto.

Derived from the Renaissance *contratenor altus,* abbreviated to *contratenor* (countertenor) or *altus* (alto), the term countertenor was originally applied to an alto part as well as to the voice or the instrument taking this part (*see also* tenor). Although the falsetto voice lost favour in the rest of Europe during the 18th century, the tradition was preserved in England in the cathedral choirs. In the 20th century the solo countertenor voice was successfully revived and, although it remains associated principally with the performance of Renaissance and Baroque music, several modern composers—notably Benjamin Britten—have written for it.

countess: *see* count.

country dance, genre of social dance for several couples, the characteristic form of folk and courtly dances of the British Isles. In England after about 1550, the term country dancing referred to a dance of the upper classes; similar dances, usually called traditional, existed contemporaneously among country people and persisted in popular tradition.

Country dances are performed in three characteristic formations: (1) circular, for an indefinite number of couples ("round" dances), (2) "longways" set, double-file line for an indefinite number of couples, men on one side, women on the other, and (3) geometric formations (*e.g.,* squares, triangles) or sets, usually for two, three, or four couples. The dancers execute a succession of varied patterns of figures. In "progressive-longways" dances, continuous interchange brings a new leading couple to the head of the set with each repetition of the pattern of figures. Round and longways dances predominate in the folk tradition. Longways and geometric sets are more frequent among courtly dances.

The patterns of the English country dances are similar to those of Irish set dances and of Scottish country dances such as reels and strathspeys. The step work of English dances, however, is simpler and the styling less formal.

Country dances from England were assimilated into the traditional dance of other countries—*e.g.,* Portugal and Denmark. English colonists carried them to North America, where they began a new folk-dance tradition as the "contra," or longways dance (*e.g.,* the Virginia reel), and, in modified form, as the American square dance.

Courtly dances also were exported from England. Longways and geometric sets appeared in Italy by the 15th century. The 18th-century French contredanse was at first based on English country dances and later evolved into independent varieties; by the 19th century it had spread to Germany and back to England. Although country dance originated as folk dance, the historical sources for its figures and music are urban and courtly: Italian (15th–16th century), English (16th–19th century), and French (18th century). The chief English source is John Playford's *The English Dancing Master* of 1650, continued in additional volumes until 1728 and critically revised in 1957 by M.J. Dean-Smith.

Cecil Sharp (1859–1924), founder of the

English Folk Dance Society, made extensive collections of rural country dances at a time when they were in danger of dying out and was largely responsible for their 20th-century revival. The Royal Scottish Country Dance Society has published traditional dances dating back to the 17th century and modern dances in traditional style. Popular country dances include Nonesuch, Hunsdon House, Morpeth Rant, Corn Rigs, and Old Mole.

country music, also called COUNTRY AND WESTERN, style of 20th-century American popular music that originated among whites in rural areas of the South and West. The term country and western music (later shortened to country music) was adopted by the recording industry in 1949 to replace the derogatory label "hillbilly music."

Ultimately, country music's roots lie in the ballads, folk songs, and popular songs of the English, Scots, and Irish settlers of the Appalachians and other parts of the South. In the early 1920s the traditional string-band music of the Southern mountain regions began to be commercially recorded, with Fiddlin' John Carson garnering the genre's first hit record in 1923. The vigour and realism of the rural songs, many lyrics of which were rather impersonal narratives of tragedies pointing to a stern, Calvinist moral, stood in marked contrast to the often mawkish sentimentality of much of the popular music of the day.

More important than recordings for the growth of country music was broadcast radio. Small radio stations appeared in the larger Southern and Midwestern cities in the 1920s, and many devoted part of their airtime to live or recorded music suited to white rural audiences. Two regular programs of great influence were the "National Barn Dance" from Chicago, Ill., begun in 1924, and the "Grand Ole Opry" from Nashville, Tenn., begun in 1925. The immediate popularity of such programs encouraged more recordings and the appearance of talented musicians from the hills at radio and record studios. Among these were the Carter Family and Jimmie Rodgers, whose performances strongly influenced later musicians. These early recordings were of ballads and country dance tunes and featured the fiddle and guitar as lead instruments over a rhythmic foundation of guitar or banjo. Other instruments occasionally used included Appalachian dulcimer, harmonica, and mandolin; vocals were done either by a single voice or in high close harmony.

With the migration of many Southern rural whites to industrial cities during the Great Depression and World War II, country music was carried into new areas and exposed to new influences, such as blues and gospel music. The nostalgic bias of country music, with its lyrics about grinding poverty, orphaned children, bereft lovers, and lonely workers far from home, held special appeal during a time of wide-scale population shifts.

During the 1930s a number of "singing cowboy" film stars, of whom Gene Autry was the best known, took country music and with suitably altered lyrics made it into a synthetic and adventitious "western" music. A second and more substantive variant of country music arose in the 1930s in the Texas-Oklahoma region, where the music of rural whites was exposed to the swing jazz of black orchestras. In response, a Western swing style evolved in the hands of Bob Wills and others and came to feature steel and amplified guitars and a strong dance rhythm. An even more important variant was honky-tonk, a country style that emerged in the 1940s with such figures as Ernest Tubb and Hank Williams. Honky-tonk's fiddle–steel-guitar combination and its bitter, maudlin lyrics about rural whites adrift in the big city were widely adopted by other country musicians.

The same period saw a concerted effort to recover some of country music's root values. Mandolin-player Bill Monroe and his string band, the Blue Grass Boys, discarded more recently adopted rhythms and instruments and brought back the lead fiddle and high harmony singing. His banjoist, Earl Scruggs, developed a brilliant three-finger picking style that brought the instrument into a lead position. Their music, with its driving, syncopated rhythms and instrumental virtuosity, took the name "bluegrass" from Monroe's band.

But commercialization proved a much stronger influence as country music became popular in all sections of the United States after World War II. In 1942 Roy Acuff, one of the most important country singers, co-organized in Nashville the first publishing house for country music. Hank Williams' meteoric rise to fame in the late 1940s helped establish Nashville as the undisputed centre of country music, with large recording studios and the Grand Ole Opry as its chief performing venue. In the 1950s and '60s country music became a huge commercial enterprise, with such leading performers as Tex Ritter, Johnny Cash, Tammy Wynette, Buck Owens, Merle Haggard, Patsy Cline, Loretta Lynn, and Charley Pride. Popular singers often recorded songs in a Nashville style, while many country music recordings employed lush orchestral backgrounds.

The 1970s saw the growth of the "outlaw" music of prominent Nashville expatriates Willie Nelson and Waylon Jennings. The gap between country and the mainstream of pop music continued to narrow in that decade and the next as electric guitars replaced more traditional instruments and country music became more acceptable to a national urban audience. Country retained its vitality into the late 20th century with such diverse performers as Dolly Parton, Randy Travis, Garth Brooks, Reba McEntire, Emmylou Harris, and Lyle Lovett. Despite its embrace of other popular styles, country music retained an unmistakable character as one of the few truly indigenous American musical styles.

Country Party: *see* National Party.

Count's War, Danish GREVENS FEJDE (1534–36), the last Danish war of succession, which resulted in the strengthening of the monarchy and in the establishment of Danish Lutheranism, as well as in a change in the Baltic balance of power. The war derived its name from Count Christopher of Oldenburg. Christopher unsuccessfully led the forces of Lübeck, the principal nobles of Denmark, and much of the Danish peasantry against Prince Christian, the Lutheran heir to the throne of the recently deceased King Frederick I (reigned 1523–33). Christian's forces, supported by the naval power of Sweden, reversed some initial military setbacks by the end of 1535. They put down a peasant revolt that had spread throughout Jutland, defeated Christopher's army at Öxneberg, and destroyed a Hanseatic fleet, thus ending Lübeck's power in the Baltic. Also, in 1535, Christian subdued a Norwegian revolt against his imposition of Protestantism. Although the war was for all practical purposes over, Count Christopher held Copenhagen until Prince Christian's blockade of the city forced him to surrender on July 28, 1536. With Christian's confirmation as King Christian III (reigned 1536–59), the monarchy was made hereditary, the Reformation was established in Denmark-Norway, and Norwegian autonomy was greatly reduced.

county, territorial and administrative division of government in the United Kingdom, United States, and other English-speaking countries.

United Kingdom. In Great Britain the county, or shire, is the principal subdivision of the country for political, administrative, judicial, and other purposes. Counties are used in England and Wales but have been replaced by other administrative units in Scotland and Northern Ireland.

Before the Norman Conquest of the 11th century, the chief unit of local government in England was the shire, which had originated in the Saxon communities of the 5th century. Each shire was ruled by an ealdorman (alderman), but after the 11th century his functions were taken over by the shire-reeve, or sheriff, who was appointed by the king. By the 14th century a county court, composed of several justices of the peace, or magistrates, had developed to help the sheriff administer the county. Over the centuries these crown-appointed magistrates gradually became the primary administrators of counties. Each county also became the constituency for the elections of knights of the shire, or county members of Parliament.

This system of county government, with centrally appointed justices of the peace holding legislative, judicial, and executive powers, became inadequate in the 19th century as the suffrage was extended, government services expanded, and industrial cities continued to grow. To remedy this undemocratic system, the Local Government Act of 1888 established county councils, with members elected by local residents, to take over the legislative and executive duties of the magistrates. The act also replaced the historic counties with new administrative counties, which often had different boundaries. The act also created about 60 county boroughs; these were cities that were given county powers in order to better provide local government services.

The Local Government Act of 1972 reorganized the county system again; 47 new counties contained all urban as well as rural areas in their boundaries, and each county was subdivided into several districts, which numbered almost 300 in all. A British county provides police and fire services, education, social-welfare services, public transport, traffic regulation, consumer protection, libraries, and some highways and parks. The county council is the general governing board of a county; it is a large body, with 50 to 100 popularly elected members, and much of its basic administrative work is delegated to committees.

Outside the United Kingdom, the system of county government was adopted, with variations, in most of the countries settled from Britain. In Canada, however, the county system never became universal; where it exists, the county councils are generally much smaller than in England. New Zealand has had county councils since 1876. In Australia the administrative unit is generally called the shire, though the name county is used for larger areas.

United States. In the United States the county is the principal geographic and political subdivision of the states. All states divide their territories into counties except Louisiana, where the equivalent units are called parishes, and Alaska, where they are called boroughs. A few cities, mostly in Virginia but also including St. Louis, Mo., and Baltimore, Md., are outside any county government. In the late 20th century there were about 3,140 counties in the United States, ranging from 3 in Delaware to more than 250 in Texas.

The major functions of the U.S. county are law enforcement, judicial administration, construction and maintenance of roads, provision of public assistance to the needy, and the recording of legal documents. In some states, principally in the South, the county has an important role in school administration. Some counties may also provide health protection, hospitals, libraries, parks, weed control, fire protection, and agricultural aid. The principal organ of county government is usually a board of commissioners or supervisors, whose

members are elected either from county subdivisions or districts or from the county at large. The board usually has three or five members, and a four-year term is common. The county board can levy taxes and borrow money on behalf of the county, though its bond issues often require voter approval. In addition to members of the board, the voters of a county elect certain other officials, most commonly a sheriff, treasurer, clerk, coroner, assessor, superintendent of schools, surveyor or engineer, and recorder or register of deeds. The local prosecutor, though in legal terms a state officer, is often elected from the county. Certain other county officers, such as highway commissioners, health directors, and welfare superintendents, are more often appointed by the county board than elected. County government is mostly financed from local property taxes and state-aid funds, though fees and fines constitute minor revenue sources. Occasionally counties levy sales taxes or other nonproperty taxes, or operate public enterprises that yield revenues.

county home: *see* almshouse.

coup d'état, also called COUP, the sudden, violent overthrow of an existing government by a small group. The chief prerequisite for a coup is control of all or part of the armed forces, the police, and other military elements. Unlike a revolution, which is usually achieved by large numbers of people working for basic social, economic, and political change, a coup is a change in power from the top that merely results in the abrupt replacement of leading government personnel. A coup rarely alters a nation's fundamental social and economic policies, nor does it significantly redistribute power among competing political groups. Among the earliest modern coups were those in which Napoleon overthrew the Directory on Nov. 9, 1799 (18 Brumaire), and in which Louis Napoleon dissolved the assembly of France's Second Republic in 1851. Coups were a regular occurrence in various Latin American nations in the 19th and 20th centuries and in Africa after the countries there gained independence in the 1960s.

coupé, also spelled COUPE, four-wheeled, horse-drawn carriage that was based on the coach but was smaller and lighter in weight. While originally the word coupé described any cut-down coach body, it later became associated with a specific type of truncated coach body that came into general use in western Europe and America in the mid-18th century. A coupé usually contained one enclosed seat for two passengers and a higher, outside seat for a driver, although the largest model, the clarence, had two enclosed seats and accommodated four passengers. In the 20th century



Dress chariot (a type of coupé), late 19th century; in the collection of the Science Museum, London
Trustees of the Science Museum, London

the name was given to the closed, two-door, two-passenger automobile.

Couper, Archibald Scott (b. March 31, 1831, Kirkintilloch, Dunbartonshire, Scot.—d. March 11, 1892, Kirkintilloch), Scottish chemist who, independently of August Kekule, proposed the tetravalency of carbon and the ability of carbon atoms to bond with one another.

Couper was a student at the universities of Glasgow and Paris and became an assistant at the University of Edinburgh. Through Charles-Adolphe Wurtz, Couper submitted the paper on which his fame rests to the French Academy, but because Wurtz was not a member of the academy, the paper's presentation was delayed until June 14, 1858, about two months after Kekule's paper containing the same revolutionary theory had been presented. A controversy about priority ensued. Though Couper's paper was the first to use formulas picturing structural relationships of organic molecules by continuous or dotted lines, it was ignored. Kekule, by contrast, became famous. Couper had never enjoyed sound health, and after the rejection of his achievement he suffered physical and mental reverses and lived in retirement until his death.

Couper, Thomas: *see* Cooper, Thomas.

Couperin, François, byname COUPERIN LE GRAND ("the Great") (b. Nov. 10, 1668, Paris, France—d. Sept. 12, 1733, Paris), French composer and harpsichordist, the most renowned of the Couperin dynasty of 17th- and 18th-century musicians. He was the nephew of Louis Couperin.

Although François Couperin was only 11 when his father, Charles Couperin, died, the wardens of the Church of Saint-Gervais in Paris reserved his father's office of organist for him until he was 18. The boy took over the post before his 18th birthday and in 1693 became one of the four organists of the royal chapel. One honour followed another: harpsichord teacher to the royal children (1694) and the survivance (right to succeed) of Jean-Henri d'Anglebert as court harpsichordist (1717). By 1723 Couperin's health obliged him to bestow the survivance at Saint-Gervais upon his cousin Nicolas, and in 1730 the d'Anglebert survivance went to his daughter Marguerite-Antoinette.

Like his uncle Louis, François is known above all for his harpsichord music. Between 1713 and 1730 he published four books of suites (*ordres*) for harpsichord. The movements of these suites have highly ornamented melodies and complex accompaniments, with frequent dialogues between treble and bass. Some of Couperin's more than 200 harpsichord pieces are frankly programmatic. Couperin also wrote notable chamber music, including trio sonatas (for harpsichord and two violins) and the *Concerts royaux* (*c.* 1714–15), which he composed for the king's Sunday evening entertainments. He also wrote motets and other church music. His last and greatest liturgical work, the *Leçons de ténèbres* (*c.* 1715), brings to the linear subtlety of the French vocal style and the pathos of Italian harmony a quality of mysticism that has no parallel in the French or Italian music of the period. J.S. Bach knew Couperin's work and copied it.

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Couperin, Louis (b. *c.* 1626, Chaumes-en-Brie, France—d. Aug. 29, 1661, Paris), French composer, organist, and harpsichordist, the first major member of the Couperin dynasty of musicians of the 17th and 18th centuries.

Couperin's father, a merchant and small landowner in Chaumes-en-Brie, France, was also the organist of the local abbey church, and Louis and his two younger brothers, François (*c.* 1631–1708/12) and Charles (1638–79), learned to play respectably on the violin, viol, harpsichord, and organ. Still, they might have remained provincial musicians but for Jacques Champion de Chambonnières, the best harpsichordist in France, who heard one of Louis's compositions in 1650 and insisted that the young man go to Paris.

In 1653 Louis became the first Couperin to occupy the post of organist at the Church of Saint-Gervais, situated across from Notre-Dame Cathedral. He also held a court appointment as a treble viol player, but it was for his performing ability as a harpsichordist that he was best known. Until about 1960, when a collection of 70 organ pieces was discovered, his known compositions had consisted of 123 pieces for harpsichord and a handful of works for viol and organ. This small surviving sample of his life's work suggests that when he died in 1661, at only 35, the 17th century lost one of its greatest musical talents. He was a brilliant harpsichordist, and contemporary accounts suggest that his vigorous style of playing revealed the same qualities as his harpsichord compositions, which are distinguished by an almost aggressive use of dissonance and of Baroque ornamentation. He had command of a sturdy contrapuntal technique that recalls the French organ school of the 16th century, but at times his tonal architecture, built on Italian models, and his bel canto melodies suggest those of George Frideric Handel. His compositions were conceived in the transitional convention of the chaconne or passacaglia, for as a composer he was both reactionary and progressive.

The two younger brothers followed him to Paris and also became successful musicians. François was described as a "great musician and great drunk"; no compositions are known, but his line of the family carried the name of Couperin into the 19th century. Charles succeeded Louis at Saint-Gervais and, in 1668, produced an only child, François Couperin le Grand, who stands far above all the other Couperins with the exception of Louis.

Couperus, Louis Marie Anne (b. June 10, 1863, The Hague, Neth.—d. July 16, 1923, De Steeg), one of the greatest Dutch novelists of the 1880 literary revival.



Couperus, engraving by T. Kerstel after a portrait by H.J. Haverman
By courtesy of the Iconographisch Bureau, The Hague

Couperus grew up in Batavia (now Jakarta) in the Dutch East Indies. After returning to The Netherlands, he settled in Italy. During World War I he returned to The Hague and later traveled through Africa and East Asia, describing his journeys in a series of impressionistic newspaper sketches.

Couperus' novels show a rare versatility of style and genre, ranging from the French-influenced realism of his first and best-known, *Eline vere* (1889; Eng. trans., 1892), dealing with contemporary life in The Hague, to the fin-de-siècle spirit of luxurious decadence of *Extaze* (1892; *Ecstasy*) and *De berg van licht* (1906; "The Mountain of Light"). Prolonged residence in Italy brought out the romantic and impressionist in him, though his artistic detachment is always evident. Later, he developed an interest in the occult and the Oriental attitude toward fate, which provided themes for several of his novels, in particular, *Van oude menschen, de dingen, die*

voorbijgaan (1906; *Old People and the Things That Pass*). Couperus made use of new word-formations in evoking atmosphere and displayed a gently ironic humour and an extraordinary narrative skill.

couple, in mechanics, pair of equal parallel forces that are opposite in direction. The only effect of a couple is to produce or prevent the turning of a body. The turning effect, or moment, of a couple is measured by the product of the magnitude of either force and the perpendicular distance between the action lines of the forces.

The steering wheel of an automobile is turned by hand forces that constitute a couple, and a screwdriver is twisted by the equivalent of a couple. A wrench, on the other hand, is actuated by a force applied at one end only, and, in addition to the turning moment, it creates an unbalanced force on the element being tightened.

couplet, a pair of end-rhymed lines of verse that are self-contained in grammatical structure and meaning. A couplet may be formal (or closed), in which case each of the two lines is end-stopped, or it may be run-on, with the meaning of the first line continuing to the second (this is called enjambment). Couplets are most frequently used as units of composition in long poems; but, since they lend themselves to pithy, epigrammatic statements, they are often composed as independent poems or function as parts of other verse forms, such as the Shakespearean sonnet, which is concluded with a couplet. In French narrative and dramatic poetry, the rhyming alexandrine (12-syllable line) is the dominant couplet form, and German and Dutch verse of the 17th and 18th centuries reflects the influence of the alexandrine couplet. The term couplet is also commonly substituted for stanza in French versification. A "square" couplet, for example, is a stanza of eight lines, with each line composed of eight syllables. The preeminent English couplet is the heroic couplet, two rhyming lines of iambic pentameter with a caesura (pause), usually medial, in each line. Introduced by Chaucer in the 14th century, the heroic couplet was perfected by John Dryden and Alexander Pope in the late 17th and early 18th centuries. An example is:

> Then share thy pain, allow that sad relief;
> Ah, more than share it, give me all thy grief.
> (Alexander Pope, "Eloisa to Abelard")

Couplets were also frequently introduced into the blank verse of Elizabethan and Jacobean drama for heightened dramatic emphasis at the conclusion of a long speech or in running dialogue, as in the following example:

> Think what you will, we seize into our hands
> His plate, his goods, his money, and his lands.
> (Shakespeare, *Richard II*)

coupling, in machinery, a device that links two rotatable shafts. *See* hydraulic transmission; shaft coupling.

Cour de Cassation (French: "Court of Cassation," or "Abrogation"), the highest court of criminal and civil appeal in France, with the power to quash (*casser*) the decisions of lower courts. The high court considers decisions only from the point of view of whether the lower court has applied the law correctly; it does not deal with the facts of a case, nor does it retry it. The appeals courts (*see* appeal) hear cases on matters of fact and retry them. The aim of the Cour de Cassation is rather to ensure a uniformity of the interpretation of the law among all the French courts. It does not, on the other hand, determine whether a particular law itself is constitutional, as do the United States Supreme Court, the Supreme Court of Japan, and the Constitutional Court of Germany.

The Cour de Cassation was instituted during the French Revolutionary period at the end of the 18th century, but its roots go back to the Middle Ages, when the king's courts gave relief to those who felt they had been denied justice. From the 16th through the 18th century, appeals for cassation of court decisions were dealt with by the Privy Council section of the king's council. By the late 17th century the council's powers were limited to voiding decisions that violated the law. The spirit of the French Revolution reinforced this limitation, for the French, by preventing the judiciary from voiding the work of the legislature, in effect refused to allow one branch of government to infringe on the domain of any other. This practice embodied a stricter interpretation of the doctrine of separation of powers than that provided for in the United States Constitution, which allowed the judiciary certain powers to limit the actions of the executive and the legislature.

After 1967 the Cour de Cassation had one criminal chamber and five civil chambers, including those that dealt specifically with financial and commercial problems or with social problems. The court as a whole has a premier president and a chief prosecutor (*procureur général*), who is assisted by several advocates. Petitions for appeal go directly to the relevant chamber, which decides whether it will hear them. Although most cases are brought up on appeal from one of the parties, the *procureur général* keeps an eye out for questionable decisions in lower courts and recommends that certain ones be reviewed.

The chamber that takes the case hears argument relevant to the specific point of law in question. No other matters may be brought up, and no new evidence may be introduced save that which the *procureur général* feels would be in the interests of law. If the court does not uphold the decision, it is quashed, and the case is remanded back to another court of the same rank as that from which it came. A new trial is then held, and, if the lower court chooses to oppose the decision of the Cour de Cassation, the case is returned to the higher court. In the past this second appeal was considered by a united session of all the chambers. With the growth of the court, the number of participants became unwieldy, so in 1967 the task of reconsideration was shifted to a plenary assembly made up of the premier president, the chamber presidents, and usually a few senior members from each chamber. If the high court again quashes the decision, it is sent to a third court, again of the same rank as the first court. This last court, however, must conform to the high court's decision on the specific point of law covered.

Courant, Richard (b. Jan. 8, 1888, Lublinitz, Prussia, Ger. [now Lubliniec, Pol.]—d. Jan. 27, 1972, New Rochelle, N.Y., U.S.), German-born American mathematician and educator who made significant advances in the calculus of variations.

Courant received his secondary education in Germany and Switzerland and his doctorate from the University of Göttingen in 1910 under David Hilbert. For the next four years he taught mathematics at Göttingen. Then, at age 26, his teaching and research were interrupted by World War I. A few years after the war, Courant returned to Göttingen, where he founded and, from 1920 until 1933, was director of the university's mathematics institute. While at the institute he wrote a two-volume treatise with Hilbert, *Methods of Mathematical Physics* (1953–62; originally published in German, 1924–37), a work that furthered the evolution of quantum mechanics.

With the rise of the Nazis in 1933, Courant fled from Germany to England. The following year he was appointed professor of mathematics at New York University, a position he held until his retirement in 1958. Courant wanted to duplicate at NYU a mathematical institute similar to the one that he had directed at Göttingen. Under his leadership, Courant, with mathematicians James J. Stoker and Kurt O. Friedrichs, established one of America's most prestigious institutes of applied mathematics; upon his retirement, the institute was named in his honour. Courant also wrote a two-volume elementary work on applied calculus, *Differential and Integral Calculus* (1934; originally published in German, 1927–29), and, with H. Robbins, a general work for the layman, *What Is Mathematics?* (1941).

courante, also spelled COURANT (from Latin *currere,* "to run"), court dance for couples, prominent in the late 16th century and fashionable in aristocratic European ballrooms, especially in France and England, for the next 200 years. It reputedly originated as an Italian folk dance with running steps. As a court dance it was performed with small, back-and-forth, springing steps, later subdued to stately glides. Each couple held hands to move forward and backward or dropped hands to face each other or turn. In its early courtly form the dance was preceded by a wooing pantomime for three couples.

As a musical form the dance appears as the French courante in modern $\frac{3}{2}$ (♩♩♩) time with some contrasting measures in $\frac{6}{4}$ (♩♩♩♩♩♩) and as the Italian corrente in rapid $\frac{3}{4}$ or $\frac{3}{8}$ time with running passages of eighth notes. Georg Philipp Telemann, George Frideric Handel, J.S. Bach, and other Baroque composers used both types in their orchestral and keyboard suites. In these suites the courante follows the allemande, as it did in the ballroom.

Courantyne River, Dutch CORANTIJN, also spelled (in Guyana) CORENTYNE, or (in Suriname) COEROENI, river in northern South America, rising in the Akarai Mountains and flowing generally northward for 450 miles (700 km) to the Atlantic Ocean near Nieuw Nickerie, Suriname. It divides Suriname and Guyana. Guyana nationals have free navigation on the river but no fishing rights. Small oceangoing vessels drawing 14 feet (4.25 m) or less may ascend 45 miles (72 km) to the first rapids at Orealla. The Courantyne basin, however, remains largely undeveloped, much of it unexplored forest.

Courbet, Gustave (b. June 10, 1819, Ornans, Fr.—d. Dec. 31, 1877, La Tour-de-Peilz, Switz.), French painter and leader of the realist movement. Courbet rebelled against the Romantic painting of his day, turning to everyday events for his subject matter. His huge shadowed canvases with their solid groups of figures ("The Artist's Studio," 1855) drew sharp criticism from the establishment. From the 1860s a more sensuous and colourful manner prevailed in his work.

Early Life and Work. Courbet was born in eastern France, the son of Eléonor-Régis, a prosperous farmer, and Sylvie Courbet. After attending both the Collège Royal and the college of fine arts at Besançon, he went to Paris in 1841, ostensibly to study law. He devoted himself more seriously, however, to studying the paintings of the masters in the Louvre. Father and son had great mutual respect, and, when Courbet told his father he intended to become a painter rather than a provincial lawyer, his father consented, saying, "If anyone gives up, it will be you, not me," and adding that, if necessary, he would sell his land and vineyards and even his houses.

Freed from all financial worry, young Courbet was able to devote himself entirely to his art. He gained technical proficiency by copying the pictures of Diego Velázquez, Ribera, and other 17th-century Spanish painters. In 1844, when he was 25, after several unsuccessful attempts, his self-portrait "Courbet with a Black Dog," painted in 1842, was ac-

cepted by the Salon—the only annual public exhibition of art in France, sponsored by the Royal Academy. When in the following years the jury for the Salon thrice rejected his work because of its unconventional style and bold subject matter, he remained undaunted and continued to submit it.

The development of Realism. The Revolution of 1848 ushered in the Second Republic and a new liberal spirit that greatly affected the arts. The Salon held its exhibition not in the Louvre itself but in the adjoining galleries of the Tuileries. Courbet exhibited there in 1849, and his early work was greeted with considerable critical and public acclaim.



"L'Atelier du peintre, Allégorie réelle" ("The Artist's Studio, a Real Allegory of a Seven-Year Long Phase of My Artistic Life"), with Courbet at the easel, oil on canvas, 1855; in the Louvre, Paris

Giraudon—Art Resource/EB Inc.

In 1849 he visited his family at Ornans to recover from the hectic life in Paris and, inspired again by his native countryside, produced two of his greatest paintings: "The Stone-Breakers" and "Burial at Ornans." Painted in 1849, "The Stone-Breakers" is a realistic rendering of two figures doing menial labour in a barren, rural setting. The "Burial at Ornans," from the following year, is a huge representation of a peasant funeral, containing more than 40 life-size figures. Both works depart radically from the more controlled, idealized pictures of either the Neoclassic or Romantic schools; they portray the life and emotions not of aristocratic personages but of humble peasants, and they do so with a realistic urgency. The fact that Courbet did not glorify his peasants but presented them boldly and starkly created a violent reaction in the art world.

Leader of the new school of Realism. Courbet, an intimate of many writers and philosophers of his day, including the poet Charles Baudelaire and the social philosopher Pierre-Joseph Proudhon, became the leader of the new school of Realism, which in time prevailed over other contemporary movements. One of the decisive elements in his development of Realism was his lifelong attachment to the traditions and customs of his native province, the French-Comté, and of his birthplace, Ornans, one of the most beautiful towns in the province. After a brief visit to Switzerland, he returned to Ornans and in late 1854 began an immense canvas, which he completed in six weeks: "The Artist's Studio," an allegory of all the influences on Courbet's artistic life, portrayed as human figures from all levels of society. Courbet himself presides over all the figures with ingenuous conceit, working on a landscape and turning his back to a nude model. When the painting was refused by the jury for the 1855 Exposition Universelle, Courbet, with the financial support of a friend, opened his own pavilion of Realism to exhibit his works close to the exposition. His show provided the first group exhibition of Realistic paintings. The enterprise failed; the painter Eugène Delacroix alone, in his journal, praised the audacity and talent of Courbet, who made another attempt in 1867 but was again unsuccessful.

In 1856 Courbet visited Germany, where he was warmly welcomed by his fellow artists. Three years later, at the age of 40 and still working in defiance of severe criticism in his own country, he was the undisputed master and leader of a new generation of painters that had turned away from the traditional schools of painting, which they considered only barriers to artistic inspiration. Courbet worked in all genres. A lover of women, he glorified the female nude in paintings of stunning warmth and sensuality. He executed admirable portraits, but above all he celebrated the Franche-Comté, the forests, springs, rocks, and cliffs of which were immortalized by his vision. In 1865 he set up his easel before the cliffs of Étretat, Deauville, Trouville, and other resorts fashionable during the Second Empire. Carefully observing air currents and storm skies, he successfully depicted the architecture of a tempest in a series of seascapes. These pictures were an extraordinary achievement that amazed the world of art and opened the way for Impressionism, which was to achieve an even greater sensuousness by reproducing the colour and light reflected by an object rather than its strict linear shape.

Political activities. The Franco-German War broke out in 1870, the Second Empire collapsed, and the Third Republic was proclaimed. On March 18, 1871, the republican Paris Commune was established to fight the Germans in France as well as to fight the Army of Versailles, which had remained loyal to Napoleon III and had concluded an armistice with the Germans that was judged to be dishonourable by the members of the Commune. Courbet, who had been recently elected president of the artists' federation and was charged with reopening the museums and organizing the annual Salon, took part in the revolutionary activities of the Commune. Instead of opening the museums, he decided to protect the major public monuments, especially the Sèvres china factory and the palace at Fontainebleau, for Paris had been under constant bombardment by the Germans. Alarmed by the excesses of the Commune, he resigned May 2.

The Commune had voted to destroy the column in the Place Vendôme commemorating the Grand Army of Napoleon Bonaparte, and it carried out the decision on May 16. But on May 28 the Commune was crushed by the Army of Versailles, and on June 7 Courbet was arrested at the home of a friend. Because he was thought to be responsible for the demolition of the column, he was brought before a military court. As he had often made known his disgust of the militarism represented by the monument, he was charged with having been the instigator, although he had in no way participated in its destruction. A scapegoat was needed, and Courbet was arbitrarily chosen, despite his protests and those of the persons actually responsible for the demolition, who had fled to England. He was sentenced to six months in prison, and, thanks to the intervention of Adolphe Thiers, head of the provisional government of the French Republic, he was given a minimum fine of 500 francs. He served his sentence first at the Sainte-Pélagie prison, and, when he became seriously ill, he was moved to a clinic near Paris. Once freed, he hastened to Ornans in the hope of regaining his strength.

When Thiers resigned in 1872, the Bonapartist deputies reopened Courbet's case and sued him for the cost of rebuilding the column. His entire personal property and all his paintings were seized, and he was fined 500,000 gold francs. Having no alternative but to leave France because he could not pay the fine, he crossed the border into Switzerland on July 23, 1873, and settled in the small town of Fleurier. He set to work again, but, feeling unsafe so close to France, he first went to Vevey and then to La Tour-de-Peilz, where he bought an old inn, appropriately named the Bon-Port (Safe Arrival). There he died at the age of 58, physically and morally exhausted.

Courbet's reputation has continued to grow since his death. His detractors often judge his art only on the basis of his Socialism, ignoring the fact that his political beliefs grew out of his generosity and compassion. His work, however, exerted much influence on the modern movements that followed him. He offered succeeding generations of painters not so much a new technique as a whole new philosophy. The aim of painting was not, as previous schools had maintained, to embellish or idealize reality but to reproduce it accurately. Courbet succeeded in ridding painting of its artistic clichés, contrived idealism, and timeworn models. (R.J.F.)

MAJOR WORKS. "Courbet au chien noir" ("Courbet with a Black Dog," 1842; Musée du Petit Palais, Paris); "Juliette Courbet" (1844; Musée du Petit Palais); "L'Homme à la pipe" ("Man with a Pipe," *c.* 1846; Musée Fabre, Montpellier, Fr.); "St. Nicolas ressuscitant les petits enfants" (1847; Église de Saules, near Ornans, Fr.); "L'Après-dinée à Ornans" ("After Dinner at Ornans," 1849; Musée des Beaux-Arts, Lille, Fr.); "Un Enterrement à Ornans" ("Burial at Ornans," 1849; Louvre, Paris); "Les Paysans de Flagey revenant de la foire" ("The Peasants of Flagey Returning from the Fair," 1850; Musée des Beaux-Arts et d'Archéologie, Besançon, Fr.); "Young Ladies from the Village" ("Les Demoiselles de village," 1851–52; Metropolitan Museum of Art, New York City); "Les Baigneuses" (1853; Musée Fabre); "Portrait de Bruyas" (1854; Musée Fabre); "La Rencontre ou bonjour, Monsieur Courbet" (1854; Musée Fabre;) "La Roche de dix-heures" (*c.* 1854; Louvre); "Les Cribleuses de blé" ("The Winnowers," 1854; Musée des Beaux-Arts, Nantes, Fr.); "L'Atelier du peintre, Allégorie réelle" ("The Artist's Studio, a Real Allegory of a Seven-Year Long Phase of My Artistic Life," 1855; Louvre); "Mère Grégoire" (1855; Art Institute of Chicago); "Les Demoiselles desbords de la Seine" ("Young Women on the Banks of the Seine," 1856; Musée du Petit Palais); "La Toilette de la mariée" ("The Bride at Her Toilet," 1859; Smith College Museum of Art, Northampton, Mass.); "La Diligence dans la neige" (1860; National Gallery, London); "Combat de cerfs. Le Rut du printemps" ("Battle Between Two Stags," 1861; Louvre); "The Trellis" (*c.* 1863; Toledo Museum of Art, Toledo, Ohio); "Proudhon et ses enfants" ("Proudhon and His Family," 1865; Musée du Petit Palais); "La Remise de chevreuils" ("Roe-Deer in Cover by the Plaisir-Fontaine Stream," 1866; Louvre); "The Woman with a Parrot" ("La Femme au Perroquet," 1866; Metropolitan Museum of Art); "Les Dormeuses" ("Sleeping Women," 1866; Musée du Petit Palais); "La Source ou baigneuse à la source"

(1868; Louvre); "Falaise d'Étretat après l'orage" ("The Cliffs at Étretat," 1870; Louvre); "Mer orageuse" ("La Vague," 1870; Louvre); "Portrait de Regis Courbet" (1874; Musée du Petit Palais).

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Courbevoie, northwestern industrial suburb of Paris, Hauts-de-Seine *département*, Paris region, France, connected to the capital by suburban express-railway service. The suburb is bordered to the south by avenue du Général-de-Gaulle, a continuation of the Champs-Élysées. The city is one of the centres of dispersion of Parisian population, especially from the Étoile area. High-rise buildings with flats and offices were constructed along the avenue as part of a vast program to develop Paris in the second half of the 20th century. Pop. (1982) 59,821.

Courci, John de (d. September 1219?), Anglo-Norman conqueror of Ulster, who was a member of a celebrated Norman family of Oxfordshire and Somerset.

Sent to Ireland with William FitzAldelm by Henry II in 1176, he immediately led an expedition from Dublin to Ulster and in 1177 seized its capital, Down (now Downpatrick). He subsequently gained effective control of eastern Ulster, and his firm rule there was responsible for the early prosperity of the area.

John de Courci had a perennial feud with the de Lacys, another Anglo-Norman family adventuring in Ireland, and the younger Hugh de Lacy (later 1st earl of Ulster) took and held him prisoner for a short while in 1204. De Courci, perhaps by a refusal of homage, had angered King John, who in May 1205 granted Ulster to Hugh with the title of earl. De Courci, with his brother-in-law, Reginald, king of Man (the Isle of Man), laid siege to the castle of Rath (possibly Dundrum) but was routed by Hugh's elder brother, Walter de Lacy, lord of Meath. He disappeared until 1207, when he received permission to return to England. He accompanied King John to Ireland in 1210 and seems thereafter to have retained his favour.

Both John de Courci and his wife, Affreca, were benefactors of the church and founded monasteries in Ulster. John replaced the secular canons of Down priory with Benedictine monks from St. Werburgh's abbey, Chester.

Courier, Paul-Louis (b. Jan. 4, 1772, Paris—d. April 10, 1825, Véretz, Fr.), French classical scholar and pamphleteer, remembered for his brilliant style and antimonarchist writings following the Second Restoration of the Bourbons after the defeat of Napoleon (1815).

Courier joined the army in 1792 and had a successful career in the artillery, though he was ill-suited to military discipline. In 1798 he joined the army in Italy. After a long illness, he returned to Italy in 1804–09 for a further adventurous campaign.

His stay in Italy allowed him to pursue his classical studies, and he published translations from Latin and Greek. He discovered an unknown fragmentary manuscript of the Greek novelist Longus in a Florentine library, and in 1810 he published a pamphlet defending himself against a charge that he had deliberately defaced it.

Under the Restoration, Courier settled in his estate in France and published a stream of pamphlets defending the rights of the peasantry and attacking reactionary politicians and the clergy. His reputation was enhanced by his trial and imprisonment in 1821. He had a genius for invective, and his style, although somewhat overworked, has been compared to that of the greatest French writers.

Courier's marriage to a girl of 19 was unhappy. When he dismissed a servant with whom his wife had been unfaithful, the man murdered him.

Courier Game, board game, an expanded form of chess developed in Germany by the early 13th century and played there for several hundred years. The game was played on a board containing 96 squares (8 by 12) instead of the conventional 64 (8 by 8). All of the conventional pieces were used, although their powers of movement in some cases were slightly different. There were also four additional pawns, two couriers, a jester, and a sage. The courier, a man galloping on horseback with a horn to his lips, could move any number of squares along a diagonal, just as the modern bishop. The jester, with cap and bells, moved one square horizontally or vertically. The sage, a long-bearded old man, could move one square in any direction.



Courier Game shown in "The Chess Players," oil painting by Lucas van Leyden, c. 1508; in the Staatliche Museen zu Berlin

Bildarchiv Foto Marburg—Art Resource/EB Inc

The game began with both players advancing their two rooks' pawns and queen's pawn two squares each and the queen to her third square. Other rules were similar to those of conventional chess.

Courier-Journal, The, morning daily newspaper published in Louisville, Ky., long-recognized as one of the outstanding regional newspapers of the United States.

It was founded in 1868 by a merger of the *Louisville Courier* and the *Louisville Journal* brought about by Henry Watterson, *The Courier-Journal*'s first editor, who also became a part owner. Watterson was an eloquent writer and a veteran of the Confederate army in the Civil War who greatly admired Abraham Lincoln and who believed in political participation by blacks. His half-century tenure as editor brought *The Courier-Journal* nationwide distinction for its thorough coverage and for having the strength of its sometimes unpopular convictions. It was a leading voice in the creation of what eventually became known as the New South.

Liberal and Democratic in its editorial outlook, *The Courier-Journal* supported progressive causes while stressing national and international news coverage. Under Watterson, and later under the Bingham family, it was an influential force in Democratic Party presidential nominations and in the politics of the state and region. Its support of equal rights and opportunities for blacks was as conspicuous in the 1960s and 1970s as it had been 100 years before during the Reconstruction era.

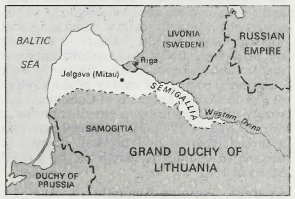
courlan: *see* limpkin.

Courland, also spelled KURLAND, Latvian KURZEME, region on the Baltic seacoast, located south of the Western Dvina River and named after its inhabitants, the Latvian tribe of Curonians (Kurs, Cori, Cours; Latvian: Kursi). The duchy of Courland, formed in 1561, included this area as well as Semigallia (Zemgale), a region located east of Courland proper.

After the Order of the Brothers of the Sword (from 1237 the Livonian Knights, or Order of the Teutonic Knights of Livonia) conquered the Latvian lands north of the Western Dvina, it mounted a crusade (*c.* 1220s) against the Curonians, who had established their own tribal kingdom by the end of the 9th century. In 1230 the Curonian king Lammekinus (Lamikis), in order to avoid the order's rule, made peace directly with the papal legate, accepted baptism, and became a vassal of the pope. But the order refused to honour this arrangement. The Knights prevented the king from receiving his crown from the pope and, after obtaining nominal possession of two-thirds of the country from the bishop of Courland (1234), subjugated the Curonians (1269) and ruled them as their feudal lords for the next 300 years.

In 1561 the Livonian Knights dissolved their order and combined Courland and Semigallia (which they had conquered in about 1290) into the duchy of Courland, which became a Polish fief. The duchy, created for the order's last master, Gotthard Kettler, and his descendants, flourished during the 17th century, especially under the rule of Duke Jacob (reigned 1640–82). He encouraged the development of industries, including shipbuilding, which provided the basis for a strong navy, a sizable merchant marine, and a lucrative foreign trade. He also fostered friendly relations with the major European powers, and the duchy became strong enough to try to establish colonies in the West Indies (Tobago; 1645–65) and West Africa (The Gambia; 1651–65).

Courland's prosperity declined, however, after 1658, when Sweden, engaged in a war against Poland, seized Jelgava (Mitau, the capital of Courland), and captured the duke. Jacob was returned to Courland in 1660, but his duchy had been severely weakened. Although his successors were able to retain the splendour of the ducal court and to maintain dynastic ties with the sovereign houses of Europe (*e.g.*, in 1710 Duke Frederick William married Anna, the niece of Peter I the Great and future empress of Russia), they impoverished the peasantry and allowed Russia's influence over Courland to increase. When the last Kettler duke died (1737), Russia's nominee, Ernst Johann von Biron, was elected to succeed him; and when Biron was out of



The Duchy of Courland, 13th–18th centuries

From W. Shepherd, *Historical Atlas;* Barnes & Noble Books, New York

favour, there was a period of Russian-sponsored Saxon rule (1740–63). Finally, in 1795, at the Third Partition of Poland, the duchy was incorporated into the Russian Empire.

Under Russian administration the Latvian serfs in Courland were freed (1817), but they received no land, and the German nobility remained the favoured class until the end of the 19th century, when repressive Russification measures were imposed upon both groups. During the 19th century, however, a strong Latvian nationalism had also been developing; and in 1918, after the empire had been dissolved by revolution, Courland became a part of the newly founded independent state of Latvia.

Courland Lagoon, German KURISCHES HAFF, Lithuanian KURŠIU MARIOS, Russian KURSKY ZALIV, gulf of the Baltic Sea at the mouth of the Neman River, in Lithuania and Russia. The lagoon, with an area of 625 square miles (1,619 square km), is separated from the Baltic Sea by a narrow, dune-covered sandspit (English: Courland Spit; Russian: Kurskaya Kosa), 60 miles (97 km) long and 1–2 miles (1.5–3 km) wide. A road along the spit connects resort and fishing villages. At its north end, the lagoon is connected to the Baltic Sea by a navigable strait, site of the Lithuanian port of Klaipėda. The east coast of the Courland Lagoon is low, wooded marshland, part of which forms the Neman River delta. To the south lies the Samland Peninsula, formerly part of East Prussia.

Cournand, André F(rédéric) (b. Sept. 24, 1895, Paris—d. Feb. 19, 1988, Great Barrington, Mass., U.S.), French-American physician and physiologist who in 1956 shared the Nobel Prize for Physiology or Medicine with Dickinson W. Richards and Werner Forssmann for discoveries concerning heart catheterization and circulatory changes.

His medical studies interrupted by World War I, Cournand graduated from the University of Paris in 1930. He studied at Bellevue Hospital, New York City, where he met Richards. Together they collaborated in clinical lung and heart research and perfected Forssmann's procedure, now termed cardiac catheterization, whereby a tube is passed into the heart from a vein at the elbow. With this procedure it became possible to study the functioning of the diseased human heart and to make more accurate diagnoses of the underlying anatomic defects. Cournand and Richards also used the catheter to examine the pulmonary artery, thus enabling improvement in the diagnosis of lung diseases as well.

Cournand joined the faculty of the College of Physicians and Surgeons of Columbia University in 1934, retiring as emeritus professor of medicine in 1964. He remained active as a special lecturer until his final illness. He became a naturalized citizen of the United States in 1941.

Cournot, Antoine-Augustin (b. Aug. 28, 1801, Gray, Fr.—d. March 31, 1877, Paris), French economist and mathematician, a pioneer in mathematical economics. Cournot was the first economist who, with a competent knowledge of both subjects, endeavoured to apply mathematics to the treatment of economic questions. His main work in economics is *Recherches sur les principes mathématiques de la théorie des richesses* (1838; *Researches Into the Mathematical Principles of the Theory of Wealth*). He was concerned primarily with an analysis of partial market equilibrium based on the assumption that participants in the process of exchange are either producers or merchants whose end is the maximization of profit. He therefore ignored the concept of utility. His most important contributions were his discussions of supply-and-demand functions and of the establishment of equilibrium under conditions of monopoly, duopoly, and perfect competition; his analysis of the shifting of taxes, which he treated as changes in the cost of production; and his discussion of problems of international trade.

Courrèges, André (b. March 9, 1923, Pau, Fr.), dress designer who first made a reputation in the Parisian fashion world of the 1960s for futuristic, youth-oriented styles.

Courrèges wished to be an artist, but his father, a butler in a wealthy English home, directed him into engineering, at which he was successful. But in 1948 he went to work in a small Parisian fashion house and eight months later joined the staff of the couturier Cristóbal Balenciaga as a presser. Eleven years later, he had advanced to the position of Balenciaga's first assistant.

In 1961 Courrèges opened his own house but found it difficult, at first, to break away from the strong influence of Balenciaga. By 1964, however, he had become established as one of the most original couturiers in Paris. His collection featured proportionate, well-cut pants, rigidly constructed clothes with smooth "trapeze," or trapezoidal, lines, and short skirts, with white midcalf boots and large, dark glasses as accessories. White became his trademark.

Because his simple designs were widely copied, in 1965 he established strict control over the manufacture of his designs. In 1967 he showed both haute-couture creations and ready-to-wear fashions for his boutique, Couture Future, with distribution controlled through licensed outlets.

His designs remained dramatically simple, with complete lack of nostalgia. His models, moving to lively rock music, wore such innovations as hip-hugger pants with halter tops, transparent tops, sequined jumpsuits, and vinyl-trimmed suits and coats.

courser, any of 9 or 10 species of Old World shorebirds belonging to the family Glareolidae (order Charadriiformes), which also includes the pratincoles. Most live in semideserts, where they chase insects afoot; they can, however, fly strongly with their short wings. The best-known species is the cream-coloured courser (*Cursorius cursor*) of Africa, a pale-brown bird with white underparts, bold eye stripes, and black wing tips. The Indian courser (*C. coromandelicus*) is brown with a strong face pattern. The bronze-winged courser (*Rhinoptilus chalcopterus*), largest of several species in sub-Saharan Africa, frequents woodlands and is chiefly nocturnal. It is about 30 cm (12 inches) long.

coursing, the pursuit of game by hounds hunting by sight and not by scent. In modern, organized coursing competitions, two greyhounds at a time pursue one hare. The dogs are judged on performance as well as on their success in catching the hare: points are awarded for outracing the other dog and catching up with the hare, for turning it at a right angle, for wrenching (turning it at less than a right angle), for tripping the hare, and for a kill. Coursing was fully described about AD 150 by the Greek philosopher and historian Arrian in his *Cynegeticus* (translated as *Arrian on Hunting*).

The sport became very popular in England, Ireland, and Scotland during the 16th century, and the first known set of rules was drawn up by Thomas Howard, duke of Norfolk. The "laws of the leash," as they were called, laid down principles upon which the sport has since been based.

The first known coursing club came into existence in 1776 at Swaffham through the enterprise of Lord Orford. The Waterloo Cup, the Derby of coursing, was established in 1836 and is held annually at the Altcar Club, near Liverpool. The event was named for the Waterloo Hotel in Liverpool, where the first promoters met. The National Coursing Club was formed in 1858.

Coursing was taken up in the United States early in the 19th century. An American Coursing Board governed the sport from 1886 to 1906, when the National Coursing Association (NCA) came into being. Spring and fall coursing meetings are held by the association in Abilene, Kan. The sport is also still practiced in parts of Australia.

Dog, or greyhound, racing with a mechanical lure is a popular outgrowth of coursing.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

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court, also called COURT OF LAW, a person or body of persons having judicial authority to hear and determine disputes in particular cases, civil, criminal, ecclesiastical, or military. The term court also denotes the chamber, hall, building, or other place where such judicial proceedings take place. (*See also* military law.)

A brief treatment of courts follows. For full treatment, *see* MACROPAEDIA: Judicial and Arbitrational Systems.

The word court originally meant simply an enclosed place, and still does in the architectural sense. Judicial tribunals were originally enclosures where the judges sat, while counsel, attorneys, and the general public had to remain on the outside of a bar; hence, the expression "called to the bar" is used to apply to a lawyer newly qualified to practice. At first these enclosures were temporary structures in an open field; later, they became fixtures in a large room or hall, the courtroom.

In Europe in the early Middle Ages the judicial functions were not yet separate from the legislative and administrative functions. The king or other ruler, together with his chief councillors, sat in a meeting hall for the exercise of all these functions, and so the household of the ruler was also called "the court." Since all judicial authority was derived from the ruler, his presence was assumed in all the specialized courts.

From the 12th century onward the increasing number of university-trained civilians and canonists created a recognized legal profession, and the rise of the legal profession also determined the gradual separation of judicial from administrative functions.

English courts are divided by certain features which can be briefly indicated. A first distinction is between courts trying criminal cases and courts trying civil cases. A second distinction is made between the inferior courts, or courts of first instance, in which the first hearing of any judicial proceeding takes place, and the superior courts, or courts of appeal, in which the judgment of the first courts are brought under review. The court of appeal is the main appeal court, whose decision may be reviewed by the House of Lords in important points of law.

The structure of court organization in the United States reflects the division of functions characteristic of the federal form of government; federal and state courts are roughly parallel in organization and jurisdiction. Each state has its own independent, comprehensive system of courts, capable as a whole of adjudicating almost every conceivable matter and subject. At the same time, there exists a system of federal courts, established to adjudicate distinctively federal questions and handle other cases not appropriately tried in state courts.

The federal system of courts is a hierarchy of three levels. At the apex of the national judicial system is the Supreme Court of the United States, made up of nine judges—the

chief justice of the United States and eight associate justices. Their work is primarily to review decisions of state courts and lower federal courts on questions of federal law that are of national importance. The second level of the federal judiciary consists of the U.S. Courts of Appeals, one for each of 12 circuits (each circuit covering a definite geographic area) and one national court, the U.S. Court of Appeals for the Federal Circuit, handling matters of patent, trademark, and copyright and such matters as internal-revenue claims and breach-of-contract claims. The work of each of the regional Courts of Appeals is mainly to review decisions of administrative agencies and to review judgments of the lower district courts. The district courts form the third level of the federal court system; there are 90 districts.

The system within each state is roughly similar to that of the federal government, although most states have only a two-tiered rather than a three-tiered system. The highest state court, an appellate court, is referred to as the supreme court in most states. Then there are the trial courts of general jurisdiction. In some states, intermediate appellate courts have been established. In addition, there are numerous special and inferior courts of first instance with limited jurisdiction. These include probate courts, criminal courts, county courts, justices of the peace, small claims courts, and so forth. In contrast to the federal practice, the selection of state judges is often by popular election.

court, in architecture, an open area surrounded by buildings or walls. There have been such courts from the earliest recorded times and in all civilizations. In medieval Europe the court was a characteristic adjunct of all major domestic buildings, as the cloister of a monastery, the ward of a castle, and the quadrangle of a college or hospital.



Court of the Myrtles in the Alhambra, Granada, Spain, 13th–14th century
Ardean Miller III from FPG

Palaces often included a complex of courts. The Alhambra in Granada, Spain, built in the 13th and 14th centuries, has six, including the Court of the Lions and Court of the Myrtles, the most celebrated of all Muslim patios. In Tudor and Elizabethan England of the 16th century, the principal mansions frequently had a forecourt, with wings of the house projecting forward on either side. The larger houses in France were similarly planned; but by the late 17th century it became necessary to add a second courtyard at the rear for stables, coachhouses, and the like; and the forecourt became the court of honour (*cour d'honneur*). *See also* cortile.

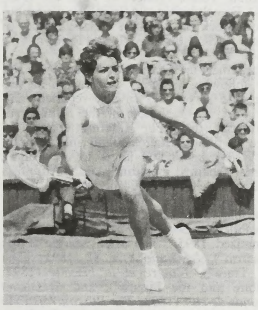
Court, Antoine (b. March 17, 1695, Villeneuve-de-Berg, Fr.—d. June 12, 1760, Lausanne, Switz.), minister and itinerant preacher in the Reformed church who restored Protestantism to France after a period of persecution begun by King Louis XIV's revocation of the Edict of Nantes in 1685, which had guaranteed the religious and civil liberties of Protestants.

By 1700 the Reformed church was in chaos, its ministers exiled or dead and its leaderless membership becoming increasingly unorthodox and disorganized. At the age of 20, Court devoted himself to reviving the discipline and doctrines of the Reformed church, beginning with a small gathering at Monoblet, Gard province, in 1715. This provincial synod, the first in the French Reformed church since 1685, sought the reestablishment of old congregations, their supervision by elected elders, the provision of refuge for persecuted ministers, and the collection of money for prisoners and the poor. To restore discipline, the synod also decreed that women must not preach, that Scripture must be the only rule of faith, and that aid could not be given those who carelessly courted danger. Ordained in 1718 by his coadjutor, Pierre Corteiz, Court helped found other synods and trained young ministers.

After 1724 increased activity brought renewed persecution, and Court withdrew temporarily to Switzerland several times. Eventually settling at Lausanne, he founded and directed a seminary there for training ministers for the "Church of the Desert," as he termed the Reformed church in France. He wrote *Histoire des troubles des Cevennes ou de la guerre des Camisars* (1760; "The History of the Troubles of the Cevennes, or the War of the Camisars") and left numerous materials in manuscript, preserved in the Geneva public library.

Court, Margaret, *née* SMITH (b. July 16, 1942, Albury, N.S.W., Australia), Australian tennis player who dominated women's competition in the 1960s. She won 66 grand-slam championships, more than any other woman, and in 1970 became the second woman (after Maureen Connolly in 1953) to win the grand slam of tennis singles: the British (Wimbledon), U.S., Australian, and French titles in the same year. She is the only player to achieve the grand slam in doubles as well as singles, winning the four events with fellow Australian Kenneth Fletcher in 1963.

Smith first attracted attention after winning the Australian singles title in 1960. She won that title the next six years, the Wimbledon singles in 1963, 1965, and 1970; the U.S. singles in 1962, 1965, 1969, 1970, and 1973; and the French singles in 1962, 1969, 1970, and 1973. She retired after marrying Barrymore Court in 1967 but returned to competition shortly afterward. She won many doubles titles, including U.S. Open mixed doubles in 1969 and 1970.



Margaret Smith Court
Miller Services Ltd.

Court was noted for her powerful serve and volley and her exceptional endurance. She continued to win many tournaments after the birth of her first child, including the U.S. Open in 1973. That year she lost to 55-year-old Bobby Riggs, in a much-publicized match. Court was the top woman player in the world in 1962–65, 1969–70, and 1973, and placed in the top five in 1961, 1966, 1968, 1971–72. She was elected to the International Tennis Hall of Fame in 1979.

court baron, Latin CURIA BARONIS ("baron's court"), medieval English manorial court, or *halimoot,* that any lord could hold for and among his tenants. By the 13th century the steward of the manor, a lawyer, usually presided; originally, the suitors of the court (*i.e.,* the doomsmen), who were bound to attend, acted as judges, but the growing use of juries rendered their function obsolete. The 17th-century jurist Sir Edward Coke distinguished between two forms of the manorial court: the court baron for free tenants and the customary court for those who were not free. In the 12th and 13th centuries, however, there was no distinction between the two. The manorial court usually met every three weeks and considered personal actions between its suitors. The lord had considerable power over his bound tenants, but he had only civil jurisdiction over his free tenants, and that was increasingly diminished by the growing use of royal writs. Much of the business of the court was to administer the "custom of the manor" and to admit copyhold tenants; the proceedings were recorded on the court roll.

court cupboard, sideboard with three tiers, used mainly for displaying plate. It was a variant of the buffet and was fashionable throughout the 16th century and during the first three-quarters of the 17th, more commonly in northern than in southern Europe. Some examples were fitted in the upper stage with a cupboard, the front corners of which were set at an oblique angle to the front panel. Drawers were often included in the friezes, or horizontal bands, in the centre and top tiers.



Court cupboard, English, early 17th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

The name is said to have come from the French *court* ("short") because of the low height of the cupboard. Probably the best-known contemporary reference to court cupboards is in William Shakespeare's play *Romeo and Juliet,* in which the order is given for the hall of Capulet's house to be cleared for dancing: "Away with the joint-stools; remove the court-cupboard; look to the plate." Court cupboards became less fashionable in the last quarter of the 17th century, though they were probably still made in country districts until the mid-18th century.

Court de Gébelin, Antoine (b. Jan. 25, 1725, Nîmes, France—d. May 12, 1784, Paris), French scholar, philologist, and prose writer, who is remembered for an unfinished study of ancient language and mythology and for championing the causes of Protestantism and of American independence from Great Britain.

Like his noted father, Antoine Court (1695–1760), Court de Gébelin was a pastor of the French Reformed church. Though later preoccupied with literary work, he remained a tolerant propagandist for Protestantism, as in a work called *Les Lettres toulousaines* (1763; "The Toulouse Letters"). With the American patriot Benjamin Franklin and others he supported U.S. independence in *Affaires de l'Angleterre et de l'Amérique* (1776 *et seq.*; "Affairs of England and America"). His most important work of scholarship was the unfinished *Le Monde primitif, analysé et comparé avec le monde moderne* (1773–84; "The Primitive World, Analyzed and Compared with the Modern World"), which, among other things, offered a theory of allegory, a history of the calendar, a comparative grammar, and a universal theory of languages.

court leet, plural COURTS LEET, or COURT LEETS, an English criminal court for the punishment of small offenses. The use of the word leet, denoting a territorial and a jurisdictional area, spread throughout England in the 14th century, and the term court leet came to mean a court in which a private lord assumed, for his own profit, jurisdiction that had previously been exercised by the sheriff.

The court met twice a year under the presidency of the lord's steward, who, by the end of the 13th century, was almost always a professional lawyer and acted as judge. The two main functions of the court were to hold view of frankpledge (the pledge of responsibility made by each freeman) and to receive notices of accusation of crimes made by the juries, constituted in the Assize of Clarendon in 1166. Because serious cases were increasingly reserved to itinerant justices, the rights of trial of small, local courts became restricted to petty misdemeanours only. The 17th-century jurist Sir Edward Coke held that a court leet could not imprison but could only fine or apply other pecuniary penalties, and as time went on its capacity to enforce its judgments became progressively weaker. After the 16th century the duties of the court leet were increasingly transferred to the justice of the peace.

court-martial, plural COURTS-MARTIAL, or COURT-MARTIALS, military court for hearing charges brought against members of the armed forces or others within its jurisdiction; also, the legal proceeding of such a military court. In ancient times, soldiers generally forfeited any rights that they might have had as civilians and were completely subject to the will of their military commanders. Such military law prevailed through medieval times in Europe until the 16th century, when the beginnings of a military judicial process arose, creating military councils charged with the duty of determining guilt and punishment.

The British Mutiny Act of 1689 provided for the disciplining of a standing army and initiated modern Anglo-American military law. Most modern countries have separate military codes of justice administered by military courts, usually subject to civilian appellate review. Germany is a notable exception, delegating the trial and punishment of military personnel to the civilian courts, except for the most petty of offenses.

Generally, courts-martial are convened as *ad hoc* courts to try one or more cases referred by the convening authorities. A general court-martial can be convened only by the commander of a major military installation, by a general or flag officer, or by some higher military authority. A special court-martial can be convened by a regiment-grade or brigade-grade officer. Whereas a general court-martial can try any offense and impose any penalty, the special court-martial is limited in its penalty to short-term confinement and dishonourable discharge. The convening officer chooses officers from his command to sit on the court, where they determine guilt or innocence and hand down sentences.

Court of ——: *see under* substantive word (*e.g.*, Chancery, Court of; Appeal, Court of).

court tennis (sport): *see* real tennis.

Courtauld Institute Galleries, museum and school in London, established (1931) as a department within the University of London to promote the study and research of art history. It is located in Home House, the gift of Samuel Courtauld, who also established a trust to have preserved there his fine private collection of 19th-century French Impressionist and Post-Impressionist paintings.

The Lee and Gambier-Perry collection of old masters and the Roger Fry collection of early 20th-century French and English paintings were added later. Other major acquisitions included the Witt collection of master drawings and the Spooner collection of English landscape watercolours and drawings.

courtaut (musical instrument): *see* curtal.

Courteen, Sir William, Courteen also spelled COURTEN, or CURTEEN (b. 1572, London, Eng.—d. May/June 1636, London), English merchant and shipowner noted especially for his enterprises in the West Indies and the East Indies.

The son of a Protestant refugee who had come to London in 1568, Courteen from an early age acted as the agent in Haarlem, Neth., for his father's silk and linen business. He became senior partner in the merchant house of Courteen and Moncy in 1606. His trade with Europe, Guinea, and the West Indies brought him great wealth, and in 1622 he was knighted. One of his vessels discovered an island which he named Barbados and to which in 1625 he sent colonists. But James Hay, 1st Earl of Carlisle, claiming a lease of all Caribbean islands under deeds of 1627 and 1628, seized Barbados in 1629. This entailed heavy losses on Courteen, as did large loans made to Kings James I and Charles I. He also suffered trading failures in the East Indies and long, unsuccessful litigation over the estate with one of his partners. Though still wealthy, he never recovered his former prominence.

Courteline, Georges, pseudonym of GEORGES-VICTOR-MARCEL MOINEAU (b. June 25, 1858, Tours, France—d. June 25, 1929, Paris), French writer and dramatist whose humorous work is a brilliant social anatomy of the late 19th-century middle and lower-middle classes.

Courteline's father tried to dissuade his son from following a literary career, and he was obliged to serve in a cavalry regiment and then work in the offices of the Ministry of the Interior (though he seldom attended). He began to publish sketches and short stories. From 1891 he offered farces to the leading Parisian theatres, including André Antoine's Théâtre-Libre. After 1894 he was able to devote himself entirely to literature.

Courteline's volumes of novels and short stories include *Les Gaîtés de l'escadron* (1886, dramatized 1895; "The High Spirits of the Squadron"), *Le Train 8 h. 47* (1891; "The 8:47 Train"), *Lidoire et la biscotte* (1892; "Lidoire and the Biscuit"), and *Messieurs les ronds-de-cuir* (1893; *The Bureaucrats*). He had many plays produced, notably the farces *Boubouroche* (1893), *La Paix chez soi* (1903;



Courteline
Archives Photographiques—J.P. Ziolo

"The Peace at His Place"), and *La Conversion d'Alceste* (1905).

Courteline's works present a colourful and acutely observed picture of his day. He portrayed the life of the barrack room, the office, and daily middle-class life with shrewdness and accuracy, though his powerful sense of humour often served to conceal a fundamental bitterness. He possessed a talent for creating real human characters, such as the gullible cuckold Boubouroche, and his gift for comedy with tragic overtones led to comparisons with Molière, but the manners and problems of the social types that inhabit his plays—civil servants, officers, magistrates, and concierges—now seem somewhat dated. He remains the greatest humorist in modern French literature, however.

Courtenay, city, on the east coast of Vancouver Island, adjacent to the town of Comox, at the head of Comox Harbour, southwestern British Columbia, Can. Named for Captain George William Courtenay of the Royal Navy, who was stationed there from 1846 to 1849, it is now a service centre for a fishing, logging, and farming area. Inc. city, 1915. Pop. (1991) 11,652.

Courtenay, William (b. *c.* 1342, near Exeter, Devon, Eng.—d. July 31, 1396, Maidstone, Kent), archbishop of Canterbury, leader of the English church and moderating influence in the political disputes of King Richard II of England.

A great-grandson of King Edward I, Courtenay studied law at the University of Oxford, where he became chancellor in 1367. He was subsequently consecrated bishop of Hereford, Herefordshire, in 1370 and then of London (1375), where he led a clerical party against the ecclesiastical reformer John Wycliffe. He became archbishop of Canterbury in 1381.

Courtenay's leadership was vigorous. He defended the lower clergy against papal and royal taxation and held a council at Canterbury in 1382 that condemned Wycliffe, whose works Courtenay censured. He obtained Richard's permission to imprison heretics (1382) and to seize heretical books (1388), bringing him into conflict with John of Gaunt, Duke of Lancaster and Wycliffe's protector. In November 1382 Courtenay assembled a convocation at Oxford, where he forced the academic Lollards (holders of certain religious tenets derived from Wycliffe's teachings) into submission. He protested the second (1390) Statute of Provisors, which disapproved of ecclesiastical offices appointed by the pope; he condemned it as a restraint upon apostolic power and liberty.

courtly love, French AMOUR COURTOIS, medieval concept of love in which the relation between lover and lady approximated closely that between vassal and lord. First appearing in literature toward the end of the 11th century in the court troubadour poetry of Aquitaine and Provence, in southern France, it constituted a revolution in thought and feeling, the

effects of which are still apparent in Western culture.

The courtly lover existed to serve his lady. His love was invariably adulterous, marriage at that time being usually the result of business interest or the seal of a power alliance. Ultimately the lover saw himself as serving the all-powerful god of love and worshipping his lady-saint. Faithlessness was the mortal sin.

The philosophy found little precedent in other, older cultures. Conditions in the castle civilization of 11th-century southern France, however, were favourable to a change of attitude toward women. Castles themselves housed many men, few women; poets, wishing to idealize physical passion, looked beyond the marriage state. The Roman poet Ovid undoubtedly provided inspiration in the developing concept of courtly love. His *Ars amatoria* had pictured a lover as the slave of passion—sighing, trembling, growing pale and sleepless, even dying for love. The Ovidian lover's adoration was calculated to win sensual rewards; the courtly lover, however, while displaying the same outward signs of passion, was fired by respect for his lady. This idealistic outlook may be explained partly by contemporary religious devotions, both orthodox and heretical, especially regarding the Virgin Mary, and partly by France's exposure to Arab mystical philosophy (gained through contacts with Islām during the Crusades), which embodied concepts of love—as a delightful disease, as demanding of faithful service—that were to characterize courtly love.

Courtly love may therefore be regarded as the complex product of numerous factors—social, erotic, religious, and philosophical. The idea spread swiftly across Europe, and a decisive influence in this transmission was Eleanor of Aquitaine, wife first to Louis VII of France and then to Henry II of England, who inspired some of the best poetry of Bernard de Ventadour, among the last (12th century) and finest of troubadour poets. Her daughter Marie of Champagne encouraged the composition of Chrétien de Troyes's *Lancelot* (*Le Chevalier de la charrette*), a courtly romance whose hero obeys every imperious (and unreasonable) demand of the heroine. Soon afterward the doctrine was "codified" in a three-book treatise by André le Chapelain (*q.v.*). In the 13th century a long allegorical poem, the *Roman de la rose,* expressed the concept of a lover suspended between happiness and despair.

Courtly love soon pervaded the literatures of Europe. The German minnesinger (*q.v.*) lyrics and court epics such as Gottfried von Strassburg's *Tristan und Isolde* (*c.* 1210) are evidence of its power. Italian poetry embodied the courtly ideals as early as the 12th century, and during the 14th century their essence was distilled in Francesco Petrarch's sonnets to Laura. But perhaps more significantly, Dante had earlier managed to fuse courtly love and mystical vision: his Beatrice was, in life, his earthly inspiration; in *La divina commedia* she became his spiritual guide to the mysteries of Paradise. Courtly love was also a vital influential force on most medieval literature in England, but there it came to be adopted as part of the courtship ritual leading to marriage. This development, discussed in C.S. Lewis' *Allegory of Love* (rev. ed., 1951), became more pronounced in later romances.

Courtneidge, Dame Cicely (b. April 1, 1893, Sydney—d. April 26, 1980, London), British actress who played musical comedy and revue, both in a celebrated partnership with her husband, Jack Hulbert, and as a highly talented comedienne in her own right.

She was the daughter of actor Robert Courtneidge and made her first appearance in 1901. By the 1930s she and her husband were well-established figures in revue and the variety theatre and made several films together.

After World War II Courtneidge starred in Ivor Novello's *Gay's the Word,* then turned increasingly toward the nonmusical theatre, gaining notable successes in *Dear Octopus* and *Move Over Mrs. Markham.* In 1974, after more than 70 years on the stage and nearly 60 years of marriage, she played opposite Hulbert in *Breath of Spring.* She was made a dame of the British Empire in 1972. Her autobiography, *Cicely,* appeared in 1953.

Courtney (of Penwith), Leonard Henry Courtney, Baron (b. July 6, 1832, Penzance, Cornwall, Eng.—d. May 11, 1918, London), radical British politician who gained fame as an advocate of proportional representation in Parliament and as an opponent of imperialism and militarism.

A lawyer, journalist, and teacher of political economy, Courtney was elected to the House



Courtney, detail of a watercolour by Théobald Chartran, 1880; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

of Commons in 1876. Appointed financial secretary to the treasury by Prime Minister W.E. Gladstone in 1882, he resigned in 1884, when the Cabinet refused to include proportional representation in a parliamentary reform bill. In 1883 he married Kate Potter, whose sister and brother-in-law were the Fabian Socialists Beatrice and Sidney Webb.

Courtney had become a constant critic of British imperial expansion in Africa since 1877, when the Transvaal was annexed. In 1900 he lost his seat in the Commons because of his condemnation of the South African (Boer) War of 1899–1902. Although he originally (1886) opposed Gladstone's plan for Irish self-government, he was converted to the idea of Home Rule after he had come to see Anglo-Irish relations in terms of British imperialism. From about 1908 he attacked British foreign policy as likely to provoke a European war, and during World War I he advocated a negotiated peace and fearlessly defended conscientious objectors. In 1906 Courtney was raised to the peerage. His marriage was childless, and the barony lapsed upon his death.

Courtois, Bernard (b. Feb. 8, 1777, Dijon, Fr.—d. Sept. 27, 1838, Paris), French chemist who discovered the element iodine.

Courtois served as a pharmacist in the French Army and later joined his father's saltpetre business. In 1811 he added too much sulfuric acid to seaweed ash, a major raw material in saltpetre production, and obtained a violet vapour that condensed to form dark crystals. He prepared numerous compounds of this new element and investigated its properties. His work was announced in 1813, and the element was later named iodine.

After the Napoleonic Wars his saltpetre business failed. Although he turned to the manufacture of iodine, this business also failed, and he died in poverty.

Courtrai (Belgium): *see* Kortrijk.

Courtrai, Battle of (1302): *see* Golden Spurs, Battle of the.

courtship, in animals, behaviour that results in mating and eventual reproduction. Courtship may be rather simple, involving a small number of chemical, visual, or auditory stimuli; or it may be a highly complex series of acts by two or more individuals, using several modes of communication.

Many creatures resort to courtship feeding to attract a mate. Females of some insect species, such as the gypsy moth (*Lymantria dispar*), may use odorous substances called pheromones to attract males from a distance. Male painted turtles (*Chrysemys* species) court by touch, and the courtship songs of frogs (*Rana* species) are heard on spring nights across much of the world.

Complex courtship patterns are found in certain bird species. Boobies perform ritualized dances with many components, including whistling and an elaborate gesture known to ornithologists as sky-pointing. The more elaborate forms of courtship frequently help strengthen a pair bond that may last through the raising of the young or even longer. Another important function of courtship is its use as an isolating mechanism, a method of keeping different species from interbreeding. (*See also* display behaviour.)

Human courtship, although it springs from the same drives and is directed at the same goals, is so molded by cultural context that it is commonly thought of in terms of custom rather than instinct.

courtyard theatre, Spanish CORRALE, any temporary or permanent theatre structure established in an inn's courtyard in England or a residential courtyard in Spain. Under Elizabeth I, many plays were performed in the courtyards of London inns, with the first recorded innyard performance in 1557. By 1576 there were five courtyard theatres in London, but they declined thereafter, since by then London had two permanent theatres.

The structure of the Elizabethan playhouse was similar to that of the earlier innyard theatres. Actors performed on an open stage protruding from a rear wall, while spectators sat or stood on three sides of the platform, on ground level and in the "box seats" provided by surrounding windows. Although most of the courtyard stages were temporary booth stages on trestles or barrels, permanent stages and spectator stands were constructed in the courtyards of the Red Lion and Boar's Head inns at Whitechapel in the 1560s.

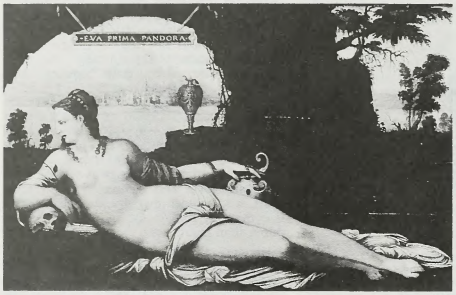
The *corrales* of Spain were established in the courts at the backs of houses. Valladolid transformed a courtyard into a theatre by 1554, Barcelona by 1560, and Cordoba by 1565. Madrid had five *corrales,* which by 1568 were principally managed by the *cofradias,* fraternities founded to aid the poor and to fund hospitals. The typical 16th-century *corrale* had a wide stage that extended across a courtyard. In front of the stage and alongside the walls were raised seats. The audience occupying the rest of the courtyard stood, as in Elizabethan theatres. As in England, privileged spectators could observe the performances from windows of the surrounding houses. The *cofradias* either rented these rooms or allowed owners to pay for their exclusive rights to these seats. Because there was no roof over the stage or seats, performances were always held in the afternoon and were frequently cancelled because of inclement weather.

couscous, North African dish of semolina and accompanying foods. The semolina grains (the endosperm of Durum wheat) are prepared in a *couscousière,* a large covered pot with a lower compartment in which a stew or broth cooks and an upper portion with a pierced bottom in which the couscous steams. The grains must be sprinkled with liquid, stirred to separate the clumps, and steamed several times. While the grain is steaming, a stew of lamb, chicken,

chickpeas, and vegetables cooks in the lower portion of the pot. The couscous and stew are eaten with *harissa*, a fiery sauce of red pepper and other spices. Alternatively, couscous can be eaten as a sweet dish with fruits and milk or as a breakfast porridge.

Cousin, Jean, THE ELDER (b. 1490, Sens, Fr.—d. 1560/61, Paris), French painter and engraver whose rich artistic contribution also included tapestry, stained-glass design, sculpture, and book illustration.

A man of many accomplishments, Cousin worked as an expert geometer in his native village of Sens in 1526 and designed a walled enclosure for the city of Courgenay in 1530. The same year he repaired a clock and restored a tableau representing the Virgin for the cathedral of Sens. Cousin created several stained-glass windows in the chapels of Saint-Eutrope and Notre-Dame de Lorette, both of the Sens cathedral. In about 1540 Cousin ventured to Paris, where he soon qualified as a master painter and citizen of Paris. In 1540 he helped design the decorations in honour of the Holy Roman emperor Charles V's entry into Paris. In 1541 he was commissioned to design three models of tapestries commemorating the life of St. Geneviève, and in 1543 he painted eight cartoons of tapestries depicting scenes from the life of St. Mammès. In 1549 he designed a portal in front of the Chatelet to honour the entry of Henry II into Paris. Cousin also painted the life of St. Germain and in 1557 was commissioned to design stained-glass windows for the hospital constructed by the Parisian goldsmiths. Despite his lengthy and productive career in Paris, he still managed to contribute work to his native city of Sens.



"Eva Prima Pandora," painting on panel by Jean Cousin the Elder, *c.* 1550; in the Louvre, Paris

Giraudon–Art Resource/EB Inc.

Few extant works can be definitely attributed to Cousin. The painting "Eva Prima Pandora," now in the Louvre, is generally agreed to be his; it shows that he was not influenced by the dominant Fontainebleau school, but rather it reflects the influence, among others, of Leonardo da Vinci and Albrecht Dürer in composition, physiognomy, and lighting. Cousin's *Traité de perspective* (1560; "Treatise of Perspective") summarizes his knowledge of art, science, and geometry.

Cousin, Jean, the Younger (b. 1522, Sens, Fr.—d. 1594, Paris), artist and craftsman noted for his painting, engraving, stained glass, sculpture, and book illustration, who, like his father, achieved fame for his versatility and independent style.

Cousin followed his father, Jean Cousin, to Paris and became a student in his studio, which he took over when his father died in 1560/61. Early in his career in Paris he achieved the title of master painter. Occasionally he left Paris to work in other locations: he journeyed to Sens in 1563 to consult on the preparations for the entrance of Charles IX, and he painted a series of portraits of his family there. Also in 1563 Cousin decorated the window and sculptures of the chapel of the Château de Fleurigny. From 1565 to 1572 he worked on a funeral monument for Admiral Chabot; there is some controversy surrounding Cousin's exact contribution to the piece, though it is now believed he made the ornamental border.

Cousin's style generally remained faithful to his father's, so it is difficult to distinguish many of their works, which are undated. Jean Cousin's most important surviving work is the "Last Judgment," now in the Louvre, the theme of which is the insignificance of human life: the composition suggests both Florentine Mannerism and Flemish influences. Cousin also is noted for his drawing style, best represented in the emblematic style of his "Livre de Fortune" (1568). His other noted works include his engraving "Moses Showing the Serpent to the People," his stained glass "Judgment of Solomon" (1586), and his illustrations for Ovid's *Metamorphosis.*

Cousin, Victor (b. Nov. 28, 1792, Paris—d. Jan. 13, 1867, Cannes, Fr.), French philosopher, educational reformer, and historian whose systematic eclecticism made him the best known French thinker in his time.

At the École Normale in 1811 Cousin was influenced by his studies of the philosophers P. Laromiguière, E.B. de Condillac, and John Locke. He was soon impressed also by the Common Sense school in Scottish philosophy and by François Maine de Biran and Pierre-Paul Royer-Collard, whose assistant he later became. After teaching briefly at the École Normale, Cousin travelled in Germany (1817–18), where he met and was influenced by G.W.F. Hegel and Friedrich Schelling. In 1820, after antiliberal political feeling grew in France, Cousin was deprived of his assistantship, and the École Normale was closed in 1822. He then went to Germany, where for six months he was imprisoned (1824–25) on a political charge still not identified. In the early 1820s he wrote *Fragments philosophiques* (1826), completed editions of the works of the Greek Neoplatonic philosopher Proclus and of René Descartes, and began his translation of the works of Plato.



Victor Cousin, detail of an oil painting by L.-H. Mouchot; in the Musée National de Versailles et des Trianons, France

Cliche Musees Nationaux

Reinstated at the reopened École Normale (1826) in 1828, Cousin lectured on philosophy and won unprecedented popularity. For the next 20 years he dominated the field in France. He became a member of the council of public instruction (1830), of the Académie Française (1831), and of the Académie des Sciences Morales et Politiques (1832). In 1832 he was named a peer of France and two years later was made a director of the École Normale. After a visit to Germany to study educational methods, he drafted the bill (presented by the statesman François Guizot in 1833) that brought about landmark reforms in French primary education. When Guizot became prime minister in 1840, Cousin was appointed minister of public instruction.

In addition to lectures and official duties, Cousin wrote prolifically. Although he developed no philosophical system uniquely his own but, rather, assembled a system from the works of others, he managed to change the emphasis in French philosophy from Materialism to Idealism. Positing God as creator and using the concept to unify disparate aspects of the world, he nevertheless turned to historical events to find evidence for God's work in the world and was consequently attacked, particularly by Roman Catholics, for denying divine revelation. He has also been criticized for his arbitrary and simplistic division of all philosophy into four systematic types: sensualism, Idealism, Skepticism, and mysticism. He saw some truth in each of them. Stressing the need to embrace the areas of sensation, reason, and emotion in his own work, he borrowed from others those elements that best served his own purpose.

Among his other writings are *De la métaphysique d'Aristote* (1835); *Du vrai, du beau et du bien* (1836; "On the True, the Beautiful, and the Good"); *Cours d'histoire de la philosophie moderne* (1841–46; Eng. trans. 1852); and *Des Pensées de Pascal* (1843; "Of the Pensées of Pascal"). Cousin also wrote a series of studies of 17th-century women: *Jacqueline Pascal* (1845); *La Jeunesse de Madame de Longueville* (1853), with copious supplements; *Madame de Sablé* (1854); and *Madame de Chevreuse et Madame de Hautefort* (1856).

Cousin-Montauban, Charles-Guillaume-Marie-Apollinaire-Antoine, COMTE (count) DE PALIKAO (b. June 24, 1796, Paris—d. Jan. 8, 1878, Versailles, Fr.), French general who commanded an expeditionary force in China, capturing Peking (1860), and later headed the French government briefly during the collapse of the Second Empire.

Commissioned in the army in 1815, Cousin-Montauban passed through the staff college and went with the 1823 expedition to Spain to restore Ferdinand VII to the throne. Serving in Algeria from 1831 to 1857, he won rapid promotion, being appointed divisional general in 1855. From 1857 to 1860 he held three commands in metropolitan France before being sent to China in 1860 to command French troops in the joint Anglo-French expedition sent to enforce Chinese compliance with the Treaty of Tientsin (1858). He defeated a large

force of Chinese troops at Pa-li-ch'iao (French: Palikao), a town near Peking, on September 21 and entered the Chinese capital on October 12; worldwide indignation was aroused when troops under his command took part in the pillage and burning of the summer palaces outside Peking. A hero at home, however, he was appointed to the French Senate in December and named Count de Palikao by Napoleon III in 1862.

After the outbreak of the Franco-German War, Palikao was designated prime minister by the empress regent Eugénie on Aug. 9, 1870. His government, which lasted less than a month, witnessed the downfall of the Second Empire. Despite his attempts to reorganize forces for the defense of France, he was unable to prevent the catastrophic defeat at Sedan (September 1–2) and was ousted by the republican revolution of September 4. Fleeing to Belgium, he retired to private life.

Cousins, Norman (b. June 24, 1912, Union Hill, N.J., U.S.—d. Nov. 30, 1990, Los Angeles, Calif.), American essayist and editor, long associated with the *Saturday Review.*

Cousins attended Teachers College, Columbia University, and began his editorial career in 1934. From 1942 to 1972 he was editor of the *Saturday Review.* Following his appointment as executive editor in 1940, he introduced essays that drew a connection between literature and current events, whereupon circulation of the magazine increased 50 percent. Unafraid to criticize, Cousins was outspoken and his articles sometimes bitter. At times he criticized the U.S. government, but he felt strongly that a unique potential for greatness existed in America; he wrote *The Good Inheritance: The Democratic Chance* (1942) to explore this idea. Cousins felt modern problems stemmed from the absence of a collective voice and from Americans' inability to see their social and political dilemmas clearly. In 1972 Cousins left the *Saturday Review* but returned the following year. In 1980 he was named "editor emeritus." In his final years he was adjunct professor of psychiatry and biobehavioral science at the University of California at Los Angeles.

Cousins wrote on a variety of subjects, including a biography of Albert Schweitzer and a book of reflections on mankind in the atomic age, *Modern Man Is Obsolete* (1945). In 1979 *Anatomy of an Illness* appeared, a book based on Cousins' own experience with a life-threatening illness and exploring the healing ability of the human mind. Later works include *Human Options* (1981), *The Physician in Literature* (1982), and *The Pathology of Power* (1987).

Cousins, Samuel (b. May 9, 1801, Exeter, Devon, Eng.—d. May 7, 1887, London), English mezzotint engraver, preeminently the interpreter of the painter Sir Thomas Lawrence.

During his apprenticeship Cousins engraved many of the best among the 360 little mezzotints illustrating the works of Sir Joshua Reynolds. In the finest of his transcripts of Lawrence, such as "Master Lambton," his brilliancy and force of effect in a high key corresponded exactly with qualities of the painter. After the introduction of steel for engraving, about 1823, Cousins and his contemporaries were compelled to use it because the soft copper employed for mezzotint plates did not yield enough fine impressions for commercial competition with line engraving. Because of the hardness of steel, the painting-like quality of mezzotints of the 18th century was wanting in Cousins' later works. The labour of scraping was so augmented that Cousins resorted to using stipple engraving and etching processes. To this mixed style he added heavy roulette and rocking-tool textures. The effect of these prints was mechanical, but their phenomenal popularity kept alive a form of mezzotint during a critical phase of its history.

Cousteau, Jacques-Yves (b. June 11, 1910, Saint-André-de-Cubzac, Fr.), French naval officer and ocean explorer, known for his extensive underseas investigations.



Cousteau
UPI—EB Inc.

Cousteau became a *capitaine de corvette* in the French navy in 1948 and president of the French Oceanographic Campaigns and commander of the ship *Calypso* in 1950. He became director of the Oceanographic Museum of Monaco in 1957.

Cousteau was the founder of the Underseas Research Group at Toulon and of the French Office of Underseas Research at Marseille, Fr. (renamed the Centre of Advanced Marine Studies in 1968). The inventor of the aqualung diving apparatus and a process for using television underwater, he became head in 1957 of the Conshelf Saturation Dive Program, conducting experiments in which men live and work for extended periods of time at considerable depths along the continental shelves. His many books include *Par 18 mètres de fond* (1946; "Through 18 Metres of Water"), *The Silent World* (1953), *The Living Sea* (1963), *Three Adventures: Galápagos, Titicaca, the Blue Holes* (1973), *Dolphins* (1975), and *Jacques Cousteau: The Ocean World* (1985). He also wrote and produced films concerning the oceans, which attracted immense audiences both in motion-picture theatres and on television.

Coustou, Guillaume (b. 1677, Lyon, Fr.—d. 1746, Paris), French sculptor who received many royal commissions. His style was rather picturesque, with some affinity to Rococo works.

Coustou was taught by his uncle Antoine Coysevox and spent several years studying in Rome. In 1703 Coustou returned to Paris. His marble statue "Hercules at the Stake" won him acceptance at the Royal Academy of Painting and Sculpture, where he received regular promotions until he was appointed director in 1735.

Coustou often worked with his brother Nicolas Coustou (b. 1658, Lyon—d. 1733, Paris),



"Chevaux de Marly," statue by Guillaume Coustou, 1740–45; Champs-Élysées, Paris
Jacques Verroust

particularly in the decoration of royal domestic architecture at Versailles. Among his last achievements were his famous "Chevaux de Marly" ("Horses of Marly"; 1740–45), for Marly park; this group of statues now decorates the entrance to the Champs-Élysées in Paris. He also created many busts, including a famous head of his brother Nicolas.

Cousy, Bob, byname of ROBERT JOSEPH COUSY (b. Aug. 9, 1928, New York, N.Y., U.S.), American professional basketball player and coach and collegiate coach, who was one of the greatest ball-handling guards in the National Basketball Association (NBA), expert both at scoring and at playmaking.

Cousy played collegiate basketball at the College of the Holy Cross (Worcester, Mass.; 1949–50), where he was an All-American. He joined the Boston Celtics in 1950. He led the NBA in assists (1953–60), his one-game record of 28 (1959) standing until 1978. He directed the Celtics' play in five championship seasons (1959–63). After he left the Celtics in 1963, he coached at Boston College (1963–



Cousy (right), 1962
AP/Wide World

69), leading his team to five post-season tournaments. He returned to professional basketball in 1969 as head coach of the Cincinnati Royals (and played in seven games that season). He coached the team (which became the Kansas City–Omaha Kings in 1972) until November 1973. He became commissioner of the American Soccer League in 1975 and remained until 1979. He then became a television sports commentator for the Celtics' games.

Cousy was elected to the Basketball Hall of Fame in 1970. In 1980 he was named to the all-time NBA team as a guard.

Coutances, ancient (Latin) COSEDIA, town, Manche *département,* in the Basse-Normandie *région* of northwestern France, on the Soulle River, near the English Channel. As Cosedia, it was one of the nation's chief pre-Roman towns, inhabited by the Unelli, an ancient Celtic tribe. Renamed Constantia in the 3rd century to honour the emperor Constantius I Chlorus, it became in the Middle Ages the seat of a viscount, with a long history of sieges. Coutances has been an episcopal see since the 5th century.

The town is dominated by the Cathedral of Notre-Dame, built on the site of a church consecrated about 1090. The present structure is mainly 13th-century Gothic, with slender turrets massed around conspicuous towers. In the interior there are fine rose windows with the stained glass of the 14th century. One of the first towns taken by the Allies after the breakthrough at Saint-Lô (July 1944),

Coutances suffered great destruction in World War II, although the cathedral escaped serious damage.

Furniture manufacturing and tanning are the principal industries. The town is the seat of a court of assizes and a subprefect and has tribunals of first instance and of commerce. Pop. (1982) 9,600.

Coutchiching Series, division of rocks in the region of northern Minnesota and Ontario radiometrically dated to have formed about 2.6 billion years ago during Precambrian Time. Rocks of the Coutchiching Series appear to underlie those of the Keewatin Series, at least in some areas, and consist of mostly sedimentary rocks that have been altered to varying degrees by metamorphic processes. Some geologists consider the Coutchiching older than the Keewatin Series, but others dispute this view; much study on the stratigraphic relationships between Coutchiching and Keewatin strata remains to be done before a conclusive answer can be provided. It seems likely that much of the Coutchiching Series is interbedded with lava flows assigned to the Keewatin Series and that the two are at least partly equivalent in age.

Couthon, Georges (b. Dec. 22, 1755, Orcet, Fr.—d. July 28, 1794, Paris), close associate of Robespierre and Louis de Saint-Just on the Committee of Public Safety that ruled Revolutionary France during the period of the Jacobin dictatorship and Reign of Terror (1793–94).

Couthon became a poor people's advocate at Clermont-Ferrand in 1788. In 1791 he went to Paris as a deputy to the Revolution's Legislative Assembly and in 1792 was elected to the National Convention, where he joined the majority in voting for the death of King Louis XVI (January 1793). By this time a disease—probably meningitis—had paralyzed Couthon's legs. Although he was confined to a wheelchair, he went on missions to the provinces in November-December 1792 and in March 1793. He bitterly denounced the moderate Girondin deputies before the Convention, and he introduced the motion that led to the arrest of the leading Girondins on June 2. The Jacobins, in alliance with the Parisian lower classes, then took control of the Revolution.

Meanwhile, Couthon and four other men had been added to the Committee of Public Safety on May 30, 1793. They drafted a new constitution, which was submitted to the Convention on June 10, and Couthon remained on the committee when it was reorganized a month later. On August 21 he was sent to direct the military operations against the counterrevolutionary stronghold of Lyon. Lyon surrendered on October 9, but Couthon had himself relieved of his command so that he would not have to carry out the Convention's order to destroy the city. Nevertheless, in speeches before the Convention he called for the extermination of enemies of the republic. In March-April 1794 he helped Robespierre and Saint-Just bring about the downfall of factions led by the radical democrat Jacques Hébert and the moderate Georges Danton. Couthon then secured passage of the Law of 22 Prairial (June 10, 1794), which speeded up the work of the Revolutionary Tribunal and unleashed the Reign of Terror. The Robespierrist leaders, however, were facing growing resistance, and on 9 Thermidor (July 27, 1794) Couthon, Robespierre, and Saint-Just were arrested by a group of their opponents. They were guillotined, along with 19 other Robespierrists, the next day.

Coutinho, Afrânio (b. March 5, 1911, Salvador, Braz.), journalist, essayist, and literary critic who was a faithful proponent of "close reading" of literary texts for critical purposes. He was influential in introducing the New Criticism to Brazil in the 1950s.

Throughout most of his life, Coutinho also carried on an active career in high school and university teaching in the area of literature. During 1942–47 he lived in the United States, serving on the editorial staff of the Portuguese-language edition of *Reader's Digest.* He was elected to the Brazilian Academy of Letters in 1962 and became editor of the literary journal *Cadernos Brasileiros.* Among his critical publications, the most widely known are *Aspectos da literatura barroca* (1950; "Aspects of Baroque Literature"), *A filosofia de Machado de Assis* (1940; "The Philosophy of Machado de Assis"), a study of the influence of Pascal on the 19th-century Brazilian literary giant, *Por uma crítica estética* (1953; "Toward Aesthetic Criticism"), and *Da crítica e da nova crítica* (1957; "On Criticism and the New Criticism"). He also organized and edited the six-volume *A literatura no Brasil* (1955–71; "The Literature of Brazil").

Coutinho, Manuel de Sousa: *see* Sousa, Luís de.

coutume (French: "custom"), in French law, the body of law in force before the Revolution of 1789 in northern and central France. The word is also used in modern France to denote customary law and general custom.

Local custom in medieval France was based on an admixture of Roman law, Frankish law, royal legislation, canon law, and feudal law. At first, each seigneury (manor) had its own customs and justice. After 1200, customs became more uniform within such larger areas as Brittany and Normandy. The south, too, lived largely by unwritten custom, despite an erudite enthusiasm for the revived Roman law of the Byzantine emperor Justinian I. The dominant rules of southern custom, favouring full propriety and partible inheritance among other things, were Roman only to the extent that the southern barbarian codes had been influenced by Roman law. These rules held firm until 1212, when the "custom of France near Paris" was imposed by the northern crusader knights. Throughout France the newly revived Roman law influenced the written custom books which, especially after 1200, tended to define regional uniformities. The learned Roman law had some effect on the *coutumes* of the north, but it did not replace them.

The *coutumes* dealt primarily with such matters of private law as property and succession. They differed greatly from one area to the next, and, consequently, a movement arose to record the various *coutumes* and thereby lessen some of the confusion. During the 13th and 14th centuries, legal scholars recorded the customs of their provinces in books called *coutumiers.*

Most of the *coutumes* were compiled during the first half of the 16th century—for example, that of Paris in 1510 and that of Brittany in 1539. Gradually, after 1650, the idea arose that the common law of France resided in all the *coutumes.* Books written from that point of view, along with the *coutumes* themselves, provided considerable assistance to those who later drafted the Civil Code of 1804.

Couturat, Louis (-Alexandre) (b. Jan. 17, 1868, Ris-Orangis, near Paris, France—d. Aug. 3, 1914, Paris), French philosopher and logician who sought a universal language and symbolic-logic system to study the history of philosophy and the philosophy of mathematics.

Educated at the École Normale Supérieure in philosophy and mathematics, Couturat became a professor at the University of Toulouse and the Collège de France before dedicating himself to private research. To promote his international language of Ido based on the "rational intuition" of Esperanto, Couturat helped to organize the International Congress of Philosophy (1900), to prepare *Vocabulaire technique et critique de la philosophie* (1926; "Technical Vocabulary and Critique of Philosophy"), and to establish *Progresso* (1908), a monthly publication written in Ido.

Couturat's major works include *De l'Infini mathématique* (1896; "On Mathematical Infinity"), *La Logique de Leibniz* (1901; "The Logic of Leibniz"), *Histoire de la langue universelle* (1903, with L. Leau; "History of the Universal Language"), *L'Algèbre de la logique* (1905; "The Algebra of Logic"), and *Les Principes de mathématiques* (1905; "The Principles of Mathematics").

Couture, Thomas (b. Dec. 21, 1815, Senlis, Fr.—d. March 30, 1879, Villiers-le-Bel), academic painter best known for his portraits and historical genre pictures such as "The Romans of the Decadence" (1847), which created a sensation at the Salon of 1847.



"The Romans of the Decadence," oil on canvas by Thomas Couture, *c.* 1847; in the Louvre Museum, Paris

By courtesy of the Musee du Louvre, Paris; Cliche Musees Nationaux

Couture developed his excellent portrait skills under Baron Antoine-Jean Gros. An academician of stature, he combined soft, 18th-century colouring and a strict 19th-century classicism in his most important work. His sharp use of tonal contrasts is thought to have influenced one of his most famed students, Édouard Manet. Puvis de Chavannes and Henri Fantin-Latour also studied under this popular teacher.

couvade (from French *couver,* "to hatch"), the custom of the father going to bed at the birth of his child and simulating the symptoms of labour and childbirth. In an extreme form of couvade, the mother returns to her work as soon as possible after giving birth, often the

same day, and waits on the father; the roles of the sexes are thus reversed. The term is sometimes applied to practices in which both parents of a newborn child are confined and similarly restricted. Some degree of restriction on the behaviour of the father at the birth of a child, however, is common among nonliterate and ancient peoples.

In both ancient and recent times the full couvade has been observed on all continents and has been reported as recently as the early 20th century in the Basque country and in Brazil. Its social function seems to emphasize the role of the father in reproduction, although some writers have proposed that, by lessening the fear of what is felt to be the largely culturally induced pain of childbirth, the custom of couvade actually lightens the physical ordeal for the mother.

Couve de Murville, Maurice, in full JACQUES MAURICE COUVE DE MURVILLE (b. Jan. 24, 1907, Reims, France), French diplomat and economist who served a record term as foreign minister (1958–68). Known for his cool, competent professionalism in foreign affairs and finance, Couve de Murville was considered the consummate civil servant.

Born into a prosperous French Protestant family, Couve de Murville studied law, literature, and political science. He then joined the corps of finance inspectors (1930) and in 1940 became director of external finance in the Ministry of Finance. Although he initially served in the cabinet of Philippe Pétain and Pierre Laval (1940), he soon joined General Henri Giraud in Algiers and became commissioner of finance in the Free French government under Charles de Gaulle (1943).

Upon the war's end Couve de Murville served as director general of political affairs in the foreign ministry, and he took an important part in the complex diplomatic negotiations that attended the European postwar settlement. During the 1950s he held posts as ambassador to Egypt (1950–54), to NATO (1954), to the United States (1955), and to West Germany (1956–58).

In 1958 de Gaulle became president and appointed Couve de Murville his foreign minister, a position he held for 10 years. Couve de Murville was effective and capable in carrying out de Gaulle's policies. He helped sign a friendship treaty with West Germany and was instrumental in France's barring Great Britain from the Common Market, pulling out of NATO, recognizing the People's Republic of China, and moving into a more neutral position between East and West.

Defeated the first time that he ran for political office (1967), Couve de Murville ran again as deputy to the National Assembly and was elected and reelected (1968, 1973, 1978, 1981). De Gaulle appointed him finance minister (May–July 1968) and then premier (July 1968–June 1969). He was appointed inspector general of finances in 1969, and he also served as president of the foreign affairs committee of the National Assembly (1973–78) and as a member of the French delegation to the United Nations (1978–81). French president Valéry Giscard d'Estaing made him special emissary to Lebanon at Egyptian President Anwar el-Sadat's request during the 1976 civil war in Lebanon.

Couve de Murville was the author of *Une Politique étrangère 1958–69* (1971; "Foreign Politics 1958–69").

Covadonga, village, Asturias *provincia* and *comunidad autónoma* ("autonomous community"), northwestern Spain. It lies east of Oviedo city, at the head of the Deva River valley, near the base of the Peaks of Europa, which form the highest massif of the Cordillera Cantábrica (Cantabrian Mountains). The village is noted as the reputed site of the defeat of the Moors in the Battle of Covadonga (*c.* 718–725) by Pelayo, first Christian king of Asturias. The battle traditionally marks the beginning of the Christian reconquest of Spain, and despite the legendary character of the stories about Pelayo, he became a major symbol of Christian resistance in medieval Spanish history.

The tiny village has become a national shrine and place of pilgrimage. The *cueva* (grotto) where Pelayo and his followers reputedly took refuge from battle contains the tombs of the king and his wife and sister as well as the small Chapel of Our Lady (Virgen de las Batallas);



The Basilica of Nuestra Señora de las Batallas, Covadonga, Spain
By courtesy of the Ministry of Information and Tourism

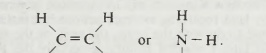
the chapel has been frequently destroyed and restored, most recently after the Spanish Civil War (1936–39). The Basilica of Nuestra Señora de las Batallas was built between 1877 and 1901.

Southeast of the village in the Peaks of Europa is the Covadonga Mountains National Park, which was established in 1918. The park's heavily wooded area of 65 square miles (169 square km) shelters chamois, roe deer, wildcat, bear, and numerous birds. Pop. (1970) 15.

covalent bond, in chemistry, the interatomic linkage that results from the sharing of an electron pair between two atoms. The binding arises from the electrostatic attraction of their nuclei for the same electrons. A covalent bond forms when the bonded atoms have a lower total energy than that of widely separated atoms.

A brief treatment of covalent bonds follows. For full treatment, *see* MACROPAEDIA: Chemical Bonding.

Molecules that have covalent linkages include the inorganic substances hydrogen, nitrogen, chlorine, water, and ammonia (H_2, N_2, Cl_2, H_2O, NH_3) together with all organic compounds. In structural representations of molecules, covalent bonds are indicated by solid lines connecting pairs of atoms; *e.g.*,



A single line indicates a bond between two atoms (*i.e.*, involving one electron pair), double lines (═) indicate a double bond between two atoms (*i.e.*, involving two electron pairs), and triple lines (≡) represent a triple bond, as found, for example, in carbon monoxide (C≡O). Single bonds consist of one sigma (σ) bond, double bonds have one σ and one pi (π) bond, and triple bonds have one σ and two π bonds.

The idea that two electrons can be shared between two atoms and serve as the link between them was first introduced in 1916 by the American chemist G.N. Lewis, who described the formation of such bonds as resulting from the tendencies of certain atoms to combine with one another in order for both to have the electronic structure of a corresponding noblegas atom.

Covalent bonds are directional, meaning that atoms so bonded prefer specific orientations relative to one another; this in turn gives molecules definite shapes, as in the angular (bent) structure of the H_2O molecule. Covalent bonds between identical atoms (as in H_2) are nonpolar—*i.e.*, electrically uniform—while those between unlike atoms are polar—*i.e.*, one atom is slightly negatively charged and the other is slightly positively charged. This partial ionic character of covalent bonds increases with the difference in the electronegativities of the two atoms. *See also* ionic bond.

Covarrubias, Miguel (b. 1904, Mexico City, Mex.—d. Feb. 4, 1957, Mexico City), Mexican painter, writer, and anthropologist.

Covarrubias received little formal training. In 1923 he went to New York City on a government scholarship, and his incisive caricatures soon began to appear in such magazines as *Vanity Fair.* A collection of his caricatures, *The Prince of Wales and Other Famous Americans,* was published in 1925. His illustrations appeared in numerous magazines and books, showing his interest in the study of racial types. In 1930 and 1933 he and his wife visited the Orient, and subsequently he wrote *Island of Bali* (1937) and painted six mural maps illustrating the cultures of the Pacific area for the Golden Gate International Exposition, San Francisco, which were then published as *Pageant of the Pacific* (1939).

Turning to Mexico, Covarrubias wrote and illustrated an account of the Tehuantepec region, *Mexico South* (1946). His last book, *The Eagle, the Jaguar, and the Serpent* (1954), surveyed the cultures of the northern American Indians. Covarrubias also worked as a theatre designer, easel painter, printmaker, and art history teacher. His work in the visual arts reflects a flair for decoration, with perceptiveness and thorough craftsmanship.

Consult the INDEX *first*

Covasna, *județ* (county), east-central Romania. The eastern Carpathian Mountains, including the Vrancei and Baraolt ranges, rise above settlement areas in the valleys of the county, which is drained southwestward by the Negru and Olt rivers. Sfîntu Gheorghe (*q.v.*), the county capital, and several other towns, including Baraolt, Covasna, and Tîrgu Secuiesc, have industries that produce timber, textiles, and foodstuffs. Lignite mines operate at Căpeni and Vîrghiș, and andesite is mined near the town of Bixad.

Sfîntu Gheorghe was built on the site of a Daco-Roman settlement and was occupied by Hungarians (Magyars) during medieval times. The regional museum in Sfîntu Gheorghe contains examples of Neolithic pottery, Dacian coins, and doors from the Hungarian period. Tîrgu Secuiesc town was built on the remains of the Roman settlement of Praetoria Augusta and now has a small museum. The town was a craft centre during the Middle Ages and is now an industrial centre. Covasna town is a resort. Fortified churches are found in Sfîntu Gheorghe, Arcuș, Ghidfalău, and Ilieni. Highways and railway connections extend through Sfîntu Gheorghe, with branches extending eastward through the Oituz Pass (2,841 feet [866 m]) into Bacău county. Area 1,431 square miles (3,705 square km). Pop. (1992 prelim.) 232,600.

covellite, a sulfide mineral that is a copper ore, cupric sulfide (CuS). It typically occurs as an alteration product of other copper sulfide minerals (chalcopyrites, chalcocite, and bornite) present in the same deposits, as at Leogang, Austria; Kawau Island, N.Z.; and Butte, Mont., U.S. Covellite forms crystals that

belong to the hexagonal system. For detailed physical properties, *see* sulfide mineral (table).

coven, basic group in which witches are said to gather. One of the chief proponents of the theory of a coven was the English Egyptologist Margaret Murray in her work *The Witch Cult in Western Europe* (1921). According to her a coven consists of 12 witches and a devil as leader. The number is generally taken as a parody of Christ and his 12 disciples. (An alternate theory, stressing the Murray view of a pre-Christian tradition of witches, explains 13 as the maximum number of dancers that can be accommodated in a nine-foot circle.)

Each member of a coven is said to specialize in a particular branch of magic, such as bewitching agricultural produce, producing sickness or death in humans, storm raising, or seduction. The actuality of covens was also accepted by Montague Summers, a well-known Roman Catholic writer on witchcraft in the 1920s and 1930s, and more recently by Pennethorne Hughes in his *Witchcraft* (1952, 1965). Many students of witchcraft, however, dismiss the Murray theory of covens as unfounded and based on insufficient evidence. Nonetheless, 20th-century witchcraft groups continue to use the term coven, and reports of coven activity in the United States and Europe are not uncommon.

covenant, a binding promise of far-reaching importance in relations between individuals, groups, and nations. Having social, legal, and religious ramifications, the subject is primarily concerned with its special religious sense in Judaism and Christianity.

A brief treatment of covenant follows. For full treatment, *see* MACROPAEDIA: Doctrines and Dogmas, Religious.

Probably deriving from the patterns of political treaties in the ancient world, the covenant as understood in the Bible came to bind the people of Israel to obedience to God and in so uniting that community religiously also forged a political federation of tribes. In general, the covenant agreement was made solemn by a ritual, typically the death of an animal, which symbolized the treatment of one breaking the agreement. Deities were invoked to oversee and enforce compliance to the terms. Beyond control of social and legal relations of individuals and groups, covenant came to be understood as the major way of conceptualizing religious community and its relation to God.

For more than 1,000 years prior to the covenant at Mount Sinai recorded in the Bible, covenants concerned bringing new social relationships into existence. This practice possibly grew out of the forms of marriage commitments. Very early it came to be a prominent and important device for defining political relations. Of course, new political relationships were seldom, if ever, voluntary. Rather, when one social group subdued another by military force, the former extracted from the latter promises meant to formalize the relationship and end the need for force. But such covenants were unlikely to be reliable. Around 1500 BC, the covenant treaties of the Hittite Empire assumed a more uniform and clearly recognizable structure in the attempt to show that the terms were actually beneficial to the conquered people.

The Exodus, the delivery in the 13th century BC of the people of Israel from their bondage in Egypt, is the central event of the Old Testament. The monotheistic and ethical religion of the nation of Israel that emerged from that event can scarcely be accounted for by the aristocratic and religiously pluralistic societies surrounding it. However, the unification of the community can be understood in terms of commitment to a religious covenant similar to the political treaties of the day. Indeed, the Ten Commandments, given as a covenant at Mount Sinai, exhibit the same structure as the Hittite treaties. In effect, this religious covenant in its form of a political treaty constituted the people of Israel as the Kingdom of Yahweh, the only God they were to worship, the only ruler they were to recognize. Thus the covenant provided a means for securing peace and cooperation among a large population. It went beyond the organization of society by force to seek the commitments of its members, and it became the source of much of the theology and ethics of Israel.

As this new community expanded and conquered neighboring peoples, there were additional covenant ceremonies at Shittim and Shechem that essentially continued and extended the Sinai Covenant by gaining the commitment of the additional people. In slightly more than one generation, the community begun by the Covenant at Sinai included as many as a quarter of a million people bound to the one Yahweh. But when Israel copied its neighbors and became a monarchy, radical changes were enacted. While the covenant committed all the people to Yahweh alone, the new monarchy used pre-Sinai sources to justify the notion of an earthly king as a chosen ruler and to portray God as the one bound to Israel by promises. This eased the incorporation into the kingdom of various city-states that had not made a commitment to the covenant. But it interjected into the religion of Israel a confusion and conflict that was to last for centuries. One after the other, prophets arose to declare the necessity of the destruction of the kings. The few attempted reforms met little success. Only the destruction of the monarchy and its temple allowed the survival of the Sinai tradition. After the return from the Exile, a covenant was entered into, but it was understood in terms of obedience to the law and its members were identified as the descendants of Abraham.

The Christian understanding of covenant centres in the New Testament upon Jesus, who at his last supper before his crucifixion identified the cup of wine as the new covenant. That is, the bread and wine were identified with his body and blood, and his death was for all those who were joined with him by partaking of the bread and wine. His death as a sacrificial victim was a punishment, as prescribed by the curses, for the community's violation of the old covenant. But since his death fulfilled the curses, it also completed and therefore nullified them. That is, his death satisfied and therefore set aside the old covenant and opened the way for a new relationship with God, as known in Christ. The new Kingdom of God was not governed by laws regarding external actions but instead had to do with the heart, the soul, or the self. In later Christian history, especially the Reformed churches, covenant continued to be a means of forming new communities.

The religion of Islām appends to the Judeo-Christian covenants what it regards as the Last Covenant, made between God and the Prophet Muḥammad.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Covenant, Ark of the (Judaism): *see* Ark of the Covenant.

covenant, restrictive: *see* restrictive covenant.

covenant theology, also called FEDERAL THEOLOGY, type of Reformed (Calvinistic) theology emphasizing the biblical covenants of works made by God with Adam—the first created man, according to the book of Genesis—and the covenant of grace made between God and man through the grace of Christ. In Reformed theology, Christ was viewed as the second Adam, as he was described in the letters of the Apostle Paul.

English Puritans of the 17th century incorporated the concept of the two covenants (law and grace) into what has been called a natural and a supernatural covenant. In the development of this theological movement, the 16th–17th-century English Puritan theologian William Ames's book *Medulla Theologiae* (*Marrow of Sacred Divinity*) influenced Reformed theology for nearly a century. The covenantal concept spread among Reformed groups in England, Germany, Scotland, the Netherlands, and the New England colonies, where it was especially influential.

Covenanter, any of the Scottish Presbyterians who at various crises during the 17th century subscribed to bonds or covenants, notably to the National Covenant (1638; *q.v.*) and to the Solemn League and Covenant (1643; *q.v.*), in which they pledged to maintain their chosen forms of church government and worship. After the signing of the National Covenant, the Scottish Assembly abolished episcopacy and in the Bishops' Wars of 1639 and 1640 fought to maintain their religious liberty. The financial difficulties into which these wars brought the crown led to the English Civil War. Subsequently, by the Solemn League and Covenant (September 1643), the Scots pledged their assistance to the parliamentarian party in England on the condition that the Anglican Church would be reformed. The Covenanter army thereafter took part in the English Civil War and received Charles I's surrender in 1646. In December 1647, however, Charles agreed to the Solemn League and Covenant and secured military assistance from the Scots. They also fought for Charles II, who signed the covenant in June 1650. In both campaigns they were defeated by the English.

The religious settlement forced upon Scotland by Commonwealth rule failed to satisfy the more rigid Presbyterians. The restoration of the English monarchy in 1660, however, began the Covenanters' period of martyrdom. All legal sanctions of Presbyterianism were removed, episcopacy was reestablished, and covenants were denounced as unlawful oaths. For 25 years the Covenanters suffered brutal persecution, and three rebellions (1666, 1679, 1685) were cruelly suppressed. After the English Revolution of 1688 an ecclesiastical settlement reestablished Presbyterian church government in Scotland but did not renew the covenants.

Covent Garden, London square in which was situated, for more than 300 years, the principal fruit, flower, and vegetable market of the metropolis. Alongside stands the Royal Opera House, Covent Garden, home of the national opera and ballet companies. Originally a convent garden, owned by the Benedictines of Westminster, the site was developed by the 4th earl of Bedford as the cities of London and Westminster grew together along the north bank of the River Thames in the 17th century. It was laid out as a residential square to the design of Inigo Jones in 1630–33.

The market was established in 1670 and rebuilt in 1830. In 1974 it moved to a new, more spacious market site south of the River Thames at Nine Elms.

The original theatre on the site opened in 1732 and served for plays, pantomimes, and opera. Under George Frideric Handel as music director (1734–37), opera was emphasized, but later the focus shifted to plays. Managers in the late 18th and early 19th centuries included the noted actors George Colman the Elder, John Philip Kemble, and Charles Kemble. The theatre burned in 1808 and was rebuilt in 1809.

In 1847 it became the Royal Italian Opera

House under the noted conductor Michael Costa and, later, Frederick Gye. The building burned in 1856, and a new building was erected in 1858. The Royal Italian Opera failed in 1884 and was replaced in 1888 by the Royal Opera Company under Augustus Harris and, later, Maurice Grau; the repertory was largely Italian opera.

The house closed during World War I but reopened in 1919. In 1933–39 the resident company was directed by the conductor Sir Thomas Beecham. Closed again during World War II, the house reopened in 1946 through the activities of a trust founded by the economist John Maynard Keynes. The Sadler's Wells Ballet (founded 1931; later, the Royal Ballet) moved to the theatre at that time. Though flexible, the policy of producing operas in English with English casts was initiated. Postwar musical directors included the conductors Rafael Kubelík, Georg Solti, and Colin Davis.

Coventry, district (city), metropolitan area of West Midlands, England. It has an area of 37 square miles (97 square km).

Coventry probably dates from Saxon times. The sacking of the Saxon nunnery of St. Osburga by the Danes in 1016 led to the founding of a monastery by Earl Leofric of Mercia and



Monument to Lady Godiva with Holy Trinity Church (left) and the old spire of St. Michael's Cathedral (right) at Coventry, West Midlands
Shostal—EB Inc.

his wife Godiva (Godgifu) in 1043. Godiva is best known for her legendary ride unclothed on a white horse through the town. The monastery brought trade and prosperity to the town, and by the mid-15th century Coventry was an important centre of the woolen-textile industry, especially noted for thread but having a variety of other crafts.

In the 18th century silk ribbon weaving became the staple industry, and later watchmaking was introduced. The silk ribbon trade collapsed in 1860, and many weavers left the town. But the introduction of bicycle manufacture in 1868 brought new prosperity. Workers in the declining watch industry were soon in demand as skilled mechanics, and the bicycle industry developed into motorcycle and later automobile manufacture with the first Daimler car produced in 1896. In the 20th century rayon manufacture and later radioelectronics and ordnance works were introduced.

World War II brought great destruction to Coventry, and the air raids of November 1940 and April 1941 destroyed much of the city, including all but the spires of St. Michael's Cathedral and the Grey Friars' Church; 50,479 houses were damaged. Rebuilding of the town centre at the end of the war concentrated on separating pedestrians from motor traffic, and the new city centre is encircled by an inner-ring road. The new St. Michael's Cathedral, designed by Sir Basil Spence and consecrated in 1962, is probably the best known of Coventry's new buildings. The design left the old cathedral spire and ruined nave beside the new building.

The prosperous manufacturing industries of the postwar period have attracted large numbers of workers to the city, and large housing estates have been built. Today the motor-vehicle, engineering, and machine-tool industries are the main employers, with modern textiles and telecommunications also important. The city is an important educational centre with two long-established secondary schools and more recently established centres of higher education. The University of Warwick received its charter in 1965, and the Coventry Polytechnic was designated in 1970. Pop. (1988 est.) 306,000.

Coventry, town (township), Tolland county, east-central Connecticut, U.S., on the Willimantic River, amid rolling hills. The area, known as Waramaug, was first settled about 1700. It was incorporated in 1712 and named for Coventry, Warwickshire [now in West Midlands], Eng. The town is known chiefly as the birthplace of the patriot Nathan Hale (1755–76), who was hanged by the British and credited with saying, "I only regret that I have but one life to lose for my country." The Nathan Hale Homestead, built in 1776 by his father, Deacon Hale, is preserved. The burial plot in Nathan Hale Cemetery is in South Coventry above Wangumbaug Lake and is marked by a 45-foot (14-metre) granite obelisk. The town's main economic activities centre on agriculture and the manufacture of sutures, boats, snowmobile trailers, and machine parts. Pop. (1988 est.) 9,820.

Coventry, Sir John (d. 1682), English politician, remembered for his connection with the Coventry Act of 1671.

Coventry was the son of Sir John Coventry (d. 1652), a Royalist and member of the Long Parliament, and the grandson of Thomas, Lord Keeper Coventry. The young Coventry was knighted in 1660 and entered Parliament in 1667. His uncles Sir William and Henry Coventry were leading figures at court, but Coventry associated himself with the parliamentary opposition.

In December 1670, during a debate on a playhouse tax, Coventry hinted that King Charles II's interest in the stage was confined to actresses. He was waylaid (December 21), and his nose was slit by some guards officers led by Sir Thomas Sandys. Parliament delayed business until the passing of the Coventry Act, declaring assaults accompanied by personal mutilation a felony without benefit of clergy. An attempt was even made to bar the royal prerogative of pardon that had been exercised to protect the assailants. The king was shielded from further repercussions by an organized court party majority in the House of Commons.

Coventry (of Aylesborough), Thomas Coventry, 1st Baron (b. 1578, Croome, Worcestershire, Eng.—d. Jan. 14, 1640, London), English lawyer, lord keeper of England from 1625 to 1640.

Coventry was educated at Balliol College, Oxford, and at the Inner Temple, where he fell under the influence of the jurist Sir Edward Coke. Despite Francis Bacon's opposition, Coventry became recorder of London in 1616 and solicitor general in 1617. Under the patronage of George Villiars, 1st Duke of Buckingham (whose ambition to obtain the office of lord high constable Coventry was later to oppose), he began a rapid rise: he was appointed attorney general in 1621 and lord keeper in 1625.

Coventry, who was raised to the peerage in 1628, was loyal to Charles I and a firm supporter of the royal prerogative on such issues as ship money. He was, however, more of a lawyer than a politican, and he had but little influence in the inner councils of state. By nature a moderate man, he sought to mitigate the severity of the Star Chamber sentences and to prevent many of the court's illegal practices, such as the hanging of men for resisting press gangs. He cannot be wholly exculpated of responsibility for the excesses of the Star Chamber, but he was respected by the majority of his contemporaries and, as lord keeper, tried to remove many of the abuses of the court of chancery.

Coventry, Sir William (b. *c.* 1628—d. June 23, 1686, near Tunbridge Wells, Kent, Eng.), English statesman, one of the ablest and most respected figures of Charles II's reign.

Coventry entered Queen's College, Oxford, in 1642 but soon left to join the Royalist army and later followed the court into exile. He returned to England in 1652 but, by refraining from Royalist activities, survived unmolested to assist in the Restoration of Charles II. James, Duke of York, made him his secretary in 1660, and he was elected member of Parliament in 1661. He became commissioner of the navy in 1662 and a member of the treasury commission in 1667. In this post and as an outstanding speaker in the House of Commons, he led a determined drive for administrative efficiency. Regarding the Earl of Clarendon as an obstacle to this, he resigned from the Duke of York's service in September 1667, but he did not join in Clarendon's impeachment. Economies in expenditure became his principal concern during 1668, and the king's resentment at the restraints that these imposed made it easier for the Duke of Buckingham to secure Coventry's disgrace in 1669. Coventry was released after a short confinement in the Tower of London, utterly disillusioned with public service and determined never to take office again. Although he remained in Parliament until 1679, he retired thereafter to his country house.

Coverdale, Miles (b. 1488?, York, Yorkshire [now in North Yorkshire], Eng.—d. Jan. 20, 1569, London), bishop of Exeter, Eng., who translated (rather freely; he was inexpert in Latin and Greek) the first printed English Bible.

Ordained a priest (1514) at Norwich, Coverdale became an Augustinian friar at Cambridge, where, influenced by his prior, Robert Barnes, he absorbed Lutheran opinions and later busied himself in biblical studies. In 1528, as a secular priest in Essex, he began preaching against images and the mass. In 1529 he helped William Tyndale (*q.v.*) translate the Pentateuch in Hamburg and then apparently settled in Antwerp, where he translated the Bible. He later returned to England and took up the Reform cause, translating tracts and editing the Great Bible (1539). In 1540 Henry VIII's religious policies forced him to flee, and he settled in Strasbourg. After Henry's death he returned to England, supported the new Protestant religious line, and was made bishop of Exeter (1551). Under the Roman Catholic Mary, Coverdale lost his bishopric and was spared burning by intercession from Denmark, where he then briefly went. During 1555–57 he was in Bergzabern near Strasbourg and thereafter until 1559 was in Switzerland. In 1559 he returned to England and helped consecrate Queen Elizabeth's archbishop, Matthew Parker. Yet his Puritanism, strengthened by stays abroad, prevented him from resuming his bishopric of Exeter. He declined all preferments save a brief one (1564–66) at St. Magnus, Old London Bridge, but he often preached sermons that were highly esteemed.

covered bridge, timber-truss structure carrying a roadway over a river or other obstacle, popular in folklore and art but also of major significance in engineering history. The function of the roof and siding, which in most

covered bridges create an almost complete enclosure, is to protect the wooden structural members from the weather. A truss is a basic form in which the members are arranged in a triangle or series of triangles.

There is no evidence of timber-truss bridges, with or without covering, in the ancient world, but the 13th-century sketchbook of the French architect Villard de Honnecourt de-



Covered bridge, Mount Union, Pa.
FPG—EB Inc.

picts a species of truss bridge, and the Italian Andrea Palladio's "Treatise on Architecture" (1570) describes four designs. Several notable covered bridges were constructed in Switzerland. The Kappel Bridge (1333) of Luzern has been decorated since 1599 with 112 paintings in the triangular spaces between roof and crossbeams, depicting the history of the town and the lives of its two patron saints. In the 18th century the Grubenmann brothers of Switzerland built covered timber bridges of considerable length, notably an arch-truss bridge over the Limmat River in Baden with a clear span of 200 feet (61 m).

In North America the covered bridge underwent further evolution. From simple king-post trusses, in which the roadway was supported by a pair of heavy timber triangles, New England carpenters in the 18th century developed bridges combining simplicity of construction with their other economic advantages. The first long covered bridge in America, with a 180-foot (55-metre) centre span, was built by Timothy Palmer, a Massachusetts millwright, over the Schuylkill River at Philadelphia in 1806. Covered timber-truss bridges soon spanned rivers from Maine to Florida and rapidly spread westward. A New Haven architect named Ithiel Town patented the Town lattice, in which a number of relatively light pieces, diagonally crisscrossed, took the place of the heavy timbers of Palmer's design and of the arch; it could be "built by the mile and cut off by the yard," in its inventor's phrase. Another highly successful type was designed by Theodore Burr, of Torrington, Conn., combining a Palladio truss with an arch. Numerous Town and Burr designs remained standing throughout North America into the late 20th century, some dating back to the early 19th century.

To carry the heavy loadings of the railroad, iron was adopted for covered bridges, at first for only part of the truss, in either vertical or diagonal members, and later for the whole truss. Iron was soon replaced by steel, and a principal form of the modern railroad bridge rapidly evolved. The metal truss did not require protection from the weather and consequently was not covered. The building of covered timber bridges, however, continued even in the second half of the 20th century.

covid: *see* cubit.

Covilhã, city and *concelho* (township), Castelo Branco *distrito,* east-central Portugal, on the southeastern slopes of the Serra da Estrela, overlooking the Zêzere River, east of Coimbra. The city originated as the Roman Silia Hermia. It was destroyed by the Moors and was rebuilt (1186) by Sancho I. Made a city by decree in 1870, it is now a major textile (especially wool) centre and a marketing point for the fertile Cova de Beira Basin. A polytechnic institute is located there. Covilhã is one of the few winter-sports resorts in Portugal. Pop. (1981) city, 21,689; *concelho,* 60,916.

Covilhã, Pêro da, also spelled PEDRO DE COVILHAM, or COVILHÃO (b. *c.* 1460, Covilhã, Port.—d. after 1526), early Portuguese explorer of Africa, who established relations between Portugal and Ethiopia.

As a boy, Pêro served the Duke de Medina-Sidonia in Seville for six or seven years, returning to Portugal with the duke's brother late in 1474 or early in 1475, when he passed into the service of King Afonso V, first as a junior squire and then as squire, serving with horse and arms. He accompanied the king when he claimed the Castilian throne and was proclaimed at Plasencia, and he was present at the Battle of Toro. He also escorted the king on a fruitless journey to France to seek aid from Louis XI. On Afonso's death, Pêro served his son John II as a squire of the royal guard and was employed as a confidential messenger to Spain. He was sent on two missions to North Africa, one, in the guise of a merchant, to seek the friendship of the ruler of Tlemcen, and the other to Fez to buy horses for Dom Manuel, later king (as Manuel I).

John II hoped to profit from the spice trade of India and to make contact with the Christian ruler of Abyssinia (Ethiopia), identified with the semimythical Prester John. Abyssinians had already visited Rome and even the Iberian Peninsula. John had sent Diogo Cão (Diogo Cam) down the west coast of Africa, and he had discovered the Congo and sailed beyond, but his belief that he had reached or was about to reach the cape proved unfounded. John then ordered Bartolomeu Dias to pursue Cão's explorations. He also decided to send travelers by land to report on the location and trade of India and Abyssinia. This move may have resulted from reports received in 1486 in Benin (a kingdom on the west coast of Africa), referring to a great ruler far to the east. Pêro was chosen for the mission to India, and Afonso de Paiva, a squire who spoke Arabic, was to seek Prester John and discover a route from Guinea to Abyssinia. The men left Portugal in May 1487 with letters of credit on Italian bankers; they reached Barcelona and sailed to Naples and Rhodes, where they assumed the guise of honey merchants and sailed to Alexandria. They became ill, and their wares were seized, but they bought other goods and went to Cairo, joining a group of North Africans traveling to Aden. There they separated, Pêro going to India, reaching Cannanore, Calicut, and Goa. He then returned to Ormuz, in Persia, sometime between October 1489 and March 1490. Meanwhile, Afonso de Paiva had reached Abyssinia. The two had proposed to meet at Cairo. Pêro arrived there about the end of 1490 or early 1491 and received news of his companion's death. Meanwhile, John II had sent two messengers to Cairo to instruct Pêro to return when the mission was completed. Pêro wrote a letter to John about his experiences and continued on to Abyssinia. One of the messengers accompanied him to Ormuz, where they separated. Pêro made his way to the Red Sea. Disguised as a Muslim, he visited Mecca and Medina. He also saw Mount Sinai, reaching Zeila in 1492 or 1493, whence he passed by caravan to Abyssinia, where he was destined to spend the rest of his life.

Pêro was received by the Abyssinian ruler, Emperor Eskender, and was well treated and made governor of a district. He was not, however, allowed to leave the country. Some years later the Abyssinian regent, Queen Helena, sent an Armenian named Matthew to Portugal. He reached Afonso de Albuquerque at Goa in 1512 and was in Portugal in 1514. It was then decided to send a Portuguese embassy to Abyssinia. The first ambassador died, and his successor, Dom Rodrigo de Lima, and his party left from India in 1517 and finally reached the emperor's camp in December 1520. They found Pêro old but robust, and he served them as guide and interpreter. When they returned in 1524, Pêro and his wife and family accompanied them for part of the way, and he sent his 23-year-old son with Dom Rodrigo to be educated in Portugal.

(H.V.L.)

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coving, in architecture, concave molding or arched section of wall surface. An example is the curved soffit connecting the top of an exterior wall to a projecting eave. The curve typically describes a quarter-circle. The arched sections of a curved ceiling would be coving. Such a coved ceiling serves to join the vertical walls with a flat ceiling.

Rococo architecture exploits the angle of coving toward a potential viewer; the frequently broad surface is profusely decorated. A particularly fine example of a coved ceiling is found in the Petit Trianon, Versailles (1762–68), built by Ange-Jacques Gabriel.

Covington, city, one of the seats of Kenton county (the other being Independence), north-central Kentucky, U.S., at the juncture of the Ohio and Licking rivers, adjoining Newport (east) and opposite Cincinnati, Ohio. The site, originally given to George Muse in return for military services, was traded (1780) for a keg of whiskey. Laid out in 1815, it was named for General Leonard Covington, who died in the War of 1812. With the surge of river traffic and the opening of the Covington-Georgetown Turnpike (1819), it began to flourish as a trading centre. Covington is now an agricultural market (tobacco, corn [maize], livestock) and has acquired various manufactures.

The Roman Catholic Cathedral Basilica of the Assumption (1910) is styled after Notre-Dame in Paris. Thomas More College (1921; formerly Villa Madonna College) and Northern Kentucky University (1968) are in Covington. Works by artist Frank Duveneck, a native son, are displayed in the public library. The birthplace of Dan Carter Beard, founder of the Boy Scouts of America, is a national historic landmark. Inc. 1834. Pop. (1990) 43,264.

cow, in animal husbandry, the mature female of domesticated cattle (*q.v.*).

cow, sanctity of the, in Hinduism, the belief, dating from the Vedic period, that associates the cow with certain deities and thus accords it veneration. Though oxen and bulls were sacrificed and their flesh consumed in ancient India, the slaughter of milk-producing cows was prohibited, and verses of the Ṛgveda refer to the cow as Devī (goddess), identified with Aditi (mother of the gods) herself.

By the early centuries of the Common era, the killing of a cow was equated to the sin of killing a Brahman (a member of the highest, priestly, caste). The degree of veneration afforded the cow is indicated by the use in rites of purification and extreme penance of the *pañcagavya,* the five products of the cow—milk, curd, butter, urine, and dung.

The importance of the pastoral element in the Krishna cycle of legends, particularly from the 10th century onward, further emphasized

the sanctity of the cow. In modern India the question of the slaughtering of cattle is often a political issue.

cow parsnip, broadly, any plant of the genus *Heracleum,* in the parsley family (Apiaceae). The genus comprises about 60 species, which are distributed throughout the North Temperate Zone and on tropical mountains. Cow parsnips are perennials, often several feet high, with large compound leaves and broad clusters of white or purplish flowers. *H. sphondylium* (eltrot, hogweed, or common cow parsnip), native to Eurasia, is now naturalized in eastern North America. *H. mantegazzianum,* the giant hogweed, is native to the Caucasus but is grown elsewhere as an ornamental. This striking plant can attain a height of 4 m (about 13 feet) and has a stout red-spotted stem and



Cow parsnip (*Heracleum*)
J.M. Langham

a white inflorescence up to 0.5 m in diameter. For species of the genus *Sium, see* water parsnip.

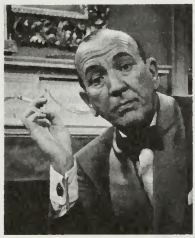
Cowansville, town, Montérégie region, southern Quebec province, Canada. It lies along the south branch of the Yamaska River, 14 miles (23 km) north of the Canada-U.S. boundary. Originally known as Nelsonville (honouring Lord Nelson) after it was settled in the early 19th century, the town was later renamed in honour of its first postmaster, Peter Cowan. Industries include silk, rayon, cotton, and woollen milling, woodworking, and the manufacture of furniture, pottery, footwear, doors, and signs. Inc. 1931. Pop. (1991) 11,982.

Coward, Sir Noël (Peirce) (b. Dec. 16, 1899, Teddington, near London, Eng.—d. March 26, 1973, St. Mary, Jamaica), English playwright, actor, and composer best known for highly polished comedies of manners.

Coward appeared professionally as an actor from the age of 12. Between acting engagements he wrote such light comedies as *I'll Leave It to You* (1920) and *The Young Idea* (1923), but his reputation as a playwright was not established until the serious play *The Vortex* (1924), which was highly successful in London. In 1925 the first of his durable comedies, *Hay Fever,* opened in London. Coward ended the decade with his most popular musical play, *Bitter Sweet* (1929).

Another of his classic comedies, *Private Lives* (1930), is often revived. It shares with *Design for Living* (1933) a worldly milieu and characters unable to live with or without one another. His patriotic pageant of British history, *Cavalcade* (1931), traced an English family from the time of the Boer War through the end of World War I. Other successes included *Tonight at Eight-Thirty* (1936), a group of one-act plays performed by Coward and Gertrude Lawrence, with whom he often played. He rewrote one of the short plays, *Still Life,* as the film *Brief Encounter* (1946). *Present Laughter* (1939) and *Blithe Spirit* (1941; filmed 1945; musical version, *High Spirits,* 1964) are usually listed among his better comedies.

In his plays Coward caught the clipped speech and brittle disillusion of the generation that emerged from World War I. His songs and revue sketches also struck the world-weary note



Coward
Ernest Reshovsky

of his times. Coward had another style, sentimental but theatrically effective, that he used for romantic, backward-glancing musicals and for plays constructed around patriotism or some other presumably serious theme. He performed almost every function in the theatre—including producing, directing, dancing, and singing in a quavering but superbly timed and articulate baritone—and acted in, wrote, and directed motion pictures as well.

Coward's *Collected Short Stories* appeared in 1962, followed by a further selection, *Bon Voyage,* in 1967. *Pomp and Circumstance* (1960) is a light novel, and *Not Yet the Dodo* (1967) is a collection of verse. His autobiography through 1931 appeared as *Present Indicative* (1937) and was extended through his wartime years in *Future Indefinite* (1954); a third volume, *Past Conditional,* was incomplete at his death. Among his more notable songs are "Mad Dogs and Englishmen," "I'll See You Again," "Some Day I'll Find You," "Poor Little Rich Girl," "Mad About the Boy," and "Marvellous Party."

Coward was knighted in 1970. He spent his last years chiefly in the Caribbean and Switzerland.

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cowbane, any of several poisonous plants, including seven species of *Oxypolis,* in the parsley family (Apiaceae), that are especially poisonous to cattle. The plants grow in marshes and are widely distributed in North America. They have clusters of white flowers



Cowbane (*Oxypolis*)
Kitty Kohout from Root Resources

surrounded by bracts (modified leaves). The most common species is *O. rigidior,* which is also called water-dropwort. Several species of *Cicuta* are also called cowbane (*see* water hemlock).

cowbird, any of six or seven species of birds belonging to the family Icteridae (order Passeriformes) that are parasitic egg-layers. Cowbirds forage on the ground, and derive their name from their habit of associating with cattle in order to prey on insects stirred up from vegetation. In most species the male cowbird is uniform glossy black in colour, while the female is grayish brown. Like some cuckoos, cowbirds habitually lay their eggs in the nests



Brown-headed cowbird (*Molothrus ater*)
Hal H. Harrison from Grant Heilman

of other birds. Young cowbirds, usually one to the host nest, customarily either displace competing nestlings or appropriate their food and may even exceed the foster parents in size. Some species parasitize many kinds of birds, but others use the nests of only one or two kinds of orioles. The best-known species is the brown-headed cowbird (*Molothrus ater*) of temperate North America. The bay-winged cowbird (*M. badius*) of South America is the only species that builds its own nest.

cowboy, in the western United States, a horseman skilled at handling cattle, an indispensable labourer in the cattle industry of the trans-Mississippi west, and a romantic figure in American folklore. Pioneers from the United States encountered the *vaquero* (Spanish, literally "cowboy"; English "buckaroo"), on ranches in Texas about 1820, and some pioneers mastered his skills—the use of lariat, saddle, spurs, and branding iron. But cattle were only a small part of the economy of Texas until after the Civil War. The development of a profitable market for beef in northern cities after 1865 prompted many Texans to go into cattle raising. Within a decade that lucrative industry had spread across the Great Plains from Texas to Canada and westward to the Rocky Mountains.

Cattle could be managed most efficiently in herds of about 2,500 head, with 8 to 12 cowboys for each herd. In the autumn the cowboys rounded up the cattle, including ownerless ones from the open range, and branded those not already branded; in the winter they kept watch over the herd; and in the spring they selected the cattle ready for market and drove them to the nearest railroad town, often hundreds of miles away. There the cattle were sold

to eastern buyers and the cowboys enjoyed a brief period of relaxation before returning home to begin the routine of another year.

As the agricultural frontier moved west, the open range was transformed into farms, and



Cowboys branding calves at a roundup on the Salt Fork, Kansas, in the 1890s
By courtesy of the Kansas State Historical Society, Topeka

by 1890 the cattlemen had been forced to settle on ranches with barbed-wire boundaries and usually close to a railroad. The legendary era of the cowboy was over, but in dime novels and other fiction of the late 19th and 20th centuries he attained immortality as the taciturn, self-reliant, and masterful hero of the West. Motion pictures and television have perpetuated that image.

Cowbridge, market town, Vale of Glamorgan district, South Glamorgan County, Wales. Centrally located in the Vale of Glamorgan, Cowbridge dates from the 14th century and prospered as the chief market and population centre of the area. The town may have been the site of the Roman military station of *Bovium,* as evidenced by its rectangular layout and the discovery of Roman coins nearby. To the east is the traditional site of the Welsh leader Owen Glendower's victory over Henry IV in 1405. The commerce of the 19th century placed an increased economic emphasis on ports and since then Cowbridge has been almost completely overshadowed by the nearby ports of Barry and Cardiff. The M4 Motorway linking Cardiff and Swansea passes just to the north of the town. Pop. (1981 prelim.) 1,166.

Cowdray (of Midhurst), Weetman Dickinson Pearson, 1st Viscount, also called (1910–17) BARON COWDRAY OF MIDHURST (b. July 15, 1856, Shelley Woodhouse, Yorkshire, Eng.—d. May 1, 1927, Dunecht House, Aberdeen, Aberdeen, Scot.), British engineer and a developer of the Mexican petroleum industry.

At 19 Pearson became a partner in his family's contracting firm, the operation of which he extended to Spain and the United States. In December 1889 he went to Mexico, where he drained swamps; built railways, power lines, waterworks, and harbours; and acquired much oil-rich land. He began drilling to obtain fuel for his locomotives and in the first two decades of the 20th century secured control of the Mexican oil industry. His firm built the Blackwall Tunnel under the Thames River, London, and several railroad tunnels under the East River, New York City; enlarged the Dover (England) harbour; and in 1926 completed a large dam on the Blue Nile in The Sudan.

Pearson was elected to Parliament in 1895, remaining a member for 15 years. He was created Baron Cowdray in 1910 and viscount in 1917.

Cowell, Henry (Dixon) (b. March 11, 1887, Menlo Park, Calif., U.S.—d. Dec. 10, 1965, Shady, N.Y.), composer who, with Charles Ives, was among the most innovative American composers of the 20th century.

Cowell grew up in poverty in San Francisco and on family farms in Kansas, Iowa, and Oklahoma. At 14 he acquired a piano and at 15 in San Francisco gave a concert of his experimental piano compositions. At 17 he studied at the University of California under Charles Seeger, who persuaded him to undertake systematic study of traditional European musical techniques. He also urged Cowell to formulate a theoretical framework for his innovations, which he did in his book *New Musical Resources* (1919; published 1930). While studying comparative musicology with Erich von Hornbostel, he became interested in the music of non-Western cultures; he later studied Oriental and Middle Eastern music, and non-Western elements appear in many of his compositions. He taught at the New School for Social Research, New York City (1932–52), and from 1949 at Columbia University.

His innovations appear particularly in the piano pieces written between 1912 and 1930. Seeking new sonorities, he developed "tone clusters," chords that on the piano are produced by simultaneously depressing several adjacent keys (*e.g.*, with the forearm). Later he called these sonorities secondal harmonies—*i.e.*, harmonies based on the interval of a second in contrast to the traditional basis of a third. Secondal harmonies appear in his *Piano Concerto* (1930), in his early piano pieces such as *The Tides of Manaunaun* (1912), and in his *Synchrony* (1931) for orchestra and trumpet solo. Other piano compositions, such as *Aeolian Harp* and *The Banshee,* are played directly on the piano strings, which are rubbed, plucked, struck, or otherwise sounded by the hands or by an object. Cowell's *Mosaic Quartet* was an experiment with musical form; the performers are given blocks of music to arrange in any desired order. With



Cowell
The Bettmann Archive

the Russian engineer Leon Theremin, Cowell built the rhythmicon, an electronic instrument that could produce 16 different simultaneous rhythms.

Cowell wrote numerous pieces reflecting his interest in rural American hymnology, Irish lore and music, and non-Western music. He founded the *New Music Quarterly* (1927; editor until 1936) to publish the scores of modern composers. He also edited *American Composers on American Music* (1933) and with his wife, Sidney Cowell, wrote *Charles Ives and His Music* (1955).

Cowes, locality, Medina district, northern extremity of the county of Isle of Wight, England, 11 mi (18 km) south of Southampton. The estuary of the River Medina separates East Cowes and Cowes.

Cowes Castle (1540) was built for coastal defense by Henry VIII; it has been the headquarters of the Royal Yacht Squadron (founded 1815) since 1856. Nearby Osborne House became Queen Victoria's marine residence in 1845, and she died there in 1901. Annual sailing regattas culminate in Cowes Week (early August). Cowes is the most industrialized part of the Isle of Wight. Its industries include the manufacture of hovercraft, yachts, and sails. Pop. (1981 prelim.) 19,663.

cowfish: *see* boxfish.

cowl, hooded cloak worn by monks, usually the same colour as the habit of the order. Originally a common outer garment worn by both men and women, it was prescribed by St.



Franciscan monks wearing cowls, detail of an oil painting on panel by del Castro, 15th century; in the John G. Johnson Collection, Philadelphia
Courtesy, John G. Johnson Collection, Philadelphia

Benedict for the monks of his order (*c.* 530). In addition to the typical garment, the separate hood worn by Augustinians, the small hood attached to Franciscans' habits, and the large, pleated choir robe worn by English Benedictines are also called cowls.

Cowl, Jane, also called JANE COWLES, original name GRACE BAILEY (b. Dec. 14, 1883, Boston—d. June 22, 1950, Santa Monica, Calif., U.S.), highly successful U.S. playwright and actress.

After study at Columbia University, Cowl made her acting debut in New York City in 1903 at the theatre of her mentor, David Belasco, in *Sweet Kitty Bellairs.* She won acclaim in her first leading role, as Fanny Perry in Belasco's production of Leo Ditrichstein's *Is Marriage a Failure?* (1909). Among her many other successful roles were Jeannine in *Lilac Time* (1917) and Moonyean Claire and Kathleen Dungannon in 1,170 performances of *Smilin' Through* (1919–22); both plays were written by Alan Langdon Martin (pseudonym for Cowl and her most frequent collaborator,



Jane Cowl in *The First Mrs. Fraser*
zodiac

Jane Murfin) and produced by her husband, Adolph Klauber, drama critic for *The New York Times.* Other successful plays that she wrote include *Information Please* (1918) and *Daybreak* (1917), with Murfin; *Hervey House* (1935), with Reginald Lawrence; and *The Jealous Moon* (1928), with Theodore Charles. In 1917 she starred in her second of seven motion pictures, *The Spreading Dawn,* produced by Samuel Goldwyn. Her last film, *Payment on Demand,* appeared in 1951.

Cowles FAMILY, publishing family known for *Look* and other mass magazines and for the dominant daily newspapers in two important regions in the United States.

John Cowles (b. Dec. 14, 1898, Algona, Iowa, U.S.—d. Feb. 25, 1983, Minneapolis, Minn.) was the son of a small-town banker who bought the *Des Moines Register and Leader,* the weakest of three daily papers in the Iowa metropolis. John attended Phillips Exeter Academy and Harvard University, where he earned an A.B. degree in 1921. He went home to work on what through a merger had become the *Register and Tribune,* starting in the advertising department and moving on through a wide variety of jobs to learn the trade, finally becoming general manager. In the 1930s and '40s, John Cowles served on the board of directors of the Associated Press, and he also held the position of president of the Audit Bureau of Circulations for four years. John and his brother Mike persuaded their father to approve their purchase of *The Minneapolis Star,* which was at the time in financial difficulties, and in 1937 John moved to Minneapolis to manage it. He later bought the *Minneapolis Tribune.*

Active in government affairs, John was a member of the General Advisory Committee of the U.S. Arms Control and Disarmament Agency from 1962 to 1969.

Gardner Cowles, Jr., called Mike (b. Jan. 31, 1903, Algona, Iowa—d. July 8, 1985, Southampton, N.Y.), followed his brother John to Phillips Exeter Academy and Harvard University, where he edited the Harvard *Crimson.* Upon his graduation in 1925, he went home to Des Moines to be city editor of the *Register and Tribune.* The next year he became news editor and then moved up gradually to be executive editor in 1931. During his tenure the paper came to be the dominant daily in the entire state of Iowa.

In 1937 Gardner Cowles founded *Look* magazine, which he operated from Des Moines until 1941, when he moved it to New York. The magazine gave Henry Luce's *Life* significant competition, but increasing production and distribution costs and competition from television forced its suspension despite healthy circulation in the 1960s. Gardner Cowles was editor in chief and chairman of the board of Cowles Communicatons from 1937 to 1971.

Fleur Fenton Cowles (b. Jan. 20, 1910, Montclair, N.J., U.S.) was married to Gardner Cowles, Jr., from 1946 to 1956, and during the marriage she was active in the affairs of Cowles Publications. She had previously been an advertising writer and set up her own business. She wrote a weekly column in the *New York World-Telegram* and did some work for *Look.* Her influence led to the introduction of two short-lived magazines, *Quick* (1949) and *Flair* (1950–51).

John Cowles, Jr. (b. May 27, 1929, Des Moines, Iowa), followed the family pattern of attending Phillips Exeter and Harvard, where he graduated in 1951. In 1953, he joined the *Minneapolis Star* and the *Minneapolis Tribune,* acquired by his father. He became editor in 1961 and was chairman from 1973 to 1979, resuming active control again in 1982. The recession of the 1980s forced the merger of the *Star* and *Tribune* into one paper. Further losses led to John Cowles's ouster as president and publisher in 1983.

Cowles, Henry Chandler (b. Feb. 27, 1869, Kensington, Conn., U.S.—d. Sept. 12, 1939, Chicago), American botanist, a pioneer in the field of plant ecology.

During the 1890s, Cowles conducted a study of sand dune vegetation that resulted in his development of the concept of ecological succession. This idea assumed an inevitable sequence of biological communities, each rendering the habitat more favourable to its successors than to itself, until a climax community characteristic of the climatic conditions of the region is attained. Cowles's concept became a fundamental tenet of modern ecology and helped bring attention to the dynamic nature of biotic populations.

Cowles spent most of his career at the University of Chicago (1897–1934). His *Vegetation of Sand Dunes of Lake Michigan* (1899), outlining the concept of ecological succession, established the university as an early centre of ecological research in the United States.

Cowley, Abraham (b. 1618, London—d. July 28, 1667, Chertsey, Eng.), poet and essayist who wrote poetry of a fanciful, decorous nature. He also adapted the Pindaric ode to English verse.

Educated at Westminster school and the University of Cambridge, where he became a fellow, he was ejected in 1643 by the Parliament during the Civil War and joined the royal court at Oxford. He went abroad with the queen's court in 1645 as her cipher secretary and performed various Royalist missions until his return to England in 1656. Seemingly



Abraham Cowley, detail of an oil painting by Mary Beale; in the Bodleian Library, Oxford
By courtesy of the curators of the Bodleian Library, Oxford

reconciled to the Commonwealth, he did not receive much reward after Charles II was restored in 1660 and retired to Chertsey, where he engaged in horticulture and wrote on the virtues of the contemplative life.

Cowley tended to use grossly elaborate, self-consciously poetic language that decorated, rather than expressed, his feelings. In his adolescence he wrote verse (*Poeticall Blossomes,* 1633, 1636, 1637) imitating the intricate rhyme schemes of Edmund Spenser. In *The Mistress* (1647, 1656) he exaggerated John Donne's "metaphysical wit"—jarring the reader's sensibilities by unexpectedly comparing quite different things—into what later tastes felt was fanciful poetic nonsense. His *Pindarique Odes* (1656) try to reproduce the Latin poet's enthusiastic manner through lines of uneven length and even more extravagant poetic conceits.

Cowley also wrote an unfinished epic, *Davideis* (1656). His stage comedy *The Guardian* (1641, revised 1661) introduced the fop Puny, who became a staple of Restoration comedy. As an amateur man of science he promoted the Royal Society, publishing *A Proposition for the Advancement of Experimental Philosophy* (1661). In his retirement he wrote sober, reflective essays reminiscent of Montaigne.

Cowley is often considered a transitional figure from the metaphysical poets to the Augustan poets of the 18th century. He was universally admired in his own day, but by 1737 Alexander Pope could write, justly: "Who now reads Cowley?" Perhaps his most effective poem is the elegy on the death of his friend and fellow poet Richard Crashaw.

Cowley, Malcolm (b. Aug. 24, 1898, Belsano, Pa., U.S.—d. March 27, 1989, New Milford, Conn.), American literary critic and social historian who chronicled the writers of the "Lost Generation" of the 1920s and their successors. As literary editor of *The New Republic* from 1929 to 1944, with a generally leftist position on cultural questions, he played a significant part in many of the literary and political battles of the Depression years.

Cowley grew up in Pittsburgh. His education at Harvard was interrupted during World War I by work with the American Ambulance Service in France and a brief period in a U.S. Army artillery officers' training school. He graduated cum laude from Harvard in 1920, took advanced study in France at the University of Montpellier (1922), and helped to put out the expatriate little magazines *Secession* and *Broom* in Paris, where he came to know the Parisian avant-garde. He returned to the United States in 1923 and for the next five years supported himself by free-lance writing and translating, eventually settling in Sherman, Conn. His *Exile's Return: A Narrative of Ideas* (1934; revised edition published 1951 under the subtitle *A Literary Odyssey of the 1920's*) is an important social and literary history of the expatriate American writers of the 1920s. Cowley revived the literary reputation of William Faulkner with his editing of the anthology *The Portable Faulkner* (1946).

Among Cowley's other works are *The Literary Situation* (1954), a study of the role of the American writer in his society, and the collections of criticism and comment *Think Back on Us* (1967) and *A Many-Windowed House* (1970). The correspondence he exchanged with Faulkner appeared in 1966 in *The Faulkner-Cowley File: Letters and Memories, 1944–1962.* Among the many books he edited are *After the Genteel Tradition: American Writers Since 1910* (1937, reprinted 1964) and *Books That Changed Our Minds* (1939). *And I Worked at the Writer's Trade* (1976) combines literary history and autobiography.

cowpea, also called BLACK-EYED PEA, cultivated forms of *Vigna unguiculata,* annual plants within the pea family (Fabaceae). In other countries they are commonly known as China bean, or black-eyed bean. The plants are believed to be native to India and the Middle East but in early times were cultivated in China. The compound leaves have three leaflets. The white, purple, or pale-yellow flowers usually grow in pairs or threes at the ends of long stalks. The pods are long and cylindrical. Those of *V. unguiculata,* variety *catjang* grow 7.5–12.5 centimetres (3–5 inches) long; those of *V. unguiculata,* variety

sinensis grow 20–30 cm ($7^2/_3$–$11^2/_3$ inches) long. In the southern United States the cowpea is extensively grown as a hay crop, as a green-manure crop, or for the beans, which are used for human consumption.

Cowpens, Battle of (Jan. 17, 1781), in the U.S. War of Independence, brilliant American victory over a British force on the northern border of South Carolina, slowing Lord Cornwallis' campaign to invade North Carolina. From his headquarters at Charlotte, N.C., the new American commander in the South, General Nathanael Greene, had divided his army and sent a force of 1,000 men under General Daniel Morgan to the southwest to intercept Cornwallis' advance. At Cowpens, Morgan confronted about 1,150 troops under Colonel Banastre Tarleton and inflicted a surprise defeat upon them. British casualties were set at about 600, while the Americans lost only 72. Not discouraged by what he described as a "very unexpected and severe blow," Cornwallis pushed on into North Carolina.

Cowper, William (b. Nov. 26, 1731, Great Berkhamstead, Hertfordshire, Eng.—d. April 25, 1800, East Dereham, Norfolk), one of the most widely read English poets of his day, whose most characteristic work, as in *The Task* or the melodious short lyric "The Poplar Trees," brought a new directness to 18th-century nature poetry.

Cowper wrote of the joys and sorrows of everyday life and was content to describe hedgerows, ditches, rivers, haystacks, and



William Cowper, detail of an oil painting by Lemuel Abbott, 1792; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

hares. In his sympathy with such phenomena, his concern for the poor and downtrodden, and his comparative simplicity of language, he may be seen as one in revolt against much 18th-century verse and as a forerunner of Robert Burns, William Wordsworth, and Samuel Taylor Coleridge. While he is often gently humorous in his verse, the tragedy that was never far below the surface of his mind is revealed in "The Castaway."

After the death of his mother when he was six, Cowper (pronounced "Cooper"), the son of an Anglican clergyman, was sent to a local boarding school. He then moved to Westminster School, in London, and in 1750 began to study law. He was called to the bar in 1754 and took chambers in London's Middle Temple in 1757. During his student days he fell in love with his cousin, Theodora Cowper, and for a while the two were engaged. But Cowper was beginning to show signs of the mental instability that plagued him throughout his life. His father had died in 1756, leaving little wealth, and Cowper's family used its influence to obtain two administrative posts for him in the House of Lords, which entailed a formal examination. This prospect so disturbed him that he attempted suicide and was confined for 18 months in an asylum, troubled by religious doubts and fears and persistently dreaming of his predestined damnation.

Religion, however, also provided the comfort of Cowper's convalescence, which he spent at Huntingdon, lodging with the Reverend Morley Unwin, his wife Mary, and their small family. Pious Calvinists, the Unwins supported the evangelical revival, then a powerful force in English society. In 1767 Morley Unwin was killed in a riding accident, and his family, with Cowper, took up residence at Olney, in Buckinghamshire. The curate there, John Newton, a leader of the revival, encouraged Cowper in a life of practical evangelism; however, the poet proved too frail, and his doubt and melancholy returned. Cowper collaborated with Newton on a book of religious verse, eventually published as *Olney Hymns* (1779).

In 1773 thoughts of marriage with Mary Unwin were ended by Cowper's relapse into near madness. When he recovered the following year, his religious fervour was gone. Newton departed for London in 1780, and Cowper again turned to writing poetry; Mrs. Unwin suggested the theme for "The Progress of Error," six moral satires. Other works, such as "Conversation" and "Retirement," reflected his comparative cheerfulness at this time.

Cowper was friendly with Lady Austen, a widow living nearby, who told him a story that he made into a ballad, "The Journey of John Gilpin," which was sung all over London after it was printed in 1783. She also playfully suggested that he write about a sofa—an idea that grew into *The Task*. This long discursive poem, written "to recommend rural ease and leisure," was an immediate success on its publication in 1785. Cowper then moved to Weston, a neighbouring village, and began translating Homer. His health suffered under the strain, however, and there were occasional periods of mental illness. His health continued to deteriorate, and in 1795 he moved with Mary Unwin to live near a cousin in Norfolk, finally settling at East Dereham. Mrs. Unwin, a permanent invalid since 1792, died in December 1796, and Cowper sank into despair from which he never emerged.

Robert Southey edited his writings in 15 volumes between 1835 and 1837. Cowper is also considered one of the best letter writers in English, and some of his hymns, such as "God Moves in a Mysterious Way" and "Oh! For a Closer Walk with God," have become part of the folk heritage of Protestant England. *The Letters and Prose Writings*, in two volumes, edited by James King and Charles Ryskamp, was published in 1979–80.

Cowper, William Cowper, 1st Earl, Viscount Fordwich, also called (1706–18) baron cowper of wingham (b. *c.* 1665—d. Oct. 10, 1723, Colne Green, Hertfordshire,



1st Earl Cowper, engraving by S.F. Ravenet

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Eng.), English lawyer and a leading Whig politician who was the first lord high chancellor of Great Britain.

The elder son of Sir William Cowper, 2nd Baronet, he was educated at St. Albans School and was called to the bar in 1688. Having promptly given his allegiance to William of Orange, he was made recorder of Colchester in 1694 and from 1695 to 1705 was a member of the House of Commons.

Having survived the odium of a murder charge brought against his brother Spencer (the grandfather of poet William Cowper), Cowper was appointed lord keeper of the great seal in 1705. In 1706 he succeeded to his father's baronetcy and was raised to the peerage as Baron Cowper. In 1707, after the union with Scotland, he was appointed the first lord high chancellor of Great Britain. He resigned in 1710. On the death of Queen Anne, he was made one of the lords justices for governing the country during the interregnum, and Cowper wrote a paper entitled *An Impartial History of Parties* for George I's guidance. He was reappointed lord chancellor in 1714, supported the impeachment of Lord Oxford in 1715, and presided, in 1716, as lord high steward at the trials of peers who had been charged with complicity in the Jacobite Fifteen Rebellion of 1715. In 1718, shortly after receiving the titles Viscount Fordwich and Earl Cowper, he resigned, probably because his intimacy with, and support of, the Prince of Wales (afterward George II) had incurred George I's enmity. Earl Cowper remained an active member of the House of Lords until his death. His eldest son, William, succeeded to the family honours.

Cowper's gland: *see* bulbourethral gland.

cowpox, also called vaccinia, mildly eruptive disease of cows that when transmitted to otherwise healthy humans produces immunity to smallpox. The cowpox virus is closely related to variola, the causative virus of smallpox. The word vaccinia is sometimes used interchangeably with cowpox to refer to the human form of the disease, sometimes to refer to the causative virus, and sometimes to refer only to the artificially induced human form of cowpox.

Cowpox disease, which is evident from the ulcers on the teats of cows, had been known as a disease of cows for hundreds of years; human cowpox occurred as a self-contained localized ulcer on the hands or at other sites where scratches or abrasions allowed entry of the virus. The preventive effect of vaccination, or intentional inoculation with the vaccinia virus, was demonstrated by Edward Jenner in 1796, following the observation that milkmaids who had been infected by cowpox during milking subsequently were immune to smallpox. During the 1980s, researchers discovered that rodents were also a natural reservoir for the virus, and that rodents, not cattle, were responsible for most cowpox infections in humans.

The vaccinia virus used in modern vaccines, though descended from cowpox, differs genetically from the existing cowpox virus; this difference may be a result of documented contamination of earlier vaccine cultures with variola virus, creating a hybrid that still confers immunity to smallpox infection. Vaccinia, by the strictest definition, does not occur in nature but enters the body during vaccination; though this usually produces a self-limiting, local ulcer like cowpox infection, it can cause a systemic smallpox-like disease in patients whose immunity is compromised, and it has—though rarely—been found to cause encephalitis.

With the disappearance of human smallpox by 1980, these risks have caused the discontinuation of routine vaccination on a population-wide basis.

Cowra, town, east-central New South Wales, Australia, on the Lachlan River, in the Western Slopes region. Founded in 1846, it derived its name from an Aboriginal word meaning

"the rocks." Proclaimed a town in 1849, it became a municipality in 1888. Linked to Sydney (144 miles [232 km] east) by air, rail, and the Midwestern Highway, Cowra serves an area of sheep, wheat, and mixed farming; irrigation water is supplied from the Wyangala Dam on the Lachlan. Industries include a large cannery, a wool-processing plant, and livestock-feed, engineering, freezing, and ceramic works. In 1944 a mass outbreak from a local Japanese prisoner of war camp resulted in the death of 239 escapees; they are buried outside Cowra in a cemetery maintained by the Japanese government. Pop. (1986) 8,207.

cowrie, any of several marine snails of the subclass Prosobranchia (class Gastropoda) comprising the genus *Cypraea,* family Cypraeidae. The humped, thick shell is beautifully coloured (often speckled) and glossy; the apertural lips, which open into the first whorl in the shell, are inrolled and may be fine-toothed.



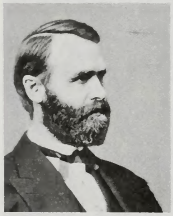
Cowrie (*Cypraea*)
Bucky Reeves from The National Audubon Society Collection/Photo Researchers—EB Inc.

Cowries occur chiefly in coastal waters of the Indian and Pacific oceans. The 10-centimetre (4-inch) golden cowrie (*C. aurantium*) was traditionally worn by royalty in Pacific Islands, and the money cowrie (*C. moneta*), a 2.5-centimetre (1-inch) yellow species, has served as currency in Africa and elsewhere.

cowslip, any of several flowering plants, including (chiefly in British usage) the wild primrose (*Primula veris*) and (in American usage) the marsh marigold (*Caltha palustris*). *See* marsh marigold; primrose.

Cox, Jacob Dolson (b. Oct. 27, 1828, Montreal, Que., Can.—d. Aug. 8, 1900, Magnolia, Mass., U.S.), U.S. political leader who became one of the great "civilian" Union generals during the American Civil War and one of the country's foremost military historians.

After dipping into the fields of theology and education, Cox was admitted to the Ohio bar in 1853 and served in the state senate (1859–61). Appointed by the governor as one of three generals of militia (1860), he studied tactics, strategy, and military history. He subsequently



Jacob Cox
By courtesy of the Library of Congress, Washington, D.C.

raised troops for the Union and was commissioned brigadier general, U.S. volunteers. Cox took part in the West Virginia campaign (1861), and he was in supreme command of the Kanawha region from spring to August 1862. His troops were then ordered to Virginia to join General Ambrose E. Burnside's IX Corps, which he commanded during the Battle of Antietam (September). In April–December 1863 he headed the Department of Ohio, and he also participated in the Atlanta campaign (1864).

After the war, Cox was active in Republican politics, legal practice, and university administration. He was elected governor of Ohio in 1866 and served as secretary of the interior in President Ulysses S. Grant's Cabinet (1869–70), in which post he effectively opposed the patronage system. His last public office was a term in the U.S. House of Representatives, to which he was elected in 1876. Cox's extensive writings on the Civil War include *Military Reminiscences of the Civil War,* 2 vol. (1900).

Cox, James M(iddleton) (b. March 31, 1870, Jacksonburg, Ohio, U.S.—d. July 15, 1957, Dayton, Ohio), American newspaper publisher and reformist governor of Ohio who ran unsuccessfully for U.S. president on the Democratic ticket in 1920.

After spending his early years as a country schoolteacher, Cox worked as a reporter on *The Cincinnati Enquirer.* In 1898 he bought the *Dayton News* and in 1903 the *Springfield Daily News.* Entering Democratic politics, he early became identified with the programs of party leader Woodrow Wilson, future U.S. president. Cox served in the U.S. House of Representatives (1909–13) and as governor of Ohio (1913–15, 1917–21), where he introduced workmen's compensation, minimum wage, and the initiative and referendum legislation.

Cox was nominated for president by the Democrats in 1920, but he was defeated in a



James Cox, portrait by Henry Mosler, 1914; in the collection of the Ohio Historical Society Library
By courtesy of the Ohio Historical Society Library

landslide in which the Republicans not only recaptured the presidency but won the largest number of seats in the U.S. House of Representatives they had ever held. After 1920 Cox retired from public life and devoted himself to his business interests.

Cox, Kenyon (b. Oct. 27, 1356, Warren, Ohio, U.S.—d. March 17, 1919, New York, N.Y.), American painter and critic, known for his murals and decorative work.

Cox was a pupil of Carolus Duran and of J.L. Gérôme in Paris from 1877 to 1882, when he returned to New York City, subsequently teaching with much success in the Art Students' League. Among the better-known examples of his work are the frieze for the courtroom of the Appellate Court, New York City, and decorations for the Walker Art Gallery, Bowdoin College, Brunswick, Me., and for the capitol at St. Paul, Minn. He was the author of several books in which he generally argued against new movements in art and advocated what he termed "the classic point of view."

Cox, Sir Percy (Zachariah) (b. Nov. 20, 1864, Herongate, Essex, Eng.—d. Feb. 20, 1937, Melchbourne, Bedfordshire), diplomat who was especially important in the development of independent Iraq from a British mandated territory after World War I. Interpreting the mandate favourably to Iraqi interests, he oversaw the transition from a provisional and



Sir Percy Cox, 1923
BBC Hulton Picture Library

largely military regime to a national government under King Faysal I.

Educated at the Royal Military Academy, Sandhurst, he served in the army in India from 1884 to 1890, when he joined the Indian political service. From 1893 to 1914 he held various political posts in the Persian Gulf area and Persia. He was knighted in 1911. During World War I, as chief political officer of the Indian Expeditionary Force, Cox was responsible for all relations with local authorities in British-occupied Iraq. From 1918 to 1920 he acted as British minister to Persia.

In October 1920 Cox went to Baghdad as British high commissioner to the new state of Iraq, which had been placed under British mandate by the Supreme Allied Council earlier that year. He established an all-Iraqi ministry and provincial administration, subject to British supervision; organized an Iraqi army; and conducted the referendum in which the emir Faysal was elected king as Faysal I (crowned Aug. 23, 1921). Cox and Faysal shared the credit for overcoming serious difficulties in establishing the constitution and the political structure of the nation. On Oct. 10, 1922, Cox signed the Anglo-Iraq Treaty (not ratified by Iraq until 1924), which provided for a 20-year alliance, later reduced to 4 years. He retired in May 1923.

Cox, Richard (b. *c.* 1500, Whaddon, Buckinghamshire, Eng.—d. July 22, 1581, Ely, Isle of Ely [now in Cambridgeshire]), Anglican bishop of Ely and a leading advocate in England of the Protestant Reformation.

Appointed dean of Christ Church, Oxford, in 1547, Cox was made dean of Westminster Abbey two years later. He had an important share in drawing up the Anglican prayer books of 1549 and 1552. As chancellor of the University of Oxford (1547–53), he introduced the work of such continental theologians as Peter Martyr Vermigli, and he sought to remove all traces of Roman Catholic influence from books, manuscripts, and ornaments of the university. Because of his anti-Catholic views, he was imprisoned for a short time upon the accession of the Roman Catholic queen Mary in 1553. Leaving England to seek refuge on the European continent the next year, Cox eventually arrived at Frankfurt. Trouble there between his supporters and those of religious Reformers John Knox and William Whittingham, who had adopted an extremely puritanical form of service, ended with Knox's expulsion and a return to the use of the 1552 prayer book.

Cox returned to England upon Mary's death in 1558 and was briefly bishop of Norwich, then bishop of Ely until his resignation in

1580. As bishop, Cox earned a reputation for intolerance for refusing to serve in the royal chapel because of the remnants of Roman Catholicism evident in its crucifix and devotional lights. He relinquished his see in a dispute with courtiers who coveted episcopal landholdings after Elizabeth I intervened in the conflict and ordered him to grant his palace in Holborn to her favourite, Christopher Hatton. Among Cox's literary works are translations of the Gospels, Acts, and Romans for the Bishops' Bible of 1568.

Cox, William Trevor: *see* Trevor, William.

coxal gland, in certain arthropods, one of a pair of excretory organs consisting of an end sac where initial urine is collected, a tubule where secretion and reabsorption may take place, and an excretory pore at the base (coxa) of one of the legs. Variations among the species include highly convoluted tubule sections, doubling back of straight tubule sections, and expansion of the terminal end into a bladder. In many higher crustaceans the excretory glands are located in the head. They are called antennal glands or maxillary glands, depending on whether they open at the base of the antennae or at the maxillae. If the tubule adjacent to the excretory pore is green, the gland is called a green gland.

Coxey's Army, a group of unemployed who marched to Washington, D.C., in the depression year of 1894. It was the only one of several groups that had set out for the U.S. capital to actually reach its destination. Led by Jacob S. Coxey, a businessman, it left Massillon, Ohio, on March 25, 1894, with about 100 men and arrived in Washington on May



Jacob S. Coxey leading a parade of his followers en route to Washington, D.C., 1894
By courtesy of the Library of Congress, Washington, D.C.

1 with about 500. Coxey hoped to persuade Congress to authorize a vast program of public works, financed by a substantial increase of the money in circulation, to provide jobs for the unemployed, but despite the publicity his group received it had no impact on public policy. The venture came to an ignominous end when Coxey and some of his followers were arrested for trespassing on the lawns at the Capitol.

Coxinga (Ming pirate): *see* Cheng Ch'eng-kung.

Cox's Bāzār, town, southeastern Bangladesh, situated along the Bay of Bengal. A small port and health resort, it has one of the largest beaches in the world. Cox's Bāzār is connected by road, rail, and air with Chittagong. Its industries include cigar and cotton-textile manufacturing. Nearby are numerous salt-producing cottage industries and magnetite iron-ore, monazite, zircon, and titanium deposits. Rāmu, 10 miles (16 km) east, is the site of a Buddhist temple. Constituted a municipality in 1869, the town was named for Hiram Cox, who supervised the settlement there of Arakanese refugees from Burmese conquest in 1799. It has a college affiliated with the University of Chittagong. Pop. (1981 prelim.) 29,830.

coydog, hybrid of the domestic dog with the coyote (*q.v.*).

Coyoacán, delegation (administrative subdivision), north central Federal District, central Mexico. It is a residential neighbourhood south of central Mexico City, on the Río de la Magdalena (now channeled underground). Coyoacán was built on the site of a pre-Columbian settlement from which the Spanish conquistador Hernán Cortés launched his attack on Tenochtitlán, the Aztec capital (now Mexico City), and was the first capital of New Spain. The name is from Nahuatl, meaning "place of coyotes." The most notable surviving colonial buildings are the San Juan Bautista church (1583) and the Dominican monastery (1530). Ciudad Universitaria, campus of the National Autonomous University of Mexico (founded 1551), is at nearby Villa Obregón. Pop. (1970) 31,045.

Coyote, in the mythology and folklore of North American Indians of the Central Plains, California, and the Southwest, the chief animal of the prehuman animal age. His exploits as creator, culture hero, lover, magician, and trickster are celebrated in a vast cycle of oral tales. Among the tribes of the American West, he was predominantly a demiurge (independent creative force) or maker of fateful decisions. Among the Plains tribes, however, he was more often regarded as a culture hero, who secured for man such necessities as fire and daylight or who originated human arts.

Although almost all tribes believed he possessed the power to transform beings and objects, they also attributed to Coyote certain negative character traits. These traits often appeared in humorous tales in which he was shown as a clever trickster who, nevertheless, was frequently bested by those who exploited his greed or turned his cunning against him.

Among the hundreds of tales in the cycle are a series in which Skunk and Coyote demonstrate their extraordinary incompetence as hunters; another in which Coyote tricks Porcupine out of a portion of buffalo meat, incurring Porcupine's revenge; an incident in which Coyote is tricked into dumping his grandmother's acorns into a river; and the tale of his transformation into a platter in order to be heaped with food to satisfy his voracious appetite.

Among tribes of Eastern North America, Coyote was paralleled by the Great Hare, or Master Rabbit, whose adventures became a supplementary source for the Brer Rabbit folk tales of Southern black Americans.

coyote, also called PRAIRIE WOLF, BRUSH WOLF, or LITTLE WOLF (*Canis latrans*), New World member of the dog family (Canidae). The coyote, whose name is derived from the Aztec *coyotl,* is found from Alaska to Costa Rica, and especially on the plains. Historically, the eastern border of its range was the Appalachians, but the coyote has, during the 20th century, moved into New England, New York, and other parts of the eastern United States, occupying the niche formerly held by the wolf. Smaller and more lightly built than the wolf, the coyote stands about 60 cm (24 inches) at the shoulder, weighs about 9–23 kg (20–50 pounds), and is about 1–1.3 m (3.3–4.3 feet) long, including its 30–40-centimetre tail. The fur is long and coarse and is generally grizzled buff above and whitish below, with reddish legs and a bushy, black-tipped tail. There is, however, considerable local variation in size and colour.



Coyote (*Canis latrans*)
Cy LaTour

Noted for its nightly serenades of short yaps and mournful howls, the coyote is primarily nocturnal and hunts alone or in relays, running tail downward and sometimes attaining a speed of 64 km (40 miles) per hour. It feeds mainly on rodents and hares but also eats carrion and most types of animal and vegetable matter. It lives in a burrow where, in spring, six or more pups are born after a gestation period of 60–63 days. The parents, which are sometimes lifelong mates, feed and care for the pups until fall. The coyote hybridizes readily with the domestic dog, the offspring being called coydogs. An intelligent animal with a reputation for cunning and swiftness, the coyote has been persecuted by humans because of the damage (greatly overrated) done by individuals that sometimes prey on domestic or game animals. Despite such persecutions, the coyote has adapted well environments dominated by humans and is found with alarming regularity in such populous areas as suburban Los Angeles.

coyotillo (*Karwinskia humboldtiana*), woody shrub of the buckthorn family (Rhamnaceae) that is native to the southwestern United States and northern Mexico. It grows about 1–7 m (3–23 feet) tall and has opposite, oval leaves 2.5–7.5 cm (1–3 inches) long. The small, greenish flowers, which grow in clusters, are followed by brownish-black oval berries about 1 cm in diameter. The fruit is poisonous to humans and to livestock.

Coypel, Antoine (b. March 11, 1661, Paris—d. Jan. 7, 1722, Paris), French painter who was an important influence in encouraging the Baroque style in French art.

Coypel was an artistic prodigy. At the age of 11 he went to Rome with his father, Noël Coypel, who was appointed director of the



Vault of the chapel at Versailles, Fr., by Antoine Coypel, 1708–09
Eddy Van der Veen

French Academy there. After three years in Rome, Antoine spent one year in northern Italy studying Correggio and the Bolognese and Venetian schools. In 1676 he returned to Paris, where in 1681 he was received as a member of the French Royal Academy with his work "Louis XIV Resting after the Peace of Nymegen," which shows a Bolognese influence and anticipates the gay mood of the Rococo style. Coypel's style evolved in an eclectic fashion. His admiration of Rubens emerged in his "Democritus" (1692), and soon afterward the influence of Poussin was felt. This combination of influence is seen in Coypel's most noted works—a series of large biblical compositions. Coypel became director of the Academy in 1714 and was appointed first painter to the king in the following year.

The Grand Dauphin, Louis XIV's brother, commissioned the artist to paint a series of panels in 1700 illustrating the story of Cupid and Psyche; these works show some of the lightness of Rococo work but with a heavy measure of Baroque. In 1702 the Duke of Orléans commissioned Coypel to decorate the big gallery of the Palais Royal with illustrations from the story of Aeneas; the ceiling is an outstanding example of the Baroque style in French art. Coypel's ceiling for the chapel of Versailles in 1708 is even bolder; in it the artist follows a Roman Baroque model. He is also noted for several engravings (*e.g.*, "Judith," "The Virgin and Child").

Coypel, Charles-Antoine (b. July 11, 1694, Paris—d. March 14, 1752, Paris), French painter and engraver whose major achievements were in teaching and in the administration at the Royal Academy, where he served as director with zeal and distinction.

Coypel's first teacher was his father, Antoine, whose somewhat stiff artistic style he perpetuated. Upon the death of his father in 1722, Charles inherited the elder Coypel's painting and design responsibilities at court, became the chief painter of the Duke of Orléans, and received lodging at the Louvre, which he retained until his death. In 1747 he became the director of the Royal Academy and chief painter of the king.

Coypel's masterpiece was a large work portraying scenes from Don Quixote (1716). He also received several commissions for the château of Versailles and for the chapel of Trianon; and he worked for the King's mistress, Madame de Pompadour. In 1747 Coypel received a commission for tapestries for the Queen of Poland, a series of scenes from various plays. Coypel also painted portraits of Louis XV, the Duke of Orléans, and other political and religious figures; he also painted actors. Many of his works lack vigor and originality, and his paintings often reflect a theatrical influence but little study of nature. Coypel is also noteworthy for his writings, which include prose, verse, two tragedies, and several comedies; his greatest literary achievements are his critiques, written in 1747 and 1751, of the works on exhibit at the Louvre.

Coypel, Noël (b. 1628, Paris—d. 1707, Paris), French Baroque historical painter who was the founding member of a dynasty of painters and designers employed by the French court during the late 17th and 18th centuries.

Made an academician in 1663, Coypel served as director of the French Academy in Rome from 1672 to 1676, and in 1695 he was made director of the Royal Academy in Paris. Although Noël Coypel is primarily known as one of the principal producers of decorative paintings for Louis XIV at the palaces of the Tuileries, the Louvre, and Versailles, he is also renowned for such important ecclesiastical commissions as the well-known painting of "The Martyrdom of St. James" in Notre Dame, Paris. Stylistically his mature works show the influence of Charles Le Brun; but his earlier paintings were in the manner of Poussin, and for this reason he was sometimes called Coypel le Poussin.

coypu (rodent): *see* nutria.

Coysevox, Antoine (b. Sept. 29, 1640, Lyon—d. Oct. 10, 1720, Paris), French sculptor known for his decorative work at the palace of Versailles and for his portrait busts,



"Glory of Louis XIV," marble relief by Antoine Coysevox, *c.* 1686; in the Salon de la Guerre, Versailles, Fr.

Cliche Musees Nationaux, Paris

which introduced a trend toward the sharpened depiction of individual character.

Of Spanish descent, Coysevox became a sculptor to King Louis XIV in 1666 and by 1679 was engaged at Versailles, enriching the Galerie des Glaces (Hall of Mirrors) and the Ambassador's staircase and carving the brilliant equestrian relief of the King (*c.* 1688) for the Salon de la Guerre. He also executed much decorative sculpture for the royal gardens, notably the equestrian "Renown" and "Mercury" (1700–02). Other important works are the tombs of the finance minister Jean-Baptiste Colbert (1685–87; Saint-Eustache, Paris) and Cardinal Mazarin (1689–93; Louvre) and the votive group of Louis XIV on the high altar of Notre-Dame. These, like his formal portrait busts, have a marked Baroque character. His more intimate portrait sculptures, however, such as that of the Duchesse de Bourgogne as Diana (1710; Louvre), omit the Italianate swagger of Bernini and the formality of the state portraits and anticipate the naturalism and grace of the Rococo style. His principal students, including his nephews Nicolas and Guillaume Coustou, perpetuated his influence, especially on the development of French portrait sculpture in the 18th century.

Coyter, Volcher: *see* Coiter, Volcher.

Cozens, Alexander (b. 1717, St. Petersburg, Russia—d. April 23, 1786, London), Russian-born British draftsman and painter who, along with his son John Robert Cozens, was one of the leading watercolourists of the 18th century.

Son of Richard Cozens, shipbuilder to the tsar of Russia, Alexander settled in England after visiting Rome in 1746 and became a fashionable drawing master. William Beckford, author of the Oriental novel *Vathek*, was his pupil and has preserved almost all that is known of Cozens' personal characteristics. His fondness for systematization found expression in many publications for artists. *A New Method of Assisting the Invention in . . . Landscape* (1785) advocated the free manipulation of ink for suggesting compositions, and his own "blots" done in this manner are among his most effective drawings. He exercised considerable influence on the development of English watercolour drawing. His watercolours are carried out almost exclusively in monochrome washes, through which he achieved breadth and atmospheric effect.

Cozens, John Robert (b. 1752, London—d. December 1797, London), British draftsman and painter whose watercolours influenced several generations of British landscape painters.

The son of the watercolourist Alexander Cozens, John began to exhibit drawings with the Society of Artists in 1767. The two long visits he paid to the Continent, 1776–79 and 1782–83, were the formative and decisive events in his career. On the first occasion he travelled through Switzerland to Italy, and spent much time in Rome. His second visit was made with the author William Beckford, who had studied drawing under Alexander Cozens, and whom he accompanied as far as Naples. Cozens became insane in 1793 and spent the remainder of his life under the care of Thomas Monro, an alienist and amateur draftsman.

Cozens found the subject matter of his art in the Alps and the Roman Campagna. Painting in low-toned combinations of blue, green, and gray watercolour, he evoked a haunting and sometimes melancholy poetry. Thomas



"View with the Roman Campagna," watercolour by John Cozens, last quarter of the 18th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, A.C. Cooper Ltd.

Girtin and J.M.W. Turner copied his works in their early years, and first learned from him the full range of watercolour as an expressive medium.

Cozie, Alpi (France–Italy): *see* Cottian Alps.

Cozumel, island, Caribbean Sea, approximately 10 mi (16 km) off the eastern coast of the Yucatán Peninsula, Mexico, in the jurisdiction of Quintana Roo territory. With a total area of 189 sq mi (489 sq km), and measuring 29 mi (46 km) from northeast to southwest and averaging 9 mi (14 km) in width, it is the largest of the islands off the peninsula. Geologically similar to the peninsula, Cozumel is a plain broken by low hills and surrounded by sandy beaches. Ebony, fruits, henequen (a hemplike crop), corn (maize), and cassava are the principal products. San Miguel de Cozumel, Cedral, and Colombia are the largest towns.

Cozumel was discovered in 1518 by the Spanish explorer Juan de Grijalva and subsequently visited by the conquistador Hernán Cortés. Now one of Mexico's premiere tourist resorts, it offers excellent beaches, fishing, boating, and skin diving. An airport built for military purposes has made the island accessible by air as well as by sea. Pop. (1970) 5,858.

Cozzens, James Gould (b. Aug. 19, 1903, Chicago—d. Aug. 9, 1978, Stuart, Fla., U.S.),

American novelist, whose writings dealt with life in middle-class America.

Cozzens grew up on Staten Island, N.Y., graduated from the Kent (Conn.) School



James Gould Cozzens, 1961
William H. Tague

(1922), and attended Harvard University for two years. In a year of teaching in Cuba he accumulated background material for the short novels *Cockpit* (1928) and *The Son of Perdition* (1929). He gained critical attention in 1931, when his novella *S.S. San Pedro* won the Scribner's prize. Thereafter he published increasingly complex novels, most of which focus on professional people. In *The Last Adam* (1933) the protagonist is a doctor; *Men and Brethren* (1936) depicts the life of an Episcopalian minister; *The Just and the Unjust* (1942) and *By Love Possessed* (1957) are about lawyers; and *Guard of Honor* (1948) concerns air force officers and men. *Ask Me Tomorrow* (1940) is an autobiographical novel, and *Children and Others* (1964) is a short-story collection.

Cozzens' works reflect a philosophy of political and social conservatism, and some have maintained that he was slow to receive widespread critical acclaim because of his conservative views. Acclaim did come, however; he received the Pulitzer Prize for fiction in 1949 for *Guard of Honor* and the Howells Medal of the American Academy of Arts and Letters in 1960 for *By Love Possessed*. The latter was also Cozzens' greatest popular success. His later works became increasingly convoluted in plot and style, especially his last novel, *Morning Noon and Night* (1968). A collection of his works, with critical appraisals, can be found in *Just Representations* (1978).

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CP violation, in particle physics, violation of the combined conservation laws associated with charge conjugation (C) and parity (P) by the weak nuclear force, which is responsible for reactions such as the decay of atomic nuclei. Charge conjugation is a mathematical operation that transforms a particle into an antiparticle, for example, changing the sign of the charge. Charge conjugation implies that every charged particle has an oppositely charged antimatter counterpart, or antiparticle. The antiparticle of an electrically neutral particle may be identical to the particle, as in the case of the neutral pi meson, or it may be distinct, as with the antineutron. Parity, or space inversion, is the reflection in the origin of the space coordinates of a particle or particle system; *i.e.*, the three space dimensions x, y, and z become, respectively, $-x$, $-y$, and $-z$. Stated more concretely, parity conservation means that left and right and up and down are indistinguishable in the sense that an atomic nucleus throws off decay products up as often as down and left as often as right.

For years it was assumed that charge conjugation and parity were exact symmetries of elementary processes, namely those involving electromagnetic, strong, and weak interactions. The same was held true for a third operation, time reversal (T), which corresponds to reversal of motion. Invariance under time implies that whenever a motion is allowed by the laws of physics, the reversed motion is also an allowed one. A series of discoveries from the mid-1950s caused physicists to alter significantly their assumptions about the invariance of C, P, and T. An apparent lack of the conservation of parity in the decay of charged K mesons into two or three pi mesons prompted the Chinese-born American theoretical physicists Chen Ning Yang and Tsung-Dao Lee to examine the experimental foundation of parity itself. In 1956 they showed that there was no evidence supporting parity invariance in weak interactions. Experiments conducted the next year verified decisively that parity was violated in the weak interaction beta decay. Moreover, they revealed that charge conjugation symmetry also was broken during this decay process. The discovery that the weak interaction conserves neither charge conjugation nor parity separately, however, led to a quantitative theory establishing combined CP as a symmetry of nature. Physicists reasoned that if CP were invariant, time reversal T would have to remain so as well. But further experiments, carried out in 1964, demonstrated that the electrically neutral K meson, which was thought to break down into three pi mesons, decayed a fraction of the time into only two such particles, thereby violating CP symmetry. CP violation implied nonconservation of T, provided that the long-held CPT theorem was valid. In this theorem, regarded as one of the basic principles of quantum field theory, charge conjugation, parity, and time reversal are applied together. As a combination, these symmetries constitute an exact symmetry of all types of fundamental interactions.

No completely satisfactory explanation of CP violation has yet been devised. The size of the effect, only about two parts per thousand, has prompted a theory that invokes a new force, called the "superweak" force, to explain the phenomenon. This force, much weaker than the nuclear weak force, is thought to be observable only in the K-meson system or in the neutron's electric dipole moment, which measures the average size and direction of the separation between charged constituents. Another theory, named the Kobayashi-Maskawa model after its inventors, posits certain quantum mechanical effects in the weak force between quarks as the cause of CP violation.

The attractive aspect of the superweak model is that it uses only one variable, the size of the force, to explain everything. Furthermore, the model is consistent with all measurements of CP violation and its properties. The Kobayashi-Maskawa model is more complicated, but it does explain CP violation in terms of known forces.

CP violation has important theoretical consequences. The violation of CP symmetry, taken as a kind of proof of the CPT theorem, enables physicists to make an absolute distinction between matter and antimatter. The distinction between matter and antimatter may have profound implications for cosmology. One of the unsolved theoretical questions in physics is why the universe is made chiefly of matter. With a series of debatable but plausible assumptions, it can be demonstrated that the observed matter-antimatter ratio may have been produced by the occurrence of CP violation in the first seconds after the "big bang," the violent explosion that is thought to have resulted in the formation of the universe (*see* big-bang model).

CPD, abbreviation of *Cape Photographic Durchmusterung (q.v.)*, an astronomical catalog.

crab, any short-tailed member of the crustacean order Decapoda—especially the Brachyura, or true crabs, but also other forms such as the Anomura, which may resemble them in appearance and habits. The approximately 4,500 species occur in all oceans, in fresh water, and on land.

Unlike those of other decapods (*e.g.*, shrimp, lobster, crayfish), crabs' tails are curled under the thorax, or midsection. The carapace (upper body shield) is usually broad. The first pair of legs is modified into chelae, or pincers.

Distribution and variety. Most crabs live in the sea; even the land crabs, which are abundant in tropical countries, usually visit the sea occasionally and pass through their early stages in it. The river crab of southern Europe, the Lenten crab (*Potamon fluviatile*), is an example of the freshwater crabs abundant in most of the warmer regions of the world. As a rule, crabs breathe by gills, which are lodged in a pair of cavities beneath the sides of the carapace, but in the true land crabs the cavities become enlarged and modified so as to act as lungs for breathing air.

Walking or crawling is the usual mode of locomotion, and the familiar sidelong gait in the common shore crab is characteristic of most members of the group. The crabs of the family Portunidae, as well as some others, swim with great dexterity by means of their flattened paddle-shaped feet.

Like many other crustaceans, crabs are often omnivorous and act as scavengers, but many are predatory and some are vegetarian.

Though no crab, perhaps, is truly parasitic, some live commensally with other animals. One example is the little pea crabs (Pinnotheridae), which live within the shells of mussels and a variety of other mollusks, worm-tubes, and echinoderms and share the food of their hosts; another example is the coral-gall crabs (Hapalocarcinidae), which irritate the growing tips of certain corals so that they grow to enclose the female in a stony prison. Many of the sluggish spider crabs (Majidae) cover their shells with growing seaweeds, zoophytes, and sponges, which afford them a very effective disguise.

The giant crab of Japan (*Macrocheira kaempferi*) and the Tasmanian crab (*Pseudocarcinus gigas*) are two of the largest known crustaceans. The former may span nearly 4 m (12 feet) from tip to tip of its outstretched legs. The Tasmanian crab, which may weigh well over 9 kg (20 pounds), has much shorter, stouter claws; the major one may be 43 cm 17 inches) long; the body, or carapace, of a very large specimen may measure 46 cm (18 inches) across. At the other extreme are tiny crabs measuring in adulthood scarcely more than a centimetre or two in length.

Better-known Anomura crabs are the hermit crabs that live in empty shells of gastropod mollusks, which they carry about with them as portable dwellings. As the crab grows it changes its abode from time to time. In tropical countries the hermit crabs of the family Coenobitidae live on land, often at considerable distances from the sea, to which they must return to hatch out their spawn. The large robber, or coconut, crab of the Indo-Pacific islands (*Birgus latro*), which belongs to this family, has given up the habit of carrying a portable dwelling, and the upper surface of its abdomen has become covered by shelly plates.

As in most crustaceans, the young of nearly all crabs, when newly hatched from eggs, are very different from the parents. The larval stage, known as the zoea, is a minute transparent organism with a legless, rounded body, swimming at the surface of the sea. After casting off its skin several times, the enlarging crab passes into a stage known as the megalops, in which the body and limbs are more crablike, but the abdomen is large and not folded up. After a further molt the animal assumes a









(From top) Puget Sound king crab (*Lopholithodes mandtii*), a lithodid ("stone") crab, Anomura group; common swimming crab (*Portunus holsatus*), showing its paddle-shaped feet; edible crab (*Cancer pagurus*); arrow crab (*Stenorhynchus seticornis*), a spider crab that lives on sea anemones

(From top) © Neil G. McDaniel—The National Audubon Society Collection/Photo Researchers, Dr. Eckart Pott—Bruce Coleman Ltd., Martin Dohrn—Bruce Coleman Ltd., Jane Burton—Bruce Coleman Ltd.

form very similar to that of the adult. There are a few crabs, especially those living in fresh water, that do not pass through a metamorphosis but instead leave the egg as miniature adults.

Economic importance. Many crabs are sought as food by humans. The most important and valuable are the edible crab of the British and European coasts (*Cancer pagurus*) and, in North America, the blue crab (*Callinectes sapidus*) of the Atlantic coast and the Dungeness crab (*Cancer magister*) of the Pacific coast. In the Indo-Pacific region the swimming crabs, *Scylla* and *Portunus*, related to the American blue crab, are among the most important sources of seafood. Commercially valuable Anomura are the lithodid (literally "stone") crabs, of which the so-called king crab (*Paralithodes camtschatica*) found off Japan and in the Bering Sea and Alaskan waters is the most important.

Crab (constellation): *see* Cancer.

crab apple, also called CRAB, any of several small trees of the genus *Malus*, in the rose family (Rosaceae), native to North America and Asia. Crabs are widely grown for their attractive growth habit, spring flower display, and decorative fruit. The fragrant five-petaled, white, pink, carmine, or purplish flowers appear early in showy masses. The fruits are



Crab apple (*Malus*)
E.R. Degginger—EB Inc.

much smaller and more tart than the common apple but are suitable for jellies, preserves, and cider. The tree itself is stiffer in form and more spiny than the common apple.

Outstanding Oriental crabs include the Chinese flowering crab (*M. spectabilis*), Siberian crab (*M. baccata*), Toringo crab (*M. sieboldii*), and Japanese crab (*M. floribunda*). Among the notable American species are the garland, or wild sweet crab (*M. coronaria*); Oregon crab (*M. fusca*); prairie, or Iowa crab (*M. ioensis*); and southern crab (*M. angustifolia*).

The showiest crabs, hybrids derived from *M. floribunda*, are among the choicest small, hardy decorative trees; many have large, fragrant double blossoms and bear colourful fruit that persists well into winter. Certain cultivated varieties of both the Oriental and American crabs are susceptible to cedar apple rust, apple scab, and fire blight, but hybrids with tolerance or resistance to these diseases have been developed.

crab-eating fox, also called SAVANNA FOX, or CRAB-EATING DOG (*Cerdocyon thous*), South American member of the dog family (Canidae), found in grassy or forested areas. It attains a length of 60–70 cm (24–28 inches), excluding a 30-centimetre tail, and has a gray



Crab-eating fox (*Cerdocyon thous*)
Carlos Rivero

to brown coat that is frequently tinged with yellow. It generally lives alone or in pairs and spends the day in a burrow, emerging at night to hunt for such foods as small animals, fruit, insects, turtle eggs, and fowl. It is easily tamed and is sometimes kept as a pet by Indians.

crab louse: *see* pubic louse.

Crab Nebula (catalog numbers NGC 1952 and M1), probably the most intensely studied bright nebula, in the constellation Taurus, about 5,000 light-years from Earth. Roughly 5 to 10 light-years in diameter, it is assumed to be the remnant of a supernova (violently exploding star) observed by Chinese and other astronomers first on July 4, 1054. The supernova was visible in daylight for 23 days and at night for almost 2 years. There are no records of its observation at the time by Europeans.

The discovery of the object as a nebula is attributed to the English physician and amateur astronomer John Bevis in about 1731. In 1758 it was the first object listed (M1) in Charles Messier's catalog of nebulous objects. It acquired its name, suggested by its form, in the mid-19th century. In 1921 it was discovered to be still expanding; the present rate is about 1,100 km (700 miles) per second.

The Crab is one of the few astronomical objects from which radiation has been detected over the entire measurable spectrum, from radio waves through infrared and visible wavelengths to ultraviolet and X rays. In the late 1960s the pulsar NP 0532, thought to be the collapsed remnant of the supernova, was discovered near the centre of the nebula.

crab plover (species *Dromas ardeola*), long-legged, black and white bird of Indian Ocean coasts, related to plovers and allied species of shorebirds. It comprises the family Dromadidae (order Charadriiformes). Crab plovers are



Crab plover (*Dromas ardeola*)
Painting by H. Douglas Pratt

tame, noisy birds about 40 cm (16 inches) long. They flock on beaches and reefs, where they hunt mollusks and crabs, which they then break up by pounding them with their heavy bills. They have a hunched posture on land. Crab plovers dig burrows about 1.5 m (5 feet) deep in sandbanks and lay a single large white egg.

crab spider, any member of the family Thomisidae (order Araneida). They are crab-like in shape and, like many crabs, walk sideways or backward. The family, which is worldwide in distribution, contains many common species. About 125 species occur in the United States.

The body of the crab spider is gray or brown in colour and is about 12 mm (0.5 inch) long. Members of *Misumena* and *Misumenoides*,

common North American genera, are found chiefly in open spaces, on plants or on fences. They do not spin a web but instead wait in hiding for prey. *Misumena vatia*, found on flowers, is white or yellow with a red stripe on the side of the abdomen. Over a period of several days it can change colour to match that



Crab spider (*Misumenoides aleatorius*) awaiting prey in the flower of a thistle
John H. Gerard

of the flower on which it rests. Some species of crab spider live on or under the bark of trees.

Other spiders sometimes known as crab spiders are found in the families Platoridae, Heteropodidae, and Selenopidae.

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Crabbe, George (b. Dec. 24, 1754, Aldeburgh, Suffolk, Eng.—d. Feb. 3, 1832, Trowbridge, Wiltshire), English writer of poems and verse tales memorable for their realistic details of everyday life.

Crabbe grew up in the impoverished seacoast village of Aldeburgh and was apprenticed to a surgeon at 14. Hating his mean surroundings and unsuccessful occupation, he abandoned both in 1780 and went to London. In 1781 he wrote a desperate letter of appeal to Edmund Burke, who read Crabbe's writings and persuaded James Dodsley to publish one of his didactic, descriptive poems, *The Library* (1781). Burke also used his influence to have Crabbe accepted for ordination, and in 1782 he became chaplain to the Duke of Rutland at Belvoir Castle.

In 1783 Crabbe demonstrated his full powers as a poet with *The Village*. Written in part as a protest against Oliver Goldsmith's *The Deserted Village* (1770), which Crabbe thought too sentimental and idyllic, the poem was his attempt to realistically portray the misery and degradation of rural poverty. Crabbe made good use in *The Village* of his detailed observation of life in the bleak countryside from which he himself came. *The Village* was popular but was followed by an unworthy successor, *The Newspaper* (1785), and after that Crabbe published nothing for the next 22 years. Apparently happily married (1783) and the father of a family, he no longer felt impelled to write poetry.

In 1807, however, spurred by the increasing expenses associated with his sons' education, Crabbe began to publish again. He reprinted his poems, together with a new work, "The Parish Register," in which he made use of the register of births, deaths, and marriages to compassionately depict the life of a rural community. Other verse tales followed, including *The Borough* (1810), *Tales in Verse* (1812), and *Tales of the Hall* (1819).

Crabbe is often called the last of the Augustan poets because he followed John Dryden, Alexander Pope, and Samuel Johnson in using the heroic couplet, which he came to handle with great skill. Like the Romantics, who esteemed his work, he was a rebel against the realms of genteel fancy that poets of his day were forced to inhabit, and he pleaded for the poet's right to describe the commonplace realities and miseries of human life. Another Aldeburgh resident, Benjamin Britten, based his opera *Peter Grimes* (1945) on one of Crabbe's grim verse tales in *The Borough*.

crabeater (fish): *see* cobia.

crabeater seal (species *Lobodon carcinophagus*), southern seal of the family Phocidae found among drifting ice packs around the Antarctic continent. A slender animal measuring about 2–2.5 m (6.6–8.2 feet) long and up to about 225 kg (500 pounds) in weight, the crabeater seal feeds on krill (planktonic crustaceans and larvae), rather than on crabs as its name implies. Its teeth are elaborately cusped



Crabeater seal (*Lobodon carcinophagus*)
Carleton Ray—Photo Researchers

and fit together to filter its food from the sea. The coat of the seal is blotched gray-brown but fades and becomes whitish by the time the crabeater molts in late summer. Breeding occurs on the pack ice; the pup is pale brown at birth. Adult crabeater seals frequently bear scars from wounds that have been inflicted by killer whales.

crabgrass, also called FINGER GRASS, any of about 300 species of grasses in the genus *Digitaria* (family Poaceae), especially *D. sanguinalis* or the slightly shorter *D. ischaemum* (smooth crabgrass). *D. sanguinalis* has long hairs covering its leaves and has five or six spikelets, while *D. ischaemum* has no hair and only two or three spikelets. Both species are



Crabgrass (*Digitaria sanguinalis*)
Grant Heilman

natives of Europe that became widely naturalized as weeds in North America. They and a few closely related species are very troublesome weeds in lawns, fields, and waste spaces because they have decumbent stems that root at the joint. Such a habit, in spite of their being annual grasses, makes their eradication difficult, especially if they have seeded into existing lawns. Rooting at the joints makes thick, tenacious patches of the weed, and mowing merely induces new flowering and the shedding of more seed.

Crabgrass is an annual perpetuated by seeds that overwinter in the ground. Because the seed germinates later than that of desirable competitors, preemergence sprays may be useful as a means of eliminating the plants. Hand weeding is also useful, but the most effective control is a hardy lawn that smothers crabgrass seedlings. One species of crabgrass, Arizona cottontop (*D. californica*), is a useful forage grass in southwestern North America.

cracking, in petroleum refining, process by which heavy hydrocarbon molecules are broken up into lighter molecules by means of heat and usually pressure and sometimes catalysts. Cracking is the most important process for the commercial production of gasoline.

Cracking of petroleum yields light oils (corresponding to gasoline), heavier oils, and such gases as methane, ethane, ethylene, propane, and propylene. These gases are important chemical raw materials and are the starting point for the production of a large number of compounds that constitute five major groups of end products: synthetic rubber, plastics, textiles, detergents, and agricultural chemicals.

Thermal cracking processes came into use in 1913 for breaking up large nonvolatile hydrocarbons to obtain gasoline. In 1936 the cracking process was improved with catalysts to obtain a higher-octane product. Gas oils are cracked to produce high-octane gasoline in the presence of a clay catalyst. *See also* alkylation.

Cracow (city, Poland): *see* Kraków.

Cracow, Republic of, also called FREE CITY OF CRACOW, Cracow also spelled KRAKÓW, Polish KRAKOWSKA RZECZPOSPOLITA, or WOLNE MIASTO KRAKÓW, tiny state that, for the 31 years of its existence (1815–46), was the only remaining independent portion of Poland. Established by the Congress of Vienna at the conclusion of the Napoleonic Wars (1815), the free Republic of Cracow consisted of the ancient city of Cracow and the territory surrounding it. Containing a population of 95,000, it was placed under the joint protection of Austria, Prussia, and Russia, which had divided the rest of Poland among themselves.

Despite the economic and political limitations imposed on the republic by its size and location, Cracow flourished. Particularly after the Congress Kingdom of Poland was strictly subordinated to the Russian Empire (1830), Cracow became the major symbol of Poland's independent political existence and a lively intellectual and political centre for Polish patriots.

When a Polish insurrection broke out in Galicia (Austrian Poland) early in 1846, Austria held that Cracow's independent status provided the stimulus as well as a forum for the planning of Polish revolts and obtained the consent of Russia and Prussia to suppress the Republic of Cracow. After a brief resistance, Cracow was occupied by Austrian troops (March 1846) and attached to Galicia.

Cracticidae, songbird family, of the order Passeriformes, that includes species of the bellmagpie, butcherbird, and currawong (*qq.v.*) groups of Australia. They are sometimes collectively called songshrikes, from their vocal powers and their shrikelike behaviour.

Craddock, Charles Egbert, pseudonym of MARY NOAILLES MURFREE (b. Jan. 24, 1850, near Murfreesboro, Tenn., U.S.—d. July 31, 1922, Murfreesboro), American writer in the local-colour movement, who depicted Tennessee mountain life in her short stories.

For her stories published in *Appleton's Journal* and *The Atlantic Monthly* she utilized the pen name Charles Egbert Craddock, and her identity was not disclosed until after the publication of her first volume of short stories,

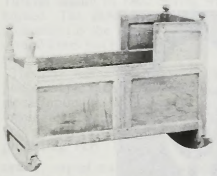


Charles Craddock, engraving
By courtesy of the Library of Congress, Washington, D.C.

In the Tennessee Mountains (1884). Most of her stories present the narrow, stern life of the mountaineers who were left behind in the advance of civilization.

cradle, in agriculture, rakelike harvesting implement of wood, devised in ancient times for gathering the stalks of wheat, oats, barley, and other grains (first cut with the sickle) and laying them in rows for binding. The later cradle scythe invented in Europe consisted of a framework of long, fingerlike prongs attached to the cutting edge of a long-handled scythe. The device was swung like the usual scythe but simultaneously cut the grain and gathered it into loose bundles ready for tying. Cradles of this type are still employed in some areas of the world.

cradle, in furniture, infant's bed of wood, wicker, or iron, having enclosed sides and suspended from a bar, slung upon pivots, or mounted on rockers. The rocking motion of the cradle is intended to lull the infant to sleep. The cradle is an ancient type of furniture, and its origins are unknown. Early cradles developed from hollowed-out tree trunks to oblong, lidless wood boxes, originally with apparently detachable rockers. Later cradles were paneled and carved, supported on pillars, inlaid, or mounted in gilded bronze.



Oak cradle, American, 1625–75; in the Metropolitan Museum of Art, New York City
The Metropolitan Museum of Art, New York City, gift of Mrs. Russell Sage, 1909 (10.125.672)

Every period of furniture style has produced a variety of cradle types, from simple boxes to the elaborate draped state cradles of 18th-century France. While peasant babies slept in light wooden or wickerwork cradles, royal and noble medieval infants were rocked in cradles decorated with gold, silver, and precious stones. The wood cradles mounted on rockers so popular from the 15th through the 17th century were gradually superseded in the 18th and 19th centuries by wicker cradles that were slung between end supports in order to raise them higher from the ground. Cradles were gradually replaced by the barred crib in the early 20th century.

Cradle Mountain, mountain situated at the northern boundary of the 622-square-mile (1,611-square-kilometre) Cradle Mountain–Lake St. Clair National Park, in northwest-central Tasmania, Australia. Located on Tasmania's central plateau, its lava basalt peak rises to 5,069 feet (1,545 m). It is an arête (narrow ridge) that resembles a cradle, hence the name. The mountain was reportedly first scaled either by Henry Hellyer, a surveyor, in 1831 or by the Australian climbers Franz and Julius Malcher.

craft guild, also called MYSTERY (from Latin *ministerium,* "occupation"), a European medieval occupational association, usually comprising all the artisans—and often the suppliers, retailers, and wholesale merchants—concerned with a specific branch of industry or commerce. A weavers' guild is recorded at Mainz as early as 1099 and in London and other cities of England during the reign of Henry I (1100–35); but the greatest period of guild expansion occurred after rather than before 1250.

The general characteristics of the medieval craft guild are well known and were in general remarkably alike throughout Europe. Assemblies of all members enjoyed some legislative powers, but the control of guild policy lay in the hands of a few officials (from two to four wardens in the case of most English crafts) and a council of advisers or assistants. From an early stage in its development, the typical mystery tended to be an extremely hierarchical body, divided into the three categories of masters, journeymen, and apprentices. In the largest and wealthiest trades the master craftsmen formed a select inner circle, open only to those apprentices and journeymen who could provide proof not only of their technical competence (the "masterpiece") but also of their wealth and social eligibility.

The primary economic objective of most craft guilds was the establishment of a complete monopoly over all who were associated together in the pursuit of a common profession, but the ability of the craft guilds actually to exercise their authority was subject to serious practical limitations. Many of the innumerable extant craft-guild regulations can never have been applied continuously, and guild monopoly power was usually too weak to take the blame (as it once did) for the economic difficulties of late medieval Europe. Despite frequent attempts at price-fixing, it seems unlikely that many guilds were able to exert permanent influence on local selling prices and wage rates. The very multiplicity of crafts within a given city tended to prevent any one mystery from pursuing its monopolistic ambitions to extremes, as the perennial conflicts throughout Europe between weavers and fullers or between the victualing and nonvictualing guilds fully demonstrate. Moreover, municipal supervision and interference in matters of craft policy was common at all stages of guild history and, from the 15th century onward, was increasingly supplemented by the intervention of national governments, which began regulating apprenticeship and demanding articles of incorporation.

The decline of the medieval craft guilds was a slow and tortuous process. New fraternities were still being founded throughout Europe in the 17th century; nevertheless the 16th century can be said to have marked a decisive turn in the fortunes of most mysteries. Apart from the disruptive effects of the Protestant Reformation and the growth of governmental power, the craft guilds were seriously weakened by the appearance of new markets and greater capital resources. The drift of industrial activity away from the towns into the countryside, very evident in the case of English and Flemish cloth production, left the guilds increasingly isolated from the main currents of economic power, as did the emergence of regulated companies and other associations of wealthy merchant-capitalists. By the time of the decrees and acts abolishing craft associations in France (1791), Rome (1807), Spain (1840), England (1835), Austria and Germany (1859–60), and Italy (1864), the bases of their authority had been long eroded.

craft union, trade union combining workers who are engaged in a particular craft or trade but who may work for various employers and at various locations. Formed to improve wage levels and working conditions, craft unions were established on a permanent basis in the middle of the 19th century in Great Britain. Craft unions derive their power from their control over the supply of skilled labour, maintained through their control of licensing and apprenticeship practices. Many craft unions came to include skills not directly related to the original craft in which the union developed. *See* industrial union.

crag and tail (geology): *see* rôche moutonnée.

Craggs, James (baptized June 10, 1657, Wolsingham, Durham, Eng.—d. March 16, 1721), English politician implicated in the South Sea Bubble (1720), a widespread speculation in shares of the South Sea Company, which had taken over most of the British national debt. The company persuaded investors



Craggs, detail of a portrait attributed to Johann Baptist Closterman, 1710; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

to exchange their state annuities for the greatly overvalued stock, which rose as high as 1,000 during the summer of 1720 and fell to 124 in December. After the collapse of the "bubble," it was learned that Craggs and other government officials had accepted large bribes from the company's directors.

Following service as steward to the 7th Duke of Norfolk, Craggs entered the household of the 1st Duke of Marlborough, whose wife arranged for his election to the House of Commons in 1702. After holding several other offices, he became postmaster general (jointly with the 4th Baron Cornwallis) in 1715. The South Sea Company directors gave him at least £30,000 worth of company stock; when the speculation had run its course, he tried to negotiate a settlement with the British government and the Bank of England. He broke down under examination by a parliamentary committee, and his mysterious death on the eve of his trial was generally believed to be a confession of guilt by suicide. His son James Craggs, the Younger, secretary of state, died of smallpox before the parliamentary committee could examine him.

Craig, Edward Gordon (b. Jan. 16, 1872, Stevenage, Hertfordshire, Eng.—d. July 29,

1966, Vence, France), English actor, theatre director-designer, producer, and theorist who influenced the development of the theatre in the 20th century.

Early life. Craig was the second child of a liaison between the actress Ellen Terry and the architect Edward William Godwin. Like Edith (the other child of his parents), their son was given the name Craig, which he adopted as a surname. He began his career as an actor,



Edward Gordon Craig, 1890
By courtesy of the Mander and Mitchenson Theatre Collection

in Henry Irving's company at the Lyceum Theatre, London, and in several touring companies (1889–97), but he abandoned acting before undertaking his first important theatrical productions: Henry Purcell's *Dido and Aeneas* (1900) and George Frideric Handel's *Acis and Galatea* (1902) for the Purcell Operatic Society and Henrik Ibsen's *The Vikings* (1903) for Terry's company at the Imperial Theatre, London. In his sets, decor, and costumes for these productions, Craig asserted his revolutionary theories of theatrical design. His productions were marked by simplicity and unity of concept, with the emphasis being placed on the movement of actors and of light. But his productions—their artistic impact notwithstanding—were commercial failures, and the financial support that would have permitted him to develop his ideas was not forthcoming in England.

Consequently, in 1904, Craig went into voluntary exile, accepting the invitation of Count Harry Kessler—the arbiter of taste at the Weimar court—to visit Germany. While there he wrote his best-known essay, *The Art of the Theatre* (1905; republished, with articles from *The Mask*, as *On the Art of the Theatre*, 1911). He finally arrived in Italy, where he created the sets for a production of Ibsen's *Rosmersholm* for Eleonora Duse and settled in Florence. There he invented (1907) the portable folding screens used in set designs for a coproduction with Konstantin Stanislavsky of *Hamlet* at the Moscow Art Theatre in 1912. There too he made the copperplate etchings that record his researches into the creation of an art of movement, and he founded and edited his international review, *The Mask* (1908–29), which helped to make his theatrical ideals widely known and in which many of his articles—notably "The Actor and the Übermarionette" (1907)—were published. In Florence he published the etchings illustrating his scenographic concepts in *A Portfolio of Etchings* (1908) and also wrote *Towards a New Theatre* (1913), which contains 40 plates of his original scenic designs. He established his School for the Art of the Theatre in 1903.

After World War I, which put an end to his school's activities, Craig turned increasingly to theatrical history, writing *Henry Irving* (1930) and *Ellen Terry and Her Secret Self* (1931). He did take part in some outstanding productions, though, designing sets and scenery for Ibsen's *The Pretenders* (Copenhagen, 1926) and the decor for *Macbeth* (New York, 1928). His work as an engraver reached its peak in the illustrations for the Cranach Press *Hamlet* (1929), and among his notable postwar publications were the essays and articles collected in *Scene* (1923), in which he defined his theory of the history of stage design and expounded his ideas of a stage setting based on the use of portable screens and the part played by light in evoking atmosphere. In 1931 he went to live in France and in 1948 made his home in the south of that country, where he wrote his memoirs, entitled *Index to the Story of My Days* (1957).

From the outset, Craig propounded an art of the theatre in which reality, instead of being reproduced by traditional representational methods, would be transcended and interpreted by symbol. To him outlines, forms, colours, and lighting were a means of conveying atmosphere. His most original theatrical concept was that the entire "scene" in a dramatic work should be movable in all parts; both the floor and the ceiling were to be composed of squares that, under the control of the artist, could be moved up and down independently or in groups within a constantly changing pattern of light. Thus an emotional response might arise in the audience through the abstract movement of these plastic forms. Craig's stage productions and, even more, his writings and his highly stylized stage designs, woodcuts, and etchings strongly influenced the antinaturalist trends of the modern theatre in the first half of the 20th century. (De.B./Ed.)

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Craig, James: *see* Craigavon, James Craig, 1st Viscount.

Craig, Sir James (Henry) (b. 1748, Gibraltar—d. Jan. 12, 1812, London, Eng.), British soldier in the American Revolutionary War who later served as governor-general of Canada (1807–11) and was charged by French-Canadians with conducting a "reign of terror" in Quebec.

Craig entered the British army at the age of 15 and was made captain in 1771. In his Revolutionary War service he was wounded at the Battle of Bunker Hill (June 17, 1775). He helped repel the Continental Army's invasion of Canada (1776) and was noted for distinguished service in the early part of General John Burgoyne's invasion of the Hudson River valley.

After fighting in North Carolina (1781), Craig was promoted to lieutenant colonel. He played a leading role in the capture (1795) of the Dutch colony of the Cape of Good Hope and served as its temporary governor (1795–97). Knighted in 1797, he was given commands in India and in England and saw service in the renewed Napoleonic Wars.

In 1807 Craig was appointed governor-general of Canada, a post to which he was temperamentally unsuited. His cooperation with the governing clique in Quebec and his repressive policy toward the French-Canadians were not popular. He resigned his post in 1811 and returned to England, where he was promoted to general just before his death.

Craigavon, district and borough, Northern Ireland, established in 1973 from portions of Counties Antrim, Down, and Armagh. It is situated south of Lough (lake) Neagh and is bordered by the districts of Dungannon to the west, Armagh to the southwest, Banbridge to the southeast, and Lisburn to the east. Its administrative seat is Craigavon new town. In the northern part of Craigavon district, near the shore of Lough Neagh, the land is flat and composed largely of peat soils; in the south it rises to undulating lowlands with scattered drumlins (oval mounds of glacial till). Craigavon is an important fruit-growing district, and cattle, poultry, and pigs are raised as well. Industries in the district include textiles, metal fabrication, food processing, pharmaceutical products, and the manufacture of motor vehicle components. A national highway extends from Belfast through Craigavon district to the town of Dungannon. Area 147 square miles (381 square km). Pop. (1991 prelim.) 74,350.

Craigavon, new town (built after 1966), Craigavon district, Northern Ireland, southwest of Belfast. Craigavon new town was developed under the New Towns Act of 1965 as a commercial, light industrial, and residential centre linking the older towns of Lurgan and Portadown. It was named after James Craig, 1st Viscount Craigavon, the first prime minister (1921–40) of Northern Ireland. The new town's planning concept aimed at creating an urban area set in the countryside with linear interior road patterns and easy external access. By the early 1980s Craigavon had become a major centre of economic development outside of Belfast. Pop. (1981) 10,195.

Craigavon, James Craig, 1st Viscount (b. Jan. 8, 1871, Sydenham, Belfast, County Antrim, Ire. [now in Northern Ireland]—d. Nov. 24, 1940, Glencraig, County Down, N.Ire.), soldier and statesman, a leading advocate of maintaining the union between Ireland and Great Britain, and the first prime minister of Northern Ireland (from June 22, 1921, until his death).

Craig became a stockbroker, served with an Irish unit in the South African (Boer) War, and in 1906 entered Parliament as a Unionist. In the acute Irish Home Rule controversy after 1910, he emerged as a leader of the Ulster Unionists and worked with Sir Edward Carson for the exclusion of Ulster from Home



Craigavon
Keystone

Rule. In addition to his part in the threats to establish a provisional government of Ulster, Craig was involved in gunrunning and in the organization of an Ulster volunteer force.

During World War I Craig recruited and organized the 36th (Ulster) Division. He held various British government offices until 1920, when the Government of Ireland Act came into force and he became prime minister. For 19 years he led the Unionist Party to large majorities in every general election.

The civil war in the Irish Free State spread

into Northern Ireland to some extent; bombings, political murders, and incendiary acts were common, and in 1922 more than 200 persons were killed. In 1925 the Craig government signed an agreement with the Free State and Britain to preserve the Irish frontier. His government also reformed the lower courts, nationalized road transport, and introduced new systems of education and agricultural marketing.

Craig was created a baronet in 1918 and a viscount in 1927. A biography, *Craigavon, Ulsterman* (1948), was written by St. John Greer Ervine.

Craigie, Sir William Alexander (b. Aug. 13, 1867, Dundee, Angus, Scot.—d. Sept. 2, 1957, Watlington, Oxfordshire, Eng.) Scottish lexicographer and language and literature scholar who was joint editor (1901–33) of *The Oxford English Dictionary* and chief editor (1923–36) of the four-volume *Historical Dictionary of American English.*

Craigie attended St. Andrews University, studied Scandinavian languages in Copenhagen, and taught at St. Andrews before joining the Oxford dictionary staff in 1897; from 1905 on he taught at the University of Oxford. His writings include several works on Scandinavian, English, and Scottish philology and literature.

Crailsheim, city, Baden-Württemberg *Land* (state), southwestern Germany. It lies along the Jagst River, about 45 miles (70 km) northeast of Stuttgart. A Frankish settlement in the 6th and 7th centuries, it was chartered in 1320 and passed to the Hohenzollerns in 1399 and to Württemberg in 1810. Most of the old city with its historic buildings was destroyed in World War II, but the Romanesque church of St. John and the 14th-century Chapel of Our Lady were subsequently restored. Crailsheim is a rail and road junction and manufactures machinery, clothing, canned foods, and wood products. Pop. (1989 est.) 26,678.

Craiova, city, capital of Dolj *judeţ* (county), southwestern Romania. It is situated near the Jiu River, 115 miles (185 km) west of Bucharest. Settlement there is of long standing. Close to the city archaeologists have discovered the remains of a Roman fortress built under Trajan. From the late 15th to the 18th century Craiova was the residence of the military governors of the region. The city prospered as a regional trading centre despite an earthquake in 1790, a plague in 1795, and a Turkish assault in 1802 during which it was burned. The oldest remaining architectural monument is the St. Dimitru church, rebuilt several times but still a likeness of the original erected in 1652.

The city has a university (1966), a state philharmonic orchestra and theatre, and a regional museum. Manufactures include diesel locomotives, transformers, mining equipment, and machine tools, and there is some food processing. Pop. (1985 est.) 275,098.

crake, any of numerous marsh birds of the family Rallidae (order Gruiformes), generally any small rail (*q.v.*) in which the bill is short and conical. The name is chiefly European but can be extended to New World rails of this type. The most widespread genus is *Porzana* (13 species), typified by the spotted crake (*P. porzana*) found in Europe and eastward to Mongolia; in winter it reaches southern Asia and northern Africa. It is a brown bird 25 cm (9 inches) long with a light-spotted breast and buffy undertail. Its New World counterpart is the sora, or Carolina rail (*P. carolina*). The sora is about 23 cm (9 inches) long and grayish brown with black on the face and throat, with a short yellow bill. Other *Porzana* species are Baillon's crake (*P. pusilla*), occurring in parts of Europe, Asia, Africa, Australia, and New Zealand; the spotless crake (*P. tabuensis*), ranging from Australia to the Philippines;



Little crake (*Porzana parva*)
D. Zingel—Bruce Coleman Inc./EB Inc

and the little crake (*P. parva*), a relatively common Eurasian form.

The corncrake, or land rail (*Crex crex*), of Europe and Asia, migrating south to Africa, is a slightly larger brown bird with a rather stout bill and wings showing reddish in flight. Africa's black crake (*Limnocorax flavirostra*) is a 20-centimetre- (8-inch-) long form, black with a green bill and pink legs. It is less secretive than most. Pygmy crakes (*Sarothrura* species), about 14 cm (6 inches) long, are very secretive, inhabiting swampy African forests. Other New World crakes are the several species of *Laterallus* (including the black rail, *L. jamaicensis*) and several related genera.

crakow, also spelled CRACKOWE, long, pointed, spiked shoe worn by both men and women first in the mid-14th century and then condemned by law. Crakows were named after the city of Kraków (Cracow), Pol., and they were also known as poulaines (Polish).



Physician and patient wearing crakows, illustration from the *Anathomia* of Guido da Vigevano, 1345; in the Musée Condé, Chantilly, Fr.
Giraudon—Art Resource/EB Inc.

Crakows were admired on the feet of the courtiers of Anne of Bohemia, who married Richard II of England. The exaggerated toes were imitated even in armour.

Cram, Donald J(ames) (b. April 22, 1919, Chester, Vt., U.S.), American chemist who, along with Charles J. Pedersen and Jean-Marie Lehn, was awarded the 1987 Nobel Prize for Chemistry for his creation of molecules that mimic the chemical behaviour of molecules found in living systems.

Cram was educated at Rollins College, Fla., and at the University of Nebraska, and he received a Ph.D. degree in organic chemistry from Harvard University in 1947. He joined the faculty of the University of California at Los Angeles in 1947 and became a full professor there in 1956.

Cram amplified and expanded upon Pedersen's ground-breaking synthesis of the crown ethers—basically two-dimensional organic compounds that are able to recognize and selectively combine with the ions of certain metal elements. Cram synthesized molecules that took this chemistry into three dimensions, creating an array of differently shaped molecules that could interact selectively with other chemicals because of their complementary three-dimensional structures. His work represented a large step toward the synthesis of functional laboratory-made mimics of enzymes and other natural molecules whose special chemical behaviour is due to their characteristic structure.

Cram, Ralph Adams (b. Dec. 16, 1863, Hampton Falls, N.H., U.S.—d. Sept. 22, 1942, Boston), architect and writer, the foremost Gothic revival architect in the United States.

Inspired by the influential English critic John Ruskin, Cram became an ardent advocate of and authority on English and French Gothic styles. In 1888 he opened an architectural firm in Boston, where he became associated with B.G. Goodhue and later with F.W. Ferguson. Together they designed St. Thomas' Church (New York City), Euclid Avenue Presbyterian Church (Cleveland), the First Baptist Church (Pittsburgh), and many other major churches, as well as the buildings of the United States Military Academy at West Point, N.Y. Cram and Ferguson transformed the Cathedral of St. John the Divine (New York City) from a Romanesque to a late Gothic building, making it one of the great cathedrals of the world.

Cram attempted to create buildings that would convey spiritual values as a corrective to technological civilization. He insisted that educational buildings be Gothic and designed the graduate college (1913) and chapel (1929) at Princeton University in this style. His influence helped establish Gothic as the standard style for the American college and university buildings of the period. He also designed buildings in other styles, including Classical, Byzantine, and American Colonial. Cram was professor of architecture at Massachusetts Institute of Technology from 1914 to 1921.

He wrote many scholarly and articulate books on architecture, aesthetics, and sociology, including *Church Building* (1901); *The Gothic Quest* (1907); *The Ministry of Art* (1914); *The Substance of Gothic* (1916); *The Nemesis of Mediocrity* (1918); *My Life in Architecture* (1936); and *The End of Democracy* (1937).

Cramer, Johann Baptist (b. Feb. 24, 1771, Mannheim, Rhenish Palatinate [Germany]—d. April 16, 1858, London), one of the leading pianists of the period of transition from Classicism to Romanticism, composer, and founder (1824) of the London music publishing firm Cramer & Company.

Cramer was taken to England in 1772 by his father. His piano teachers included the noted pianist and composer Muzio Clementi, under whom he developed the exceptional abilities that gained him a European reputation as a performer. His playing stressed smoothness and clarity and was restrained in comparison with the bravura of the later Romantic pianists. A prolific composer, he is remembered for his piano studies, which, like his playing, were highly regarded by Beethoven.

Cramer's rule, in linear and multilinear algebra, procedure for solving systems of simultaneous linear equations by means of

determinants (*see also* determinant; linear equation). If

$$a_{11}x_1 + \ldots + a_{1n}x_n = b_1$$
$$a_{n1}x_1 + \ldots + a_{nn}x_n = b_n$$

is a system of n simultaneous linear equations in n unknowns, then a solution of this sytem is

$$x_i = \det \boldsymbol{B}_i / \det \boldsymbol{A};\ i = 1, 2, \ldots, n$$

in which det $\boldsymbol{A}$ is the determinant of the matrix $\boldsymbol{A}$ (in which the elements of each row are the coefficients a_{ij} of one of the equations) and the matrix $\boldsymbol{B}_i$ is formed by replacing the ith column of $\boldsymbol{A}$ by the column of constants $b_1, \ldots, b_n$.

If det $\boldsymbol{A}$ equals zero, the system has no unique solution; that is, there is no set $x_1, \ldots, x_n$ that satisfies all of the equations.

cramp, painful, involuntary, and sustained contraction of muscle, most common in the limbs but also affecting certain internal organs. Examples of cramping include menstrual cramps and spasms of the circular muscles of the bowel (irritable colon), blood vessels (vasospasm), and pylorus of the stomach (pylorospasm; the pylorus is the opening from the stomach to the intestine).

Cramps of the muscles of the extremities may occur in a variety of circumstances. Overexertion in cold water is responsible for swimmer's cramp of the legs or stomach, and the accompanying severe pain and temporary paralysis may lead to drowning unless the individual is rescued immediately. Severe cramp in the calf of a leg can awaken people from a sound sleep. The origin may be overstretching or strain of the affected muscle on the previous day, unconscious tensing of the muscle during sleep, or, especially in older individuals, poor circulation. Toe cramps are usually less painful than leg cramps.

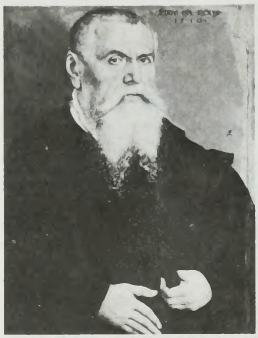
Menstrual cramps, which involve contractions of the uterine muscle, occur before or during menstruation and may last from several hours to a day. They occur most commonly in younger women who have not had children. Heat cramps in the muscles of the extremities or abdomen stem from loss of salt after periods of profuse perspiration. Overexertion in a hot environment usually is responsible for this condition.

Professional or occupational cramp is a functional spasm affecting certain muscles that are used constantly in a daily occupation. At first there is a gradually increasing difficulty, or clumsiness, in making the movements required for the work at hand. Writers, for example, cannot move the pen or pencil with freedom, and the typist loses his dexterity in finding the right key on the keyboard. Painters, pianists, and tailors and seamstresses are other candidates for occupational cramp. Cramping usually fails to occur when the same muscles are employed in tasks not associated with the occupation, suggesting a psychological basis for the disorder. Indeed, there are many neurological, reflex, and psychological causes for muscle cramps.

Cramps are particularly bothersome in victims of Parkinson's disease and Huntington's chorea. Tetany (*q.v.*) is a severe form of cramping that is noticed first in muscles located in the extremities.

crampfish: *see* electric ray.

Cranach, Lucas, THE ELDER, original name LUCAS MÜLLER (b. 1472, Cranach, bishopric of Bamberg [now Kronach, Ger.]—d. Oct. 16, 1553, Weimar, Saxe-Weimar), leading painter of Saxony, and one of the most important and influential artists in 16th-century German art. Among his vast output of paintings and woodcuts, the most important are altarpieces,



Cranach, self-portrait, tempera on panel, 1550; in the Uffizi, Florence
Alinari—Art Resource

court portraits and portraits of the Protestant Reformers, and innumerable pictures of women—elongated female nudes and fashionably dressed ladies with titles from the Bible or mythology.

Life and career. Lucas Müller was born in a village approximately 55 miles (90 km) north of Nürnberg. Although only a year younger, he survived Albrecht Dürer, the great genius of German art, by 25 years and, in fact, outlived all the significant German artists of his time. Lucas's teacher was his father, the painter Hans Müller, with whom he worked from 1495 to 1498. He is known to have been in Coburg in 1501, but the earliest of his works that have been preserved date from about 1502, when he was already 30 and living in Vienna. It was in that city that he dropped the surname of Müller, calling himself Cranach after his hometown, which is now spelled Kronach.

In Vienna Cranach made an important contribution to the painting and illustrations of the Danube school, the art of the Austrian Danubian region around Vienna and other towns. In Vienna he also came in contact with the humanists teaching at the university and did portraits of the scholars Johannes Stephan Reuss (1503) and Johannes Cuspinian (*c.* 1502–03).

Presumably while Cranach was still in Vienna, he received news of his appointment as court painter to the elector Frederick the Wise of Saxony; he must already have been a famous artist, for he was given two and a half times the salary paid to his predecessor. In spring 1505 he arrived in Wittenberg, a university town on the Elbe River and seat of the electors, where he remained for 45 years, until 1550, as court painter. He became a prominent citizen, serving as a member of the town council in 1519–20 and as burgomaster three times in the years 1537–44. Through Cranach, who received important commissions from three successive electors and caused many young artists to come to Wittenberg, the town became an art centre.

The Protestant Reformation had begun in 1517 in Wittenberg with Martin Luther's Ninety-five Theses. Cranach was on friendly terms with Luther, who had been a teacher at the University of Wittenberg since 1508. Cranach painted portraits of Luther, his wife, Katherina von Bora, and his parents. Through these and other portraits, he helped form today's image of Luther's circle. Indeed, apart from his other duties as court artist, Cranach became the chief pictorial propagandist of the Protestant cause in Germany, multiplying the images of the Reformers and the Protestant princes in innumerable painted, engraved, and woodcut portraits. The scope of this activity is indicated by a single payment in the electoral accounts (1533) for "sixty pairs of small paintings of the late Electors." Cranach also did altarpieces and paintings for Lutheran churches. His works were sought after by Protestant and Roman Catholic patrons alike, and hundreds of pictures now in museums and private collections testify to his exceptional productivity. Aside from his paintings, there are more than 100 separate woodcuts by him.

Paintings. Cranach did not sign his works with his full name. The early ones, before 1504, were unsigned; from 1504 to 1506 his signature consisted of an entwined "LC"; from 1506 to 1509, it consisted of the separated initials "LC"; from 1509 to 1514, it consisted of these spaced initials and his coat of arms, the winged serpent, which became his sole signature in 1515. All works, even those that had issued from his large workshop or studio (in which he often employed 10 or more assistants), henceforth carried this device, which was also used by his son Lucas the Younger, until the latter's death in 1586. This gave rise to many problems of attribution that still remain unsolved. The fact that so few works bear any date further complicates the establishment of a Cranach chronology.

It is certain, however, that Cranach's style was fully formed and underwent little development after about 1515, and the highly finished, mass-produced paintings after that date suffer by comparison with the more individual works he painted in early adulthood. The paintings the 30-year-old artist did in Vienna were of a profoundly devotional kind set in the wild landscapes of the Alpine foothills, with ruins and windswept trees. These pictures show Cranach as an avant-garde artist of considerable emotional force, and one of the initiators of the Danube school. Notable among them are a "Crucifixion" (*c.* 1500) and "St. Jerome in Penitence" (1502; Kunsthistorisches Museum, Vienna).

The first decade of Cranach's stay at Wittenberg was marked by a series of experiments in which he adapted his style to suit the demands of the Saxon court. The right wing of the "St. Catherine Altarpiece" (1506; Gemäldegalerie, Dresden) already shows a radical break with his earlier style; there is exquisite detail in the realistic portrait heads, but courtly decorum has purged the scene of all emotion and given it a decorative bias, with strong emphasis on the patterns of dress. Following his visit to the Netherlands in 1508, Cranach experimented with Italo-Netherlandish ideas of spatial construction and with monumental nudes, but his true talent lay elsewhere, as is shown by the splendid full-length portraits of "Duke Henry the Pious" and "Duchess Katharina von Mecklenburg" (1514; Gemäldegalerie, Dresden), which mark the establishment of his official portrait style. Here, space and volume are annihilated; magnificent clothes, set off by a featureless backdrop, are topped by faces reduced to their essential, typical features. Cranach was a pioneer of the frigid state portraiture of the 16th century, but he fell short of the icy reserve of his successors—Hans Holbein the Younger and Bronzino—because his abiding Gothic taste invariably led him to exaggerate a feature or elaborate a beard or dress for the sake of linear rhythms or calligraphic effects. With male sitters his method sometimes yields an image of startling power—*e.g.*, the "Portrait of Dr. J. Scheyring" (1529; Royal Museum of Fine Arts, Brussels). His female portraits are uniformly vapid, however.

The resurgence of Gothic linear rhythms is fundamental for the whole of Cranach's later work, in which the borderline between sacred and mundane art is blurred. He represented female saints as beautiful and elegant ladies in fashionable dress and covered with jewelry. His "Reclining River Nymph at the Fountain"

(1518; Museum of Fine Art, Leipzig) shows with what assurance he translated a Renaissance model—Giorgione's "Venus"—into his personal language of linear arabesque. This work inaugurated a long series of paintings of Venus, Lucretia, the Graces, the judgment of Paris, and other subjects that serve as pretexts for the sensuous female nude, in which Cranach appears as a kind of 16th-century François Boucher. The naive elegance of these ladies, whose slender, sinuous bodies defy basic principles of anatomy, were clearly to the taste of the German courts and have an enduring charm. But in conception and style they look back to the International Gothic style of a century before. Thus from a historical viewpoint Cranach's work was a backwater in European art of the 16th century. And though he was the dominant figure in the painting of northeastern Germany during his lifetime, his influence was confined to his immediate circle.



"The Judgment of Paris," oil on wood by Lucas Cranach, 1530; in the Staatliche Kunsthalle, Karlsruhe, Ger.
Staatliche Kunsthalle Karlsruhe

Cranach is called *Pictor celerrimus* ("swiftest of painters") on his tombstone, and his contemporaries never ceased to marvel at the speed with which he worked. But this very speed also suggested the limitations of his art, for his strength lay not in reflection, composition, and construction but in an impulsive creativity that was nourished by his imagination and fancy, particularly in unheroic and idyllic scenes. His art was especially popular in that period of great political upheavals, perhaps because his contemporaries, who in public life were the protagonists of embattled ideologies, yearned for beauty in man and in nature and for a peaceful refuge from the world's turmoil.

Both of Cranach's sons were members of his studio. The elder, Hans Cranach, who died in 1537, left a few signed works that are indistinguishable in style from those of his father. Lucas Cranach the Younger (1515–86), whose part in the joint production of the studio became important from about 1545, continued to work in the family style long after his father's death in 1553. (F.Th./D.Kg./Ed.)

MAJOR WORKS. "St. Francis Receiving the Stigmata" (*c.* 1502; Gemäldegalerie der Akademie der Bildenden Künste, Vienna); "St. Jerome in Penitence" (1502; Kunsthistorisches Museum, Vienna); "Christ on the Cross" (1503; Alte Pinakothek, Munich); "Rest on the Flight into Egypt" (1504; Staatliche Museen Preussischer Kulturbesitz, Berlin); "St. Catherine Altarpiece," right wing (1506; Gemäldegalerie, Dresden, Ger.); "The Holy Kinship" (*c.* 1510–12, Gemäldegalerie der Akademie der Bildenden Künste); "Duke Henry the Pious" and "Duchess Katharina von Mecklenburg" (1514; Gemäldegalerie); "Virgin and Child with St. Anne" (*c.* 1515–20; Alte Pinakothek); "The Nativity" (*c.* 1515–20; Gemäldegalerie); "A Prince of Saxony" and "A Princess of Saxony" (*c.* 1516–18; National Gallery of Art, Washington, D.C.); "Reclining River Nymph at the Fountain" (1518; Museum der Bildenden Kunste, Leipzig); "Martin Luther as St. George" (*c.* 1521; Kunstsammlungen, Weimar, Ger.); "David and Bathsheba" (1526; Staatliche Museen Preussischer Kulturbesitz); "Cardinal Albrecht of Brandenburg as St. Jerome" (1526; John and Mable Ringling Museum of Art, Sarasota, Fla.); "Adam and Eve" (1526; Courtauld Institute Galleries, London); "Portrait of Dr. J. Scheyring" (1529; Musées Royaux des Beaux Arts, Brussels); "The Stag Hunt of the Elector Frederick the Wise" (1529; Kunsthistorisches Museum); "Paradise" (1530; Kunsthistorisches Museum); "The Close of the Silver Age (?)" (*c.* 1530; National Gallery, London); "Apollo and Diana in a Wooded Landscape" (1530; Staatliche Museen Preussischer Kulturbesitz); "Venus and Cupid" (*c.* 1530; Staatliche Museen Preussischer Kulturbesitz); "The Judgment of Paris" (1530; Kunsthalle, Karlsruhe, Ger.); "Hercules and Antaeus" (*c.* 1530; private collection, Garmisch-Partenkirchen, Ger.); "Feast of Herod" (1531; Wadsworth Atheneum, Hartford, Conn.); "The Old Lover" (1531; Gemäldegalerie der Akademie der Bildenden Künste); "The Payment" (1532; Nationalmuseum, Stockholm); "Venus" (1532; Städelsches Kunstinstitut, Frankfurt am Main); "Self-Portrait" (1550; Uffizi, Florence).

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cranberry, fruit of any of several small creeping or trailing plants of the genus *Vaccinium* (family Ericaceae), related to the blueberries. The small-fruited, or northern, cranberry (*V. oxycoccus*) is found in marshy land in northern North America and Asia and in northern and central Europe. Its stems are wiry and creeping; the leaves are evergreen, oval or elliptical, and less than 1.2 cm (0.5 inch) long. Its small flowers appear in June and have a four-lobed, rose-tinted corolla. Its round, crimson berries, which ripen in September, are about the size of currants and are often spotted; they have an acid taste.

The American cranberry (*V. macrocarpon*) is found wild in the greater part of the northeastern United States. It is more robust than is *V. oxycoccus,* with larger, round, oblong, or pear-shaped berries that vary in colour from pink to very dark red or mottled red and white. It is cultivated on acid soils of peat or vegetable mold with a surface layer of sand. Additional sand is applied every few years. The American cranberry is grown extensively in Massachusetts, New Jersey, and Wisconsin and near the Pacific coast in Washington and Oregon. Early Black and Howes are the principal varieties in the east, McFarlin and Searls in Wisconsin, and McFarlin in the far west. Three recently developed varieties are Beckwith, Stevens, and Wilcox.

False-blossom virus and various types of fruit rot are the main diseases affecting cranberry crops. The vines are protected from frost by flooding.

Berry picking begins in early September and continues until late October. More than 110,000 metric tons are produced in the United States annually. Most cranberry products are consumed in the United States and Canada. In regions where they are grown, cranberries are a popular pie filling; their juice is widely marketed as a beverage; and in sauce and relish form, cranberries are traditionally associated with American and Canadian Thanksgiving and Christmas meals.

Other fruits of species in the genus *Vaccinium* are erroneously called cranberries. The cowberry, or foxberry (*V. vitis-idaea*), also known as mountain, or rock, cranberry, or as lingonberry, is not cultivated but is used in northern Europe and by Scandinavians in the United States. The southern cranberry, or red huckleberry (*V. erythrocarpum*), is found in mountainous areas from West Virginia to Georgia; its large berries are dark red in



Cranberry (*Vaccinium macrocarpon*)
Walter Chandoha

colour and of exceptionally fine flavour. The fruit of the cranberry tree (*see* Viburnum) is sometimes substituted for true cranberries in Canada and the northern United States.

Cranborne, Robert Cecil, Viscount: *see* Salisbury, Robert Cecil, 1st Earl of.

Cranbrook, city, southeastern corner of British Columbia, Canada. It lies in the Kootenay River valley on the western edge of the Rocky Mountain Trench. The region was first settled about 1863 by gold prospectors. Cranbrook was probably named for a town near the farm home in Kent, Eng., of one of the settlers, Colonel James Baker. The Canadian Pacific Railroad's Crowsnest branch line reached the site in 1898. Now a highway and railway junction and a service centre for ranchers, farmers, lumbermen, and miners, the city is the principal administrative headquarters for East Kootenay district. Its economy is based on forest industries, lead-zinc mining, and tourism. The Kootenay Indian Reservation is immediately to the north, and Fort Steele Historic Park (which includes a restored Kootenay village of 1890–1905) is 10 miles (16 km) northeast. Inc. city, 1905. Pop. (1991) 16,447.

Cranbrook, Gathorne Gathorne-Hardy, 1st earl of, VISCOUNT CRANBROOK OF HEMSTED, BARON MEDWAY OF HEMSTED PARK, original name (until 1878) GATHORNE HARDY (b. Oct. 1, 1814, Bradford, Yorkshire, Eng.—d. Oct. 30, 1906, Hemsted Park, Kent), English Conservative politician who was a strong proponent of British intervention in the Russo-Turkish conflict of 1877–78.

Called to the bar in 1840, Hardy entered Parliament in 1856, earning a reputation as a skilled debater and a staunch Conservative. In 1858–59 he was under secretary in the



1st Earl of Cranbrook, drawing by George Richmond, 1857; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Home Office. He entered the 14th Earl of Derby's Cabinet as president of the Poor Law Board (1866) and succeeded Spencer Walpole as home secretary (1867).

In the early 1870s he often acted as Benjamin Disraeli's deputy in the House of Commons. As war secretary (1874–78) he gained the full confidence of Queen Victoria. He strongly supported Disraeli's pro-Ottoman policy against Russia in the late 1870s. In 1878, after becoming secretary of state for India, he retired to the House of Lords as Viscount Cranbrook. In the first two governments of the 3rd Marquess of Salisbury (1885–86, 1886–92), Lord Cranbrook was president of the council. When he retired from public office in 1892, he was created earl and baron.

Crandall, Prudence (b. Sept. 3, 1803, Hopkinton, R.I., U.S.—d. Jan. 28, 1890, Elk Falls, Kan.), American schoolteacher whose attempt to educate black girls aroused controversy in the 1830s.

Educated in the Friends' school at Providence, R.I., she taught at Plainfield, Conn., and then in 1831 established a private academy for girls at Canterbury, Conn. Although the school was recognized as one of the best in the state, she lost her white patrons by admitting a black girl, and in March 1833, on the advice of William Lloyd Garrison and Samuel J. May, she opened a school for "young ladies and little misses of colour." For this she was socially ostracized; and eventually the state legislature passed Connecticut's Black Law (repealed in 1838), prohibiting the establishment of schools for nonresident blacks in any city or township of Connecticut without the consent of the local authorities. Crandall, refusing to submit, was arrested, tried, and convicted in the lower courts; the verdict, however, was reversed by the court of appeals in July 1834. Thereupon the local opposition to her redoubled, and in September 1834 she was finally forced to close her school. She married the Reverend Calvin Philleo, a Baptist clergyman, in 1834, and they moved to Illinois. After her husband's death, she lived with her brother in Kansas.

crane, any of 14 species of tall wading birds of the family Gruidae (order Gruiformes). Superficially, cranes resemble herons but usually are larger and have a partly naked head, a heavier bill, more compact plumage, and an elevated hind toe. In flight the long neck is stretched out in front, the stiltlike legs trailing out behind.



Crowned crane (*Balearica pavonina* [*regulorum*])

K.B. Newman—EB Inc.

Cranes form an ancient group, the earliest fossils having been recovered from Eocene deposits in North America. Living forms are found worldwide except in South America, but populations of many are endangered by hunting and habitat destruction.

These graceful terrestrial birds stalk about in marshes and on plains, eating small animals of all sorts as well as grain and grass shoots. Two olive-gray eggs spotted with brown are laid in a nest of grasses and weed stalks on drier ground in marsh or field. The same nest may be used year after year. The brownish, downy young can run about shortly after hatching. The trachea (windpipe) is simple in the chick but lengthens with age, coiling upon itself like a French horn. It lies buried in the hollow keel of the breastbone and reaches a length of 1.5 m (5 feet) in the adult whooping crane (*q.v.; Grus americana*).

The sandhill crane (*G. canadensis*) breeds from Alaska to Hudson Bay; it formerly bred in south-central Canada and the Great Lakes region of the United States but is now rare in these regions. This brownish-gray crane is about 90 to 110 cm (35 to 43 inches) long. Its call is long, harsh, and penetrating. The Florida sandhill crane (*G. c. pratensis*), a smaller race, breeds in Florida and southern Georgia and is nonmigratory. Other subspecies of sandhills are classified as rare or endangered. The common crane (*G. grus*) breeds in Europe and northern Asia, wintering in large flocks in northern Africa, India, and China. The Australian crane, native companion, or brolga (*G. rubicunda*), lives in Australia and southern New Guinea. The demoiselle crane (*Anthropoides virgo*) breeds in Algeria, southeastern Europe, and Central Asia; the crowned crane (*Balearica pavonina* [*regulorum*]), over nearly all of Africa; and the wattled crane (*Bugeranus carunculatus*), in eastern and southern Africa.

crane, any of a diverse group of machines that not only lift heavy objects but also shift them horizontally. Cranes are distinct from hoists, passenger elevators, and other devices intended solely or primarily for vertical lifting and from conveyors, which continuously lift or carry bulk materials such as grain or coal. Cranes have come into their present widespread application only since the introduction of steam engines, internal-combustion engines, and electric motors, beginning in the 19th century.

The most prominent component of that class of cranes known as derrick cranes is the jib, or boom; this is a long beam that is structurally reinforced so that it will not bend. The jib is supported or held aloft by guy wires running from its top to a vertical mast, or pillar, that is itself stiffly braced; the guy wires set the angle at which the jib leans. Along the entire length of the jib runs a pulley system whose cables or chains are wound and unwound around a drum, or cylinder, that is placed at the jib's base and is turned by a motor. The cable dropping from the top of the jib is attached to loads and lifts them vertically. The loads may also be moved from side to side by having the jib pivot, or rotate, on its base around the mast. A simple pivoting hand-operated jib crane is depicted in Figure 1.

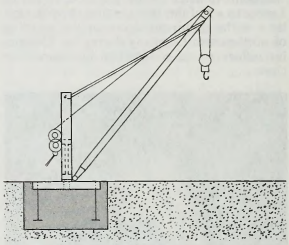

Figure 1: Simple pivoting hand-operated jib crane

A traveling jib crane is one in which the pulley system is suspended from a trolley, or wheeled carriage, moving along the length of the jib, as illustrated in Figure 2. Such traveling cranes usually have lifting capacities of from 5 to 250 tons. A potentially more powerful derrick is the floating crane, which is built on a barge for such purposes as constructing bridges or salvaging sunken objects. The *Musashi,* a large crane of this type built in Japan in 1974, can lift a 3,000-ton load.

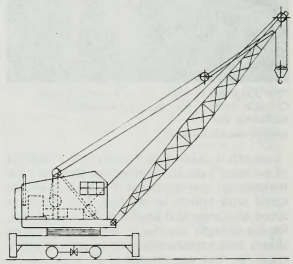

Figure 2: Traveling jib crane

Problems in maintaining stability always arise with jib cranes, and in the case of larger cranes that lift heavy loads at long outreaches, special care has to be taken to avoid tipping of the crane. For this purpose, besides the usual practice of mounting the hoisting machinery in such a way as to counterpoise part of the load on the boom, special ballast weights must be added to ensure that the crane will not be overturned.

The cantilever crane, a type much used in the construction of ships and tall buildings, has a horizontal boom that rests upon and can rotate about a vertical mast. The load is suspended from a trolley that can move along a track on the boom. A cantilever crane used in shipyards is depicted in Figure 3. During the erection of a building of many stories, the mast of a cantilever crane may be extended upward repeatedly as the height of the building increases. (*See also* cantilever.)

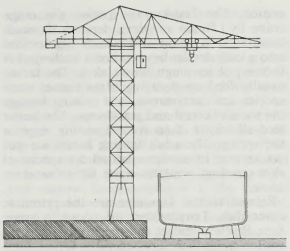

Figure 3: Cantilever crane used in shipyards

Bridge cranes comprise another important class of cranes in which the pulley system is suspended from a trolley that moves on tracks along one or two horizontal beams, called the bridge, that are supported at both ends. In most cases, the bridge itself can move along a pair of parallel rails, so that the crane can serve a large rectangular area. A circular space can be served by a rotary bridge crane, in which one end of the overhead beam is supported by a central pivot while the other end moves on a circular rail on the periphery of the area. The overhead traveling crane, a bridge crane for which the rails are mounted above the level of the ground or floor, has the advantage of causing no obstruction of the working area. Overhead traveling cranes are commonly used indoors, where their rails can be attached to the columns that support the roof. This type of crane is depicted in Figure 4. If the construction of overhead rails is impracticable, the ends of the bridge can be attached to upright towers that move on rails at the ground level; such cranes are called gantry, or goliath, cranes.

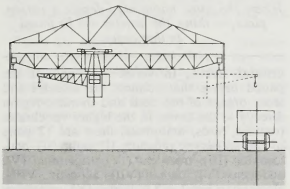

Figure 4: Overhead traveling crane

A commonly used type of small movable crane is the truck crane, which is a crane mounted on a heavy, modified truck. Such cranes frequently use unsupported telescoping booms; these are made up of collapsible sections that can be extended outward like the sections of an old nautical telescope or spyglass. The extension of the boom is usually managed hydraulically. Truck cranes make up in mobility and ease of transport what they lack in hoisting capacity.

Crane, Hart, in full HAROLD HART CRANE (b. July 21, 1899, Garrettsville, Ohio, U.S.—d. April 27, 1932, at sea, Caribbean Sea), American poet who celebrated the richness of life—including the life of the industrial age—in lyrics of visionary intensity. His most noted work, *The Bridge* (1930), was an attempt to create an epic myth of the American experience. As a coherent epic it has been deemed a failure, but many of its individual lyrics are judged to be among the best American poems of the 20th century.

Crane grew up in Cleveland, where his boyhood was disturbed by his parents' unhappy marriage, which culminated in divorce when he was 17. Emotionally ill at ease and self-destructive for the rest of his life, he was given to homosexual affairs and alcoholic bouts. He worked in a variety of jobs in New York City and Cleveland and, as his poetry began to be published in little magazines, eventually settled in New York in 1923. The clamourous vitality of urban life impressed him, and he attempted to deal with it in his poetry by insinuating into contemporary things a sense of continuity with an epic past.

His first published book was *White Buildings* (1926). It contains his long poem "For the Marriage of Faustus and Helen," which he wrote as an answer to what he considered to be the cultural pessimism of *The Waste Land,* by T.S. Eliot.

With financial assistance from his father and from the philanthropist Otto H. Kahn, Crane completed *The Bridge.* Inspired in part by the Brooklyn Bridge and standing for the creative power of man uniting the present and the past, the poem has 15 parts and is unified by a structure modeled after that of the symphony.

Crane was granted a Guggenheim Fellowship and went to Mexico City, where he planned to write another verse epic with a Mexican theme. The tensions of his life had become increasingly disturbing, however, and he did not write it, though he did write a good poem, "The Broken Tower" (1932), during his Mexican stay. On his way back to the United States he jumped from the ship into the Caribbean and was drowned.

His *Collected Poems* appeared in 1933 but was superseded in 1966 by *The Complete Poems and Selected Letters and Prose,* which incorporated some of his previously uncollected writings.

Crane, Stephen (b. Nov. 1, 1871, Newark, N.J., U.S.—d. June 5, 1900, Badenweiler, Baden, Ger.), American novelist, poet, and short-story writer, best known for his novels *Maggie: A Girl of the Streets* (1893) and *The Red Badge of Courage* (1895) and the short stories "The Open Boat," "The Bride Comes to Yellow Sky," and "The Blue Hotel."

Stephen's father, Jonathan Crane, was a Methodist minister who died in 1880, leaving Stephen, the youngest of 14 children, to be reared by his devout, strong-minded mother. After attending preparatory school at the Claverack College (1888–90), Crane spent less than two years at college and then went to New York City to live in a medical students' boardinghouse while freelancing his way to a literary career. While alternating bohemian student life and explorations of the Bowery slums with visits to genteel relatives in the country near Port Jervis, N.Y., Crane wrote his first book, *Maggie: A Girl of the Streets* (1893), a sympathetic study of an innocent and abused slum girl's descent into prostitution and her eventual suicide.

At that time so shocking that Crane published it under a pseudonym and at his own expense, *Maggie* left him to struggle as a poor and unknown freelance journalist, until he was befriended by Hamlin Garland and the influential critic William Dean Howells. Suddenly in 1895 the publication of *The Red Badge of Courage* and of his first book of poems, *The Black Riders,* brought him international fame. Strikingly different in tone and technique from *Maggie, The Red Badge of Courage* is a subtle impressionistic study of a young soldier trying to find reality amid the conflict of fierce warfare. The book's hero, Henry Fleming, survives his own fear, cowardice, and vainglory and goes on to discover courage, humility, and perhaps wisdom in the confused combat of an unnamed Civil War battle. Crane, who had as yet seen no war, was widely praised by veterans for his uncanny power to imagine and reproduce the sense of actual combat.



Stephen Crane, 1897

Stephen Crane Collection, Syracuse University Library Department of Special Collections

Crane's few remaining years were chaotic and personally disastrous. His unconventionality and his sympathy for the downtrodden aroused malicious gossip and false charges of drug addiction and Satanism that disgusted the fastidious author. His reputation as a war writer, his desire to see if he had guessed right about the psychology of combat, and his fascination with death and danger sent him to Greece and then to Cuba as a war correspondent.

His first attempt in 1897 to report on the insurrection in Cuba ended in near disaster; the ship *Commodore* on which he was traveling sank with $5,000 worth of ammunition, and Crane—reported drowned—finally rowed into shore in a dinghy with the captain, cook, and oiler, Crane scuttling his money belt of gold before swimming through dangerous surf. The result was one of the world's great short stories, "The Open Boat."

Unable to get to Cuba, Crane went to Greece to report the Greco-Turkish War for the New York *Journal.* He was accompanied by Cora Taylor, a former brothel-house proprietor. At the end of the war they settled in England in a villa at Oxted, Surrey, and in April 1898 Crane departed to report the Spanish-American War in Cuba, first for the New York *World* and then for the New York *Journal.* When the war ended, Crane wrote the first draft of *Active Service,* a novel of the Greek war. He finally returned to Cora in England nine months after his departure and settled in a costly 14th-century manor house at Brede Place, Sussex. Here Cora, a silly woman with social and literary pretensions, contributed to Crane's ruin by encouraging his own social ambitions. They ruined themselves financially by entertaining hordes of spongers, as well as close literary friends—including Joseph Conrad, Ford Madox Ford, H.G. Wells, Henry James, and Robert Barr, who completed Crane's Irish romance *The O'Ruddy.*

Crane now fought a desperate battle against time, illness, and debts. Privation and exposure in his Bowery years and as a correspondent, together with an almost deliberate disregard for his health, probably hastened the disease that killed him at an early age. He died of tuberculosis that was compounded by the recurrent malarial fever he had caught in Cuba.

After *The Red Badge of Courage,* Crane's few attempts at the novel were of small importance, but he achieved an extraordinary mastery of the short story. He exploited youthful small-town experiences in *The Monster and Other Stories* (1899) and *Whilomville Stories* (1900); the Bowery again in *George's Mother* (1896); an early trip to the southwest and Mexico in "The Blue Hotel" and "The Bride Comes to Yellow Sky"; the Civil War again in *The Little Regiment* (1896); and war corre-

spondent experiences in *The Open Boat and Other Tales of Adventure* (1898) and *Wounds in the Rain* (1900). In the best of these tales Crane showed a rare ability to shape colourful settings, dramatic action, and perceptive characterization into ironic explorations of human nature and destiny. In even briefer scope, rhymeless, cadenced and "free" in form, his unique, flashing poetry was extended into *War Is Kind* (1899).

Stephen Crane first broke new ground in *Maggie*, which evinced an uncompromising (then considered sordid) realism that initiated the literary trend of the succeeding generations—*i.e.*, the sociological novels of Frank Norris, Theodore Dreiser, and James T. Farrell. Crane intended *The Red Badge of Courage* to be "a psychological portrayal of fear," and reviewers rightly praised its psychological realism. The first nonromantic novel of the Civil War to attain widespread popularity, *The Red Badge of Courage* turned the tide of the prevailing convention about war fiction and established a new, if not unprecedented, one. The secret of Crane's success as war correspondent, journalist, novelist, short-story writer, and poet lay in his achieving tensions between irony and pity, illusion and reality, or the double mood of hope contradicted by despair. Crane was a great stylist and a master of the contradictory effect.

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Crane, Walter (b. Aug. 15, 1845, Liverpool, Lancashire, Eng.—d. March 14, 1915, Horsham, Sussex), English illustrator, painter, and designer primarily known for his imaginative illustrations of children's books.

He was the son of the portrait painter and miniaturist Thomas Crane (1808–59), and he served as an apprentice (1859–62) to the wood engraver W.J. Linton in London, where he was able to study both the Italian old masters and contemporary work by Dante Gabriel Rossetti and John Millais. Probably the most important technical development in his art derived from his study of Japanese colour prints, whose methods he used in a series of toy books (1869–75), thereby starting a new fashion. The ideas and teachings of the Pre-Raphaelites and of John Ruskin manifested themselves in his early paintings such as "The Lady of Shalott" (1862). He came to oppose the policies of the academy, which steadily refused his later work. In 1864 he began to illustrate an admirable series of sixpenny toy books of nursery rhymes for Edmund Evans,



"King Cole" from *Sing a Song of Sixpence* by Walter Crane, *c.* 1865
Mary Evans Picture Library

the colour printer. A new series, beginning with *The Frog Prince* (1873), was more elaborate, and to the Japanese influence was added that of Florentine 15th-century painting, following a long visit to Italy.

A strong didactic, moral element underlies much of Crane's work, and for several years he contributed weekly cartoons to the socialist periodicals *Justice* and *The Commonweal*. Many of these were collected as *Cartoons for the Cause* (1896). He was founder-president of the Art Workers' Guild and in 1888 founded the Arts and Crafts Exhibition Society. Crane designed Art Nouveau textiles and wallpaper that became internationally popular. Crane became art director first of the Manchester School of Art (1893–96), then of Reading College (1896–98), and finally principal of the Royal College of Art, South Kensington, London (1898–99). His chief importance lies in book illustration, the standard of which he helped greatly to raise. He worked with William Morris in 1894 on the page decorations of *The Story of the Glittering Plain*, printed by the Kelmscott Press in the style of 16th-century German and Italian woodcuts. Among the best of his book illustrations are those for Edmund Spenser's *Faerie Queene* (1895–97) and *The Shepheardes Calendar* (1897).

crane flower: *see* bird-of-paradise flower.

crane fly, also called DADDY LONG LEGS, any insect of the family Tipulidae (order Diptera). In English-speaking countries other than the United States, the crane fly is popularly called daddy long legs because it has a slender, mosquito-like body and extremely long legs. (In the United States, "daddy longlegs" generally refers to an arachnid.) Ranging in size from tiny to almost 3 cm (1.2 inches) long, these harmless, slow-flying insects are usually found around water or among abundant vegetation. The best-known species, the range crane fly (*Tipula simplex*), deposits its small black eggs in damp areas. Each egg hatches into a long slender larva, called a leatherjacket because of its tough brown skin. The larvae usually feed on decaying plant tissue; some species are carnivorous, and others damage the roots of cereal and grass crops. The larvae feed all winter, then enter a resting stage in the spring. The adult feeding habits are not yet known. In northern latitudes a species of slow-crawling, wingless crane fly is found on snow.



Range crane fly (*Tipula simplex*)
Stephen Dalton—EB Inc

Related to the Tipulidae are the primitive crane flies, Tanyderidae; the phantom crane flies, Ptychopteridae; and the winter gnats, or winter crane flies, Trichoceridae. These families closely resemble the Tipulidae, but the insects are smaller in size.

Cranfield, Lionel: *see* Middlesex, Lionel Cranfield, 1st Earl of.

Cranford, town ("urban township"), Union county, New Jersey, U.S. It lies along the Rahway River, immediately west of Elizabeth. The first permanent settler, John Denman, arrived about 1699, and the Denman Homestead (1720) is marked by a plaque. A bronze tablet identifies Crane's Ford, where, during the American Revolution, a light-horse troop was stationed to warn Washington at Morristown of British raiding parties. A secret tunnel in the cellar of Cory House (still standing) helped American soldiers evade the British. In the American Civil War era, Cory House was a stop along the Underground Railroad for sheltering fugitive slaves. Originally called Craneville, the community was renamed Cranford and incorporated in 1871. Although mainly residential, it has some manufactures, which include plastics and cosmetics. Union College (1933) is in the township. Pop. (1990) 22,633.

Where the same name may denote a person, place, or thing, the articles will be found in that order

cranial nerve, in vertebrates, any of the paired nerves that connect the muscles and sense organs of the head and thoracic region directly to the brain. In the higher vertebrates (reptiles, birds, mammals) there are 12 pairs of cranial nerves: olfactory (I), optic (II), oculomotor (III), trochlear (IV), trigeminal (V), abducens (VI), facial (VII), acoustic (VIII), glossopharyngeal (IX), vagus (X), accessory (XI), and hypoglossal (XII).

The lower vertebrates (fishes, amphibians) have 10 pairs. These nerves are made up of motor nerve cells (neurons), sensory neurons, or both. The 10th cranial nerve, the vagus, is one of the most important; it extends to many of the organs in the chest and upper abdomen. The cranial nerves are part of the parasympathetic nervous system.

craniopharyngioma, brain tumour arising from Rathke's pouch, an embryonic remnant posterior to and above the pituitary gland. Although most common in children, it can occur at any age and is believed to arise from epithelial tissue along a track between the pituitary and the brain. As it grows, the tumour compresses the optic nerve and other nearby structures, causing loss of vision, headaches, vomiting, behavioral changes, and sometimes loss of the sense of smell. Because of the proximity and frequent involvement of the pituitary, endocrine disorders like those caused by pituitary tumours may occur.

craniosynostosis, also called CRANIOSTOSIS, any of several types of cranial deformity—sometimes accompanied by other abnormalities—that result from the premature union of the skull vault bones. The defect is five times more frequent in males than in females, and

all simple forms seem to show a recessive pattern of inheritance.

Normally, the skull bones grow in response to pressure from the growing brain; growth occurs along the cranial sutures perpendicularly to the long axis of the suture. If the brain fails to grow or if all the sutures fuse early, an abnormally small head results. Of the various sutures, the sagittal (front to back along the top midline of the skull) most frequently fuses prematurely. Because the skull then cannot grow in width, the vault becomes long, high, and narrow (scaphocephaly). If the coronal suture (side to side near the front) fuses early, the skull becomes short front to back but wide and high (acrocephaly). Apert's syndrome (acrocephalosyndactyly) is a rare, heritable disorder in which premature closure of the coronal suture is associated with fused digits, defects of the brain and face, and sometimes other abnormalities. With premature closure of both sagittal and coronal sutures, growth occurs only vertically, and a tower-shaped skull develops. Crouzon's disease is a rare, heritable disorder characterized by the fusing of the coronal, sagittal, and sometimes lamboid (side to side posteriorly) sutures, undergrowth of the upper jaw, and other deformities. Premature closure of the metopic suture (which separates the frontal bone into halves for the first two years of life) produces a triangularly shaped head (trigonocephaly) and may be accompanied by brain damage.

Modern surgical procedures within the first two years of life minimize the deformities and decrease the possibility of such complications as mental retardation and blindness by allowing the sutures to remain in the open position until brain growth is complete.

crank, in mechanics, arm secured at right angle to a shaft with which it can rotate or oscillate. Next to the wheel, the crank is the most important motion-transmitting device, since, with the connecting rod, it provides means for converting linear to rotary motion, and vice versa.

There are many conflicting claims concerning the origin of the crank, but it has been reasonably well established that the first recognizable crank appeared in China early in the 1st century AD. The first cranks had two right-angle bends and were hand-operated. The carpenter's brace, invented about AD 1400 by a Flemish carpenter, may be considered the first complete crank, since it had four right-angle bends, with the arm and wrist of the operator forming the connecting rod.

The first mechanical connecting rods were used, it is said, on a treadle-operated machine in AD 1430. About this time flywheels were added to the rotating members to carry the members over the "dead" positions when the rod and the crank arm are lined up with each other (collinear).

Cranko, John (b. Aug. 15, 1927, Rustenburg, S.Af.—d. June 26, 1973, Dublin), dancer, choreographer, and ballet director best known for his work with the Stuttgart Ballet.

His basic dance training was at the Cape Town University Ballet School, where he performed as well as choreographed his first ballet, *The Soldier's Tale* (1942). In 1946 he joined the Sadler's Wells Ballet (later called the Royal Ballet) and continued to choreograph. *Pineapple Poll* (1951) and *The Prince of the Pagodas* (1957) were two of his early successes. Cranko found his choreographic opportunities limited, however, and he left to become the director of the Stuttgart Ballet in 1961.

Though the company was little known at the time, Cranko developed the Stuttgart into one of the world's leading companies. In addition to creating his own works, he re-choreographed a number of ballet classics. He was also the principal choreographer for the Bavarian State Opera Ballet from 1968 to 1971. His career ended suddenly when he died of a heart attack while returning with his company from a successful U.S. tour.

Cranmer, Thomas (b. July 2, 1489, Aslacton, Nottinghamshire, Eng.—d. March 21, 1556, Oxford), the first Protestant archbishop of Canterbury (1533–56), adviser to the English kings Henry VIII and Edward VI. As archbishop, he put the English Bible in parish churches, drew up the Book of Common Prayer, and composed a litany that remains in use today. Denounced for promoting Protestantism by the Catholic Mary I, he was convicted of heresy and burned at the stake.



Cranmer, detail of an oil painting by G. Flicctus, 1546; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Early life. Cranmer was the second son of Thomas Cranmer and Agnes (*née* Hatfield). His father seems to have belonged to the lowest rank of the gentry; at any rate, he had only enough property to endow his eldest son, John, so that Thomas and his younger brother were destined for the church. After experiencing the teaching of a "marvellous severe and cruel schoolmaster," whose ministrations Cranmer later maintained instilled in him a permanent uncertainty and pliability, the boy went on to Cambridge in 1503. In 1510 or 1511 he was elected to a fellowship at Jesus College but was soon compelled to vacate because he married a relative of the landlady of the Dolphin Inn. During this time he earned his living by teaching at Buckingham (later Magdalene) College, leaving his wife to lodge at the Dolphin; out of this arrangement grew a later story that he had started out in life as a hostler.

His wife died in childbirth soon after their marriage, however, and Jesus College restored Cranmer to his fellowship. He now entered the church and threw himself into his studies, becoming one of the outstanding theologians of his time, a man of immense, though not very original, learning. From about 1520 he belonged to a group of scholars who met regularly to discuss the theological problems raised by Luther's revolt; known to be inclined to the new way of thinking, they were dubbed "Little Germany." Among the group that was to lead the English Reformation were William Tyndale, Robert Barnes, Thomas Bilney, and, above all, Cranmer, who by 1525 included among his prayers one for the abolition of papal power in England.

Entry into royal service. Cranmer's ambitions for reform would have remained academic had it not been for the political events into which he was soon drawn, however contrary they were to his upbringing and tastes. From 1527 onward, Henry VIII pursued his desire to be freed from his first wife, Catherine of Aragon, in order to marry Anne Boleyn, and in 1529 the wheels of the "divorce" seized also upon Cranmer. In August a plague known as the sweating sickness swept the country and was especially severe in Cambridge; to escape the sickness, Cranmer left the town with two of his pupils, named Cressy and related to him through their mother, and went to their father's house at Waltham in Essex. The King was visiting in the immediate neighbourhood at the time, and two of his chief councillors, Stephen Gardiner and Edward Fox, soon afterward met Cranmer in those lodgings. Not surprisingly, they were led to discuss the King's meditated divorce. The old idea that Cranmer suggested consulting the canonists and the universities about the legality of a marriage with a deceased brother's widow was mistaken, but he evidently demonstrated his belief that the King had the right of it and advocated reliance on the services of home-bred theologians.

Henry, who was willing to secure the help of any likely head and hand, however obscure, summoned Cranmer for an interview and commanded him to lay aside all other pursuits in order to devote himself to the question of the divorce. Cranmer accepted a commission to write a propaganda treatise in the King's interest, stating the course he proposed and defending it by arguments from Scripture, the Fathers, and the decrees of general councils. He was commended to the hospitality of Anne Boleyn's father, the Earl of Wiltshire, in whose house at Durham Place he resided for some time; was appointed archdeacon of Taunton; became one of the King's chaplains; and also held a parochial benefice, the name of which is unknown. When the treatise was finished, Cranmer was called upon to defend its argument before the universities of Oxford and Cambridge; but in the end the debates, which on the whole endorsed his position, took place in his absence. He had already been sent to plead the cause before a more powerful if not a higher tribunal. An embassy, with the Earl of Wiltshire at its head, was dispatched to Rome in 1530, and Cranmer was an important member of it. He was received by the Pope with marked courtesy and was appointed grand penitentiary of England, but his argument, if discussed, did not lead to any practical decision of the divorce question.

In 1532 he was sent to Germany, officially as ambassador to the emperor Charles V, but with instructions to establish contact with the Lutheran princes. At Nürnberg he made the acquaintance of Andreas Osiander, whose theological position midway between Luther and the old orthodoxy appealed to Cranmer's cautious temperament, while Osiander's niece Margaret appealed even more strongly to one who had for too long remained in uncongenial celibacy. Despite his priest's orders he married her in 1532; at the same time, his theological views underwent a further decided change in the direction of reformed opinion.

Archbishop of Canterbury. The year 1532 proved to be a critical one altogether, for in August, William Warham, the aged archbishop of Canterbury, died. At first the usual practice of extending the vacancy for the benefit of the King's finances was followed, but by the end of the year it was apparent that the see would have to be filled because the divorce question was coming to a head. Thomas Cromwell's arrival in power as chief adviser in ecclesiastical matters had heralded a more energetic policy, and by January 1533 the act against appeals to Rome was being drafted, and Anne Boleyn was pregnant. Since Stephen Gardiner, the obvious candidate for the archbishopric, was out of favour, the King chose Cranmer; by March 1533 he was consecrated and instituted at Canterbury, with the assistance of confirmatory papal bulls and after a declaration that he took the obligatory oath

to the pope without feeling bound by it. He proceeded to do what was expected of him. In May he convened his court at Dunstable, declared the king's marriage to Catherine of Aragon void from the beginning, and pronounced the marriage to Anne Boleyn valid.

In 1536, convinced by the dubious evidence of Anne's alleged adulteries, he in turn invalidated that marriage; in 1540 he assisted in the freeing of Henry VIII from his fourth wife, Anne of Cleves; and in 1542 he was forced to be prominent in the proceedings that resulted in Catherine Howard's execution for treasonable unchastity. There is no question that in these matrimonial politics he did as he was told, though it is improbable that his private opinions on the issues in question in any way contradicted his public doings.

More significant are his activities as archbishop in the reconstructed church. Cranmer had not sought high promotion. His marriage just before his elevation to the archbishopric is fair proof that he expected no such career in the priesthood, in which a necessarily unacknowledged wife would be nothing but an embarrassment. Not until 1548 was he able publicly to recognize her. A story of his carrying her about with him in a chest with air holes is, however, part of the scurrilous legend that grew up around him. Once put in power, however, he could not avoid the consequences; a convinced reformer with leanings toward a succession of continental theological changes, he found himself assisting at the shaping of the Church of England under a master who on the whole had no taste for change. In cooperation with Cromwell he promoted the publication of an English Bible, made compulsory in the parishes by Cromwell's Injunctions of 1538.

Even before Henry VIII died (1547), Cranmer had drifted far in the direction of Protestantism; in 1545 he had composed a litany for the reformed Church of England, one of his masterpieces, still in use; and by 1538 he had abandoned the traditional Roman Catholic belief in transubstantiation—that Christ is rendered substantially present by the Eucharist (although the properties of bread and wine remain the same)—but retained his belief in the real presence of Christ in the Eucharist. As early as 1536 he was recognized by the northern religious rebels as the leading innovator. His position was in consequence far from comfortable after the Act of Six Articles (1539), which attacked those advocating marriage of the clergy and those denying transubstantiation, and Cromwell's fall in 1540.

During Henry's last years, Cranmer's enemies laid at least three elaborate plots to destroy him by convicting him of heresy, but on each occasion they were foiled by Henry's curious attachment to him. In Cranmer, this king, who as a rule kept himself entirely free from personal feelings for his servants and advisers, found a man whom he both trusted and liked. Unlike the rest of them, the archbishop was neither greedy nor devious; he sought nothing for himself, alone was willing to plead for those who fell into disfavour (a service he performed with equal courage and futility for Sir Thomas More, Anne Boleyn, Thomas Cromwell, and others), and miraculously retained Henry's goodwill throughout. The king regarded him with that mixture of awe and amusement that the worldly and selfish bestow on those who appear simple in affairs; he liked him, listened to him, protected him, but allowed him no political influence whatsoever. It was not surprising that he turned to Cranmer when death came.

Achievements under Edward VI. With the accession of Edward VI (Henry's only child by his third wife, Jane Seymour) in 1547, Cranmer's time really arrived. From the first, the young king's guardian, Edward Seymour, Duke of Somerset, demonstrated his intention to transform the Church of England into a Protestant church. When he fell in 1549 the expected Catholic reaction did not take place because John Dudley (later the Duke of Northumberland), who had ousted Seymour, decided to introduce an even more extreme brand of Reformed religion.

In the doctrinal labours demanded by these changes, Cranmer took the chief and directing part. In 1547 he was responsible for the publication of a *Book of Homilies* designed to meet the notorious grievance that the unreformed clergy did not preach enough. The first Prayer Book, moderately Protestant, appeared in 1549, to be followed in 1552 by the second, which was more outspokenly Protestant. Cranmer was personally responsible for much of the work, but he had the assistance of a number of foreign theologians for whom Edward VI's England acted as a magnet. The most influential of these was probably Martin Bucer from Strassburg, whose position on the Eucharist is reflected especially in the communion service of the second Prayer Book. It was not so much Bucer, however, who persuaded Cranmer away from the vague Lutheranism, which seems to have been his position in 1547, as either the Pole Jan Łaski the Younger or the Englishman Nicholas Ridley, both men possessed of a more determined and unquestioning temper than was the archbishop. The ferment of those years also produced Cranmer's Forty-two Articles (1553), a set of doctrinal formulas defining the dogmatic position of the Church of England on current religious controversies. All clergy, schoolmasters, and degree candidates in the universities were compelled to subscribe to the articles, which were later reduced to 39 and officially accepted by the Anglican church.

At this time, Cranmer also attempted to revise the canon law of the English church, a proposal never enacted but published in 1571 as the *Reformatio Legum Ecclesiasticarum.* Though still deprived of any serious influence in affairs of state, Cranmer dominated and guided the religious revolution of the reign by his learning, authority, and diligence. He settled in turn the doctrine, ritual, and law of his church in a manner that was to remain; above all, the Church of England owed to him the beauty of its liturgy, which shows him to have been not only a theologian but something of a poet.

Trial for heresy. Edward VI's approaching death (July 1553) at long last involved Cranmer fatally in politics. After prolonged resistance he was forced by the dying king to subscribe the document by which Northumberland hoped to upset custom, statute law, and the will of Henry VIII in order to transfer the succession from the princess Mary (Henry's daughter by Catherine of Aragon) to his daughter-in-law, the great-niece of Henry, Lady Jane Grey. Although proclaimed queen, she was deposed nine days later, and Mary I acceded to the throne. The failure of the plot brought charges of treason against Cranmer, and he was condemned by Mary's government in November 1553. It had in any case become obvious before this that his future held no more bright promises. Mary's accession temporarily destroyed the English Reformation; Cranmer's embittered enemy Stephen Gardiner was at once released from imprisonment and promoted to the chancellorship, and in November 1554 Cardinal Reginald Pole arrived to occupy Canterbury and direct the extirpation of heresy.

Cranmer's trial for treason was but a pretext; the queen and her advisers did not intend him to die for the technical offense of having supported Northumberland's insane conspiracy but meant to destroy him for his longstanding offense in promoting Protestantism. They had to wait until they could get Parliament to repeal the acts of Henry VIII and Edward VI and to reintroduce the laws that enabled the secular arm to burn heretics. With Ridley and Hugh Latimer, a Protestant who had formerly been bishop of Worcester, Cranmer in March 1554 was removed to Oxford, where the Counter-Reformation felt safer than in Cranmer's own university. Late in that year the heresy laws were revived, and in September 1555, after enfeebling imprisonment, Cranmer was subjected to a long trial in which he stoutly defended himself against the charge of having unjustifiably departed from his own earlier position on the sacraments and the papacy. The foregone conclusion was arrived at after a variety of technical processes; on Feb. 14, 1556, in a ceremony full of carefully designed humiliation, he was degraded from his episcopal and sacerdotal offices and handed over to the state.

Martyrdom. But Mary's government had not done with him yet. The burning of the archheretic would be an even more useful deed if he could be made to renounce his errors in public, and so a number of ways were tried to break him down. The previous October he had been forced to witness the martyrdom of Ridley and Latimer; now he was temporarily removed from prison into more pleasant surroundings while government agents tried to stir up his doubts. In fact, Cranmer signed five so-called recantations of which the first four did no more than record his consistent belief that what monarch and Parliament had decreed must be obeyed by all Englishmen. His convictions on this point logically forced him to accept the Marian Counter-Reformation as valid, and this acceptance, in turn, in his weak and uncertain state, not unaffected by the delay of death and the faint hope of mercy, finally induced him to make an abject recantation (the sixth) of his whole religious development.

The government had every reason to hope that the publication of Cranmer's defection would wreck Protestantism in England. Although the vengeful Gardiner had died, Queen Mary and Cardinal Pole were quite determined that the sentence must be carried out. Thus on March 21, 1556, Cranmer was taken out to be burned, being first required to make his recantation public. The proximity of death, however, restored both his faith and his dignity. With nothing to lose and only peace of soul to gain, he shocked his enemies by disavowing his recantation and emphatically reasserting that the pope's power was usurped and transubstantiation untrue. At one blow Cranmer undid all that government propaganda had achieved and restored heart to the surviving Reformers. Then he went to his death. As he had promised, he steadfastly held his right hand—which "had offended" by signing the false recantations—into the flame until it was consumed. His brave and dignified end made an enormous impression.

Assessment. Cranmer was a very human man who in consequence has attracted a good deal of obloquy from those who have not had to share his tribulations and temptations. Essentially a scholar, he lacked the strength that singlemindedness and fanaticism instill into the less reflective. He has sometimes been thought of as infirm in moral purpose, but this is to misjudge him. His doubts at the last were cleverly induced by mental torture, and his gradual development away from traditional orthodoxy into more and more definitely Protestant views during the Reformation represents fairly the spiritual career of a man who obeyed reason rather than instinct.

Cranmer was always learning and was never ashamed to admit it; his was essentially a humble temper. He had not sought high office and did not particularly enjoy it, though he valued his place for the chance it gave him to promote the changes that he came to regard as essential to the establishment of God's truth. He refused to bear malice or to pun-

ish those who traduced him. When Cromwell once told him, in some exasperation, that the "popish knaves" would have his eyes and cut his throat before he would do something about it, Cranmer turned the prophecy with a shrug. In a persecuting age he stood out for his clemency, though in 1550 he did take part in the trial and burning of Joan Bocher. It should be remembered, however, that she was condemned for open blasphemy in denying the Trinity, the one offense that all the church had regarded as unforgivable ever since the struggle with Arianism. For the authority of the church Cranmer had a high respect, which, for instance, appears in his revision of the canon law.

It was part of his religious beliefs that he owed obedience to the king; though he did not worship the state, he served it as a matter of principle. This position did not, as is sometimes alleged, make him servile; alone of Henry VIII's councillors, Cranmer time and again spoke up for the unpopular victim of the moment, and his tart criticism of the king's theology and grammar in the debates over the King's Book of 1543 speaks well for his courage. Cranmer alone stood up to the Duke of Northumberland when everyone else quailed before him.

These occasional disputes only underline the fact that with him submission to royal authority was a fundamental, indeed a doctrinal, tenet. Though perhaps more consistent in this than most, he only stressed more heavily what nearly everybody held at the time. His other guiding star was his study of theology, in which he discarded the arid aftermath of late medieval Scholasticism and turned instead to Scripture and the early Church Fathers. His belief in the divine right of kings to rule the church as well as the state and his biblical theology made him the characteristic Anglican of his day: the intellectual and in part the spiritual founder-father of the Reformed church in England. (G.R.E./Ed.)

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A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

crannog, in Scotland and Ireland, artificially constructed sites for houses or settlements; they were made of timber, sometimes of stone, and were usually constructed on islets or in the shallows of a lake. They were usually fortified by single or double stockaded defenses. Crannogs ranged in time from the Late Bronze Age into the European Middle Ages; their distinctive substructures of brushwood and logs built up from the bottom set them apart from the pile constructions of earlier periods in Switzerland. Crannogs are among the latest prehistoric strongholds and seem to have reached their greatest development in early historic times. Important sites include present Glastonbury and Holderness.

Cranston, city, Providence county, Rhode Island, U.S. It lies on the western shore of Narragansett Bay and adjoins Providence city. The first settlement was made on the Pawtuxet River in 1636 by William Arnold, father of Benedict Arnold and a compatriot of Roger Williams, founder of Rhode Island colony. Separated from Providence in 1754, it became a town and was named for Samuel Cranston, governor of Rhode Island (1698–1727). Its early growth depended on the textile industry. Although primarily a residential suburb, Cranston has industrial plants that produce textiles, machinery, wire, rubber goods, beer, metals, and pharmaceuticals. Truck and dairy farms and nurseries are in the area. The city is the seat of several state adult and juvenile correctional institutions. The Friends Meeting-House (1729), the Joy Homestead (1770), and the Sprague Mansion (1790) are historic landmarks. Inc. city, 1910. Pop. (1993 est.) 76,626.

Crantor (fl. 4th and 3rd centuries BC, Cilicia [now in Turkey]), Greek academic philosopher whose work *On Grief* created a new literary genre, the consolation, which was offered on the occasion of a misfortune such as death. One of Crantor's consolatory arguments, reminiscent of Plato's *Phaedo* or Aristotle's *Eudemus,* was that life is actually punishment; death, the release of the soul. He wrote the first commentary on Plato's *Timaeus,* denying that Plato actually ascribed a beginning in time to the universe and its soul. Crantor's writings are lost. He was a pupil of Xenocrates and the teacher of Arcesilaus.

crappie, either of two freshwater North American fishes of the genus *Pomoxis,* family Centrarchidae (order Perciformes). Crappies are rather deep-bodied fishes that are popular as food and are prized by sport fishermen. They are native to the eastern United States but have been introduced elsewhere. They may



Black crappie (*Pomoxis nigromaculatus*)
Appel

attain a length of about 30 cm (12 inches)—rarely more—and a weight of about 2 kg (4 pounds).

The white crappie (*P. annularis*) generally inhabits rather warm, silty lakes and rivers. Silvery, with irregular dark markings, it is usually lighter in colour than the similar black crappie, or calico bass (*P. nigromaculatus*), which tends to frequent clear lakes and streams.

craps, dice game, most popular in American gambling houses. Any number may play. Each person in turn may, as the shooter, cast two matched dice in attempting to roll a winning combination.

Before his first throw the shooter puts up a stake, and the other players fade it, *i.e.,* bet against the shooter up to the amount of the stake. The shooter must withdraw any part of his stake that is not faded. If he wins, he may continue to shoot and bet again, as much or as little as he wants; or he may give up the dice. If the shooter loses, the other players take away double the amount they faded. The other players also may bet among themselves as to whether the shooter will win or lose in the next series of throws or whether certain numbers or combinations will appear. In some games, such as bank craps, players may bet only against the house.

If the shooter throws a 7 or 11 (natural) on his first roll, he wins; if he rolls 2, 3, or 12 (craps) on the first roll, he loses. Bets are settled; the shooter keeps the dice and puts up the next bet or, if he declines to shoot again, passes the dice to the player on his left, and the game continues. If the shooter's first throw is 4, 5, 6, 8, 9, or 10, that number is his point, and he continues to throw until he rolls the same number again (makes his point) and wins or throws 7 (misses out, or craps out) and loses both his bet and the dice. Side bets may be laid with or against the shooter, either before he has a point (coming out) or after (will or won't make his point). *See also* hazard.

crash, any of several rugged fabrics made from yarns that are irregular, firm, strong, and smooth but sometimes raw and unprocessed. Included are gray, bleached, boiled, plain, twill, and fancy-weave crash. The coarsest type is called Russian crash. Linen is generally used for the warp yarn, while linen, jute, or a mixture of linen and jute is used for the filler. Plain weave is normally employed, but twill is sometimes used.

Crash may or may not be made with novel or fancy borders, and it is sold in white or natural shades or in dyed colours. It is used for toweling, draperies and other decorative cloths, dresses, caps, summer suits, and sport coats.

Crashaw, Richard (b. *c.* 1613, London, Eng.—d. Aug. 21, 1649, Loreto, Papal States [Italy]), English poet known for religious verse of vibrant stylistic ornamentation and ardent faith.

The son of a zealous, learned Puritan minister, Crashaw was educated at the University of Cambridge. In 1634, the year of his graduation, he published *Epigrammatum Sacrorum Liber* ("A Book of Sacred Epigrams"), a collection of Latin verse on scriptural subjects. He held a fellowship at Peterhouse, Cambridge, a centre of High Church thought, where he was ordained.

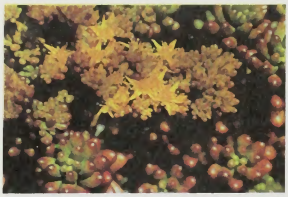
During the English Civil Wars (1642–51), his position at Peterhouse became untenable because of his growing inclination toward Roman Catholicism, and he resigned his post before the Puritans could evict him. He prepared the first edition of his *Steps to the Temple: Sacred Poems, with other Delights of the Muses* for publication in 1646. It included religious and secular poems in Latin and English.

He went to France in 1644 and became a Roman Catholic. When Queen Henrietta Maria of England, consort of Charles I, moved to Paris with her entourage two years later, Crashaw was found, by his friend and fellow poet Abraham Cowley, living in poverty. The queen sent him to Rome with a strong recommendation to the pope, but it was not until a few months before his death that he received the position of canon of the Cathedral of Santa Casa ("Holy House") at Loreto.

Crashaw's English religious poems were republished in Paris in 1652 under the title *Carmen Deo Nostro* ("Hymn to Our Lord"). Some of his finest lines are those appended to "The Flaming Heart" a poem on St. Teresa of Avila.

Having read the Italian and Spanish mystics, Crashaw reflected little of the contemporary English metaphysical poets, adhering, rather, to the flamboyant imagery of the continental Baroque poets. He used conceits (elaborate metaphors) to draw analogies between the physical beauties of nature and the spiritual significance of existence. Crashaw's verse is marked by loose trains of association, sensuous imagery, and eager religious emotion. The standard text of his poems was edited by L.C. Martin (1927; rev. ed., 1957).

Crassulaceae, the stonecrop or orpine family of about 30 genera of perennial herbs or low shrubs, in the order Rosales, native to warm, dry regions of the world. Many species are grown as pot plants or cultivated in rock gardens and borders. They have thick leaves and red, yellow, or white flower clusters. *Sedum* (stonecrop), *Sempervivum* (houseleek), *Kalanchoë, Monanthes, Umbilicus* (penny-





(Top) Stonecrop (*Sedum*) and (bottom) houseleek (*Sempervivum*)
(Top) E. Mammler; (bottom) Grant Heilman—EB Inc.

wort), *Bryophyllum*, *Echeveria*, *Crassula*, and *Cotyledon* are well-known members of the family.

Crassus, Lucius Licinius (b. 140 BC—d. 91), lawyer and politician who is usually considered to be one of the two greatest Roman orators before Cicero, the other being Marcus Antonius (143–87). Both men are vividly portrayed in Cicero's *De oratore* (55 BC).

Crassus launched his legal career in 119 by successfully prosecuting the politician Gaius Papirius Carbo, probably for extortion or treason. Before long his oratory earned him widespread fame, and he used his influence to bring about the establishment of a colony at Narbo (now Narbonne, Fr.).

As consul in 95, Crassus sponsored the Lex Licinia Mucia, which provided for the prosecution of any person who falsely claimed Roman citizenship. The law offended Rome's Italian allies, who were not fully incorporated into the Roman state, and thereby increased the tensions that led to the revolt of the allies in 90–88. Crassus soon altered his views; in 91 he supported the tribune Marcus Livius Drusus' unsuccessful attempt to enfranchise the Italian allies and reform the courts. Only fragments of Crassus' speeches remain.

Crassus, Marcus Licinius (b. *c.* 115 BC—d. 53), politician who in the last years of the Roman Republic formed the so-called first triumvirate with Julius Caesar and Pompey to challenge effectively the power of the Senate. His death led to the outbreak of the Civil War between Caesar and Pompey (49–45).

Crassus fled from Rome when Gaius Marius captured the city in 87. As a young officer, he supported Lucius Cornelius Sulla during the civil war (83–82) between Sulla and the followers of Marius, returning to Rome to help Sulla seize power in 82. The hostility between Pompey and Crassus probably originated in Sulla's clear preference for Pompey. Crassus held the praetorship *c.* 73, and in 72–71 he put down the slave uprising led by Spartacus, although Pompey managed to take the credit. Crassus and Pompey cooperated to pressure the Senate to elect them to the consulship for 70; once in office they overthrew parts of the Sullan constitution.

During the 60s, while Pompey was scoring military victories abroad, Crassus was building a political following at Rome. He used his great wealth—derived largely from the sale of property confiscated by Sulla—to extend credit to indebted senators. The young Julius Caesar was helped in this fashion in 62. In 65 Crassus served as censor.

In 60 Crassus joined with Pompey and Caesar to form the so-called first triumvirate. Crassus entered this informal coalition partly to effect passage of laws helpful to his business ventures in Asia. From 58 to 56 he supported efforts to neutralize Pompey's power. He and Pompey were reconciled at a meeting of the three leaders at Luca, Etruria, in 56, and in the following year they were both again made consuls. As governor of Syria in 54, Crassus attempted to gain military glory by embarking on an unwarranted invasion of Parthia, to the east. He was defeated and killed at the Battle of Carrhae (*see* Carrhae, Battle of) in southern Anatolia.

Crassus Dives Mucianus, Publius Licinius (b. *c.* 180 BC—d. 130), Roman politician who supported the agrarian reforms of the tribune Tiberius Gracchus. Brother of the orator and jurist Publius Mucius Scaevola, Crassus was adopted into the gens ("clan") of the Licinii. He was the father-in-law of the reformer Gaius Gracchus. When Tiberius Gracchus was murdered in 133, Crassus took the reformer's place on the Gracchan land commission and consistently opposed the conservative statesman Scipio Aemilianus. Crassus was elected *pontifex maximus* (high priest), and in 131 he was made consul.

In 130 Crassus—the first *pontifex maximus* to undertake a military command outside Italy—was defeated and killed by Aristonicus of Pergamum, in northwestern Asia Minor.

Crater Lake, deep lake within a huge volcanic caldera in the Cascade Range, southwestern Oregon, U.S. The crater, 6 mi (10 km) in diameter, is the remnant of a mountain, Mt. Mazama, which rose much higher (probably to 12,000 ft [3,650 m]) until an eruption more than 6,000 years ago destroyed the upper portion. Later, lesser outbreaks are indicated by cinder cones on the caldera floor; one of these, Wizard Island, rises above the



Crater Lake, Oregon, famed for its deep blue colour, with Wizard Island at its western end
Ray Atkeson—EB Inc

water. The intensely blue lake, which is 1,932 ft deep, and its surrounding region became a national park in 1902, which includes 250 sq mi (647 sq km).

Animal life inhabiting the area includes deer, bears, eagles, hawks, owls, and grouse, and, particularly in summer, there is an abundance of song and insectivorous birds. Crater Lake contains limited numbers of fish, all introduced by man. The area's plant life is predominantly pine and fir trees, with wild flowers covering the meadows in summer.

Craters of the Moon National Monument, region of volcanic cones and craters near the foot of White Knob Mountain in south central Idaho, U.S., 20 mi (32 km) southwest of Arco. The more than 35 craters, which have probably been extinct only a few centuries, are located on a tract of 53,545 ac (21,669 ha) set apart as a government reservation in 1924; some are nearly a half mile across and several hundred feet deep. The name was suggested by the terrain's resemblance to the Moon's surface. Although the black lava and cinders support only the scantiest vegetation and quickly absorb the very light rainfall, water is to be found in tunnels formed by fissure eruptions through a partly formed crust. The cones reach a height of more than 6,000 ft (1,800 m). Lava stalactites and stalagmites (mineral deposits resembling icicles) in red and blue are striking features of the tunnels.

Craterus (b. *c.* 370? BC—d. 321), one of the most brilliant generals of the Macedonian king Alexander the Great (ruled 336–323). Accompanying Alexander on his expedition of conquest in Asia, he played a key role in the defeat of the Indian prince Porus at the Battle of the Hydaspes (326). During the opening phase of the struggle for the succession to Alexander's empire, Craterus was killed while fighting the forces of Alexander's former secretary, Eumenes of Cardia.

Crates (fl. *c.* 449–*c.* 424 BC, Athens), actor, author of comedies, and regarded as the founder of Greek comedy proper. According to Aristotle's *Poetics,* Crates abandoned the traditional comedy of invective and introduced stories of a more general and nonpersonal nature with well-developed plots. He is said to have been the first to represent the drunkard on the stage. Before turning to writing, he acted in the plays of Cratinus, a celebrated Athenian author of the Old Comedy.

Crates OF MALLUS (fl. early 2nd century BC), Stoic philosopher, from Mallus in Cilicia, primarily important as a grammarian. His chief work was a commentary on Homer. Leader of the literary school and head of the library of Pergamum, he was the chief representative of the allegorical theory of exegesis, maintaining that Homer intended to express scientific or philosophical truths in the form of poetry. About 170 BC, he went to Rome as ambassador of Eumenes II, king of Pergamum: the lectures that he delivered there gave the first impulse to the study of grammar and criticism among the Romans.

Crates OF THEBES (fl. late 4th century BC), Cynic philosopher, a pupil of Diogenes. He gave up his fortune and made it his mission to castigate vice and pretense. Hipparchia, daughter of a wealthy Thracian family and sister of the philosopher Metrocles, forced her parents to allow her to join him in his ascetic and missionary life. He had a gift for amusing parody of serious poetry, by which he mocked other philosophers and praised the Cynic way of living. He was reputed to be the author of philosophic dramas and philosophic letters: the letters extant under his name are spurious. His historical importance lies in the influence that he exerted on Zeno the Stoic, who greatly admired him. Plutarch's biography of him is no longer extant.

Crateuas, also spelled CRATEVAS (fl. 1st century BC), classical pharmacologist, artist, and physician to Mithradates VI, king of Pontus (120–63 BC). Crateuas' drawings are the earliest known botanical illustrations. His work on pharmacology was the first to illustrate the plants described; it also classified the plants and explained their medicinal use. The

drawings that exist today and bear his name are copies, made about AD 500. Of the text of his book, only quotations by Pedanius Dioscorides, a Greek physician (flourished *c.* AD 50), are extant. All later pharmacology and medicine were influenced by Crateuas' work.

Cratinus (d. *c.* 420 BC), Greek poet, regarded in antiquity as one of the three greatest writers, with Eupolis and Aristophanes, of the vigorous and satirical Athenian Old Comedy.

Only about 460 fragments survive of Cratinus' 27 known plays, the earliest of which was written not long after 450 BC. His comedies, like those of Aristophanes, seem to have been a mixture of parodied mythology and topical allusion. The Athenian war leader Pericles was a frequent target. In the *Putine* (*The Bottle*), which defeated Aristophanes' *Clouds* for the first prize at the Athenian dramatic contest in 423, Cratinus good-humouredly exploited his own drunkenness (caricatured the previous year in Aristophanes' *Knights*), showing Comoedia (his wife) complaining of his liaison with the idle mistress Methe ("Drunkenness").

Consult the INDEX *first*

Crato, city, southern Ceará *estado* ("state"), northeastern Brazil. It lies in the Serra da Balança, at 1,384 feet (422 m) above sea level, just southwest of Juàzeiro do Norte. It was elevated to city status in 1853. Crato is a commercial centre for a region producing cattle, sugarcane, rice, cotton, and other crops that are processed and shipped by railroad and highway to coastal Fortaleza, the state capital, 248 miles (399 km) north-northeast, and to other urban centres in Ceará and Pernambuco states. Pop. (1980 prelim.) 49,244.

craton, the stable interior portion of a continent characteristically composed of ancient crystalline basement rock. The term craton is used to distinguish such regions from mobile geosynclinal troughs, which are linear belts of sediment accumulations subject to subsidence (*i.e.,* downwarping). The extensive central cratons of continents may consist of both shields and platforms. A shield is that part of a craton in which (usually) Precambrian basement rocks crop out extensively at the surface. By contrast, in a platform the basement is overlain by horizontal or subhorizontal sediments.

Craveirinha, José, pseudonym of JOSÉ G. VETRINHA (b. May 28, 1922, Lourenço Marques, Portuguese East Africa [now Maputo, Mozambique]), Mozambican journalist, story writer, and poet.

Craveirinha was the son of a Portuguese father and a black Mozambican mother. He was an ardent supporter of the anti-Portuguese group Frelimo during the colonial wars and was imprisoned in 1966. He was one of the pioneers of Negritude poetry in Mozambique, a poetry that concentrated on an examination of past African traditions and the emphatic reaffirmation of African values.

Craveirinha's poetry utilizes imagistic appeals to the African landscape, the African languages, and, above all, to an Africa governed by Africans. His poem "Grito Negro" ("Black City") is an outcry against colonialism that blends a sense of African rhythms with the nasal sounds of the Portuguese language. Craveirinha's literary works are chiefly of a political nature. They appeared in various anthologies and in such collections as *Chigubo* (1964), *Cantico a un Dio di Catrane* (1966; "Canticle to a Catrane God"), *Karingana ua Karingana* (1974; "Once Upon a Time"), and *Cela I* (1980; "Cell I"). He also wrote for *Noticias da Beira, O Brado Africano, Voz de Moçambique,* and *Caliban.*

Craven, district, county of North Yorkshire, England, with an area of 456 square miles (1,180 square km). The traditional name applies to the distinctive limestone country of the central Pennines, where the gritstone-capped summits of Ingleborough, Pen-y-Ghent, and Whernside exceed 2,000 feet (610 m). These highlands are deeply dissected by the upper dales of the Greta, Ribble, Aire, and Wharfe rivers and open southward to the Ribble–Aire gap, where Skipton, the administrative centre, is situated. The bleak limestone uplands are part of the Yorkshire Dales National Park and are predominantly rural, with attractive stone-built villages that are now tourist centres (*e.g.,* Malham).

There is evidence of some scattered settlement in prehistoric times, but Roman occupation, focused on lead mining in the high Pennines, left little imprint. Village life began in the lower dales with Angles penetrating from the River Aire valley, followed by Danes coming from the northwest. Extensive ownership of large areas by abbeys—Bolton is the only one within the district—stimulated wool production, and by the 14th century a cottage textile industry had developed.

The spinning of wool, flax, and cotton at water-powered mills spread through the dales from the 18th century, but in the 19th century the industry became concentrated in larger, steam-operated units near Skipton with access to the Liverpool-Leeds Canal. Small-scale mineral working, which was formerly widespread, included digging low-quality coal for domestic fuel, small limekilns, quarrying stone for local building, and lead mining, most important around Grassington in Wharfedale. Farming is still the dominant activity and is based on livestock, with sheep grazing and dairy farming. Pop. (1991 prelim.) 49,700.

Craven, Frank (b. 1880?, Boston, Mass., U.S.—d. Sept. 1, 1945, Beverly Hills, Calif.), American actor, director, playwright, and producer who was best known for his performance as the stage manager in his production of Thornton Wilder's *Our Town* (performed 1938) and for his domestic comedy *The First Year* (1920).

Born into a theatrical family, he first appeared on the stage in Boston as a child. After completing his schooling, he toured, then made his first New York success as James Gilley in G.H. Broadhurst's *Bought and Paid For* (1911), a part he also played in London. In 1914 Craven appeared in *Too Many Cooks,* the first of many comedies he was to write, following it with several other plays. After 1929 he turned to producing, writing, and acting in motion pictures.

Craven, William Craven, Earl of, also called (1627–65) BARON CRAVEN (b. 1606—d. April 9, 1697, London, Eng.), English courtier known for his long association with the "winter queen" of Bohemia, the English princess Elizabeth, who was the consort of Frederick V, the elector Palatine. A Royalist during the English Civil Wars, Craven provided considerable financial support for both Charles I and Charles II.



Earl of Craven, detail of a portrait; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

The eldest son of Sir William Craven, lord mayor of London (1610), he was educated at Trinity College, Oxford, and at the Middle Temple. In 1632 he went to the European continent to fight for the dispossessed king of Bohemia, Frederick V, in the defense of the Rhenish Palatinate and there began his lifelong devotion to the beautiful Elizabeth, who had been sought in marriage by Gustavus Adolphus of Sweden and Philip III of Spain. Taken prisoner by imperial forces in 1637, he ransomed himself and joined Elizabeth in her exiled court at The Hague. After the Restoration in England, Craven commanded the Coldstream Guards and was created Earl of Craven in 1665. (He had been named Baron Craven in 1627.) The queen of Bohemia, whose husband died in 1632, lived at his house in Drury Lane, London, until her death on Feb. 13, 1662.

crawdad, also called CRAWFISH: *see* crayfish.

Crawford, F(rancis) Marion (b. Aug. 2, 1854, Bagni de Lucca, Grand Duchy of Tuscany [Italy]—d. April 9, 1909, Sorrento, Italy), American novelist noted for the vividness of his characterizations and settings.

In his youth Crawford was shuttled between Italy and America; though he later chose to live in Italy, he remained a U.S. citizen and visited the country frequently. He became acquainted with various European settings while attending several universities there. A stay in India provided the inspiration for *Mr. Isaacs* (1882). This story, the tale of a diamond merchant whose sale of a unique stone brings protest from Britain, marked the beginning of Crawford's prosperous career.

Crawford objected to the serious instruction presented in realistic fiction and preferred to write romantic entertainment. In spite of this lack of depth, his work is noted for its versatile portrayals of European settings in all of their richness and colour. Crawford's best works are set in the Italy he loved. They include *Saracinesca* (1887), *Sant' Ilario* (1889), and *Don Orsino* (1892), part of a series about the effect of social change on an Italian family during the late 1800s.

Crawford, Isabella Valancy (b. Dec. 25, 1850, Dublin, Ire.—d. Feb. 12, 1887, Toronto,



Isabella Valancy Crawford, lithograph

By courtesy of Queen's University Archives, Kingston, Ont.

Ont., Can.), the first important woman poet in Canada, especially noted for her vivid descriptions of the Canadian landscape.

The daughter of a physician who emigrated to Canada in 1858, Crawford spent most of her girlhood in the picturesque Kawartha Lakes district of Ontario. She received an excellent education at home and was widely read in the classics and in French and Italian literature. From 1875 until her death, she and her widowed mother lived over a grocery store

in Toronto, meagrely sustained by the sale of her stories and poems to Toronto newspapers and to magazines in the United States.

Influenced by English Romantic and Victorian writings, Crawford was preoccupied with the beauties of her Canadian setting and with the search for ideal love. The only book published during her lifetime was a paper-covered collection, *Old Spookses' Pass, Malcolm's Katie, and Other Poems* (1884), which contains outstanding narrative and descriptive passages, marked by vigorous rhythm and bold imagery. A later collection of her poems was published in 1905.

Crawford, Joan, original name LUCILLE LESUEUR (b. March 23, 1908, San Antonio, Texas, U.S.—d. May 10, 1977, New York City), American motion-picture actress who made her initial impact as a vivacious Jazz Age flapper but later matured into a star of psychological melodramas. She developed a glamorous screen image, appearing often as a sumptuously gowned, fur-draped, successful career woman.

Crawford danced in nightclubs under the name Billie Cassin, and by 1924 she was dancing in Broadway musicals. On the screen from 1925, she danced her way through such popular films as *Our Dancing Daughters* (1928), *Dance, Fools, Dance* (1931), and *Dancing Lady* (1933). Among her early successes as a dramatic actress were *The Women* (1939), *Susan and God* (1940), *Strange Cargo* (1940), and *A Woman's Face* (1941).



Joan Crawford, c. 1934

By courtesy of the Museum of Modern Art Film Stills Archive, New York City

A major turning point in Crawford's career was her performance in *Mildred Pierce* (1945), for which she won an Academy Award. The story of an emotional and ambitious woman who rises from waitress to owner of a restaurant chain, it was followed by such high-quality pictures as *Humoresque* (1947), *Sudden Fear* (1952), and *The Story of Esther Costello* (1957). Later successful roles were in *Whatever Happened to Baby Jane?* (1962) and *The Caretakers* (1963).

Crawford was married to the actors Douglas Fairbanks, Jr. (1929–33), Franchot Tone (1935–39), and Phillip Terry (1942–46) and to Alfred Steele, the former chairman of the Pepsi-Cola Company. After his death in 1959 she became a director of the company. Crawford's adopted daughter Christina published *Mommie Dearest* (1978), an account of the harsh childhood that Christina and an adopted brother had at their mother's hands, and a film version was produced in 1981.

Crawford, Thomas (b. March 22, 1814, New York City—d. Oct. 10, 1857, London), Neoclassical sculptor best known for his colossal figure of "Freedom," which was posthumously cast and hoisted atop the dome of the Capitol in Washington, D.C., amidst great festivities in 1860.



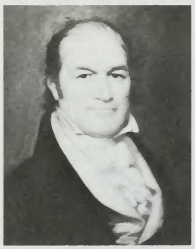
"Babes in the Wood," marble sculpture by Thomas Crawford; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York, gift of the Honourable Hamilton Fish, 1894

Crawford trained as a stonecutter in New York City. In 1835, he went to Rome, where he received some instruction from the Danish Neoclassical sculptor Bertel Thorvaldsen and where he remained for most of his life. At the time of his death his reputation rivaled that of Hiram Powers and Horatio Greenough as a leading American sculptor. The novelist Francis Marion Crawford was his son.

Crawford, William H(arris) (b. Feb. 24, 1772, Amherst County [now Nelson County], Virginia—d. Sept. 15, 1834, Elberton, Ga., U.S.), American political leader of the early U.S. republic; he finished third in electoral votes in the four-candidate race for president in 1824.

After living in Virginia and South Carolina, the Crawford family moved to Georgia, where William attended Moses Waddel's Carmel Academy. He then taught school in Augusta, studied law, and in 1799 opened a law practice in Lexington, Ga. A Jeffersonian Republican, he entered elective politics in 1803, winning a seat in the Georgia legislature. In 1807 he went to Washington to fill the unexpired term of Georgia's deceased U.S. senator Abraham Baldwin. In the Senate, Crawford quickly earned a reputation for wisdom and sound judgment, and the Georgia legislature elected him to a full term as senator in 1811. Crawford backed U.S. preparations for and the declaration of war against Britain in 1812 and—unlike most Democratic Republicans—favoured a tariff and extension of the charter of the Bank of the United States. When Vice President George Clinton died in 1812, Crawford was elected president pro tempore of the Senate (which his predecessor, Baldwin, had been) but left the position the following year to become minister to France.



William H. Crawford, oil painting by John Wesley Jarvis, 1823; in the Pennsylvania Academy of the Fine Arts, Philadelphia

By courtesy of the Pennsylvania Academy of the Fine Arts, Philadelphia

In 1815 President James Madison appointed Crawford secretary of war and a year later named him secretary of the treasury, a position in which, from 1816 to 1825, Crawford's abilities were best utilized. A leading candidate for the presidential nomination in 1816, Crawford deferred to James Monroe, who was elected and who retained Crawford as secretary of the treasury. Monroe was reelected virtually without opposition in 1820. In 1824 Crawford was again a presidential prospect, along with John Quincy Adams, Henry Clay, and Andrew Jackson.

Crawford won the vote of the party caucus, but by 1824 the caucus system had fallen into disrepute, and its choice proved meaningless. At the time of the election, Crawford was paralyzed and nearly blind as the result of a stroke. Although his supporters claimed that he was steadily improving, he finished a distant third behind Adams and Jackson.

Crawford refused Adams' invitation to stay on as secretary of the treasury and instead returned to Georgia, where he served as a judge until his death.

Crawfordsville, city, seat (1823) of Montgomery county, west central Indiana, U.S., on Sugar Creek, 45 miles (72 km) northwest of Indianapolis. Founded *c.* 1823, it was named for Colonel William Crawford, an Indian fighter. It is a commercial centre for the surrounding agricultural area (corn [maize], hogs, dairying) and has acquired some industries, notably printing and bookbinding. Wabash College for men was founded there in 1832 by Presbyterian missionaries. Crawfordsville was the home of General Lew Wallace, author of *Ben Hur;* Henry S. Lane, statesman; and Maurice Thompson, poet and novelist. Wallace's study (1896) and Lane's home (1836) are preserved as museums. Inc. 1865. Pop. (1990) 13,584.



Tower study designed by General Lew Wallace, Crawfordsville, Ind.

Brian D. Palomo—EB Inc

Crawley, district (borough) and new town, county of West Sussex, England. It has an area of 14 square miles (36 square km). Crawley is an ancient town, having received a charter from King John in 1202, but the remains of this medieval and 18th-century coaching community have been completely engulfed by the planned new town developments, though some medieval buildings have been preserved. The district includes Gatwick Airport, Greater



Shopping centre at Crawley, West Sussex

Kenneth Scowen

London's second major airport. New industries in Crawley include engineering, electrical engineering, printing, plastics, and food processing. Pop. (1981) new town, 72,684; (1992 est.) district, 88,500.

Craxi, Bettino, byname of BENEDETTO CRAXI (b. Feb. 24, 1934, Milan, Italy), Italian politician who became his nation's first Socialist prime minister (1983–87).

Craxi joined the Socialist Youth Movement in his late teens and became a member of the Italian Socialist Party's central committee in 1957. He won a seat on the city council of Milan in 1960, was elected to a seat in the national Chamber of Deputies in 1968, and became a deputy secretary of the Socialist Party in 1970. After the Socialists performed badly in the 1976 general elections, Craxi became the party's general secretary. He proceeded to unite the faction-ridden party, committed it to moderate social and economic policies, and tried to dissociate it from the much larger Communist Party. He also used the Socialists' role in coalition building to give the party a voice greater than its electoral weight. Under Craxi's leadership the Socialists were members in five of Italy's six coalition governments from 1980 to 1983. Craxi's decision to pull out of the Christian Democrat-led coalition in April 1983 provoked general elections in June that resulted in his being invited to form a government. He formed a coalition government with the Christian Democrats and several small, moderate parties. As prime minister Craxi pursued anti-inflationary fiscal policies and steered a pro-American course in foreign affairs. He formed a new coalition government in 1986 but resigned in early 1987. In February 1993 multiple charges of political corruption forced Craxi, who denied the allegations, to resign his post as party leader. He left Italy and relocated to Tunisia later that year. The government continued to investigate charges against him, and in 1994 he was twice sentenced in absentia to prison terms resulting from some of these charges.

Cray, Seymour R. (b. 1925, Chippewa Falls, Wis., U.S.), American electronics engineer who was the preeminent designer of the large, high-speed computers known as supercomputers.

Cray graduated from the University of Minnesota in 1950 with a bachelor's degree in electrical engineering. He began his career as a computer scientist working on UNIVAC I, a landmark first-generation electronic digital computer that became the first commercially available computer. In 1957 Cray helped found Control Data Corp., which became a major computer manufacturer. There Cray designed the CDC 6600 and the CDC 7600, large-scale computers notable for their high processing speeds.

In 1972 Cray left Control Data to found his own firm, Cray Research Inc., with the intention of building the fastest computers in the world. This was largely realized through his innovative design of multiprocessor computers, which allowed simultaneous (parallel) processing. His company's first supercomputer, the Cray-1, which came out in 1976, could perform 240,000,000 calculations per second. It was used for large-scale scientific applications, such as simulating complex physical phenomena, and was sold to government and university laboratories. Further supercomputers followed, each with increased computing speed: the Cray 1-M and the Cray X-MP. Cray resigned as chairman of his growing firm in 1981 and became an independent contractor to the company, designing ever-faster machines at his laboratory in Chippewa Falls. In 1985 the Cray-2 was introduced to the market; this machine could perform 1,200,000,000 calculations per second. The Cray Y-MP, introduced in 1988, was capable of 2,670,000,000 calculations per second. In 1989 Cray founded the Cray Computer Corporation. However, as microprocessor technology advanced and the demand for military applications fell in the post-Cold War era, Cray Computers filed for bankruptcy in 1995 without having sold a single computer.

crayfish, also called CRAWFISH, or CRAWDAD, any of numerous crustaceans (order Decapoda) constituting the families Astacidae (Northern Hemisphere), Parastacidae, and Austroastracidae (Southern Hemisphere). They are closely related to the lobster. Over half of the more than 500 species occur in North America. Nearly all live in fresh water, a few in brackish water or salt water.



Crayfish (*Procambarus clarkii*)
© E.R. Degginger/Bruce Coleman Inc.

Crayfish are characterized by a joined head and thorax, or midsection, and a segmented body, which is sandy yellow, green, or dark brown in colour. The head has a sharp snout, and the eyes are on movable stalks. The exoskeleton, or body covering, is thin but tough. The front pair of the five pairs of legs have large, powerful pincers. There are five pairs of smaller appendages on the abdomen.

Crayfish are usually about 7.5 cm (3 inches) long. Among the smallest is the 2.5-centimetre-long *Cambarellus diminutus* of the southeastern United States. Among the largest is *Astacopsis gouldi* of Tasmania, which may reach 40 cm and weigh about 3.5 kg (8 pounds).

Crayfish, common in streams and lakes, often conceal themselves under rocks or logs. They are most active at night, when they feed largely on snails, insect larvae, worms, and tadpoles; some eat vegetation. Crayfish mate in the autumn and lay eggs in the spring. The eggs, attached to the female's abdomen, hatch in five to eight weeks. The larvae remain on the mother for several weeks. Sexual maturity is achieved in a few months to several years, and the life span ranges from 1 to 20 years, depending on the species.

The most common genera of North America include *Procambarus, Orconectes, Faxonella, Cambarus, Cambarellus,* and *Pacifastacus. Austropotamobius,* the most common genus of Europe, is the only one native to Great Britain. The genus *Astacus* occurs in Europe, the genus *Cambaroides* in East Asia.

crayon, an implement for drawing made from clay, chalk, plumbago, dry colour, and wax. There are two types of crayons, the colouring crayon and the chalk crayon.

The colouring crayon, or the wax crayon, is the one used by children in making pictures.



Crayon drawing by a seven-year-old child
Murray Greenberg

It consists of waxes such as paraffin, beeswax, and carnauba wax and dry colour. Some synthetic waxlike materials are also used in the modern crayon. The waxes are melted and the dry colour added with continuous mixing until thoroughly dispersed. Normally, the crayon is entirely consumed during the marking process through abrasion. Special diameter crayons, suitable for use in holders that function much like mechanical pencils, are available.

The blackboard crayon, or chalk, that is used in classrooms is commonly composed of calcium carbonate, kaolin clay, oleic acid, and caustic soda. Dry colour may be added to increase the whiteness or to impart specific colours. Modifications of the formulation, such as mixing pigment with a nongreasy binder as with pastels, have provided chalk crayons for more specialized use by artists, tailors, and carpenters. For lithographic prints a plain dark-coloured wax crayon is used to draw an image directly on the stone surface. *See also* conté crayon; lithography; pastel.

Crazy Horse, Indian name TA-SUNKO-WITKO (b. 1842?, near present-day Rapid City, S.D., U.S.—d. Sept. 5, 1877, Fort Robinson, Neb.), Sioux Indian chief of the Oglala tribe who was an able tactician and determined warrior in the Sioux resistance to the white man's invasion of the northern Great Plains.

As early as 1865 Crazy Horse was a leader in his people's defiance of U.S. plans to construct a road to the goldfields in Montana. He participated in the massacre of Captain William J. Fetterman and his troop of 80 men (Dec. 21, 1866) as well as in the Wagon Box fight (Aug. 2, 1867), both near Fort Phil Kearny, in Wyoming Territory. Refusing to honour the reservation provisions of the Second Treaty of Fort Laramie (1868), Crazy Horse led his followers to unceded buffalo country, where they continued to hunt, fish, and wage war against enemy tribes as well as whites.

When gold was discovered in the Black Hills, Dakota Territory, in 1874, prospectors disregarded Sioux treaty rights and swarmed onto the Indian reservation there. General George Crook thereupon set out to force Crazy Horse from his winter encampments on the Tongue and Powder rivers in Montana Territory, but the chief simply retreated deeper into the hills. Joining Cheyenne forces, he took part in a surprise attack on Crook in the Rosebud valley (June 17, 1876), in southern Montana, forcing Crook's withdrawal.

Crazy Horse then moved north to unite with the main Sioux encampment of Chief Sitting Bull on the banks of the Little Bighorn River, where he helped annihilate a battalion of U.S. soldiers under Lieutenant Colonel George A. Custer (June 25, 1876). Crazy Horse and his followers then returned to the hill country to resume their old ways. He was pursued by Colonel Nelson A. Miles in a stepped-up army campaign to force all Indians to come to the government agencies. His tribe weakened by cold and hunger, Crazy Horse finally surrendered to General Crook at the Red Cloud Agency in Nebraska on May 6, 1877. Confined to Fort Robinson, he was killed in a scuffle with soldiers who were trying to imprison him in a guardhouse.

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Creacionismo (Spanish: "Creationism"), short-lived experimental literary movement among Spanish writers in Europe and the Western Hemisphere, founded about 1916 in Paris by the Chilean poet Vicente Huidobro. That year Huidobro also began a friendship with the French poet Pierre Reverdy, who influenced the movement. From France,

where Huidobro lived mainly until after World War II, Creacionismo influenced the Spanish poets Gerardo Diego Cendoya and Juan Larrea.

For followers of Creacionismo, the function of the poet was to create a highly personal, imaginary world rather than to describe the world of nature. Creationist poets boldly juxtaposed images and metaphors and often used an original vocabulary, frequently combining words idiosyncratically or irrationally. The movement strongly influenced the generation of avant-garde poets in France, Spain, and Latin America during the period immediately after World War I. Huidobro is considered by many authorities to be Creacionismo's most important poet.

cream, yellowish component of milk, rich in fat globules, that rises to the surface naturally if milk is allowed to stand; in the dairy industry cream is separated mechanically (*see* cream separator). Homogenization of cream reduces the size of the fat globules, and the resulting product is less suitable for whipping.

In the United States commercially produced cream is graded for use according to the percentage of fat content. Half and half, a mixture of milk and cream, contains from 10.5 to 18 percent butterfat. Light cream, the type commonly served with coffee, generally contains no less than 18 percent butterfat. Medium cream contains from 30 to 36 percent butterfat. A fourth grade called whipping cream, or heavy cream, contains no less than 36 percent butterfat. The grades and standards are slightly different in the United Kingdom. So-called clotted cream, a specialty of Devonshire and Cornwall, is gathered from fresh milk that is allowed to stand for a period and then slowly heated.

Commercial sour cream is made from light cream of from 18 to 20 percent butterfat which, after pasteurization, is inoculated with lactic-acid-producing bacteria. The cream is ripened 14–16 hours at 72° F (22° C), then chilled and aged 12–48 hours. The bacterial action thickens the cream into a semisolid and adds a tangy flavour. Sour half-and-half is a similar product made from 10.5 to 18 percent butterfat cream. *Crème fraîche* is a French product of nearly 40 percent butterfat that is reinoculated with naturally occurring ferments and lactic acid after pasteurization to initiate a "natural" fermentation. *Crème fraîche* has a nutty rather than sour flavour. It is used in cooking and is often eaten with fruit.

cream cheese, soft, smooth, unripened cheese made either with cream or with a mixture of milk and cream. It is nearly white in colour and has a mild but rich taste. Cream cheese is similar to cottage cheese but is higher in fat content, cottage cheese being made from skim or nonfat milk. A similar cheese made in France is known as Neufchâtel.

In the United States especially, cream cheese is a popular spread and filling for sandwiches; it is also used in baking, for cheesecake, and is a component of some pastries and frostings.

cream nut: *see* Brazil nut.

cream separator, machine for separating and removing cream from whole milk; its operation is based on the fact that skim milk (milk with no butterfat) is heavier than cream. The separator consists of a centrifuge in the form of a rapidly revolving bowl containing a set of disks. The bowl is mounted on a spindle situated underneath the milk supply tank. As milk enters the bowl at the top, it is distributed to the disks through a series of openings, the distributor. Thin films of milk are generated as whole milk is forced out between the disks; the milk assumes the speed of the bowl, approximately 6,000 to 8,000 revolutions per minute, and the heavier skim milk is thrown to the outer edge of the bowl and led off through an opening. The cream concentrates in the interior and moves up to the cream outlet near the centre of the bowl. The most efficient separators leave less than 0.01 percent fat in the skim milk.

creamcups (species *Platystemon californicus*), annual plant of the poppy family (Papaveraceae) native to western North America. The 30-centimetre- (1-foot-) tall, hairy plant bears



Creamcups (*Platystemon californicus*)
J.W. Wilburn

2.5-centimetre (1-inch) cream or pale yellow blooms singly on long stems. Six petals surround a prominent central puff of long, thick stamens (male reproductive structures). Creamcups grow with grasses in open ground and flower from March to May.

The genus is of botanical interest for its 6–25 almost free (partially fused) carpels, a condition that suggests a relationship to the buttercups (family Ranunculaceae).

creamware, cream-coloured English earthenware of the second half of the 18th century and its European imitations. Staffordshire potters,



Leeds creamware teapot decorated with green enameling and pierced work, Yorkshire, England, late 18th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

experimenting in order to find a substitute for Chinese porcelain, about 1750 evolved a fine white earthenware with a rich yellowish glaze; being light in body and of clean glaze, it proved ideal for domestic ware. The cream colour was considered a fault at the time, and Wedgwood introduced a white to bluish white product called pearl ware in 1779. It was produced for nearly a century. Creamware, however, continued to be made throughout the 19th century and later.

It was Josiah Wedgwood who laid the foundations of a great commercial success with this modestly priced utilitarian ware, made at Burslem from about 1762. Restrained designs and elegant transfer printing accorded well with his cream-glazed products. Wedgwood also attracted the patronage of Queen Charlotte, who allowed him to adopt the name Queen's ware. His most considerable effort was a creamware dinner service of 952 pieces supplied to Catherine II the Great of Russia in 1775. Wedgwood's most serious rival was a factory at Leeds, where identical ware was produced but with some idiosyncracies such as pierced work and green enameling. Many other English factories—Liverpool, Bristol, and Staffordshire potters among them—had turned to extensive creamware production by about 1790, and their success in both domestic and European markets brought many continental potters to the verge of bankruptcy. The latter's imitations of the English exports were generally inferior in material, but some factories such as Creil in France, Le Nove in Italy, and Alcora in Spain allied their wares to designs of individual charm.

creation myth, also called COSMOGONIC MYTH, a symbolic narrative of the beginning of the world as understood in a particular tradition and community. Creation myths are of central importance for the valuations of the world, the orientation of man in the universe, and for the basic patterns of life and culture.

A brief treatment of creation myths follows. For full treatment, *see* MACROPAEDIA: Doctrines and Dogmas, Religious; Myth and Mythology.

As the myth par excellence, the creation myth is the model for all other myths of the origins of cultural practices and artifacts. Many rituals may be thought of as dramatizations of the creation myth, performed to underscore and highlight the effectiveness of the myth in ordering and safeguarding the culture and its way of life. In addition, a culture's modes of artistic expression—the gestures and dance of ritual and the imagery of the visual and verbal arts—find their models and meanings in the myths of creation.

Although the creation myths are numerous, a few basic types may be distinguished. One of these, found in almost all parts of the world, is the belief in a supreme creator deity, usually characterized as omniscient and omnipotent, as having existed alone prior to the world's creation, and as having had a plan in creating the world. In many of these myths, the creator's plan is thwarted through some action of a creature. This rupture leads in some myths to the deity's departure from creation; in others it signifies the ambiguity of the world. In a contrasting cosmogonic view, the world emerges gradually through stages, as the fetus develops toward birth. In contrast to the supreme deity type, emergence myths emphasize the latent power in the earth and its components.

A third type of cosmogonic myth is that which sees the world as the offspring of primordial parents. The world-parents, symbolizing the sky and the earth, usually appear late in the creation narrative. The union of the parents is disrupted by the offspring, the agents of separation and thus of creation. While reasons for this separation vary, it usually results in a cosmic order centred on the techniques and knowledge of human culture. Related to this type is one in which creation derives from a cosmic egg. This egg, like the world-parents, symbolizes unity and yet contains the possibilities of separation or creation. A fifth type of cosmogonic myth tells of an animal or devil who, at the bidding of the deity, dives into the primordial waters to secure a portion of earth on which life can survive.

In most religious communities, philosophical and theological doctrines have developed as explications of or complements to the cosmogonic myths. In those myths in which creation occurs by the word or action of a high god, the transcendence (otherness or qualitative difference) of the creator is a subject for theological speculation and argument. In some cases the deity's transcendence must also be related to its immanence or presence in the world; Judaism, Christianity, and Islām all confront these issues. The cosmogonic theme of emergence is related to the doctrine of creation through emanations from a single

principle, a concept found in some so-called primitive religions (*e.g.*, Polynesian) and in Taoism.

In addition to doctrines of creation, skepticism about the knowability of the origins of the world is present in several religious traditions. In some this unknowability refers to the plan and purpose of creation, as in those myths in which the deity retires after the work of creation. The Buddha's refusal to answer questions concerning the eternality and finitude of the world also betrays a kind of skepticism, one that is also found in other religious communities. Skepticism about the ultimate origin of the world has led some theologians to depend on a notion of revelation in response to these questions. In these cases, however, the notion of revelation presupposes a relationship between creator and created and therefore implies a doctrine of creation.

Creationism (Spanish literary movement): *see* Creacionismo.

creationism, also called CREATION SCIENCE, or SCIENTIFIC CREATIONISM, counterevolutionary, fundamentalist theory or doctrine that postulates that matter, the various forms of life, and the world were created by God out of nothing.

Creationism grew as a result of the advancement of evolution that was evident after the publication in 1859 of Darwin's *Origin of Species*. Within two decades, most of the scientific community had accepted some form of organic evolution. Many religious leaders, however, feared that a less-than-literal reading of the biblical story of creation would result in a loss of faith; and well-known spokesmen for the cause—such as William Jennings Bryan—saw modern war and other purported signs of moral decay to be evidence of the damage brought about by the teaching of godless evolution. The issue was argued on a number of platforms, one of the most famous being the Scopes Trial (1925), in which a high school teacher was convicted of unlawfully teaching the theory of evolution. In the United States, creationism faced a strong denial—in legal terms—in 1987, when the U.S. Supreme Court ruled that states may not require public schools to teach the creationist theory of human origin alongside evolution if such requirements are intended to promote religious belief. It was further determined that those states that had sought to "alter the science curriculum to reflect endorsement of a religious view that is antagonistic to the theory of evolution" were breaking the First Amendment ban on the establishment of religion.

creative evolution, a philosophical theory espoused early in the 20th century by Henri Bergson, a French process metaphysician (one who emphasizes becoming, change, and novelty), in his *Évolution créatrice* (1907; *Creative Evolution*). The theory presented an evolution in which a free emergence of the individual intelligence could be recognized. It was thus wholly distinct from previous deterministic hypotheses that were either mechanistic or teleological and represented evolution as conditioned either by existing forces or by future aims. Bergson based his theory on the distinction between matter and the *élan vital,* or life force, the progress of which he saw as a line continually bifurcating or diverging from its course. The evolution of matter is orderly and geometric; disorder, however, with free and unpredictable creativity, is the effect of the life force on its material surroundings. The argument is largely conducted by means of striking metaphor and analogy: life, for instance, is compared to a wave spreading outward toward a circumference that is broken down at one point only and to an artillery shell from which new shells scatter when it bursts.

creativity, the ability to make or otherwise bring into existence something new, whether a new solution to a problem, a new method or device, or a new artistic object or form.

Psychological experiments in the fields of motivation and learning have disclosed the power of novelty as an inducement to action. There appears to be an essential and continuing tension in higher organisms between the establishment and maintenance of environmental constancies and the interruption of achieved equilibria in the interest of new possibilities of experience. Psychological studies of highly creative people have observed this tension in terms of such dualities as intellect and intuition, the conscious and the unconscious, mental health and mental disorder, the conventional and the unconventional, and complexity and simplicity.

Intelligence. A creative person is usually very intelligent in the ordinary sense of the term and can meet the problems of life as rationally as anyone can, but often he refuses to let intellect rule; he relies strongly on intuition, and he respects the irrational in himself and others. Above a certain level, intelligence seems to have little correlation with creativity—*i.e.,* a highly intelligent person may not be as highly creative. A distinction is sometimes made between convergent thinking, the analytic reasoning measured by intelligence tests, and divergent thinking, a richness of ideas and originality of thinking. Both seem necessary to creative performance, although in different degrees according to the task or occupation (a mathematician may exhibit more convergent than divergent thinking and an artist the reverse).

Personality. Many creative people show a strong interest in apparent disorder, contradiction, and imbalance; they often seem to consider asymmetry and disorder a challenge. At times creative persons give an impression of psychological imbalance, but immature personality traits may be an extension of a generalized receptivity to a wider-than-normal range of experience and behaviour patterns. Such individuals may possess an exceptionally deep, broad, and flexible awareness of themselves.

Studies indicate that the creative person is nonetheless an intellectual leader with a great sensitivity to problems. He exhibits a high degree of self-assurance and autonomy. He is dominant and is relatively free of internal restraints and inhibitions. He has a considerable range of intellectual interests and shows a strong preference for complexity and challenge.

The unconventionality of thought that is sometimes found in creative persons may be in part a resistance to acculturation, which is seen as demanding surrender of one's personal, unique, fundamental nature. This may result in a rejection of conventional morality, though certainly not in any abatement of the moral attitude.

Research. Studies of known living creative people and research gleaned from biographies of recognized past creative geniuses have yielded some ideas about the characteristics of the creative process. The single most important element in the creative process, however, is believed to be originality, or uniqueness. A great deal of research has been carried out on the nature, incidence, and cultivation of creativity, particularly among American psychologists since World War II, when scientific inventiveness became of wide concern.

Crébillon, Claude-Prosper Jolyot, sieur de (sire of), byname CRÉBILLON FILS (French: "Crébillon Son") (b. Feb. 14, 1707, Paris—d. April 12, 1777, Paris), French novelist whose works provide a lighthearted, licentious, and satirical view of 18th-century high society in France.

The son of an outstanding French poet-dramatist, Prosper Jolyot de Crébillon, he displayed a completely different temperament from that of his father (who heartily disapproved of his son's life and works). Crébillon *fils* spent all his life in Paris except for two periods of exile in the provinces as a result of satirical allusions in his novels. Of these novels, the best-known are *L'écumoire, ou Tanzaï et Néardarné* (1733), *Les Égarements du coeur et de l'esprit* (1736; *The Wayward Head and Heart*), and *Le Sopha, conte moral* (1742; *The Sofa; A Moral Tale*). These novels were appreciated by Laurence Sterne, who saw in the writing some of his own inconsequential narrative style.

Along with this literary activity, Crébillon was a founder in 1729 of the Société du Caveau, named after a cafe in which he and his friends dined, where Crébillon earned a reputation as a wit and storyteller. Like his father he enjoyed the patronage of Mme de Pompadour.

Crébillon, Prosper Jolyot, sieur de (sire of), byname CRÉBILLON PÈRE (French: "Crébillon Father") (b. Jan. 13, 1674, Dijon, Fr.—d. June 17, 1762, Paris), French dramatist of some skill and originality who was considered in his day the rival of Voltaire.

Crébillon's masterpiece, the tragedy *Rhadamiste et Zénobie* (produced 1711), was followed by a run of failures, and in 1721 he retired from literary life. He returned, however, in 1726 with *Pyrrhus,* which was successful, and he wrote for another 20 years. He was elected to the Académie Française in 1731 and became dramatic censor in 1735.

Crébillon's tragedies were modeled after those of the Roman tragic writer Seneca and, like them, bordered on melodrama. His specialty was horror: according to his preface to *Atrée et Thyeste* (1707), he aimed to move the audience to pity through terror. In private life he was an eccentric who lived in virtual seclusion in a barely furnished apartment and befriended birds and animals.

crèche: *see* day nursery.

Crécy, Battle of (Aug. 26, 1346), battle that resulted in victory for the English in the first decade of the Hundred Years' War against the French.

Edward III of England, having landed some 4,000 men-at-arms and 10,000 archers (longbowmen) on the Cotentin peninsula in mid-July 1346, had ravaged lower Normandy west of the Seine and gone as far south as Poissy, just outside Paris, when Philip VI of France, uncertain of the direction that Edward meant ultimately to take, advanced against him with some 12,000 men-at-arms and numerous other troops. Edward then turned sharply northeastward, crossing the Seine at Poissy and the Somme downstream from Abbeville, to take up a defensive position at Crécy-en-Ponthieu. There he posted dismounted men-at-arms in the centre, with cavalry to their right (under his son Edward, the Black Prince) and to their left (under the earls of Arundel and of Northampton) and with archers on both wings. Italian crossbowmen in Philip's service began the assault on the English position, but they were routed by the archers and fell back into the path of the French cavalry's first charge. More and more French cavalry came up, to make further thoughtless charges at the English centre; but while the latter stood firm, the archers wheeled forward, and the successive detachments of horsemen were mowed down by arrowshots from both sides. By the end of the day Philip's brother, Charles II of Alençon, and his allies King John of Bohemia and Louis II of Nevers, count of Flanders, as well as 1,500 other knights and esquires were dead. Philip himself escaped with a wound from the disaster. Edward went on northward to besiege Calais.

credit, transaction between two parties in which one (the creditor or lender) supplies money, goods, services, or securities in return for a promised future payment by the other (the debtor or borrower). Such transactions normally include the payment of interest to the lender. Credit may be extended by public or private institutions to finance business activities, agricultural operations, consumer expenditures, or government projects.

Most modern credit is extended through specialized financial institutions, of which commercial banks are the oldest and most important. In present-day industrial economies, the banks are able to extend and increase the supply of credit by the creation of new deposits for their loan customers.

The lender must judge each loan he makes on the basis of the character of the borrower (his intention to repay), his capacity to repay (based on his potential for earning income), and his collateral (property pledged in case of default on the loan). The terms of credit transactions may be publicly regulated to prevent abuses by customers and lenders as well as to channel credit into particular sectors of the economy.

In fields for which adequate private financing is not available, governments may extend credit. Public lending programs, often combined with public systems of savings collection, provide a large portion of housing finance in many European and Asian countries. In the U.S., public credit is frequently extended for housing, small business, and agriculture.

Commercial banks in both industrialized and less developed countries are often reluctant to extend agricultural credit because of the high risk involved; such loans are usually made only to very large farms. In addition to government credit, cooperative credit systems have been particularly important in less developed countries, where they are often the only source of funds available to small farmers at reasonable rates of interest.

credit, letter of, order from a bank to a bank or other party abroad authorizing payment of money (up to a specified limit) to a person named in the letter. A letter of credit, unlike a bill of exchange (*q.v.*), is not negotiable but is cashable only by the paying bank.

The two main classes of letters of credit are commercial and traveller's. Commercial letters of credit are often used by exporters and others who wish proof that they will be paid before they ship goods or wish to minimize delay in payment. Traveller's letters of credit are issued for the convenience of foreign travellers and answer the same purpose as traveller's checks.

credit bureau, organization that provides information to merchants or other businesses relating to the credit worthiness of their customers. Credit bureaus may be private enterprises or operated on a cooperative basis by the merchants in one locality. Users of the service pay either a fee based on the amount of service or a flat membership charge.

Cooperative credit bureaus, organized for the exchange of credit information among merchants, were known in some countries as early as 1860; most of their growth, however, occurred after World War I. Until then, the small amount of credit granted was usually based on the merchant's personal knowledge of the customer. The primary function of many of the very early credit bureaus was to maintain a list of customers who were considered poor risks. As the use of consumer credit grew and the population became more mobile, credit bureaus were established to exchange information on which to base decisions on whether to grant credit.

Their sources of information include the merchants or other businesses that have granted a customer credit in the past, his employment record, his landlords, public records, newspapers, and direct investigation. The development of automatic data-processing equipment has facilitated the accumulation and distribution of information on a nationwide basis; the threat to privacy resulting from these practices has only recently been recognized. The Fair Credit Reporting Act passed in 1971 in the United States, for example, provides that a person has the right to know what information is on file about him and requires that merchants refusing to grant credit on the basis of a credit-bureau report must give the name and address of the bureau used.

credit card, small card containing a means of identification, such as a signature or picture, that authorizes the person named on it to charge goods or services to his account, on which he is billed periodically. The use of credit cards originated in the United States during the 1920s, when individual firms, such as oil companies and hotel chains, began issuing them to customers for purchases made at company outlets; their use increased greatly after World War II.

The first universal credit card, which could be used at a variety of establishments, was introduced by the Diners' Club, Inc., in 1950. Under this system, the credit-card company charges its cardholders an annual fee and bills them on a monthly or yearly basis. Cooperating merchants throughout the world pay a service charge in the range of 4–7 percent of total billings. Another major card of this type was established by the American Express Company in 1958.

A later innovation was the bank credit-card system, in which the bank credits the account of the merchant as sales slips are received and assembles the charges to be billed at the end of the period to the cardholder, who pays the bank either in toto or in monthly installments with interest or "carrying charges" added. The first national plan was BankAmericard, begun on a statewide basis by the Bank of America in California in 1959, licensed in other states beginning in 1966, and renamed VISA in 1976–77. Other major bank cards are MasterCard (formerly Master Charge) and Barclay's. Many banks that began credit-card plans on a city-wide or regional basis have chosen to affiliate with major national-bank plans as the range of included services (meals and lodging as well as store purchases) expanded. The system has spread to all parts of the world, including Communist nations.

In bank credit-card systems, the cardholder may choose to pay on an installment basis, in which case the bank earns interest on the outstanding balance. The interest income permits banks to refrain from charging cardholders an annual fee and to charge participating merchants a lower service charge. An additional advantage of the system is that merchants receive their payments promptly by depositing their bills of sale with the bank. *See also* revolving credit.

Crédit Mobilier Scandal, in U.S. history, illegal manipulation of contracts by a construction and finance company associated with the building of the Union Pacific Railroad (1865–69); the incident established Crédit Mobilier of America as a symbol of post-Civil War corruption. Although its operations were more or less typical of 19th-century railroad building in a wide-open period of U.S. history often referred to as the "Great Barbecue," sensational newspaper exposures and congressional investigations focussed attention on the Crédit Mobilier. Experience had already taught veteran railroad organizers that more money could be made from construction contracts than from operating the completed road. This promised to be doubly true in the case of the Union Pacific, which was supported by federal loans and land grants but would be spanning the vast unpopulated region between Omaha, on the Missouri River, and Great Salt Lake—a territory unlikely to produce much immediate revenue.

Crédit Mobilier was part of a complex arrangement whereby a few men contracted with themselves or assignees for the construction of the railroad. Along with certain trustees, the manipulators reaped enormous profits but impoverished the railroad in the process. When it was revealed that Oakes Ames, a congressman from Massachusetts, was involved, the House of Representatives investigated the scandal and censured him and a colleague; several others, including Vice Pres. Schuyler Colfax, were absolved.

credit union, credit cooperative formed by an organized group of people with some common bond who, in effect, save their money together and make low-cost loans to each other. The loans are usually short-term consumer loans, mainly for automobiles, household needs, medical debts, and emergencies. In less developed countries these loans are particularly important, constituting the only credit source for many people, and are used primarily for farm production and small business enterprise. Credit unions generally operate under government charter and supervision. At annual meetings, the members elect the directors, the credit committee, and the supervisory committee.

The credit-union movement stems from societies founded in the middle 1800s by Friedrich Wilhelm Raiffeisen in Germany and Luigi Luzzatti in Italy. The first credit union in the Western Hemisphere, where the greatest development was to take place, was organized in 1900 at Lévis, Que., by Alphonse Desjardins, a legislative reporter whose work had impressed him with the hardship caused by usury. Desjardins also helped organize the first U.S. credit union in Manchester, N.H., in 1909. In that same year, Massachusetts passed the first state law recognizing credit unions. A study by the bank commissioner Pierre Jay and strong support by Desjardins and Edward A. Filene, a Boston merchant, facilitated passage of the law. In 1921, to accelerate U.S. credit union growth, Filene set up and financed the Credit Union National Extension Bureau.

In 1934 the Credit Union National Association (CUNA), a federation of credit-union leagues, was established by the credit unions themselves to take over the work of the bureau. In 1940 CUNA broadened its membership to include the Western Hemisphere, and in 1954 the CUNA World Extension Department was created to facilitate progress in Australia, Latin America, and Africa. In 1958 CUNA became a worldwide association.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Crediton, parish (town), Mid Devon district, county of Devon, England, in the valley of the River Creedy. Crediton is the traditional birthplace of St. Boniface, patron saint of Germany and The Netherlands, who was martyred in 754. This may account for Crediton's having become, in 909, the seat of the first bishopric in Devon. By 1050 this had been transferred to Exeter, and a parish church (Holy Cross) was later built on the site of the cathedral. Crediton grew with the wool trade, which reached its peak in the 18th century. Pop. (1981 prelim.) 6,169.

creditor: *see* debtor and creditor.

Cree, one of the major Algonkian-speaking Indian peoples of Canada, formerly occupying an immense area from east of the Hudson and James bays west as far as Alberta and

the Great Slave Lake. Originally inhabiting a smaller nucleus of this area, they expanded rapidly in the 17th and 18th centuries after acquiring firearms and beginning their fur trade with the Europeans, but wars with the Dakota and Blackfeet and severe smallpox epidemics, notably in 1784 and 1838, reduced their numbers. There remain today only scattered groups, totaling about 140,000 in the late 20th century according to official Canadian classifications.

The Cree assumed the living patterns of those with whom they came into contact, so that there were two major divisions: the Woodland Cree, also called Swampy Cree, or Maskegon, whose culture was essentially an Eastern Woodlands type, though their environment denied them maize cultivation and made them rely wholly on hunting; and the Plains Cree, who, living on the northern Great Plains, became bison hunters.

The Woodland Cree preferred hunting caribou, moose, bear, and beaver but relied chiefly on hare because of the scarcity of the other animals; the periodic scarcity of hare too, however, caused famine, leading to occasional cannibalism (reported in tribal tales as well as by Europeans). Various kinds of fowl were also sought. Social organization was based on bands of related families, though large groups allied for warfare. Fear of witchcraft and respect for all variety of taboos and customs relating to the spirits of game animals pervaded Cree culture; shamans and conjurers wielded great power.

The Plains Cree, after acquiring horses and firearms, were more militant than the Woodlands Cree, raiding and warring against many other Plains tribes. Though reportedly divided into 12 bands, each with its own chief, the Plains Cree had but one integrated military society. Religion and ceremony were highly valued, seemingly as means of fostering success in war and the bison hunt. The Assiniboin were the traditional allies of both the Plains and Woodland Cree.

creed, an officially authorized, usually brief statement of the essential articles of faith of a religious community, often used liturgically in public worship or initiation rites. Creeds are similar to the so-called confessions of faith (*q.v.*) of some Protestant churches, which are usually more extensive formulations.

A brief treatment of creeds follows. For full treatment, *see* MACROPAEDIA: Rites and Ceremonies, Sacred.

Religious beliefs frequently are not brought to the fully explicit level of creeds or confessions but are expressed in rituals and myths. This is especially true of the so-called primitive religions. At other times beliefs are rendered explicit in the noncreedal form of liturgical formulas, sacred writings, codifications of law, or theological reflection. This was the case with the ancient religions of Egypt, Mesopotamia, Greece, and Rome, as well as in traditional Taoism, Confucianism, and Hinduism. On the other hand, the cultural transmission of a religion (as from Semitic to Hellenistic) frequently elicits the formation of formal creeds in an attempt to maintain the religion's identity amidst discontinuity and change and the encounter with proselytizing and pluralism. Only the so-called universal religions of Zoroastrianism, Buddhism, Judaism, Christianity, Islām, and some modern movements of Hinduism possess creeds in the full meaning of the word.

In the religions of the East, certain words and phrases function in part as creedal affirmations. *Li* (laws of appropriate behaviour) and *hsiao* (filial piety) in Confucianism and *tao* (the way) in Taoism sum up important features of the religious tradition in which they are found. The mantra (evocative sacred syllables), especially popular in Tibetan Buddhism, is a type of expression of belief in the Avalokiteśvara (jewel's) presence in the world (lotus). Also serving in some degree as a declaration of faith are the various mantras of Hinduism, especially the Gāyatrī prayer from the Rigveda that Brahman youth learn as part of their initiation ceremony. In fact, in most religions it is chiefly through liturgical expressions that religious faith is confessed and religious identity sustained. In Hīnayānā Buddhism a more properly creedal formulation is found in the early Triratna, the declaration of refuge in the Buddha, the doctrine, and the community.

Creedal statements are most numerous in the religions of the West, and especially in the three classical monotheistic religions. A central part of the life of every Muslim is profession of the *shahādah,* which confesses that only God is God and that Muḥammad is the Prophet of God. In Judaism early creedal affirmations that were apparently confessed in a worship setting as part of an annual festival are preserved in Hebrew Scripture. During the medieval period various efforts were made within Judaism to formulate creeds; of these, Maimonides' Thirteen Principles of Faith is the most significant, though it has never been officially recognized as normative. The confession of the oneness of God and of the resurrection of the dead are the central declarations of Jewish belief, and these appear as parts of worship. The scarcity of creeds within Judaism is explained in that Jewish identity is defined not in relation to the acceptance of doctrine but rather according to the observance of the Oral Law.

The Christian religion, on the other hand, has given rise to numerous creeds. This is partly because the Christian church from the start possessed its distinctive gospel, or *kerygma* (proclamation), which was decidedly dogmatic in character. As early as the apostolic age this proclamation was beginning to crystallize in conventional acclamations (*e.g.*, "Jesus is Lord") and longer partly stereotyped summaries of belief.

The process of creedal formulation in the West reached its summit with the Apostles' Creed (*q.v.*), which is still used in baptismal ceremonies and public worship by most Protestants and Roman Catholics. Its present working probably goes back to the 8th century; however, it likely originated from earlier baptismal creeds, and in particular from the Old Roman Symbol, which in its essentials seems to go back to the 2nd century.

The Nicene Creed (*q.v.*), designed as an authoritative norm of orthodox teaching, was first formulated by the first of the ecumenical councils at Nicaea in 325. The second version of the creed, the so-called Niceno-Constantinopolitan Creed, is accepted in both the East and the West. Like the Apostles' Creed, the Nicene Creed is in part intended to exclude heretical views, in particular the Arian heresy that denied the equality of the Son with the Father. Thus, it affirmed that Jesus Christ is of one substance (homoousian) with the Father. Western churches also eventually adopted a *filioque* clause, which asserts that the Spirit proceeds from the Son as well as from the Father.

A third ecumenical creed in the West is the Athanasian creed (*q.v.*). This creed, which has received less recognition in the East since the 16th century, is officially accepted by Roman Catholics, Anglicans, and Lutherans, although its use in the liturgy of these communions has greatly declined in recent centuries. Strongly polemical in tone, it expounds on the themes of the nature of Christ and the Trinity. It probably originated between 450 and 500 in southern France.

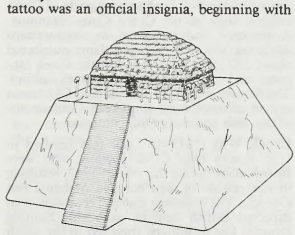
Creek, Muskogean-speaking North American Indian tribe that originally occupied a huge expanse of the flatlands of Georgia and Alabama. Their economy was based largely on the cultivation of corn (maize), beans, and squash. Most of the farming was done by the women while the men of the tribe were away hunting or fighting. There were two divisions of Creeks: the Muskogee (or Upper Creeks), settlers of the northern Creek territory; and the Hitchiti and Alabama, who had the same general traditions as the Upper Creeks but spoke a slightly different dialect and were known as the Lower Creeks. Their towns were grouped into white towns (set apart for peace



Ben Perryman, a Creek Indian, painting by George Catlin, 1836; in the National Museum of American Art, Washington, D.C.

National Museum of American Art (formerly National Collection of Fine Arts), Smithsonian Institution, Washington, D.C., gift of Mrs. Sarah Harrison

ceremonials) and red towns (set apart for war ceremonials). The Creeks were quite conscious of rank, but it was based on individual merit—achievement in battle or the acquisition of tribal wisdom—rather than heredity. Like most Indians of the Southeast, they commonly had their entire bodies tattooed. Each tattoo was an official insignia, beginning with



Creek temple built in the Lower Mississippi Valley

From R.M. Underhill, *Red Man's America: A History of the Indians in the United States,* copyright 1953, 1971 by the University of Chicago Press; all rights reserved

those awarded a young boy when he first achieved warrior status.

Each Creek town had a plaza or community square, around which were grouped the houses—rectangular structures with four vertical walls of poles plastered over with mud to form wattle. The roofs were pitched and covered with either bark or thatch, with smoke holes left open at the gables. If the town had a temple, it was a thatched dome-shaped edifice set upon an eight-foot mound into which stairs were cut to the temple door. The plaza was the gathering point for such important religious observances as the Busk, or Green Corn, ceremony, an annual first-fruits and new-fire

rite. A distinctive feature of this midsummer festival was that every wrongdoing, grievance, or crime—short of murder—was forgiven.

The Creeks' first contact with Europeans was in 1538 when Hernando de Soto invaded their territory. Subsequently, the Creeks allied themselves with the English colonists in a succession of wars (beginning about 1703) against the Apalachee (*q.v.*) and the Spanish. During the 18th century a Creek Confederacy was organized in an attempt to present a united front against both Indian and white enemies. It comprised not only the dominant Creeks but also speakers of other Muskogean languages (Hitchiti, Alabama-Koasati) and of non-Muskogean languages (Yuchi, some Natchez and Shawnee). The confederacy was a failure, for at no time did all the Creek towns (about 50 with a total population of perhaps 20,000) contribute warriors to a common battle. In 1813–14, when the Creek War (*q.v.*) with the U.S. took place, some towns fought with the whites and some (the Red Sticks) against them. The defeated Creeks ceded 23,000,000 acres of land (half of Alabama and part of southern Georgia) and were forcibly removed to Indian Territory (now Oklahoma) in the 1830s. There with the Cherokee, Chickasaw, Choctaw, and Seminole, they were one of the Five Civilized Tribes. For three-quarters of a century each tribe had a land allotment and a quasi-autonomous government modelled on that of the U.S. In preparation for Oklahoma statehood (1907), some of this land was allotted to individual Indians; the rest was opened up to white homesteaders, held in trust by the federal goverment, or allotted to freed slaves. Tribal governments were effectively dissolved in 1906 but have continued to exist on a limited form. Some Indians now live on tribal landholdings that are informally called reservations.

In the late 20th century about 20,000 Creeks were living in Oklahoma, many of them entering fully into the life of the state and remaining Creek only by formal affiliation. About 15,000 of these resided on federal trust lands. Others were more conservative, preserving the use of the Creek language, traces of the ancient town organization, and some aspects of Creek religion such as the Green Corn ceremony. A remnant had remained in southwestern Alabama, where their descendants numbered about 500. This group has lost the Creek language and almost all traces of Creek culture. The Seminole (*q.v.*) of Florida and Oklahoma are an offshoot from the Creek Confederacy of the 18th and early 19th centuries.

Creek War (1813–14), war that resulted in U.S. victory over Creek Indians, who were British allies during the War of 1812, resulting in vast cession of their lands in Alabama and Georgia. The Shawnee leader Tecumseh, who expected British help in recovering hunting grounds lost to settlers, travelled to the south to warn of dangers to native cultures posed by whites. Factions arose among the Creeks, and a group known as the Red Sticks preyed upon white settlements and fought with those Creeks who opposed them. On August 30, 1813, when the Red Sticks swept down upon 553 surprised frontiersmen at a crude fortification at Lake Tensaw, north of Mobile, the resulting Ft. Mims Massacre stirred the Southern states into a vigorous response. The main army of 5,000 militiamen was led by Gen. Andrew Jackson, who succeeded in wiping out two Indian villages that fall: Tallasahatchee and Talladega.

The following spring hundreds of Creeks gathered at what seemed an impenetrable village fortress on a peninsula on the Tallapoosa River, awaiting the Americans' attack. On March 27, 1814, at the Battle of Horseshoe Bend (Tohopeka, Ala.), Jackson's superior numbers (3,000 to 1,000) and armaments (including cannon) demolished the Creek defenses, slaughtering more than 800 warriors and imprisoning 500 women and children. The power of the Indians of the Old Southwest was broken.

At the Treaty of Ft. Jackson (August 9) the Creeks were required to cede 23,000,000 acres of land, comprising more than half of Alabama and part of southern Georgia. Much of that territory belonged to Indians who had earlier been Jackson's allies.

Creel, George (Edward) (b. Dec. 1, 1876, Lafayette County, Mo., U.S.—d. Oct. 2, 1953, San Francisco), writer and newspaperman who as head of the U.S. publicity bureau during World War I did much to shape subsequent government programs of publicity and propaganda.



Creel
By courtesy of the Denver Public Library Western Collection

Creel began his career as a newspaper reporter for the *Kansas City World* in 1894 and started publishing his own newspaper, the *Kansas City Independent,* in 1899. After writing for the *Denver Post* (1909–10), he became editor of the *Rocky Mountain News* in 1911 and began to establish a reputation as a dedicated investigative reporter. In 1917 he was appointed head of the U.S. Committee on Public Information, the government's propaganda and publicity agency, by Pres. Woodrow Wilson. For the next two years he attempted to curb anti-German hysteria with unbiased news reporting and to rally popular support for the war effort with the "Four-Minute Men," a volunteer force of 18,000 speakers for public meetings.

Creel remained in public life after the war, serving with the San Francisco Regional Labor Board in 1933 and as chairman of the National Advisory Board of the Works Progress Administration in 1935. He ran unsuccessfully for the Democratic nomination for governor of California against the novelist Upton Sinclair in 1934. Devoting much of his later years to writing, he completed 15 books, including *War Criminals and Punishment* in 1944, which was dramatized for the radio.

Creeley, Robert (White) (b. May 21, 1926, Arlington, Mass., U.S.), U.S. poet and founder of the Black Mountain movement of the 1950s (*see* Black Mountain poets).

Creeley dropped out of Harvard University in the last semester of his senior year and spent a year driving a truck in India and Burma for the American Field Service. Soon after his return in 1945, he lived on a poultry farm in New Hampshire and, by his own account, spent much time listening to jazz. Motivated by a Boston radio program of poetry readings that he chanced to hear, he began to publish his poems in small magazines. He lived in France in the early 1950s and then moved to Majorca, Spain, where he started the Divers Press. In 1955, after receiving a B.A. from Black Mountain College (North Carolina), he joined Charles Olson on its faculty and was editor of the *Black Mountain Review* for its first three years. The *Review* published poems by the then little-known Creeley, as well as poems by various other faculty members and poets.

Creeley's poems of the 1950s and 1960s reveal the influence of William Carlos Williams. In *For Love* (1962), the collection of poems written between 1950 and 1960, Creeley emerged as a master technician. Like Williams' poems, Creeley's are short and to the point. In his later books of poetry, most notably *Pieces* (1968), Creeley's poems are equally self-contained. His poetry, characterized by understatement, down-to-earth flippancy, and a studious adherence to economic and precise language, has influenced many younger poets.

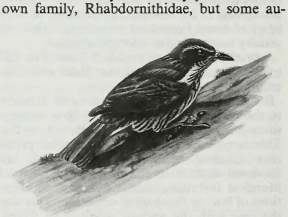
Creeley taught poetry in several universities and from 1967 was a member of the faculty of the State University of New York at Buffalo. *Selected Poems* appeared in 1976.

creep, in geology, slow downslope movement of particles that occurs on every slope covered with loose, weathered material. Even soil covered with close-knit sod creeps downslope, as indicated by slow but persistent tilting of trees, poles, gravestones, and other objects set into the ground on hillsides. The most important process producing creep, aside from direct gravitational influences, is frost heaving: as interstitial water freezes, surface particles are forced up and out perpendicular to the slope; when let down by melting, these particles are drawn directly downward by gravity and are thereby gradually moved downslope. Other processes involved are the wedging action of root growth and the wetting and drying of soil layers.

creeper, any of various small birds that hug tree trunks or rock surfaces as they move about while feeding. The following are songbirds (suborder Passeres; order Passeriformes):

The 13-centimetre (5-inch) spotted creeper (*Salpornis spilonotus*) of Africa and India is usually placed in the family Certhiidae, but its relationships are obscure.

The Philippine creepers of the genus *Rhabdornis* have brush-tipped tongues and often visit flowers. They are usually placed in their own family, Rhabdornithidae, but some authorities place them in the Sittidae and others in the Climacteridae.



Philippine creeper (*Rhabdornis inornatus*)
Painting by H. Jon Janosik

The brown creeper (*Finschia novaeseelandiae*) of New Zealand belongs to the subfamily Malurinae of the Old World warblers (family Sylviidae). It is about 13 cm long, with a rather long tail and a tiny bill. Flocks or pairs call constantly in forests of South Island.

For the North American brown creeper (*Certhia familiaris*), *see* treecreeper.

creeping bent (*Agrostis palustris*), lawn grass and member of the family Poaceae. *See* bent grass.

creeping hemlock: *see* American yew.

creeping Jenny, also called MONEYWORT and CREEPING CHARLIE (*Lysimachia nummularia*), a prostrate perennial herb, of the



Creeping Jenny (*Lysimachia nummularia*)
Miles C. Labrum

primrose family (Primulaceae), native to Europe but introduced into North America as a ground cover in warm climates and as an indoor hanging plant.

The opposite, nearly round leaves are about 2 centimetres (0.75 inch) in diameter. The solitary yellow flowers are borne on stalks. The plant is most often found in moist shade.

creeping water bug, any flat-backed, oval-shaped insect of the family Naucoridae (order Heteroptera), which numbers about 150



Creeping water bug (*Ambrysus mormon*)
William E. Ferguson

species. These small, dark bugs, commonly found in tropical regions, range between 5 and 16 millimetres (0.2 and 0.6 inch) and, when submerged, breathe from air stored under their wings.

Creeping water bugs are usually seen swimming or creeping in quiet grassy or reedy waters. They prey on small aquatic organisms.

Creevey, Thomas (b. March 1768, Liverpool—d. Feb. 5, 1838, London), English politician and placeman, best remembered as the author of *The Creevey Papers,* published in 1903 and again in 1905 and consisting partly of Creevey's own journals and partly of correspondence. They give a lively and valuable picture of the political and social life of the late Georgian era and are characterized by an almost Pepysian outspokenness.

Allegedly the son of William Creevey, a Liverpool merchant, he is believed by some to have been the illegitimate son of Charles William, 1st Earl of Sefton. He went to Queens' College, Cambridge, and graduated as seventh wrangler (1789). He became a student at the Inner Temple, transferred to Gray's Inn (1791), and was called to the bar (1794). He entered Parliament (1802) through the Duke of Norfolk's nomination and married Mrs. Eleanor Ord, a widow with six children and a comfortable income.

Creevey was a Whig and a follower of Charles James Fox, and his active intellect and social qualities procured him a considerable intimacy with the leaders of this political circle. In 1806, when the brief "All the Talents" ministry was formed, he was given the office of secretary to the Board of Control. In 1830, when next his party came into power, Creevey, who had lost his seat in Parliament, was appointed treasurer of the ordnance; and subsequently Lord Melbourne made him treasurer of Greenwich Hospital (1834). After 1818, when his wife died, he had very slender means of his own.

Creevey had a shrewd political sense and also an unrivalled capacity for giving pleasure in social life. *The Creevey Papers* include many of his letters that, as lively and as cheerful as his personality, give a good picture of the late Georgian era and are a useful addition and corrective to *The Croker Papers* (1884), the collection of diaries and correspondence written by John Wilson Croker (1780–1857) from a Tory point of view. Creevey is also known to have kept a "copious diary" covering 36 years of his life, but it was apparently destroyed sometime after his death by friends fearing exposure of the contents.

Crefeld (Germany): *see* Krefeld.

Creighton, James Edwin (b. April 8, 1861, Pictou, Nova Scotia—d. Oct. 8, 1924, Ithaca, N.Y., U.S.), U.S. Idealist philosopher and the founding president (1902) of the American Philosophical Association.

After studying in Leipzig and Berlin he obtained his Ph.D. (1892) at Cornell University, Ithaca, N.Y., where he had begun teaching in 1889. He remained at Cornell until his death, acting also as American editor of *Kantstudien* (1896–1924) and editor in chief of *Philosophical Review* (1902–24). He constantly defended Idealistic, or speculative, philosophy against Pragmatism, neo-Realism, Materialism, and Berkeleian immaterialism.

Creil, town, Oise *département,* northern France, on the Oise River, north of Paris. Its Gothic church of Saint-Médard has a 13th-century interior and a 16th-century tower. A great château (now demolished) was built at Creil by King Charles V in the 14th century, and Charles VI lived there for a number of years. The Maison Galle-Juillet, a museum in the château court, contains 19th-century provincial furniture, pottery, and paintings. An active industrial centre serving both Paris and the northwest of France by road, rail, and inland waterway, Creil has metalworks and large railroad workshops. Pop. (1982) 34,332.

Crelle, August Leopold (b. March 11, 1780, Eichwerder, Brandenburg—d. Oct. 6, 1855, Berlin), mathematician and engineer who advanced the work and careers of many young mathematicians of his day and founded the *Journal für die reine und angewandte Mathematik* ("Journal for Pure and Applied Mathematics"), now known as *Crelle's Journal.*

A civil engineer in the service of the Prussian government until 1828, he worked on the planning and construction of roads and the first railroad (completed 1838) in Germany.

Crelle was more interested in educational matters, however, and in 1828 he left government service to work with the Ministry of Ecclesiastical Affairs and Public Education. He published a large number of textbooks, and his multiplication tables have been widely used and reprinted many times. His greatest contribution to mathematics was the founding of *Crelle's Journal* in 1826. The eminent mathematicians Niels Abel of Norway and Jakob Steiner of Switzerland encouraged Crelle in this venture and were the chief contributors to the first volumes. Though Crelle was not a first-rank mathematician, he had a sure instinct for recognizing genius. Without his generous support and encouragement, some of Abel's greatest work might never have been completed and published.

Crema, town, Cremona province, Lombardia (Lombardy) region, northern Italy, on the Serio River southeast of Milan. Possibly of Celtic origin, Crema was sacked by Emperor Frederick I Barbarossa in 1159 and was rebuilt in 1185. Falling to the Visconti family in 1338, it was under Milanese, Venetian, French, and Austrian rule before the unification of Italy in 1860. Its Lombard Gothic cathedral (1284–1341) and Renaissance palaces are notable. An



Church of Sta. Maria della Croce, outside Crema, Italy, by Giovanni Battagio *c.* 1490
John G. Ross—Photo Researchers

agricultural market and industrial centre, Crema's varied manufactures include machinery, hemp and linen textiles, and food products. Pop. (1981 prelim.) mun., 34,610.

cremation, the practice of reducing a corpse to its essential elements by burning.

History. The practice of cremation on open fires was introduced to the Western world by the Greeks as early as 1000 BC. They seem to have adopted cremation from some northern people as an imperative of war, to ensure soldiers slain in alien territory a homeland funeral attended by family and fellow citizens. Corpses were incinerated on the battlefield; then the ashes were gathered up and sent to the homeland for ceremonial entombment. Although ground burial continued (even a symbolic sprinkling of earth over the body fulfilled requirements, as *Antigone* reveals), cremation became so closely associated with valour and manly virtue, patriotism, and military glory that it was regarded as the only fitting conclusion for an epic life.

The *Iliad* makes plain how elaborate and important cremations were. In that, Zeus himself forced Achilles to surrender Hector's body to his father so that he, King Priam of Troy, could have it cremated royally. The greater the hero, the greater was the conflagration. Achilles set the pattern in providing a pyre 100 feet (30 m) square for his friend Patroclus. Achilles himself was incinerated even more gloriously after his death—in "raiment of the gods" after 17 days of mourning. After the flames were quenched with wine, his bones were bathed in oil and wine and placed in a golden urn with those of Patroclus. Lavish funeral feasting and funeral games followed, and a great tomb was erected for him on a headland above the Hellespont.

The Romans followed Greek and Trojan fashion in cremating their military heroes. Virgil's *Aeneid* scornfully contrasts the etiquette of the "unhappy" Latins with that of the Romans' Trojan ancestors. Virgil describes how during a 12-day truce, declared so that both armies could cremate dead warriors, the Latins burned many without ritual or count and later heaped the bones together, covering them with a mound of earth. The Romans, on the other hand, observed all the proprieties. They covered the pyre with leaves and fronted it with cypresses; after it was set ablaze, troops shouting war cries circled it and cast trophies taken from the slain Latins into the fire. They poured the blood of animals on the flames, and, when the fires were quenched, washed the bones in wine and placed them in urns. Cremation became such a status symbol in Rome that constructing and renting space in columbariums (vaults or similar structures with niches in the walls to receive the ashes of the dead) became a profitable business. By about AD 100, however, cremations in the Roman Empire were stopped, perhaps because of the spread of Christianity. Although cremation was not explicitly taboo among Christians, it was not encouraged by them because of pagan associations and because of the concern that it might interfere with the promised resurrection of the body and its reunion with the soul. The most practical reason is that cremations were threatening to bring about serious wood shortages, since so much timber was being felled for pyres.

The pagan Scandinavians favoured cremation, believing that it helped free the spirit from the flesh and also that it kept the dead from harming the living. These pagans' practices paralleled the Greek and Roman epic cremations. After the Icelandic conversion to Christianity in AD 1000, cremation was rare in western Europe until the 19th century, except in emergencies. During an outbreak of the Black Death in 1656, for example, the bodies of 60,000 victims were burned in Naples during a single week.

In India and some other countries where the custom is ancient, cremation is considered very desirable. It is the wish of all devout Hindus to be incinerated in Vārānasi. The waterfront of that holy city is lined with concrete and marble slabs on which pyres are erected. The remains are then deposited in the Ganges River. In some Asiatic countries cremation is available to only a favoured few: in Tibet it is usually reserved for the high lamas; in Laos it is for those who die "fortunately" (*i.e.,* of natural causes at the end of a peaceful and prosperous life). Cremation ceremonies in Bali are colourful and gay. On a "lucky" day, bodies of a number of worthies, which had been temporarily buried or embalmed, are carried to a high and decorative tower made of wood and bamboo and cremated. Forty-two days later a second tower, with effigies instead of bodies, is burned to assist the soul on its journey toward the highest heaven. The ashes of the towers, like those of the bodies, are scattered on the water.

Modern cremations. Cremation in the modern manner is very different. Open fires are not used; instead, the body is placed in a chamber where intense heat transforms it in an hour or two to a few pounds of white, powdery ash. That is disposed of in accordance with law and sentiment: scattered in a garden or some other preferred spot, placed in an urn and kept at home, or taken to a cemetery for burial in a small plot or placement in a columbarium.

The revival of interest in cremation in Europe and the United States began in 1874, when Queen Victoria's surgeon, Sir Henry Thompson, published his influential book *Cremation. The Treatment of the Body After Death.* He also organized the Cremation Society of England in association with Anthony Trollope, Sir John Tenniel, the dukes of Bedford and Westminster, and other articulate critics of burial practices. Although it was not until 1884 that a British court first ruled cremation a legal procedure, it won immediate support on both sides of the Atlantic. For more than a century social and religious reformers had protested such practices as the long and sometimes disorderly wakes, or watches, held over the bodies of dead persons prior to burial. Physicians and sanitary engineers were alarmed at the practice of burial in cemeteries, holding the saturated burial grounds to be poisonous. The British movement prompted action in the United States, where the first crematorium was built in Washington, Pa., in 1876. Five years later the New York Cremation Society was organized; in 1913 the Cremation Association of America was organized. Growth of the practice has been slow in the United States, however, where by the 1970s only about 8 percent of the dead were cremated. It has been more readily accepted in some European and Asiatic countries: the figure in England, Germany, and Denmark, for example, is more than 50 percent. In Japan, where cremation was illegal in 1875, the practice has become almost universal.

As the shortage of cemetery space in urban areas becomes more acute and as objections are answered, cremation may become the chief form of burial. Many Protestant churches have actively supported it; the Roman Catholic church has announced that it is not prohibited. The Orthodox Jewish religion, however, continues to declare it forbidden. Legal objections—that it would allow crimes to go undetected—are being countered by improvements in techniques and standards in coroners' offices. Cemetery owners and undertakers have also minimized their opposition, since cremation has proved no less profitable than more traditional methods of burial.

Crémazie, Octave, byname of CLAUDE-JOSEPH-OLIVIER CRÉMAZIE (b. April 16, 1827, Quebec—d. Jan. 16, 1879, Le Havre, Fr.), poet considered the father of French-Canadian poetry.

An extraordinarily learned man, educated at the Seminary of Quebec, Crémazie started a bookshop in 1848 that became the centre of an influential literary circle. In 1860 Crémazie and his friends founded the first literary school of Quebec and in 1861 began issuing a monthly magazine of literature and history, *Les Soirées Canadiennes,* to preserve the folklore of French Canada. Crémazie also published poems in the *Journal de Québec* from about 1854.

He left Canada in 1862 for France, where he hoped he would become economically more secure, but he spent the rest of his life there in great poverty, under the assumed name of Jules Fontaine. In this period he wrote the pessimistic poem "Promenade des trois morts," which remained unfinished, and a journal, *Siège de Paris,* that gave an eyewitness account of the siege of 1870. His poems are characterized by a patriotic love of Canada and the Canadian landscape. His most famous patriotic poems are "Le vieux soldat canadien" (1855; "The Old Canadian Soldier"), celebrating the first French naval ship to visit Quebec in almost a century, and "Le Drapeau de Carillon" (1858; "The Flag of Carillon"), which almost became a national song of Canada.

Crémazie's *Oeuvres complètes* ("Complete Works") were collected and published by his friends in 1882.

Cremer, Gerard de: *see* Mercator, Gerardus.

Cremer, Sir (William) Randal (b. March 18, 1838, Fareham, Wiltshire, Eng.—d. July 22, 1908, London), British trade unionist and pacifist who won the Nobel Prize for Peace in 1903 for his advocacy of international arbitration.

In 1860 he was one of the founders of the Amalgamated Society of Carpenters and Joiners. He was secretary of the British section of the International Working Men's Association (First International) but resigned because of a dispute with another leader. During the Franco-German War (1870–71) he formed a workingmen's committee to advocate British neutrality. This group developed into the Workmen's Peace Association, of which Cremer was secretary until his death. Cremer was a member of the House of Commons from 1885 to 1895 and from 1900 to 1908. He was knighted in 1907.

Crémieux, (Isaac-) Adolphe, original name ISAAC MOÏSE (b. April 30, 1796, Nîmes, Fr.—d. Feb. 10, 1880, Paris), French political figure and Jewish leader active in the Revolution of 1848 and the Paris Commune (1871).



Crémieux, lithograph by L.-E. Coedès
By courtesy of the Bibliotheque Nationale, Paris

After a distinguished legal career in Nîmes, he was appointed advocate of the Court of Appeals in Paris (1830), where he gained further renown for his legal skill and oratory.

In 1842 Crémieux was elected to the Chamber of Deputies from the Indre-et-Loire *département* and quickly emerged as a leading member of the radical left. He played a prominent role in the revolutionary movements of 1848 and served as minister of justice in the provisional government of 1848–49. He voted for the presidential candidacy of Louis-Napoléon, but, when he withdrew his support, he was imprisoned. After his release, he returned to the bar and left-wing politics. He returned to the Chamber in 1869, representing a Parisian district, and, when the Second Empire collapsed, he joined the Government of National Defense (1870–71) as minister of justice. Subsequently, he served as a deputy from Algiers (1871–75) and then senator (1875–80).

Crémieux was an important leader of the French Jewish community. He lent his prestige and political influence to numerous campaigns for the normalization of Jewish life in France and Algeria, backing the enfranchisement of North African Jews. He was a founder of the influential Universal Israelite Alliance and was its president from 1863 to 1880.

Cremona, city, capital of Cremona *provincia,* Lombardia (Lombardy) *regione,* northern Italy, on the north bank of the Po River southeast of Milan. It was founded by the Romans in 218 BC on the site of an earlier Gallic village of the Cenomani. Virgil, the Roman poet, went to school there. With the decline of the Roman Empire, Cremona was repeatedly sacked by the Goths and the Huns before being rebuilt by the Lombards in the 7th century. A bishopric since the 9th century and an independent commune after 1098, it initially supported Emperor Frederick I Barbarossa in his conflict with the Lombards out of hostility to Milan, but it finally joined the Lombard League (an alliance of northern Italian towns)

in 1167. The city was controlled by the Visconti family and, later, by the Sforzas, of Milan, from 1334 to 1535, except for a period of Venetian rule (1499–1509). It was Spanish from 1535 and Austrian after 1707; its later history followed that of Lombardy.

Cremona centres on the cathedral square, with the finely proportioned Romanesque cathedral (consecrated 1190); the adjoining Torrazzo (*c.* 1250), reputedly the highest bell tower in Italy (nearly 400 ft [120 m]); the octagonal baptistery (1167); the city hall (1206–45); and the Loggia dei Militi (1292). Many of Cremona's numerous churches and palaces are notable for frescoes by painters of the 15th–16th-century Cremona school. Important buildings include the churches of S. Agostino (1339) and S. Pietro al Po (1563) and the Renaissance Fodri, Raimondi, and Stanga palaces. Claudio Monteverdi, one of the founders of opera as an art form, was born there in 1567.

Cremona is famous for the violins and violas made there in the 16th–18th centuries by the Amati family and their pupils, the Guarneri and Antonio Stradivari. The School of Violin and Viola Makers has a museum of antique stringed instruments in the Palazzo dell'Arte. The university school of musical paleography is unique in Italy. An important centre for agricultural and dairy produce, Cremona manufactures agricultural machinery, silk textiles, bricks, and pianos. Pop. (1981 prelim.) mun., 80,758.

Cremona, (Antonio) Luigi (Gaudenzio Giuseppe) (b. Dec. 7, 1830, Pavia, Lombardy—d. June 10, 1903, Rome), Italian mathematician who was an originator of graphical statics, the use of graphical methods to study forces in equilibrium.

Following his appointment as professor of higher geometry at the University of Bologna in 1860, he published "Introduzione ad una teoria geometrica delle curve piane" (1862; "Introduction to a Geometrical Theory of the Plane Curve"), his first paper on transformations (rules that associate with every point in a space one or more points in the same space) in planes and in space. This paper, upon which his reputation mainly rests, proclaims him a member of the Steinerian, or synthetic, school of geometricians. The paper was followed by "Sulle trasformazioni geometriche delle figure piane" (1863; "On the Geometrical Transformations of the Plane Figure"), his most important work on transformations.

In 1866 Cremona was appointed professor of higher geometry and graphical statics at the polytechnical institute of Milan. During his tenure there his creative work was at its peak, and he produced such works as *Le figure reciproche della statica grafica* (1872; *Graphycal Statics,* 1890), *Elementi di geometria proiettiva* (1873; *Elements of Projective Geometry,* 1885), and *Elementi di calcolo grafico* (1874; "Elements of Graphic Calculus"). In 1873 he was appointed director of the newly established Polytechnic School of Engineering, Rome. The responsibilities of this position effectively ended his mathematical research. In 1877 he attained the chair of higher mathematics at the University of Rome, and in 1879 he became a corresponding member of the Royal Society of London and a senator of the Kingdom of Italy.

Creodonta, order of extinct, primitive carnivores first found as fossils in Late Cretaceous deposits of Mongolia (the Cretaceous Period ended 65,000,000 years ago). The creodonts evolved from Late Cretaceous mammals (the Deltatheridia), became the early dominant carnivores, and reached the peak of their number and diversity during the Eocene Epoch (between 38,000,000 and 54,000,000 years ago). The creodonts retained numerous archaic traits. The brain was small and primitive, and the skull was relatively long and low. Prominent crests present on the skull served for the attachment of well-developed chewing muscles. Two main families are distinguished: the Oxyaenidae and the Hyaenodontidae. The oxyaenids, long-bodied, weasel-like animals with short legs, first appeared during the late Paleocene Epoch (more than 54,000,000 years ago) and became extinct at the end of the Eocene Epoch. The hyaenodonts were more diverse and abundant than the oxyaenids and had proportionately longer limbs. Some forms grew to large size and paralleled the evolution of later, more advanced carnivores, including the sabre-toothed cats. The hyaenodonts were active predators and persisted much later than the oxyaenids. Some were able to compete with the true carnivores and survived into the Pliocene Epoch (between 2,500,000 and 7,000,000 years ago). Well-known genera of hyaenodonts include *Sinopa* and *Hyaenodon.*

Creole, Spanish CRIOLLO, French CRÉOLE, originally, in the 16th–18th century, any white person born in Spanish America of Spanish parents, as distinguished from an American resident who had been born in Spain. The term has since been used with various meanings, often conflicting or varying from region to region.

In Spanish colonial America, Creoles were generally excluded from high office in both church and state, although legally Spaniards and Creoles were equal. Discrimination arose from Spanish crown policy aimed at rewarding its favoured Spanish subjects with lucrative and honorific colonial posts, while excluding Creoles from such positions and severely restricting their commercial activities. Especially in the 18th century, immigrants from Spain (called *peninsulares* or, with contempt, *gachupines* and *chapetones* in Mexico and South America, respectively) who succeeded in business in the colonies aroused the enmity of the Creoles. The Creoles acquired a reputation for being superficial and indolent, but these generalizations were made without the necessary acknowledgement that Creole education, practical experience, and especially, economic and political opportunities were quite limited. The Creoles led the revolutions that effected the expulsion of the colonial regime from Spanish America in the early 19th century. After independence in Mexico, Peru, and elsewhere, Creoles entered the ruling class. They were generally conservative and cooperated with the higher clergy, the army, large landowners, and, later, foreign investors.

In the West Indies in recent times the noun creole was used to denote descendants of any European settlers, but commonly now the term is used more largely to refer to all the people, whatever their class or ancestry—European, African, Asian, Indian—who are part of the Caribbean culture. In French Guiana the term refers to those who, whatever the colour of their skin, have adopted a European way of life; in neighbouring Suriname it refers to descendants of African slaves. In Louisiana in the United States it refers, in some contexts, to French-speaking white descendants of early French and Spanish settlers and, in other contexts, to mulattos speaking a form of French and Spanish.

In different parts of Latin America the term creole has various referents; it may denote any local-born person of pure Spanish extraction; it may refer more restrictively to members of old-line families of predominantly Spanish descent who have roots in the colonial period; or it may simply refer to members of urban Europeanized classes, as contrasted with rural Indians. In such countries as Peru, the adjective creole describes a certain spirited way of life. Important expressions of this way of life are the abilities to speak wittily and persuasively on a wide range of topics, to turn a situation to one's advantage, to be masculine (*macho*), to exhibit national pride, and to participate in fiestas and other sociable activities with a certain gusto—in sum, to be *muy criollo* ("very creole").

creole, pidgin language that has become established as the native language of a speech community. Examples are Gullah (derived from English) spoken in the Sea Islands of South Carolina, U.S., Haitian Creole (derived from French), Krio (derived from English) spoken in Sierra Leone, Louisiana Creole (derived from French), Melanesian Pidgin (derived from English), Sranantonga (derived from English) spoken in Suriname, and Papiamento (derived from Spanish and Portuguese) spoken in Curaçao, Aruba, and Bonaire. Typically, a creole arises when the speakers of one language become economically or politically dominant over speakers of another language or languages, particularly if the latter are illiterate. At first, a simplified or otherwise modified form of the language of the dominant group comes to be used for communication between members of the different groups. At this stage the communicating language is a lingua franca and, if simplified in its forms, a pidgin; when the lingua franca becomes the standard or native language of a community, usually of the less dominant group, the language has become a creole. *See also* lingua franca.

creosote, either of two entirely different substances, coal-tar creosote and wood-tar creosote. In commerce, creosote is a coal-tar distillate, a complex mixture of organic compounds, largely hydrocarbons. It is commonly used as a wood preservative. The creosote distilled from wood tar is a mixture of phenolic compounds; it once was used extensively for pharmaceutical purposes.

crepe, also spelled CRÊPE, French pancake made of a thin batter containing flour, eggs, melted butter, salt, milk, water, and, if the crepes are to be served with a sweet sauce or garnish, sugar. Crepes can be filled with a variety of sweet or savoury mixtures. For crepes suzette the crepes are folded in four and soaked in a syrup flavoured with orange liqueur, and frequently are flamed at table.

crepe, French CRÊPE ("crisped," "frizzled," or "wrinkled"), any of a family of fabrics of various constructions and weights but all possessing a crinkled or granular surface achieved through weaving variations, chemical treatment, or embossing. The fabric is usually woven with crepe yarn, a hard-twist yarn produced either with a higher number of twists per inch than ordinary yarn or with alternate "S" and "Z" twists. In the "S" twist the twist of the yarn resembles the centre part of the letter "S"; in the "Z" twist the resemblance is to the centre part of the letter "Z", these are sometimes referred to as left-hand and right-hand twists. One variation is to leave out certain risers (interlacings of warp over filler threads) present in plain weave in order to increase the float of yarn from one to three (*see also* weaving).

The fabric is woven from all of the major fibres, natural or man-made. Surface textures range from fine, flat crepes to pebbled and mossy effects; some surfaces resemble tree bark. Popular crepes include Canton, crepe-back satin, crepe de Chine, Georgette, marocain, faille, lingerie, mossy, romaine, and rough.

crepe de Chine, also spelled CRÊPE DE CHINE (French: "crepe of China"), light and fine plainwoven dress fabric produced either with all-silk warp and weft or else with a silk warp and hard-spun worsted weft. A crepe de Chine texture has a slightly crepe character, a feature

produced by the use of weft, or filling, yarns spun with the twist running in reverse directions and known as right-hand and left-hand twist, respectively. During weaving, the picks of filling are inserted in the order of "two-and-two" (*i.e.*, with two picks of weft with a right-hand twist and two picks with a left-hand twist).

During the finishing operation, because of the abnormal amount of twist in the picks of filling, these tend to untwist and recover their normal condition, thereby causing the characteristic effect of typical crepe de Chine. Crepe de Chine textures of artificial silk are common and are often difficult to distinguish from the true silk.

Crepicephalus, genus of trilobites (extinct arthropods) useful as an index fossil for Upper Cambrian rocks in North America (dating 570 to 505 million years ago); it is a relatively common fossil and occurs over a wide geographic range but within a relatively narrow time span. *Crepicephalus* is recognized by the prominent spines at the lateral margins of the tail section. Smaller spines occur at the margins of the head shield.

crepuscolarismo (Italian: "twilight school"), a group of early 20th-century Italian poets whose work was characterized by disillusion, nostalgia, a taste for simple things, and a direct, unadorned style. Like Futurism, a contemporaneous movement, *crepuscolarismo* reflected the influence of European Decadence and was a reaction to the florid ornamental rhetoric of the Italian author Gabriele D'Annunzio. It differed from the militant Futurist movement in its passivity, but both movements expressed the same spirit of desolation, and many *crepuscolari* later became *futuristi*.

The movement was named in a 1910 article, "Poesie crepuscolare," by the critic Giuseppe Borgese, who saw in their poetry the twilight of D'Annunzio's day. The main poets associated with it were Guido Gozzano, Fausto Maria Martini, Sergio Corazzini, Marino Moretti, and Aldo Palazzeschi; the last two poets later became important writers of fiction. Most notable of the group was Gozzano (d. 1916), whose poems were strong in descriptive power, stylistically skillful, and quietly humorous. Most of the poets were sentimental and nostalgic, stressing their boredom, loneliness, and the tedium of their lives.

Though the movement died out in the second decade of the 20th century, it was an important influence in returning Italian poetry to simple language and simple subjects.

Créquy, Charles I de Blanchefort, marquis de, PRINCE DE POIX, DUC DE (duke of) LESDIGUIÈRES, Créquy also spelled CRÉQUI (b. 1578—d. March 17, 1638, near Crema, Italy), marshal of France during the reign of King Louis XIII.

Créquy saw his first fighting before Laon in 1594 and was wounded at the capture of Saint-Jean-d'Angély in 1621. In the next year he became a marshal of France. He served through the Piedmontese campaign in aid of Savoy in 1624 as second in command to the constable, François de Bonne, duc de Lesdiguières, whose daughter Madeleine he had married in 1595. He inherited in 1626 the estates and title of his father-in-law, who had induced him, after the death of his first wife, to marry her half-sister Françoise. He was also lieutenant general of Dauphiné. In 1633 he was ambassador to Rome and in 1636 to Venice. He fought in the Italian campaigns of 1630, 1635, 1636, and 1637, when he helped to defeat the Spaniards at Monte Baldo. He was killed in 1638 in an attempt to raise the siege of Crema, a fortress in the Milanese.

He had a quarrel extending over years with Philip, the bastard of Savoy, which ended in a duel fatal to Philip in 1599. Some of his letters are preserved in the Bibliothèque Nationale in Paris.

Créquy, François, chevalier de (knight of), MARQUIS DE MARINES, Créquy also spelled CRÉQUI (b. *c.* 1624—d. Feb. 3, 1687, Paris), marshal of France and one of King Louis XIV's most successful commanders during the War of Devolution (1667–68) and the Third Dutch War (1672–78).

As a boy, Créquy took part in the Thirty Years' War, distinguishing himself so greatly that at the age of 26 he was made a *maréchal de camp,* and a lieutenant general before he was 30. He was regarded as the most brilliant of the younger officers, and won the favour of Louis XIV by his fidelity to the court during the second Fronde. In 1667 he served on the Rhine, and in 1668 he commanded the covering army during Louis XIV's siege of Lille, after the surrender of which the King rewarded him with the marshalate. In 1670 he overran the duchy of Lorraine. Shortly after this Turenne, his old commander, was made marshal-general, and all the marshals were placed under his orders. Many resented this, and Créquy, in particular, whose career of uninterrupted success had made him overconfident, went into exile rather than serve under Turenne. After the death of Turenne and the retirement of Condé, he became the most important general officer in the army, but his overconfidence was punished by the severe defeat of Conzer Brück (1675) and the surrender of Trier and his own captivity which followed. But in the later campaigns of this Dutch war he showed himself again a cool, daring, and successful commander, carrying on the tradition of Turenne and Condé.

Crerar, John (b. March 8, 1827, New York City—d. Oct. 19, 1889, Chicago), U.S. railway industrialist and philanthropist who endowed (1889) what later became the John Crerar Library of science, technology, and medicine.

Crerar moved in 1862 to Chicago, where he directed a railway equipment manufacturing plant. A member of the Pullman Palace Car Company when it was incorporated in 1867, he was also a bank and railroad director.



Crerar, engraving
By courtesy of the John Crerar Library, Chicago

While Crerar's library bequest did not provide for a purely science library, he expressly wished that certain novels and other works that he felt undermined morals be excluded. The library, now affiliated with the University of Chicago, contains approximately 1,000,000 volumes on physical, natural, and medical sciences as well as other subjects. Crerar's will also provided for a statue of Abraham Lincoln, resulting in a celebrated work by Augustus Saint-Gaudens in Lincoln Park, Chicago.

Cres, Italian CHERSO, island in the Kvarner group, northwest Croatia, in the Adriatic Sea, off the east coast of Istria. With an area of 156 sq mi (404 sq km), it reaches a maximum altitude of 2,150 ft (650 m) at Gorice. In the south, a canal—first made in Roman times, revived in the 16th century—separates Cres from the island of Lošinj (Italian Lussino), about 29 sq mi (75 sq km) in area; a road bridge spans the channel. Both islands are structurally part of the limestone plateau of Istria. Lake Vrana, a freshwater lake in the centre of Cres, supplies both Cres and Lošinj. Since the decline of viticulture on Cres, fishing and fruit growing provide a livelihood. A small but valuable tourist industry has recovered from the inactivity of 1921–47, when both islands were Italian. Cres has Roman ruins, a Renaissance clock tower, city loggia, and a 15th–16th-century church.

Following the fall of Rome, Cres became a part of the Byzantine Empire until 998 and then came in turn under the rule of the Croatian kingdom, Venice, Hungary-Croatia, and, from 1409 to 1797, Venice again. Subsequent rulers were Austria, France, Austria again (1814–1921), Italy (1920–47), Yugoslavia (1947–92), and independent Croatia. Pop. (1981 prelim.) Cres and Lošinj, 10,361.

Crescas, Ḥasdai ben Abraham (b. 1340, Barcelona?—d. 1410, Saragossa, Spain), Spanish philosopher, Talmudic scholar, and critic of the Aristotelian rationalist tradition in Jewish thought, who became crown rabbi of Aragon.

A merchant and Jewish communal leader in Barcelona (1367), Crescas became closely associated with the royal court of Aragon after the accession of John I (1387) and was accorded the title "member of the royal household." Empowered by royal decree to exercise over the Jewish community juridical and executive jurisdiction enumerated by Jewish law, he settled in Saragossa as the crown's chief rabbi.

Crescas' first known work is a chronicle of the massacres of Jews (including his son) in Barcelona in 1391, written in the form of a letter to the Jewish community of Avignon (now in France). Motivated to reaffirm Jewish principles during severe persecution of the Jews in Spain, he wrote (1397–98) a treatise in "Refutation of the Principles of the Christians," a critique of 10 principles of Christianity.

Crescas' closely reasoned critique of Aristotle and Jewish Aristotelian tradition, represented in particular by the 12th-century philosopher Maimonides, is contained in his *Or Adonai* ("The Light of the Lord"), completed in 1410. In the work, a commentary on various aspects of the Torah, he rejected traditional proofs for the existence of God, insisting that certainty in this matter rests only on the authority of the Bible in stating "Hear, O Israel: The Lord our God is one Lord" (Deut. 6:4).

crescent, Arabic HILĀL, political, military, and religious emblem of the Byzantine and Turkish empires and, later and more generally, of all Islāmic countries.

The Moon in its first quarter was a religious symbol from earliest times and figured, for example, in the worship of the Near Eastern goddess Astarte. Later it became the symbol of the Byzantine Empire, supposedly because the sudden appearance of the Moon saved the city of Byzantium (Constantinople) from a surprise attack. It once was thought that the Ottoman Turks adopted the crescent for their own flags after capturing Constantinople in 1453, but in fact they had been using the symbol for at least a century before that, for it appeared on the standards of their infantry under Sultan Orhan (*c.* 1324–*c.* 1360). In that case, however, the crescent may have been of different origin, formed by the base-to-base conjunction of two claws or horns. Whatever its origin, the crescent became closely associated with the Ottoman Empire (appearing on military and naval standards and on the tops of minarets), its successor states, and the world of Islām in general. It may be seen today on the national flags of many countries

in which Islām is predominant, including Algeria, Azerbaijan, Comoros, Malaysia, Maldives, Mauritania, Pakistan, Tunisia, and Turkey; and it is also in the symbol of the Red Crescent, the Muslim equivalent of the Red Cross organization.

In medieval European heraldry the crescent was originally a mark of great honour adopted by many returned crusaders, particularly in France.

crescent, Turkish (musical instrument): *see* jingling Johnny.

Crescentii FAMILY, Italian CRESCENZI, a Roman family that played an important part in the history of Rome and the papacy from the middle of the 10th to the beginning of the 11th century. Its extensive possessions were situated mainly in the Sabina.

The Crescentii a Caballo Marmoreo and the Crescentii de Theodora may both have been descended from one Crescentius recorded in 901. Crescentius (Crescenzio) I de Theodora (d. 984?) led a revolt in 974 against Pope Benedict VI, who was imprisoned in the Castel Sant'Angelo and then assassinated. Crescentius' choice as successor, the antipope Boniface VII, was immediately expelled by the new "imperial" pope, Benedict VII, under whose pontificate (974–983) the Crescentii seem to have suffered a political setback.

After the Holy Roman emperor Otto II's death, their fortunes revived, and John (Giovanni) I, probably Crescentius' son, assumed the title of *patricius* of Rome and appears to have controlled the election of the new pope, John XV, in 985. In 996 Crescentius, probably John's brother, led a rising against Pope Gregory V, but the pope's cousin the emperor Otto III reinstated him in 998. After being besieged by Otto in the Castel Sant'Angelo, Crescentius was executed on April 29, 998. His son John II was the last of the family to wield political power in Rome: after Otto's death (1002), he became *patricius* and henceforth practically governed the city; he died in 1012.

After that, the Stefaniani branch, descended from Stefania, sister of Crescentius I de Theodora, declined; the Ottaviani, descended from John II's brother-in-law Octavianus, retained the rectorate of the Sabina until the beginning of the 12th century.

Cresilas (fl. 5th century BC, Athens), sculptor whose portrait of the Athenian statesman Pericles generated a type of noble, idealized portraiture. Cresilas was a contemporary of Phidias and one of the sculptors in a competition at Ephesus about 440 BC. His entry, a figure of a wounded Amazon, is ascribed to him from its resemblance in style to his head of Pericles. The figure is known only through copies.

cresol, any of three methylphenols possessing the same molecular formula ($CH_3C_6H_4OH$) but with different structures: *ortho*-cresol, *meta*-cresol, and *para*-cresol. They are obtained from coal tar or petroleum and are useful as raw materials for various chemical products.

The isomer *o*-cresol is a starting material for the herbicides 4,6-dinitro-*o*-cresol (DNOC) and 2-methyl-4-chlorophenoxyacetic acid (MCPA). The isomers *m*-cresol and *p*-cresol are used in phenol-formaldehyde resins and are converted to tricresyl phosphate (a plasticizer and gasoline additive) and to di-*tert*-butylcresols (antioxidants called BHT).

Properties of cresols

	freezing point		boiling point	
	°C	°F	°C	°F
o-cresol	30.99	87.78	191.0	375.8
m-cresol	12.22	54.00	202.2	396.0
p-cresol	34.69	94.44	201.9	395.4

Cresylic acid, a mixture of the three cresols, together with some phenol and xylenols, is an important technical product used as a disinfectant and in the manufacture of resins and tricresyl phosphate.

Crespi, Daniele (b. *c.* 1595, Busto Arsizio, duchy of Milan [Italy]—d. 1630, Milan), Italian Baroque painter, known for the direct emotional appeal and simple compositions of his religious paintings.

Although he studied under the painter Giulio Cesare Procaccini, who was noted for the idealized beauty of his work, Crespi was more influenced by the paintings of Giovanni Battista Crespi (called Il Cerano, and to whom he was probably related), which led him to adopt the starkly realistic style of painting advocated by the Council of Trent (1545–63). His best works, such as "St. Charles Borromeo at Supper" (*c.* 1628; Santa Maria della Passione, Milan), are distinguished by harsh shadows set off by a raking overhead light.

Crespi, Giovanni Battista, also called IL CERANO (b. 1575/76, Cerano, near Novara, duchy of Milan [Italy]—d. *c.* Oct. 23, 1632, Milan), one of the chief Lombard painters of the 17th century, whose work is important in the early development of Lombard realism.

In 1586 Crespi went to Rome, where he stayed until 1595. While in Rome he formed a friendship with the Milanese cardinal, Federigo Borromeo, who became his patron and with whom he returned to Milan, then an important cultural centre and also, under the inspiration of the cardinal's uncle, Archbishop Charles Borromeo, a centre of fervent spiritual revival in art. Crespi formed a style that was Mannerist in its use of colour—with an emphasis on pale, silvery tones—and in the mystical languidness of his figures. At the same time, his figures have a solidity and immediacy that move beyond Mannerism, and they are portrayed as unidealized types with realistic detail. All Crespi's works are characterized by an intense, often agonized spirituality. He executed several important church commissions, including a series of paintings of the life of St. Charles Borromeo for Milan Cathedral that was completed in 1610, a "Baptism of St. Augustine" for San Marco in Milan (1618), and a "Mass of St. Gregory" for the Basilica of San Vittore in Varese (1615–17), which, with its boldly unconventional composition, is reminiscent of the late 16th-century Venetian painter Tintoretto. Crespi's paintings from 1610 to 1620 are particularly impressive for their simplicity and for the humanization of the religious experiences that they portray; an example is "The Madonna of the Rosary" (*c.* 1615; Brera, Milan).

In 1620 Cardinal Borromeo appointed Crespi director of the academy of painting that he had founded in Milan and in 1629 made him supervisor of the decorations for the cathedral. Crespi was also active as an architect, engraver, and writer.

Crespi, Giuseppe Maria, byname LO SPAGNOLO (Italian: "The Spaniard") (b. March 16, 1665, Bologna, Papal States [Italy]—d. July 16, 1747, Bologna), Italian Baroque painter who broke dramatically with the formal academic tradition to achieve a direct and immediate approach to his subject matter that was unparalleled at the time. Better known as a painter of genre scenes (pictures of everyday life), he also applied his innovative manner to religious paintings with impressive results.

After studying with the Bolognese painters Carlo Cignani and Domenico Maria Canuti, Crespi rejected their high-Baroque classicism after traveling to Venice and other cities of northern Italy, where he was impressed by the more fluid style of early Baroque painters, and soon modified his own style. Eventually he attempted an almost total realism. His religious works, portraits, and paintings of everyday contemporary scenes are all informed by a direct human response to the subject. One of his best-known works is "The Flea" (Uffizi, Florence). A late religious painting, "St. Giovanni Nepomuceno Confessing to the Queen of Bohemia" (1743; Civic Museum, Turin), illustrates his naturalistic style. Crespi had no followers of note in Bologna, but his graceful treatment of genre subjects had considerable influence on two Venetian painters who were his pupils, Giovanni Battista Piazzetta and Pietro Longhi.

cress, any of several plants of the mustard family (Brassicaceae), of interest for their piquant young basal leaves, which may be used in salads or as seasonings and garnishes. Watercress (*Nasturtium officinale*), perhaps the most popular of the edible cresses, is a hardy creeping perennial plant, native to Europe but extensively naturalized elsewhere in streams, pools, and ditches. Fresh watercress is used as a salad green and sandwich filling. Common garden cress, or peppergrass (*Lepidium sativum*), a fast-growing, often weedy native of western Asia, is widely grown, especially in its curl-leaved form, and used as a garnish.

Upland cress (*Barbarea verna*), a hardy biennial native to Europe, is a coarse, often weedy plant rarely cultivated. The closely related winter cress, or yellow rocket (*B. vulgaris*), is a common weed, conspicuous in fields for its bright yellow spring flowers. Bitter cress, or meadow cress (*Cardamine pratensis*), of the Northern Hemisphere, is adapted to damp meadows and rock and bog gardens. It is low-growing, with pinnately divided leaves and small white to rose flowers. Yellow cress (*Rorippa* species) includes several marshy plants little cultivated. Pennycress (*Thlaspi* species) includes a few species grown in rock gardens and one (*T. arvense*) grown for its large, round ornamental seed pods. The plants known as rock cress (*Arabis* species) are useful ornamentals grown in gardens for their small but numerous white, yellow, pink, or purplish flowers.

Cressent, Charles (b. Dec. 16, 1685, Amiens, France—d. Jan. 10, 1768, Paris), French cabinetmaker, whose works are among the most beautiful pieces of French furniture ever made.

Grandson of a cabinetmaker of the same name and son of the sculptor François Cressent, Charles practiced both arts, becoming a brilliant metalworker as well. He probably went to Paris about 1710, working at first for the studio of the late cabinetmaker André-Charles Boulle. Soon he became influenced by the designer Gilles Marie Oppenordt and the painter François Watteau and also became friendly with the sculptor François Girardon. Appointed official cabinetmaker in 1715 to the Duke d'Orléans, regent of France, Cressent was elected in 1719 to the Academy of Saint-Luc, a situation that brought him important orders. Although he made furniture for foreign courts (Portugal, Bavaria) and for wealthy French aristocrats, notably Mme de Pompadour, he apparently did not work for King Louis XV of France.

Cressent's first works, in the manner of the Louis XIV style, have affinities with Boulle's creations. In the following period (*c.* 1730–50), his artistry became balanced, retaining its elegant strength and avoiding the excess of Rococo; from that period can be dated the charming *espagnolettes—i.e.,* female figures generally fixed to the corners of tables, most characteristic of his style. Finally, after 1750, his work was inspired by a return to the antique. Cressent not only designed the models and made the furniture himself but also carved magnificent mountings of gilded bronze for them, but such unorthodox totality caused him to clash with and break the

restrictions of the guild. In 1722 the Guild of Bronze Founders and Chasers took legal action against him; he was saved through the intervention of the regent, whose son, the Duke d'Orléans, had to protect Cressent on two subsequent prosecutions, in 1735 and 1743.



Cartel clock with Louis XIV clockcase by Charles Cressent; in the Wallace Collection, London

By courtesy of the trustees of the Wallace Collection, London

Most important of all, Cressent became the leading exponent of the Régence style (*i.e.,* the transitional phase from Baroque to Rococo), replacing the monumental style of the earlier part of Louis XIV's reign with a lighter and more fluent curvilinear style. In his work, the mounts of ormolu (*i.e.,* brass made to imitate gold), so important to the design of 18th-century French furniture, became equally if not more important than the marquetry decoration of the case. He also helped introduce the marquetries of coloured woods that began to replace ebony and ebonized woods.

Cresson, Edith, *née* CAMPION (b. Jan. 27, 1934, Boulogne-Billancourt, near Paris, France), premier of France from May 15, 1991, to April 2, 1992, the first woman in French history to serve as premier.

Daughter of a French civil servant, she studied at the School of Higher Commercial Studies, earning a doctorate in demography, and in 1959 married Jacques Cresson, an executive with the automaker Peugeot. She joined the Socialist Party in 1965 and worked vigorously in François Mitterrand's failed presidential campaign of that year. She ran unsuccessfully for a parliamentary seat in 1975 but was subsequently elected mayor of Thuré (1977), member of the European Parliament (1979–81), and mayor of Châtellerault (1983). After Mitterrand's election to the presidency in 1981, Cresson served in a number of ministries—agriculture, tourism and foreign trade, industry and foreign trade, and European affairs—and became known for her outspokenness and combativeness.

In 1986 Cresson was elected as a Socialist deputy from Vienne. When Michel Rocard resigned the French premiership in 1991, her friend Mitterrand appointed her premier. She sought to improve France's industrial competitiveness while reducing social inequities. Rising unemployment and declining support for the Socialist Party among the voters prompted Mitterrand to replace Cresson as premier after she had been in office less than a year, however.

Cresta sledding: *see* skeleton sledding.

crested rat: *see* maned rat.

crested swift, also called TREE SWIFT (family Hemiprocnidae), any of three or four species of fork-tailed forest birds ranging from Southeast Asia and Australia to the Solomon Islands.

Crested swifts differ from all other members of the order Apodiformes (*e.g.,* hummingbirds) in having feet developed for effective perching. Except for the plumelike, erectile crest on the forehead and the black mask margined with elongated white feathers that distinguish two species, crested swifts in general resemble their close relatives the swifts in their wide mouths, small bills, and long, pointed wings. Crested swifts feed solitarily or in small parties, chiefly at twilight, by making forays for insects from a treetop. The nest is a small, flattish cup of bark and feathers glued together with saliva and attached to a high branch. The single egg fills the nest and is cemented into it. The incubating parent sits crosswise on the branch so as to cover nest and egg.

A widespread species is the crested tree swift (*Hemiprocne longipennis*), ranging from Southeast Asia eastward to the Celebes. It is about 20 cm (8 inches) long and has pale blue-gray upperparts, dark brown wings and



Crested tree swift (*Hemiprocne longipennis*)

Painting by H. Jon Janosik

tail, and reddish cheeks. The 29-centimetre-long whiskered tree swift (*H. mystacea*) of Southeast Asia is mostly black.

cresting (architecture): *see* brattishing.

Creston, Paul, original name GIUSEPPE GUTTOVEGGIO (b. Oct. 10, 1906, New York, N.Y., U.S.—d. Aug. 24, 1985, San Diego, Calif.), American composer noted for the rhythmic vitality and full harmonies of his music, which is marked by modern dissonances and polyrhythms.

Creston studied piano and organ and in 1934 became organist at St. Malachy's Church, New York City. He had no formal training in music theory, teaching himself composition by studying musical scores and by reading. After leaving St. Malachy's in 1967, he taught at Central Washington State College until his retirement in 1975. He was also active as a conductor and lecturer.

Creston gained prominence with his *Threnody* (1938) and *Two Choric Dances* (1938), both for orchestra. His symphonies, some with programmatic connotations, include the *Third Symphony* (1950) and the *Lancaster Symphony* (1970). His *Corinthians XIII* (1963), like the *Third Symphony,* uses themes from Gregorian chant. His belief that song and dance are the basis of music is reflected in the *Invocation and Dance* for orchestra (1953), in the two-part *Janus for Strings, Piano, and Percussion* (1959), and in the two-movement *Second Symphony* (1945). His other works include the symphonic poem *Walt Whitman* (1951); *Pavane Variations* (1966), comprising variations on four 12-tone rows; *Rapsodie* for saxophone and organ (1976); a concertino for marimba; concerti for saxophone, for piano, and for violin; solo piano pieces; and sacred vocal works.

Creswell Crags, ravine about 1,500 feet (450 m) long, near Creswell in northeastern Derbyshire, Eng. It contains caves that have yielded one of the most important British series of extinct vertebrate remains, accompanied by implements of Paleolithic hunters. Creswell Crags was excavated in 1875 and intermittently thereafter until 1960. Although traces of Mousterian artifacts were found, the best-attested evidence of human occupation belongs to the so-called Creswellian culture, widely regarded as a provincial variant of the later Magdalenian culture of southwestern France and assigned to the final episodes of the Würm glaciation. The accompanying remains of mammalian fauna include reindeer, woolly rhinoceros, mammoth, and wild horse.

Cret, Paul Phillippe (b. Oct. 21, 1876, Lyon, France—d. Sept. 8, 1945, Philadelphia, Pa., U.S.), architect and teacher, a late adherent to the Beaux Arts tradition.

Introduced to architecture in the office of his uncle, Johannes Bernard, Cret studied in Lyon and at the École des Beaux Arts, Paris. He was recommended to a post at the University of Pennsylvania in 1903 and taught there until his retirement in 1937.

Cret won numerous design competitions, the first (in collaboration with Albert Kelsey) for the building housing the International Bureau of American Republics (later the Pan American Union) in Washington, D.C. (1907). It is considered Cret's best work, combining architectural styles of North and South America in an eclectic kind of classicism.

Though Cret remained basically outside the mainstream of modernist architecture, he was respected and admired both as a teacher and as the practitioner of a virile, stripped-down classicism adapted to modern steel-frame construction techniques. His busy firm was composed mainly of former students. Among his numerous public buildings are the Public Library, Indianapolis, Ind. (1915), the Detroit Institute of Arts (1922), the Folger Shakespeare Library at Washington, D.C. (1929), and Philadelphia's Rodin Museum (1928).

Cret's firm was also actively involved in the design of bridges, passenger trains, and universities.

Cretaceous Period, interval of geologic time from approximately 144 to 66.4 million years ago. It is often divided into the Early Cretaceous Epoch (144 to 97.5 million years ago) and the Late Cretaceous Epoch (97.5 to 66.4 million years ago). As the final period of the Mesozoic Era, the Cretaceous Period follows the Jurassic Period and precedes the Tertiary Period. The Cretaceous spans more than 77 million years, making it the longest period of Phanerozoic time. The rocks that originated during the period make up the Cretaceous System.

A brief treatment of the Cretaceous period follows. For full treatment, *see* MACROPAEDIA: Geochronology.

At the start of the Cretaceous Period, South America was still connected to the western coast of Africa, and Australia was joined to Antarctica. India had split apart from these two landmasses and was drifting northward toward the Eurasian continent. North America had broken away from Africa, but it was still attached to western Europe. A deep seaway, the Tethys, extended eastward from Spain across southern Asia.

In the mid-Cretaceous, South America split from Africa and began moving westward. Then North America began to separate from western Europe, and, by the beginning of the Tertiary, the Atlantic was open right up to the Arctic Ocean. From Late Cretaceous to Early Tertiary times, the Laramide orogeny occurred along the leading edge of the mov-

ing continent, forming the Rocky Mountains. Similar disturbances occurred in the circum-Pacific belt. Meanwhile, New Zealand separated from the Australia-Antarctica complex, and, at the end of the Cretaceous, Australia began to separate from Antarctica. Africa moved north against Europe, closing the Tethys Sea and initiating the Alpine orogeny that led to the building of the Alps in the Tertiary Period.

The climate was warmer than today, but the northern hemispheric landmasses were moving away from the Equator. In the Late Cretaceous, extensive deposition of chalk (calcium carbonate) in deep water was probably paralleled by a decrease in carbon dioxide in the atmosphere, which would have lowered temperatures globally.

In Early Cretaceous times, seas began to advance over the continental area. The rocks that were deposited resemble those of the Jurassic; marine deposits, including shallow- and deep-water limestones and marine clays, were laid down over northern Europe, the Mediterranean, and the circum-Pacific belt. Nonmarine deposits, more common than in the Jurassic, included sandstones and shales in northwestern Europe and clastic deposits (*e.g.*, those of sand, clay, and mud) in Central Asia, Africa, South America, and Australia. The advancing seas reached a maximum extent in Late Cretaceous times, and marine deposits covered a far greater area than at any other time during the Mesozoic. Great thicknesses of chalk laid down in what is now western Europe, eastern Russia, the Gulf Coast of the United States, and Western Australia are especially notable. The seas retreated again at the close of the period.

In Cretaceous seas, marine invertebrates such as rudist bivalves, ammonites, belemnites, brachiopods, and echinoids continued to flourish and evolve. Both ammonites and belemnites, however, mysteriously became extinct at the end of the period. Bony fishes vigorously evolved and were prominent in Late Cretaceous times. Among marine reptiles, ichthyosaurs became less common, but the long-necked plesiosaurs continued to thrive, and a new group of aquatic lizards, the mosasaurs, appeared, attaining great size and worldwide distribution in a relatively short period of time.

On land, angiosperms (flowering plants) had a spectacular rise to supremacy in the Late Cretaceous, and the insects, bees in particular, began their thriving partnership with them. Mammals and birds remained inconspicuous throughout the Cretaceous, while the reptiles continued their spectacular dominance until the end of the period. In the air, the flying reptiles called pterosaurs were predominant, with some species reaching enormous size. On land, the dinosaurs reached the peak of their evolution. Of the saurischian dinosaurs, both sauropods and theropods persisted into the Cretaceous, but the period is chiefly remarkable for the evolution of new forms of ornithischian dinosaurs: heavily armoured ankylosaurs, horned ceratopsids, and such ornithopods as iguanodons and hadrosaurs (duck-billed dinosaurs), which were superbly adapted to eating vegetation.

The total extinction of the dinosaurs and the decimation of many other reptile groups occurred at the end of the Cretaceous. Many hypotheses have been proposed to explain their disappearance: deteriorating climate, with its attendant effects on food supply (*e.g.*, seasonal declines in edible plant matter); alterations in habitat because of Earth movements; or reduction in numbers due to egg-eating reptiles or mammals. The most credible theory, however, is that a catastrophic collision of a comet or asteroid with the Earth raised a global dust cloud that enshrouded the planet in darkness for months or even years, resulting in the cessation of photosynthesis and the death of green plants on which herbivores and their predators were ultimately dependent. Given their abruptness, their worldwide scope, and the number of groups involved, the Cretaceous boundary extinctions have provided one of the great enigmas of geology and paleontology.

Crete, modern Greek KRÍTI, ancient Greek CRETE, OR KRETE, Latin CRETA, Turkish KIRID, Venetian CANDIA, island in the eastern Mediterranean that is an administrative region of Greece. Crete is the fifth largest island in the Mediterranean and the largest of the islands forming part of modern Greece. It is relatively long and narrow, stretching for 152 miles (245 km) on its east-west axis and varying in width from 7.5 to 35 miles (12 to 56 km). The island has an area of 3,190 square miles (8,261 square km); the administrative centre is Khaniá, on the northwest coast.

There is no evidence that humans arrived on Crete before 6000–5000 BC. By 3000 BC, however, a Bronze Age culture—the Minoan civilization, named after the legendary ruler Minos—had developed. In its first centuries this culture produced little more than circular vaulted tombs and some fine stone-carved vases, but about 2000 BC it began to build "palaces" on the sites of Knossos, Phaestus, and Mallia. The Minoan civilization (*q.v.*) was centred at Knossos and reached its peak in the 16th century BC, trading widely in the eastern Mediterranean. It produced striking sculpture, fresco painting, pottery, and metalwork. By about 1500 BC Greek mainlanders from Mycenae had assumed an influential role in Minoan affairs, however, and after Crete suffered a major earthquake (*c.* 1450) that destroyed Knossos and other centres, power in the region passed decisively to the Mycenaeans, with whom Crete was closely associated until the commencement of the Iron Age (1200 BC). Eventually the Dorians, another Greek-speaking people, moved in and organized Crete.

Crete still played a role in the revival of Greek civilization that began in the 9th century BC, and during Athens' heyday (5th century BC) Crete fascinated the Greeks as a source of myths, legends, and laws. Eventually the Romans appeared, and by 67 BC they had completed their conquest of Crete and converted it into Cyrenaica, a province linked with North Africa. In AD 395 the island passed to Byzantium (the Eastern Roman Empire), and the Arabs gained control over parts of Crete after 824, contesting with the Byzantines for several centuries thereafter. In 1204, in the aftermath of the Fourth Crusade, crusaders sold the island to Venice, which fitted Crete into its growing commercial empire. The native Cretans, however, never abandoned their Orthodox religion, Greek language, and popular lore. The Ottoman Turks, who were already in control of parts of Crete, wrested the capital city of Candia (now Iráklion) from the Venetians in 1669 after one of the longest sieges in history. Crete stagnated under Turkish rule, but native uprisings were always frustrated, including ones in 1821 and 1866. The Turks were finally expelled by Greece in 1898, after which the island held autonomous status until its union with Greece in 1913.

The island is dominated by harsh mountains rising out of the sea. Crete's east-west mountainous spine consists of four main groups that rise to the island's highest point, the summit of Mount Ídhi, Stavros, 8,058 feet (2,456 m) high. The gradually sloping northern coast provides several natural harbours and coastal plains, where major towns have grown up; Khaniá, Réthimnon, and Iráklion are located there. The Mesará Plain extends along the south-central part of the island for about 18 miles (29 km) and is Crete's major expanse of flatland. The island has only a few small rivers, together with springs and seasonal water courses.

Crete's climate varies between temperate and tropical, with an annual average rainfall of about 25 inches (640 mm) and hot, dry summers. Winter temperatures are relatively mild. The Cretan landscape is dominated by characteristic Mediterranean scrub (maquis or garigue); olives, carobs, and orange trees are cultivated.

The population consists mostly of Cretans who speak Greek and belong to the Greek Orthodox church. It is concentrated in the cities on the northern coast and in the Mesará Plain. The administrative region of Crete is divided into four departments (*nomoi*)—Khaniá, Réthimnon, Iráklion, and Lasíthi—each of which is administered by a *nomarch* appointed by the central government.

Agriculture is the economic mainstay of the island. Only about one-third of Crete's total area can be cultivated, however, and its farmers have traditionally worked small patches of land with little help from machinery. The one exception is the Mesará Plain, which is relatively well watered and one of the few areas that can be farmed efficiently using large machinery. Despite its inefficient agriculture, Crete is one of Greece's leading regions in the production of olives and olive oil, grapes, citrus fruits, and carob bean, all exported mostly to the mainland. Vegetables, fruits, nuts, and some barley and oats are grown for domestic consumption. One-fifth of the island's land is entirely unproductive, and nomadic grazing of sheep and goats is widespread.

The island's industry is largely confined to food processing (grape and olive presses), building materials (stone quarries and building blocks), and a few ceramics, textiles, soap, leather, and steel-tool enterprises. Crete has to import all but the most basic items, including fuels. Tourism is an important and growing source of foreign income, however, on the basis of ancient Minoan remains at Knossos and other sites, a fine collection of Minoan art in the museum at Iráklion, and old Venetian and Turkish fortresses. Crete has a good road network and is served by Olympic Airways. Pop. (1991 prelim.) 536,980.

Crete, Sea of, also called SEA OF CANDIA, Modern Greek KRITIKÓN PÉLAGOS, southern part of the Aegean Sea (an arm of the Mediterranean Sea), lying between the Cyclades (Kikládhes) islands to the north and the island of Crete (Kríti) to the south. It is the deepest section of the Aegean Sea, reaching depths of more than 10,000 feet (3,294 m) east of Cape Sidero (Ákra Sídheros), Crete.

Creticus, Quintus Caecilius Metellus: *see* Metellus Creticus, Quintus Caecilius.

cretinism, endocrine disorder seen in infants and young children (who may mature to adult cretins), resulting from thyroid hormone deficiency (hypothyroidism) during fetal or early postnatal life. A closely related condition, juvenile myxedema, develops in previously apparently normal children, usually brought about by enzyme failures in iodine metabolism. It is more appropriately termed "familial goitre." Cretins may be afflicted with any of five or more enzyme deficiencies in the synthesis of thyroid hormone or may have a thyroid extremely reduced in size or, in fact, congenitally absent. In the fetus, thyroid deficiency produces profound deviations from normal physical and physiological development. Metabolism—particularly oxidative processes—is deficient. There is retarded growth of the brain and overgrowth of the anterior pituitary gland.

Symptoms and signs of infantile cretinism that appear at birth or several weeks thereafter include: poor appetite, breathing difficulties, low body temperature, dry and thickened skin, and decreased vigour and activity. During the

first three to five months of life, the following signs may be indicative of cretinism: delayed union of skull bones; torpid behaviour; slow nursing; spells of choking and cyanosis (*e.g.*, turning blue of the skin) during feeding; excessive sleepiness; hoarseness; constipation; pallid, cold, gray-mottled or yellow-tinged skin; enlargement of the tongue; umbilical herniation; flabby musculature; a pulse rate of less than 100; or rectal temperatures of 98° F (37° C) or lower.

The condition in the young child is characterized by thick, dry, wrinkled, and sallow skin; enlarged tongue; open, drooling mouth with thick lips; broad, flat face and nose; and numerous related conditions. Intelligence level is considerably below average. In juvenile myxedema, the condition can be the same or can vary greatly, depending upon the age at the onset of the disease. In an untreated case, the child becomes a physical and mental dwarf. With appropriate thyroid and iodine treatment administered sufficiently early, the juvenile myxedema patient may show marked recovery.

cretonne, any printed fabric, usually cotton, of the weight used chiefly for furniture upholstery, hangings, window drapery, and other comparatively heavy-duty household purposes. The fabric is similar to chintz but has a dull finish. The finer and lighter textures of cretonnes are made into smocks and other garments for women and children.

Although usually of cotton, cretonne may also be woven of linen, synthetic fibres, or combinations. The name is said to be derived from Créton, a village in Normandy, where linen was made.

Creuse, *département,* Limousin *région,* central France, comprising most of the historic province of Marche (*q.v.*), on the northwest border of the Massif Central. Its area of 2,149 square miles (5,565 square km) occupies much of the basin of the Creuse River, 160 miles (260 km) long, which flows southeast to northwest, past Aubusson near Guéret, the departmental capital. High ground, rising to an elevation of more than 3,000 feet (900 m) in the southeast, is subjected to heavy rain and snow. The main activity of the *département* is stockbreeding. Cereals and potatoes are grown in the southwest, and chestnuts abound. Despite these activities, there has been an exodus from Creuse to other parts of France. Industry, little-developed and scattered, includes mining, quarrying, spinning, metal production, and food processing. Guéret, which gives its name to one of the *département*'s two *arrondissements,* has a museum with a collection of Limoges painted enamels; Aubusson (*q.v.*), a market town famous for its tapestries, gives its name to the other. Other picturesque old towns include Auzances, Felletin, La Souterraine, and the watering place of Évaux-les-Bains. The *département* is in the educational division of Limoges. Pop. (1990) 131,349.

Creusot, Le (France): *see* Le Creusot.

Creutz, Gustav Philip, Greve (Count) (b. May 1, 1731, Anjala, Swedish Finland—d. Oct. 30, 1785, Stockholm, Swed.), Swedish poet whose light and graceful verse expressed the prevailing Rococo spirit and Epicurean philosophy of his time.

Creutz went to Stockholm in 1751 and obtained a post at court in 1756. His literary output was small, and he is remembered mainly for two poems—his early "Sommar-qväde" (1756; "Summer Song") and the rather erotic "Daphne" (1762)—and for the pastoral narrative *Atis och Camilla* (1761). After the well-known poet Hedvig Charlotta Nordenflycht, with whom he had been closely associated, died in 1763, Creutz did not write anything of importance. He entered upon a brilliant diplomatic career for which Gustavus III heaped honours upon him.

Creutzfeldt-Jakob disease, rare, fatal disease of the central nervous system that is caused by a viral infection. Creutzfeldt-Jakob disease is caused by a slow virus—*i.e.,* a virus that is harboured for years within the body before symptoms are manifested. The disease is quite rare and affects mostly adults in middle age. Symptoms begin with apathy, irritability, or self-neglect, which are the first manifestations of a rapidly developing dementia. Other intellectual defects, such as aphasia or dyslexia, may soon appear. There may also be disturbances of vision. The chief physical symptoms are tremor, writhing, and involuntary, purposeless (choreiform) movements. The disease follows a rapid course and terminates in death within 3 to 12 months after the first symptoms have appeared. There is no effective treatment.

The virus that causes Creutzfeldt-Jakob disease resembles that of kuru. Little is known about its transmission, but the virus is known to be unusually resistant to heat and other sterilizing agents, and cases exist of Creutzfeldt-Jakob disease being transmitted by means of corneal transplants and contaminated brain electrodes in hospital settings.

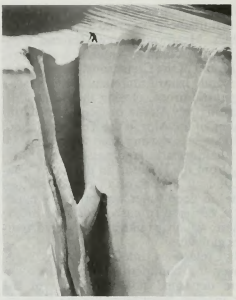
Creuzer, Georg Friedrich (b. March 10, 1771, Marburg an der Lahn, Hesse [Germany]—d. Feb. 16, 1858, Heidelberg, Baden), German classical scholar who is best known for having advanced a theory that the mythology of Homer and Hesiod came from an Oriental source through the Pelasgians, a pre-Hellenic people of the Aegean region, and that Greek mythology contained elements of the symbolism of an ancient revelation.



Creuzer, lithograph
Interfoto—Friedrich Rauch

Creuzer studied at the universities of Marburg and Jena and lived for a time in Leipzig as a private tutor. He served as professor of philology and ancient history at the University of Heidelberg almost continuously from 1804 to 1845. Creuzer presented his theory in his first and most famous work, *Symbolik und Mythologie der alten Völker, besonders der Griechen,* 4 vol. (1810–12; "Symbolism and Mythology of the Ancients, Especially the Greeks"). His controversial ideas were often the subject of vigorous attack. He also published a number of other works, among which were an edition of Plotinus and a partial edition of Cicero.

crevasse, fissure or crack in a glacier resulting from stress produced by movement. Crevasses range up to 20 m (65 feet) wide, 45 m (148 feet) deep, and several hundred metres long. Most are named according to their positions with respect to the long axis of the glacier. Thus, there are longitudinal crevasses, which develop in areas of compressive stress; transverse crevasses, which develop in areas of tensile stress and are generally curved downstream; marginal crevasses, which develop when the central area of the glacier moves



Crevasse in the Mozama Glacier on Mount Baker, Washington
Bob and Ira Spring

considerably faster than the outer edges; and bergschrund crevasses, which form between the cirque and glacier head. At the terminus of the glacier many crevasses may intersect each other, forming jagged pinnacles of ice called seracs. Crevasses may be bridged by snow and become hidden, and they may close up when the glacier moves over an area with less gradient. Studies have been made inside crevasses to determine glacier structure and stratification.

Crèvecoeur, Michel-Guillaume-Saint-Jean de, also called HECTOR SAINT JOHN DE CRÈVECOEUR, or (especially in America) J. HECTOR ST. JOHN (b. Jan. 31, 1735, Caen, Fr.—d. Nov. 12, 1813, Sarcelles), French-American author and naturalist whose work provided a broad picture of life in the New World.

After study in Jesuit schools and four years as an officer and mapmaker in Canada, he chose in 1759 to remain in the New World. He wandered the Ohio and Great Lakes region, took out citizenship papers in New York in 1765, became a farmer in Orange county, and in 1769 married Mehitable Tippet, with whom he had three children.

When the American Revolution broke out, Crèvecoeur found himself in an untenable position: his wife was from a Loyalist family and he had friends and neighbours among the opposite faction. Persecuted by both sides, he left rebel country only to languish for months in an English army prison in New York City before sailing for Europe in 1780, accompanied by one son. In London, using his American name, J. Hector St. John, he arranged for the publication in 1782 of 12 essays called *Letters from an American Farmer.*

Within two years this book—charmingly written, optimistic, and timely—went through eight editions in five countries and made its author famous, gaining him such influential patrons as the naturalist Count de Buffon and Benjamin Franklin, a membership in the Academy of Sciences, and an appointment as French consul to three of the new states in America. Before assuming his consular duties in 1784, Crèvecoeur translated and added to the original 12 essays, in *Lettres d'un cultivateur Américain,* 2 vol. (Paris, 1784).

In America again, Crèvecoeur found his home burned, his wife dead, and his daughter and second son with strangers in Boston. Reunited with his children, he set about organizing a packet service between the United States and France, continued an interest in botany, and published articles on agriculture and medicine. A two-year furlough in Europe resulted in a larger, second edition of the French *Lettres,* 3 vol. (1790). Recalled from his consulship in 1790, Crèvecoeur wrote one other book on America, *Voyage dans la haute*

Pennsylvanie et dans l'État de New York, 3 vol. (1801; *Travels in Upper Pennsylvania and New York,* 1961). He lived quietly in France and Germany until his death.

Because of his letters, Crèvecoeur was not only for a while the most widely read commentator on America but also a great favourite with such Romantics as Charles Lamb and Thomas Campbell and with the revolutionist Jacques-Pierre Brissot. His reputation was further increased in the 1920s when a bundle of his unpublished English essays was discovered in an attic in France. These were brought out as *Sketches of Eighteenth Century America, or More Letters from an American Farmer* (1925). Crèvecoeur's books outline the steps through which new immigrants passed, analyze the religious problems of the New World, describe the life of the whalers of Nantucket, reveal much about the Indians and the horrors of the Revolution, and present the colonial farmer—his psychology and his daily existence—more completely than any contemporaneous writings were able to do. The passage containing his "melting pot" theory and answering the question "What is an American?" is widely quoted, and historians of the frontier depend heavily on his documented account of the stages by which the log cabin became the opulent farmhouse. His charming style, keen eye, and simple philosophy are universally admired.

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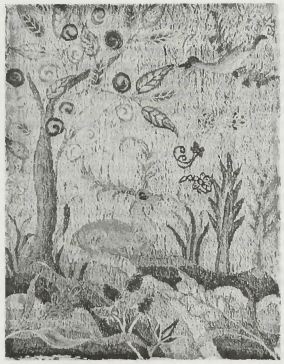
Crewe, parish, Crewe and Nantwich district, county of Cheshire, England. Crewe was created when the Grand Junction Railway Company opened its Liverpool-to-Birmingham line in 1837 and then transferred its railway works to Crewe in 1843. The town was incorporated in 1877. In the early days the railway company owned and controlled almost everything in Crewe, and its monopoly was only broken in 1938 when the Crewe Corporation Act was passed. Today railways are still important, but the town's many other industries include Rolls-Royce Motors and clothing manufacture. The motorway from Birmingham runs about 3 mi (5 km) east of Crewe. Pop. (1981 prelim.) 47,759.

Crewe and Nantwich, district (borough), county of Cheshire, England. It has an area of 166 sq mi (431 sq km). Crewe has historically been associated with the railways and is today a railway and industrial centre. Nantwich is known for its historical associations and buildings of architectural interest. The extensive rural hinterland also has many examples of black and white half-timbered buildings and is a prosperous dairy-farming area, much of the milk being used for Cheshire cheese. Pop. (1982 est.) 98,500.

crewel work, type of free-style embroidery distinguished not by the stitches employed but by the two-ply worsted wool yarn called crewel used for embroidering the design on a twill foundation (*i.e.,* linen warp and cotton weft) or sometimes on pure linen or cotton cloth. The initial fashion for crewel work dates from the 16th and, especially, the 17th centuries and was largely centred in England and its American colonies. Undoubtedly the Elizabethan and Jacobean vogue of using embroidered fabrics as hangings and furniture coverings accounts in part for the flourishing of crewel work at that time.

Crewel work designs were inspired by source books of ornaments or embroidery pattern books that had been published in Europe since the 16th century. Palampores, hand-painted (stenciled) cotton fabrics imported during the 17th century to England from India, were clearly influential in developing such traditional crewel work designs as the tree of life pattern. Embroidered Chinese fabrics that came to England from Portugal were another source of design motifs.



Crewel work picture worked on linen, New England, 1725–1800, in the Henry Francis du Pont Winterthur Museum, Delaware

By courtesy of the Henry Francis du Pont Winterthur Museum, Delaware

cri-du-chat syndrome, rare congenital disorder caused by partial deletion of the short arm of chromosome 5, characterized by mental retardation, mild facial abnormalities, anomalies of dermal ridge patterns (fingerprints, palm prints, and footprints), heart malformations, a failure to thrive, and a high-pitched, wailing cry likened to that of a cat (the name is French for "cat cry").

crib, in agriculture, bin or large container for storing ear corn or other grain or a barred or slatted manger for the feeding of hay or other bulky fodder. Old-style cribs for unshelled corn, usually made of wood, have open or slat construction to ensure ventilation by the wind. Sometimes perforated clay or concrete block walls are used.



Farm worker putting corn in wire mesh crib

Grant Heilman

Modern cribs, usually larger and constructed of metal, are short and cylindrical with temporary wall coverings and ducts through which air, either cold or heated, may be forced.

Temporary cribs of snow fencing, wire mesh, or cribbed poles may be either circular or rectangular in shape. In warm regions in which it is necessary to fumigate to control insects, cribs must be built so that they can be tightly closed.

crib death: *see* sudden infant death syndrome.

Cribb, Tom (b. July 8, 1781, Hanham, Gloucestershire, Eng.—d. May 11, 1848, Woolwich, London), champion English bareknuckle boxer, one of the most popular and respected personages in the English prize ring.

A former coal porter and sailor, Cribb began his boxing career in 1805. Although not reckoned as a world titleholder, he defeated two outstanding fighters of North American birth, both former black slaves: Bill Richmond, in 1805, and Tom Molineaux, in 1810 and again in 1811, the second contest being an especially savage battle. Cribb also scored two victories over Jem Belcher, a former London Prize Ring champion. He retired after the second Molineaux fight.

Cribbage, card game in which the object is to form counting combinations that traditionally are scored by moving pegs on a special Cribbage board. The appeal of the game, usually played by two but with a popular variant played by four or, occasionally, by three, is evident from two facts: few changes have been made in the original rules, and it remains one of the most popular of all card games. In Great Britain, from 1966 through 1969, the "Card Corner" in *News of the World* had more requests for information on Cribbage than for any other game. In the United States, Cribbage is played by more than 10,000,000 people, principally across the northern states, from New England to the Pacific, and the game has remained popular in Canada as well.

The game of Cribbage (earlier spelled Cribbidge) was invented by the 17th-century English poet Sir John Suckling. Although Cribbage quite clearly developed from Noddy, an older game for which a special scoring board also was used, it appears to be the only existing game in its family. Cribbage would quite likely have become the most popular of all two-hand card games if so many descriptions had not called the Cribbage board indispensable, which it is not.

Almost the only big change from the original rules is that in modern two-hand Cribbage each player is dealt six cards instead of five, as originally.

Scoring. Scoring is traditionally called pegging, because it usually is done by moving pegs on a scoring device, the Cribbage board. This Cribbage board is essentially a tablet with 60 counting holes (in two rows of 30) for each player, plus one game hole for each, and often extra holes for holding pegs when not in play and for keeping track of games won. Game is 121 (twice around the board plus 1 for the game hole) or 61 in the less frequently played game of Once Around. Each player has two pegs, and each scoring point is marked by jumping the rearmost peg ahead of the other (thus showing at a glance the number of points scored on a move as well as the total). Scores must be pegged in order because the first player to reach 121 (or 61) or, in some games, to pass it is the winner. Emphasis on the board as a scoring device created the idea that the game could not be played without it, but the score can be kept with pencil and paper or with chips or other counters; indeed, keeping score by discarding counters (each player starting with 121 or 61) is so efficient and simple a method that the enduring primacy of the board is difficult to understand.

The cut and deal. The customary deck of 52 cards is used, the cards ranking from king (high) to ace (low). Face cards and tens count 10 each; other cards count their index value (number of pips). The player cutting low card deals first, the deal alternating with each hand.

The dealer deals six cards, alternately, to the nondealer and to himself. Each player then discards two cards, facedown, to form the crib. In discarding to the crib, since it scores for the dealer, the nondealer tries to lay away "balking" cards, those least likely to create scoring combinations. After the discard, the undealt remainder of the pack is cut by the nondealer; the top card of the lower packet is turned faceup on top of the reunited deck and becomes the starter. If the starter is a jack, dealer immediately pegs (scores) 2, called "2 for his heels." If the starter is any other card, the jack of that suit—formerly called "knave noddy," an unmistakable link with the earlier game—is worth 1 point to the holder for "his nobs" but is not scored until later. This is followed by the two stages of scoring, the play and the showing.

The play. The nondealer begins the play by laying faceup before him any card from his hand, announcing its counting value. Dealer then plays a card (each adds cards to his own pile, so that his original hand may be counted later in the showing) and announces the total of the two cards. Play continues alternately, each player announcing the new total, until the total reaches 31, or until one player cannot play without increasing the total beyond 31. If either player cannot add a card without exceeding 31, his opponent must play any card(s) in his hand that may be added without exceeding 31. The last to play in each sequence scores a "go"—2 points if he reaches exactly 31, or 1 for any lesser total. After a go, count begins again at zero.

In addition to go, the object is to peg for certain combinations of cards played consecutively. These combinations score whether the cards are played in strict alternation or in succession by one player when his opponent cannot play. The score in every case is pegged by the player whose card completes the combination. Any player who can add to a combination, providing there has been no intervening card, can score the value of the new combination. Combinations are scored for playing a card that makes the count exactly 15 (score 2); for playing cards of the same rank to make a pair (2), three of a kind (6), or four of a kind (12); and for playing a third or later card to form a run, or sequence, regardless of suits and regardless of the order in which the cards are played (1 for each card in the run).

The next stage of scoring is the showing. After all four cards are played, the values in each hand are counted—the nondealer's hand first, then the dealer's hand, then the crib, which scores for the dealer. The starter counts as a fifth card in each of the three hands. Every combination of two or more cards totalling 15 scores 2; each pair, 2; every sequence of three or more cards, 1 for each card in the sequence; four cards of the same suit, 4, or 5 if of the same suit as the starter (but only a five-card flush matching the starter counts in the crib); and his nobs (jack of the same suit as the starter), 1. Every possible different grouping of cards in the hand, plus starter, counts separately, except that a sequence of four or five cards may be counted only once, and not as two or more separate sequences of three.

As indicated above, the order of scoring on each hand is important and is as follows: (1) scoring of starter, if it is a jack, (2) scoring in play for various combinations, (3) scoring in play for go, (4) scoring of nondealer's hand, (5) scoring of dealer's hand, and (6) scoring of crib. When either or both players approach a score of 121 (or 61), whose turn it is to score becomes important. The game ends immediately if either player is able to count out in the play or the showing. If nondealer is able to count out in the showing, it does not matter if the dealer, with or without counting his crib, could have scored a higher total. The loser scores only what he has already pegged before his opponent counts out, and if he has not already counted at least 61 (or 31), he is "lurched" ("left in the lurch") and, if the play is for stakes, loses doubly. (As sometimes played, the winner must be able to count out to exactly 121, just as, in playing for a go, he tries to reach 31 exactly. Thus, for example, if a player's score is 120, he can count out only if he can score exactly 1 point, as for his nobs or for go.) Some play that, if a player fails to claim his full score on any turn, his opponent may call out "muggins" and score for himself any points overlooked.

After each player has played all four of his cards, and the showing has been completed, the cards are put back in the deck and shuffled and dealt as before.

Variants. Five-card Cribbage was the original game. Each player discards two cards into the crib, remaining with only three, plus starter. At the beginning of the initial hand nondealer pegs 3 to offset dealer's advantage. Game is 61.

Four-hand Cribbage is played in partnerships of two on a side, partners seated across the table from each other. The dealer gives each player five cards; each discards only one into the crib. The score is usually slightly less in the showing, but the average per side is about 9 points in the play. Game is always 121.

Three-hand Cribbage has each player dealt five cards. Each discards one into the crib, and a single card is dealt blind to complete the crib, which belongs to the dealer. Each player scores for himself. Eldest hand (the one to the left of the dealer) shows first. (R.L.Fr.)

Cricetidae, family of rodents (order Rodentia) containing about 100 genera and 570 living species. It is a diverse group represented in almost all parts of the world. Well-known or economically important cricetids include the cotton rat; gerbil; grasshopper mouse; hamster; harvest mouse (American); lemming; maned rat; mole rat; muskrat; rice rat; vole; white-footed mouse; wood rat (*qq.v.*).

Crichton, James (b. August 1560, Eliock House, Dumfries, Scot.—d. July 1582, Mantua, Mantua), orator, linguist, debater, man of letters, and scholar commonly called the "Admirable" Crichton. Although many considered him to be a model of the cultured Scottish gentleman, others doubted the very existence of an individual of such achievements.



Crichton, detail of an oil painting by an unknown artist; in the Royal Collection at Holyrood, Edinburgh

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From his parents, Robert Crichton, a public official, and Elizabeth Stewart of the house of Beith, Crichton claimed royal descent. After receiving an M.A. from the University of St. Andrews in one year (1575) instead of the usual two, he went to Paris, where he seems to have distinguished himself at the Collège de Navarre. A handbill printed in Venice in 1580 attributed to him excellence in every form of athletics, skill in arms and horsemanship, mastery of 10 languages, encyclopaedic familiarity with Scholastic and Christian philosophy, and a remarkable ability to debate on any subject proposed. His first known activity in Europe was his oration of July 1579 in the ducal palace at Genoa. The next year he presented himself to the Venetian printer Aldus Manutius, probably the author of the handbill. Manutius introduced him to leading local Humanists, who were greatly impressed by his accomplishments.

At Padua in 1581 Crichton enhanced his reputation in two debates, and Manutius paid tribute to his successes in his dedication for his own edition of *Paradoxa* (1581) by the Roman author Cicero. The next year Crichton entered the service of the Duke of Mantua but was slain there at the instigation, and probably at the hand, of the young prince Vincenzo Gonzaga, whose jealousy he had aroused.

Despite the achievements of his short life, the picture of Crichton painted by Sir Thomas Urquhart in *The Discovery of a Most Exquisite Jewel* (1652) is probably exaggerated. Published letters suggest that constant indebtedness was among several of Crichton's weaknesses. He did, however, merit the term "admirable," first applied to him in 1603 in John Johnston's *Heroes Scotici,* for his knowledge of philosophy, his memory, his linguistic skill, and his ability to debate. Biographies were published by P.F. Tytler and Douglas Crichton (1909).

Criciúma, city, southeastern Santa Catarina state, southern Brazil, on the coastal plain, at 154 ft (47 m) above sea level. The city was made the seat of a municipality in 1925. Much of Criciúma's income is derived from the mining and export of metallurgical coal. It is connected by road to Florianópolis, the state capital, and Pôrto Alegre, the capital of Rio Grande do Sul state. A railroad runs north to the seaport of Laguna. Pop. (1980 prelim.) 74,003.

Crick, Francis Harry Compton (b. June 8, 1916, Northampton, Northamptonshire, Eng.), British biophysicist, who, with James Watson and Maurice Wilkins, received the 1962 Nobel Prize for Physiology or Medicine for their determination of the molecular structure of deoxyribonucleic acid (DNA), the chemical substance ultimately responsible for hereditary control of life functions. This accomplishment was widely regarded as one of the most important discoveries of 20th-century biology.

During World War II, Crick interrupted his education to work as a physicist in the development of magnetic mines for use in naval warfare, but afterward he turned to biology at the Strangeways Research Laboratory, Cambridge University (1947). Interested in pioneering efforts to determine the three-dimensional structures of large molecules found in living organisms, he transferred to the university's Medical Research Council Unit at the Cavendish Laboratories in 1949.

In 1951, when U.S. biologist James Watson arrived at the laboratory, it was known that the mysterious nucleic acids, especially DNA, played a central role in the hereditary determination of the structure and function of each cell. Watson convinced Crick that knowledge of DNA's three-dimensional structure would make its hereditary role apparent. Using the X-ray diffraction studies of DNA done by Wilkins, Watson and Crick were able to construct a molecular model consistent with the known physical and chemical properties of DNA. The model consisted of two intertwined helical (spiral) strands of sugar–phosphate, bridged horizontally by flat organic bases. Watson and Crick theorized that if the strands were separated, each would serve as a template (pattern) for the formation, from small molecules in the cell, of a new sister

strand identical to its former partner. This copying process explained replication of the gene and, eventually, the chromosome, known to occur in dividing cells. Their model also indicated that the sequence of bases along the DNA molecule spells some kind of code "read" by a cellular mechanism that translates it into the specific proteins responsible for a cell's particular structure and function.

By 1961 Crick had evidence to show that each group of three bases (a codon) on a single DNA strand designates the position of a specific amino acid on the backbone of a protein molecule. He also helped to determine which codons code for each of the 20 amino acids normally found in protein, and thus helped clarify the way in which the cell eventually uses the DNA "message" to build proteins. From 1977 he held the position of distinguished professor at the Salk Institute for Biological Studies in San Diego, Calif. His book *Of Molecules and Men* (1966) discusses the implications of the revolution in molecular biology. *What Mad Pursuit: A Personal View of Scientific Discovery* was published in 1988.

cricket, any of the approximately 2,400 species of leaping insects of the family Gryllidae (order Orthoptera), known for the musical chirping of the male. Crickets vary in length from 3 to 50 mm (0.12 to 2 inches). They have thin antennae, hind legs modified for jumping, three-jointed tarsal segments of the



Field cricket (*Gryllus*)
Henry C. Johnson

lower leg, and two slender abdominal sensory appendages (called cerci). The two forewings are stiff and leathery, and the two long, membranous hind wings are used in flying.

Male crickets chirp by rubbing a scraper located on one forewing along a row of about 50 to 250 teeth on the opposite forewing. The frequency of the chirps depends on the number of teeth struck per second and varies from 1,500 cycles per second in the largest cricket species to nearly 10,000 cycles per second in the smallest. The most common cricket songs are the calling song, which attracts the female; the courtship, or mating, song, which induces the female to copulate; and the fighting chirp, which repels other males. Both sexes have highly sensitive organs on the forelegs for sound reception. There is a direct relationship between the rate of cricket chirps and temperature; the rate tends to increase with increasing temperature.

Most female crickets insert eggs into soil or plant stems with their long, slender ovipositors, sometimes causing serious plant damage. In northern latitudes most crickets mature and lay eggs in the fall. The nymphs hatch in the spring and become adults after 6 to 12 molts; adults ordinarily live 6 to 8 weeks.

The field cricket (genus *Gryllus*) and the house cricket (*Acheta,* formerly *Gryllus, domesticus*) of the subfamily Gryllinae are stout-bodied and black or brown and often dig shallow burrows. They may feed on plants, animals, clothes, and each other. The field cricket (also called the black cricket) is common in fields and yards and sometimes enters buildings. The house cricket, introduced into North America from Europe, has a light-coloured head with dark cross bands and may be found in buildings and refuse heaps. Widely distributed, house and field crickets chirp day and night. They are used as fish bait in some countries and are also used in biology laboratories. *Gryllus* is often referred to in poetry and prose.

Ground crickets (subfamily Nemobiinae, or sometimes Gryllinae), approximately 12 mm long, are commonly found in pastures and wooded areas. Their song is a series of soft, high-pitched trills. The striped ground cricket (*Nemobius vittatus*) has three dark stripes on its abdomen.

Tree crickets (subfamily Oecanthinae) are white or green in colour and have transparent wings. Although tree crickets are beneficial to humans because they prey on aphids, the female injures twigs during egg placement. The song of most tree crickets is a long trill. The snowy tree cricket (*Oecanthus fultoni*) is popularly known as the thermometer cricket because the approximate temperature (Fahrenheit) can be estimated by counting the number of chirps in 15 seconds and adding 40. Tree- and bush-inhabiting crickets usually sing at night; weed-inhabiting crickets sing both day and night.

Ant-loving crickets (subfamily Myrmecophilinae) are minute (3 to 5 mm long), wingless, and humpbacked. They live in ant nests. Wingless bush crickets (subfamily Mogoplistinae) are generally found on bushes or under debris in sandy tropical areas near water. They are slender crickets, 5 to 13 mm long, wingless or with small wings, and are covered with translucent scales that rub off easily. Sword-bearing, or winged bush, crickets (subfamily Trigonidiinae) are 4 to 9 mm long and brown and possess a sword-shaped ovipositor. They are characteristically found in bushes near a pond.

Crickets play a large role in myth and superstition. Their presence is equated with good fortune and intelligence; harming a cricket supposedly causes misfortune. In East Asia male crickets are caged for their songs, and cricket fighting has been a favourite sport in China for hundreds of years.

Insects called crickets but not of the cricket family Gryllidae include the camel cricket, Jerusalem cricket, mole cricket, and pygmy sand cricket.

cricket, game played with bat and ball between two teams of 11 players each on a large field, which centres upon two upright wickets, each defended by a batsman. A bowler throws the ball (with a straight-arm, usually overhand delivery), attempting to put out the batsman by hitting the wicket or in other ways. Runs are scored each time that the batsmen exchange positions without being put out.

A brief treatment of cricket follows. For full treatment, *see* MACROPAEDIA: Sports, Major Team and Individual.

The origin of cricket is uncertain. The game was first definitively recorded at Guildford in Surrey at the end of the 16th century, and the first known set of rules was written in 1744. The Marylebone Cricket Club, which is the world governing body of the sport, was formed in 1787. In 1709 a team from Kent met a team from Surrey, initiating the first of the county matches that make up national cricket in England. During England's colonial history, cricket was exported to countries around the world. Australia, New Zealand, Pakistan, India, South Africa, the West Indies, Sri Lanka, and Zimbabwe are the primary countries that participate in Test (international) matches with England and each other.

Cricket centres on a playing area about 22 yards (20 m) long and 10 feet (3 m) wide called a pitch, at each end of which is a gate made of three upright stakes, known as the wicket. Atop of the wicket sit two loose cross-pieces called bails. The bowler throws the ball at the far wicket and aims to knock the bails loose; if this is done, the batsman is dismissed. To defend his wicket, the batsman tries to hit the ball out of reach of the fielders. On a good hit, the batsman and his partner at the other wicket attempt to exchange places by running the length of the pitch, thus scoring one run. They can repeat this up to six times on any hit and score six runs. The fielders will attempt to stop runs and dismiss either the batsman or his partner by throwing the ball at the wickets.

Cricket matches are divided into innings. A one-day match usually consists of one innings (always plural). Each side has one round at bat, and the innings is usually not over until 10 batsmen are dismissed, although the captain of the batting team may declare its innings closed at any time. Some international matches, however, may last five or six days and can contain high individual scores, sometimes exceeding 300 runs. *See* Sporting Record: *Cricket.*

cricket frog, either of two species of small, nonclimbing North American tree frogs that constitute the genus *Acris* (family Hylidae). They are found in the eastern and central United States, usually along the grassy edges of ponds, streams, and other shallow bodies of water. There are two species: *A. crepitans*



Cricket frog (*Acris gryllus*)
Ronald Altig

and *A. gryllus*. The cricket frog attains a maximum length of about 3 cm (1.2 inches). Its skin is warty and brown or green, with a dark triangle on the head and usually a reddish, whitish, or green stripe along the back. The call is a series of shrill clicks.

Cricklade, town ("parish"), North Wiltshire district, county of Wiltshire, England. Cricklade lies at the head of navigation of the upper Thames River, at the point where the river intersected Ermine Street, a Roman road linking Silchester and Cirencester. A Roman fort was established there as a reconnaissance centre in AD 69. Cricklade was created a borough by the Saxon king Alfred the Great in 871, and by the early 10th century it was sufficiently important to have a mint. Henry II granted the borough a charter in 1155, and Henry III (reigned 1216–72) founded a hospital and granted a weekly market and three-day fair. During the 14th century the town formed part of the dowry of the queens of England. St. Sampson's Church, on the site of a 9th-century Saxon building, dates from the 12th to the 16th century. Local industries include a glove factory, hand pottery, and a creamery and canning factory situated outside the town. Pop. (1981) 3,737.

Crile, George Washington (b. Nov. 11, 1864, Chili, Ohio, U.S.—d. Jan. 7, 1943, Cleveland, Ohio), American surgeon who made notable contributions to the study of surgical shock.

He graduated from Ohio Northern University and Wooster University Medical School and studied in London, Vienna, and Paris. He was distinguished as a surgeon of the respiratory system, developed nerve-block anesthesia, and was an early user of blood transfusion, for

which he devised a method of direct linkage. During World War I, Crile was professional director of a U.S. base hospital in France. He also founded the Cleveland Clinic Foundation.

Crile's numerous works include *An Experimental Research into Surgical Shock* (1899); *Blood-Pressure in Surgery* (1903); and *Hemorrhage and Transfusion* (1909).

crime, the intentional commission of an act usually deemed socially harmful or dangerous and specifically defined, prohibited, and punishable under the criminal law.

A brief treatment of crime follows. For full treatment, *see* MACROPAEDIA: Crime and Punishment.

Difficulties arise from the preceding definition because of the practical problems frequently involved in determining whether or to what degree an act is intentional, because some offenses known as "strict liability offenses" are punished as crimes even though they may be unintentional, and because there are wide differences of opinion concerning what is socially harmful and dangerous. Legislatures are sometimes influenced by powerful vocal minorities to enact legislation that benefits only a certain group or that reflects only the group's views of what is right and wrong. Such laws may be contrary to the general good and opposed to the moral convictions of the general public. In short, laws themselves may be immoral. For example, violations of anti-Semitic laws in Nazi Germany constituted crimes, but the morality of such laws was quite a different matter.

Conceptions of crime vary so widely from culture to culture and change with time to such an extent that it is extremely difficult to name any specific act universally regarded as criminal. Treason or disloyalty to the group, especially in time of conflict or war, is perhaps one of the most universal and among the first acts to have been recognized as a public wrong. Other types that emerge very early in human history are sacrilege or the violations of supernatural taboos, and incest, which, although almost universally condemned in primitive and modern societies, is differently defined in different cultures. Other disapproved forms of sexual expression are handled in many ways in contemporary societies and are sometimes covered by the criminal code. Murder is a recognized crime in all civilized societies. Primitive peoples and folk communities within civilized societies may treat the killing of a human being as a relatively private matter to be dealt with by the kinship groups involved. The deliberate killing customary in some societies, such as infanticide, head hunting, and the killing of very old persons, would be classified as murder in other societies.

In general it may be said that primitive peoples, more often than civilized peoples, handle infractions of social norms as torts (private wrongs) rather than as crimes; that they pay less attention to the state of mind or intention of the offender; and that responsibility is more often collectively assessed than is the case in modern criminal law, in which criminal guilt is generally regarded as strictly personal. While practices vary widely, the manner of determining guilt among preliterate peoples is usually very different from that of the contemporary criminal trial and involves much that has nothing to do with the actual evidence, such as ritual oaths, ordeals, and various magical devices.

In modern industrial society there has been an enormous proliferation of criminal laws designed to protect property rights. The conception of property and the nature of property crimes have changed enormously with the evolution of capitalist economic institutions such as those of credit, large-scale business and industry, and the modern publicly owned corporation. With this expansion of criminal law in economic and certain other areas, there has been a compensating tendency for laws relating to religious observances and to certain kinds of sexual behaviour to disappear or not to be enforced.

The criminal codes of modern nations are enormously complicated, growing bodies of written rules and doctrines, most of which are unknown to the average citizen. Offenders are detected, brought to court, tried, convicted, and punished by professionals especially trained for their particular functions; in the meantime, other professionals, the criminologists, investigate the causes of crime and examine the ways in which correction and prevention are handled. Judges, prosecutors, defense lawyers, police, prison officials, sociologists, social workers, psychiatrists, and psychologists all have different functions to perform in the criminal-justice system.

The dominant conflict of views in the field of penology is between those who put their faith in severe punishment in the belief that this will prevent the criminal from repeating his crimes and also serve as a deterrent to others and, at the other extreme, the school of thought that emphasizes the futility of punishment and the evil effects of prison life. The advocates of this latter position often conceive of the criminal as a victim of social and psychological forces outside his control.

A compromise position between the two extremes rejects the idea that punishment should be abolished and insists that moderate and just punishment itself has rehabilitative value. Instead of severity, it stresses swiftness and certainty of punishment, which it regards as having more deterrent effect and as increasing the opportunity to reform the criminal. Treatment without punishment is regarded as applicable only to the mentally ill and the very young.

During the last several centuries, use of the death penalty has declined, and it is under attack in many of the jurisdictions that still retain it, as do some of the states of the United States. Corporal punishment, torture, banishment, and other more brutal forms of punishment have largely been abandoned in favour of imprisonment for almost all serious crimes and fines for the lesser ones.

Public opinion in regard to the punishment of criminals is divided and vacillating. Rising crime rates invariably create a demand for greater severity of punishment, restoration of capital punishment, or more frequent infliction of the latter. When legislatures respond to these pressures, however, public opposition often develops and may prevent the actual imposition of the increased penalties. *See also* delinquency.

crime, délit, and contravention, three classifications of criminal offense that are central to the administration of justice in many Roman- and civil-law countries (for distinctions in Anglo-American law covering analogous offenses, *see* felony and misdemeanour). *Crimes* in French law are the most serious offenses, punishable by death or prolonged imprisonment. A *délit* is any offense punishable by a short prison sentence, usually from one to five years, or a fine. *Contraventions* are minor offenses.

Civil-law countries traditionally have used all three categories, corresponding to three types of tribunals: police courts (*tribunaux de police*), which determine guilt in cases of minor penalties; courts of correction (*tribunaux correctionnels*), requiring judges but no jury, which try all other cases not involving serious bodily harm; and full courts with a jury in other crimes.

In the 19th century, legal scholars argued for the reduction of categories of crime to two instead of three. This recommendation was incorporated into many criminal codes, including those of Sweden, Denmark, The Netherlands, Portugal, Italy, Brazil, Norway, Venezuela, and Colombia. *Délit* was generally defined as an infraction inspired by a criminal intent and infringing directly on the rights of individuals and groups, thus including offenses that had previously been designated *crimes*. *Contravention* came to mean any act committed without criminal intent but forbidden by law.

Most countries adopting the new definitions retained the three-tiered structure of the judiciary. In consequence, an informal yet important distinction was made between *délits moins graves* and *délits graves*—that is, between ordinary *délits* and crimes involving serious bodily harm that were reserved for trial by a full court with a jury. These procedural differences reduced the usefulness of the single term *délit*. Consequently, some countries, such as Hungary, Denmark, and Romania, continue to classify crimes in three rather than two categories. Only The Netherlands has pursued the logic of the dual categories of offenses by reducing the number of criminal tribunals from three to two. Most countries continue to try to reconcile a three-tiered court system with a modified form of the *délit-contravention* distinction. A person who commits a *délit moins grave*—*e.g.*, larceny—is brought directly to trial before a judge sitting without a jury. The guilt or innocence of one who commits a *contravention* is determined summarily in a police or magistrate's court.

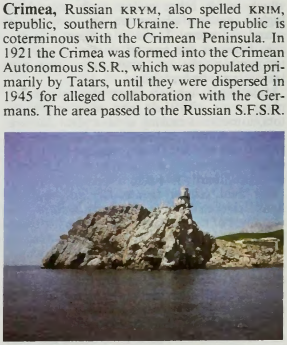
These distinctions have led to important differences in the treatment of related offenses, such as attempts. Criminal attempts are routinely punished when the substantive offense would be a *crime* or a *délit grave*. An attempt of a less serious offense is usually ignored.

At one time, a hybrid category of self-regulatory crimes existed, *délits-contraventions*, which included such offenses as alcoholism, gambling, and breaches of health laws that carried penalties of more than one year's imprisonment. Many systems have abolished this category by treating all offenses that impose such sentences as *délits*. This ensures that the same defenses available to a charge of robbery or assault are also available to one who commits other equally consequential crimes.

The distinctions between *crime*, *délit*, and *contravention* are not comparable to the Anglo-American distinctions between felony and misdemeanour. The latter belong to a fundamentally different evolution of criminal law.

crime, organized: *see* organized crime.

Crimea, Russian KRYM, also spelled KRIM, republic, southern Ukraine. The republic is coterminous with the Crimean Peninsula. In 1921 the Crimea was formed into the Crimean Autonomous S.S.R., which was populated primarily by Tatars, until they were dispersed in 1945 for alleged collaboration with the Germans. The area passed to the Russian S.F.S.R.



The southern shore of the Crimean Peninsula, site of Yalta, Ukraine

J. Alex Langley—DPI

and in 1954 was transferred to Ukraine. Formerly an *oblast* (province), it became a republic in the early 1990s. The northern part of the Crimea, a level steppe region, is under intensive agriculture. Winter wheat, corn (maize), and sunflowers are the main crops. The climate is dry, and additional water supplies are brought by canal from the Dnieper River at Kakhovka. On the lower mountain slopes of the south are many vineyards; there tobacco is important, as are flowers for perfume. Most towns are engaged in processing farm produce, especially wine making. Heavier industry is concentrated in Kerch, a centre of large-scale iron-ore mining; the ore, which has a high phosphorus content, is sent by sea to Mariupol and the Donets Basin. Simferopol (*q.v.*), the headquarters of the republic, has diversified industry and is a cultural centre. Brines from Sivash supply chemical plants at Krasnoperekopsk and Saki. There are a number of stone quarries, especially for limestone and diorite. Along the southern coast, the tourist industry is extremely important, with Yalta, Gurzuf, Alushta, and Alupka the main centres. Area 10,400 square miles (27,000 square km). Pop. (1991 est.) 2,549,800.

Crimea, khanate of the, one of the successor states to the Mongol empire. Founded in 1443 and centred at Bakhchisaray, the Crimean khanate staged occasional raids on emergent Muscovy but was no longer the threat to Russian independence that its parent state, the Golden Horde, had been even after becoming a Turkish vassal in 1475. Muscovite tributes to the khanates became increasingly perfunctory, and Grand Duke Ivan III formally declared Moscow independent in 1480. His grandson, Ivan IV the Terrible, conquered the other two major Tatar khanates, Kazan and Astrakhan, but turned his attention to the Baltic before attacking the Crimea. Prince Vasily Golitsyn made two failed attempts to subdue this last fragment of the Horde (1687–89), but the khanate of the Crimea survived to stage raids on Russia until Catherine II the Great annexed it in 1783.

Crimean Astrophysical Observatory, a major astronomical observatory, located at Simeis in Crimea, Ukraine. Established in the early 1900s, the observatory houses modern optical reflecting telescopes with diameters of 1.20 and 2.65 m (3.94 and 8.69 feet). It also operates several small radio telescopes, the most important of which is a high-precision, steerable paraboloid, 22 m (72 feet) in diameter.

Crimean Peninsula, Russian KRYMSKY POLUOSTROV, Krymsky also spelled KRIMSKII, or KRYMSKIJ, peninsula coterminous with Crimea republic, Ukraine, lying between the Black Sea and Sea of Azov and having an area of 10,400 square miles (27,000 square km). The Crimean Peninsula is linked to the mainland by the narrow Perekop Isthmus; Sivash lies between the mainland and peninsula and is separated from the Sea of Azov by a long sandspit, the Tonka of Arabat. The brines of Sivash are used to supply a chemical complex at Krasnoperekopsk on the Perekop Isthmus. The northern and central part of the Crimean Peninsula (some 75 percent of its total area) is a level plain of dry steppe with little surface water. In the south are the three parallel, thickly forested ranges of the Crimean Mountains, flat-topped limestone blocks culminating in Mount Roman-Kosh (5,069 feet [1,545 m]). The narrow southern coastal plain has a warm climate and is a major health and holiday resort region. Sevastopol, one of the best harbours in Ukraine, was long a Russian naval base.

The Crimean Peninsula, which in antiquity was known as the Tauric Chersonese, was settled by Greek colonists from the 6th century BC onward, and Scythians occupied the interior. Later it came under the kingdom of the Cimmerian Bosporus, which eventually collapsed under the barbarian invasions. Long the home of the Crimean Tatars, with Bakhchisaray as their capital, the peninsula was annexed by Russia in 1783. The Tatar "Crimean A.S.S.R." was abolished in 1944 for alleged collaboration with the Nazis, and an estimated population of 350,000 Tatars was exiled (1945) to central Asia and Siberia. Although legally rehabilitated in 1967, they were not allowed to return to the Crimea. In the late 1980s and early '90s, as the Soviet Union disintegrated, many Tatars resettled in the Crimea.

Crimean War (October 1853–February 1856), war fought mainly on the Crimean Peninsula between the Russians and the British, French, and Ottoman Turkish, with support, from January 1855, by the army of Sardinia-Piedmont. The war arose from the conflict of great powers in the Middle East and was more directly caused by Russian demands to exercise protection over the Orthodox subjects of the Ottoman sultan. Another major factor was the dispute between Russia and France over the privileges of the Russian Orthodox and Roman Catholic churches in the holy places in Palestine.

Supported by Britain, the Turks took a firm stand against the Russians, who occupied the Danubian principalities (modern Romania) on the Russo-Turkish border in July 1853. The British fleet was ordered to Constantinople (Istanbul) on September 23. On October 4 the Turks declared war on Russia and in the same month opened an offensive against the Russians in the Danubian principalities. After the Russian Black Sea fleet destroyed a Turkish squadron at Sinope, on the Turkish side of the Black Sea, the British and French fleets entered the Black Sea on Jan. 3, 1854, to protect Turkish transports. On March 28, Britain and France declared war on Russia. To satisfy Austria and avoid having that country also enter the war, Russia evacuated the Danubian principalities. Austria occupied them in August 1854. In September 1854 the allies landed troops in Russian Crimea, on the north shore of the Black Sea, and began a year-long siege of the Russian fortress of Sevastopol. Major engagements were fought at the Alma River on September 20, at Balaklava on October 25, and at Inkerman on November 5. On Jan. 26, 1855, Sardinia-Piedmont entered the war and sent 10,000 troops. Finally, on Sept. 11, 1855, three days after a successful French assault on the Malakhov, a major strongpoint in the Russian defenses, the Russians blew up the forts, sank the ships, and evacuated Sevastopol. Secondary operations of the war were conducted in the Caucasus and in the Baltic Sea.

After Austria threatened to join the allies, Russia accepted preliminary peace terms on Feb. 1, 1856. The Congress of Paris worked out the final settlement from February 25 to March 30. The resulting Treaty of Paris, signed on March 30, 1856, guaranteed the integrity of Ottoman Turkey and obliged Russia to surrender southern Bessarabia, at the mouth of the Danube. The Black Sea was neutralized, and the Danube River was opened to the shipping of all nations. The Crimean War was managed and commanded very poorly on both sides. Disease accounted for a disproportionate number of the approximately 250,000 men lost by each side.

The war did not settle the relations of the powers in eastern Europe. It did awaken the new Russian emperor Alexander II (who succeeded Nicholas I in March 1855) to the need to overcome Russia's backwardness in order to compete successfully with the other European powers. A further result of the war was that Austria, having sided with Great Britain and France, lost the support of Russia in central European affairs. Austria became dependent on Britain and France, which failed to support that country, leading to the Austrian defeats in 1859 and 1866 that, in turn, led to the unification of Italy and Germany.

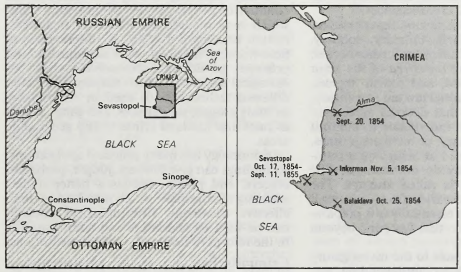
criminal investigation, ensemble of methods by which crimes are studied and criminals apprehended. The criminal investigator seeks to ascertain the methods, motives, and identities of criminals and the identity of victims and may also search for and interrogate witnesses.

Identification of a criminal who has left no fingerprints or other conclusive evidence can often be advanced by analysis of the modus operandi; professional criminals tend to stick to a certain technique (*e.g.,* forcing entrance), to seek certain types of booty, and to leave a certain trademark (*e.g.,* the means by which a victim is tied up). Criminal-investigation departments compile such data, as well as lists of stolen and lost property, and have ready access to such public records as automobile and firearms registrations and such private records as laundry and dry-cleaners' marks, pawnshop and secondhand-dealers' transactions, and many more.

Information flows in more or less continuously from police informants and undercover agents. Wiretapping and other electronic-surveillance methods have become extremely important, though subject to legal restraints.

Interrogation of suspects is one of the most important functions of criminal investigation. In most countries this proceeding is delicate because a confession gained in violation of the suspect's rights can be repudiated in court. The use of the polygraph, or lie detector, is also subject to widespread courtroom limitations.

Of increasing assistance in criminal investigation is the crime laboratory, equipped to deal with a wide range of physical evidence by means of chemical and other analysis. Techniques of identification, especially fin-



Principal battle sites of the Crimean War, 1853–56

gerprinting, and more recently voiceprinting and even "DNA fingerprinting" (a technique that is still experimental), have come to prominence in modern investigation. Photography and photomicrography, document examination, ballistics, and other scientific techniques are also standard crime-laboratory tools. Forensic medicine can supply analysis of blood and urine and identify traces of chemical substances in bodily organs of homicide victims.

criminal law, the body of law that defines criminal offenses, regulates the apprehension, charging, and trial of suspected persons, and fixes punishment for convicted offenders.

A brief treatment of criminal law follows. For full treatment, *see* MACROPAEDIA: Criminal Law; Procedural Law.

The offenses that involve criminal law, a part of public law, are those construed as being against the state. It contrasts with tort law, a part of private (or civil) law that deals with offenses regarded as between private persons. (The term civil law is also used to describe the legal systems of many continental European countries, as opposed to common law, the Anglo-American legal system. However, the civil law mentioned below means only the law governing civil offenses.)

Criminal law presupposes a rule of law in defining acts as criminal. In other words, however immoral or unjust an act may be thought to be, it is not a crime unless the law says it is one. Under the common law, custom and precedent define criminal action; in countries or states where a legal code exists, statute defines it. The principle of legality—that is, the presupposition of a rule of law—also prescribes that the application of the law be narrowly construed, that such application may not be retroactive, and that the wording of statutes be free of ambiguity. Criminal law usually precludes the trial of a person a second time for the same offense (double jeopardy) and contains statutes of limitations—that is, limits for the period during which charges may be made.

A crime is usually defined as a voluntary act or omission, in conjunction with a given state of mind. Acts committed during fits of epilepsy or while sleepwalking are involuntary and thus do not qualify as crimes. The state of mind (*mens rea*) is a factor that statutes have not always defined precisely, but basically it involves purpose, awareness, recklessness, or negligence. Mental disorders are also widely recognized as limiting or absolving responsibility for acts otherwise regarded as criminal. Other factors entering into the determination of criminal intent are self-defense, defense of other persons, protection of property, and enforcement of the law. The law of most countries recognizes that the use of force, while not justifiable, may be excused if the defendant believed that the use of force was necessitated by special circumstances.

Criminal acts include arson, rape, treason, aggravated assault, theft, burglary, robbery, and murder. These offenses are further broken down according to the *mens rea* of the actor into first, second, third, and fourth degrees. Other concerns of criminal law are conspiracy, a rather broad term that denotes agreement between two or more individuals to commit a crime, and preliminary, or inchoate, crimes, which are actions aimed at achieving a criminal result even if they do not succeed. The chief inchoate crime is called attempt. The definition of attempt varies from one legal system to another, but essentially it is preparation for criminal action that has gone beyond a legally defined point.

Criminal law also relates to the investigatory procedures employed for apprehending suspects and for charging and trying them. In this respect, it covers investigation, the assemblage of the material elements (*corpus delicti*) of a crime, the function of the police and of the prosecutor, the issuing of warrants, the role of the judge, and the role of the defense counsel. The law also deals with the preparation of charges and with trial procedures. The latter involves the formation of juries, the guarantee of a public trial, the right to counsel, the presentation of evidence, the establishment of guilt, and sentencing, if guilt has been established. Criminal law is also concerned with postconviction procedures, such as calling for a new trial or challenging a conviction, either in the court where the conviction was declared or in appeal to a higher court.

Modern criminal law has been affected considerably by the social sciences, especially with respect to sentencing, legal research, legislation, and rehabilitation.

criminology, the scientific study of nonlegal aspects of crime, including its causes and prevention.

A brief treatment of criminology follows. For full treatment, *see* MACROPAEDIA: Social Sciences, The.

Criminology originated in the late 18th century when various movements began to question the humanity and efficiency of using punishment for retribution rather than deterrence and reform. There arose as a consequence what is called the classical school of criminology, which aimed to mitigate legal penalties and humanize penal institutions. During the 19th century the positivist school attempted to extend scientific neutrality to the understanding of crime. Because they held that criminals were shaped by their environment, positivists emphasized case studies and rehabilitative measures. A later school, the "social defense" movement, denied the validity of this approach and stressed the importance of balance between the rights of criminals and the rights of society.

Criminologists commonly use several research techniques. The collection and interpretation of statistics is generally the initial step in research, but criminologists must also judge the reliability of statistics. Police statistics, for example, describe crimes, not criminals, whereas court statistics, although they deal with the persons involved in crime, include only material brought forward in court. The case study, often used by psychologists, concentrates on an individual or a group. Its reliability may be suspect, however, because of the criminal's reluctance to be honest about himself and because professional ethics often forbid the publication of case histories. The typological method involves classifying offenses, criminals, or criminal areas according to various criteria. There have been attempts, for example, to establish a continuum, from the "insane" criminal at one extreme through petty offenders to "professionals" at the other.

Criminological prediction, based on statistics and case histories, attempts to forecast the conduct of persons under certain conditions, which may include the effects of treatment. Action research draws on the observations of field-workers involved with delinquents and prisoners to develop preventive tactics. Sociological research—which may involve many different techniques—is used in criminology to study groups, subcultures, and gangs as well as rates and kinds of crime within geographic areas.

Criminology has many practical applications. Its findings can give lawyers, judges, probation officers, and prison officials a better understanding of criminals, which may lead to more effective treatment. Criminological research can be used by legislators and administrators in the reform of laws and of penal institutions.

Crimmitschau, also spelled KRIMMITSCHAU, city, Saxony *Land* (state), Germany, on the Pleisse River, just northwest of Zwickau. An industrial community since the 18th century with factories for cloth and knitted goods and spinning and weaving mills, it became a centre of the working-class movement in the 19th century. The strike of the Crimmitschau textile workers from August 1903 to January 1904 had the effect of mobilizing textile workers in all Germany. Textile machinery is manufactured. Pop. (1989 est.) 24,003.

crimping (military): *see* impressment.

crinoid, any marine invertebrate of the class Crinoidea (phylum Echinodermata) usually possessing a somewhat cup-shaped body and five or more feathery arms. The arms are edged with feathery projections (pinnules) that contain the reproductive organs and carry numerous tube feet with sensory functions. The tentacles also have open grooves, along which cilia (minute, hairlike projections) sweep food particles toward the mouth.

The distinctive limy tests (internal skeletons) of crinoids make the thousands of extinct species (together with extinct echinoderms of similar form) important Paleozoic index fossils. About 700 living species are known, mainly from deep waters.

For more information about living crinoid species and groups, *see* feather star; sea lily.

crinoline, originally, a petticoat made of horsehair fabric, of the late 1840s, taking its name from the French word *crin* ("horsehair"). It was worn with whalebone stays and multiple other petticoats and flounces. In 1856, horsehair and whalebone were replaced by a



Women holding a cage crinoline of metal hoops, detail from a cartoon in *Punch*, English, 1865; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London, Crown copyright

light frame of metal spring hoops. The wide, bell-shaped skirt contrasted with tiny corseted waists. In the late 1850s and early 1860s, the cage crinoline that evolved became so popular that it was worn by ladies' maids and factory girls as well as by the rich. From the dome shape of the 1850s, the crinoline was altered to a pyramid in the 1860s, and about 1865 it became almost flat in front. Smaller "walking" skirts were devised, and by 1868 the crinolette was hooped only at the back and served as a bustle. The crinoline was generally out of fashion by 1878. *See also* farthingale; hoop skirt.

Criobolium, in the ancient religion of Asia Minor, the sacrifice of a ram and the bathing of a devotee in its blood, in the cult of the Phrygian deities Attis and Cybele, the Great Mother of the Gods. The ceremony may have been instituted on the analogy of the Taurobolium, or bull sacrifice, which it probably resembled. When it was performed in conjunction with the Taurobolium, the altar was usually inscribed to both the Great Mother and Attis, whereas the inscription was to the

Mother alone when only the Taurobolium was performed.

Criollo (people): *see* Creole.

Criollo, horse breed of Argentina, Brazil, and other South American countries, used as a stock and riding horse. The breed was developed from horses that had been imported from Spain and allowed to run wild in Argentina for 300 years. In 1920 a herd of wild horses was gathered and a breeding program



Criollo horse

By courtesy of Servico de Remonta e Veterinaria do Exercito, Rio de Janeiro; photograph: Epaminondas Carneiro Lima

begun. Selective breeding has added style and refinement to the very hardy Criollos. The size is small, from 13.2 to 14.3 hands (about 54 to 59 inches, or 137 to 150 centimetres) tall; most colours are found, but dun, palomino, and sorrel are preferred. *See also* pony.

Crippen, Robert Laurel (b. Sept. 11, 1937, Beaumont, Texas, U.S.), U.S. astronaut who served as pilot on the first U.S. space shuttle orbital flight.

Crippen graduated from the University of Texas, Austin, with a degree in aerospace engineering in 1960. He entered the U.S. Air Force Manned Orbiting Laboratory program in 1966 and transferred to the astronaut corps in 1969. He was named commander of the Skylab Medical Experiments Altitude Test several years later and was a member of the support crews for Skylab 2, 3, and 4 and the Apollo-Soyuz Test Project.

Manned by Crippen and John W. Young, the shuttle Columbia, the world's first reusable spacecraft, was launched on April 12, 1981. The two astronauts landed the airplane-like craft on April 14, after having orbited the Earth 36 times. Crippen later commanded the second flight of the space shuttle "Challenger." This flight (June 18–24, 1983) saw the first American woman in space, Sally K. Ride, and made Crippen the first to fly in two shuttle missions.

Cripple Creek, city, seat (1899) of Teller county, central Colorado, U.S., overlooked by Mt. Pisgah (10,400 ft [3,170 m]). It lies west of Colorado Springs in a granite pocket 9,600 ft above sea level, at the edge of the Pike National Forest. In 1891 gold was discovered in nearby Poverty Gulch by Robert Womack, a cowboy (who died poor), and in nearby Victor, by Winfield Scott Stratton, a carpenter (who left a fortune of $20,000,000). Three railways reached Cripple Creek between 1893 and 1901.

Disasters that early plagued the city included a devastating fire (1894) and labour disputes (1903–04) resulting in violence and loss of life. After 1920 gold production declined and Cripple Creek became almost a ghost town. By 1960 the population (which rose to 50,000 in 1901) had declined to fewer than 1,000. Tourism is now the economic mainstay, supplemented by a small amount of gold production; in the late 1970s, however, rehabilitation of mine properties was under way, financed by the rise in world gold prices. Relics of Cripple Creek's heyday are on display at the district museum. The Florissant Fossil Beds National Monument is immediately northwest. Inc. 1892. Pop. (1990) 584.

Cripps, Sir (Richard) Stafford (b. April 24, 1889, London—d. April 21, 1952, Zürich), British statesman chiefly remembered for his rigid austerity program as chancellor of the exchequer (1947–50).

Academically brilliant at Winchester and at University College, London, where he studied chemistry, he was called to the bar in 1913. Being unfit for service in World War I, he worked in a government factory and suffered a breakdown in health (1917–19). After the war he returned to the bar and was made a King's Counsel in 1927. In 1930 he was knighted and appointed solicitor general, being elected Labour member of Parliament for Bristol East in 1931, but he refused to serve in the National Government formed in that year. On the extreme left of the Labour Party, he helped found the Socialist League in 1932. In 1936 he advocated a united front with the Communists, which widened in 1938 as an anti-Fascist popular front, resulting in his expulsion from the Labour Party.

Cripps served as ambassador in Moscow from May 1940 until January 1942. He then joined the British War Cabinet, on behalf of which he conducted a negotiation between Great Britain and India that was an important milestone on the road to Indian independence. The meetings, known as the Cripps Mission, took place in Delhi from March 22 to April 12, 1942, and marked an attempt to rally, through the rival Indian National Congress and Muslim League, Indian support for the defense of the country against Japanese invasion. The failure of the talks increased the gulf between government and Congress and led to a crisis in August, when the arrest of Mohandas Gandhi, the Congress leader, and of the Congress Working Committee was accompanied by a short-lived left-wing revolt.

Cripps then became leader of the House of Commons but was later transferred from the Cabinet to the Ministry of Aircraft Production. Readmitted to the Labour Party after World War II, he became president of the Board of Trade, initiating the postwar export drive and working for Indian independence. In 1947 he became chancellor of the exchequer at a crucial time for his country's solvency. He concentrated on investment and the balance of payments, attempting to stimulate exports and curb inflation. Illness compelled him to resign from office and from Parliament in October 1950.

Consult the INDEX *first*

Crispi, Francesco (b. Oct. 4, 1819, Ribera, Sicily—d. Aug. 12, 1901, Naples), Italian statesman, who, after being exiled from Naples and Sardinia–Piedmont for revolutionary activities, eventually became premier of a united Italy.

Crispi grew up in Sicily, where he studied law, but, disillusioned by conditions there, he went to Naples, where he became active in republican agitation. He helped plan the successful 1848 uprising in Sicily and became one of the deputies in the new government before the island was regained by the Bourbon king Ferdinand II in 1849.

Crispi fled to Turin, where he became a journalist. Suspected of complicity in an uprising in Milan in 1853, he was exiled and made his way to London, where he met Giuseppe Mazzini, the leader of the republican movement in Italy. Crispi and the republicans hoped eventually to unify Italy by beginning a revolution in Sicily, and in 1859 Crispi twice travelled to Sicily, using forged passports, to organize another uprising. After much delay, he persuaded Giuseppe Garibaldi to invade Sicily in May 1860 with his band of volunteers, known as "the Thousand," to assist the popular uprising there. Quickly conquering the whole island, Garibaldi proclaimed himself dictator and named Crispi minister of the interior.

In that powerful position Crispi came into conflict with Count Cavour, premier of Sardinia–Piedmont, who wanted to annex Sicily and Naples, which also had been conquered by Garibaldi. After Crispi's forced resignation, Sicily and Naples were annexed to the newly created Kingdom of Italy (October 1860).

Elected deputy from Sicily in the new government (1861), Crispi, a temperamental, uncompromising man lacking diplomatic finesse, made many political enemies. He broke with his former ally Mazzini when he decided that unity, even under a monarch, was more important than the establishment of a republic (1865). Because of his past he was nevertheless suspected by the monarchists.

When the leftists came to power, Crispi was elected president of the chamber (1876). After a visit to the foreign heads of state in 1877, he began to advocate that Italy should ally with Germany. Invited to be minister of interior in the Cabinet of Agostino Depretis (December 1877), he was within a few months forced to resign over a charge of bigamy.

When Depretis died, Crispi formed his first Cabinet (August 1887), which was characterized by liberal reform and economic crisis. Holding the positions of minister of interior and minister of foreign affairs, as well as premier, he was accused of dictatorial tendencies. His foreign policy, moreover, was extremely unpopular, both because he renewed the alliance of 1882 with Austria–Hungary and Germany and because he broke off trade with France (1889), causing great economic hardship. A large budgetary deficit, necessitating increased taxes, toppled his government in 1891.

Nevertheless, in December 1893 Crispi again became premier. While he greatly improved the economic situation, he became increasingly repressive, brutally crushing a socialist uprising in Sicily. He also embarked upon a disastrous foreign policy. He organized Italy's few possessions on the Red Sea into Eritrea, and then he tried to turn Italy into a colonial power in Africa. The disastrous Italian defeat at Adowa in 1896 at the hands of Emperor Menelik II of Ethiopia earned Crispi a vote of censure that caused him to resign in March of the same year.

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Crispin and Crispinian, SAINTS (both b. traditionally Rome—d. *c.* 286, possibly Soissons, Fr.; feast day October 25), patron saints of shoemakers, whose legendary history dates from the 8th century.

It is said that they were brothers from a noble Roman family and that they travelled to Soissons, where they made many converts while supporting themselves by shoemaking. The emperor Maximian condemned them to death, but they escaped from the ordeals imposed by his prefect Rictiovarus, and at last Maximian had them beheaded. Their remains were buried at Soissons but afterward moved, partly to Osnabrück, Ger., and partly to the chapel of San Lorenzo in Rome; there are also relics at Fulda, Ger. A Kentish tradition claims that their bodies were cast into the sea and floated ashore at Romney Marsh. In medieval France their feast day was the occasion of solemn processions and merrymaking in which guilds of shoemakers took the chief part. In England the day acquired additional

importance as the anniversary of the Battle of Agincourt (1415), an event noted in Shakespeare's *Henry V* (Act IV, scene 3).

Crispus Caesar, in full FLAVIUS JULIUS CRISPUS (d. 326, Pola, Venetia), Constantine the Great's eldest son, executed under mysterious circumstances on his father's orders.

His mother, Minerva (or Minervina), was divorced by Constantine in 307. Crispus received his education from the Christian writer Lactantius Firmianus. On March 1, 317, Constantine gave Crispus the title of caesar and made him titular ruler of Gaul. In the second war between Constantine and his co-emperor Licinius (324), Crispus commanded his father's fleet and won an important naval victory in the Hellespont. But in 326, while accompanying Constantine to Rome to celebrate the 20th anniversary of his accession, he was put to death at Pola. Shortly afterward his stepmother, Fausta, was also executed.

Cristea, Miron (b. July 20, 1868, Topliţa, Rom.—d. March 6, 1939, Cannes, Fr.), first patriarch of the Romanian Orthodox Church, who worked for unity in church and state.

Educated at the theological seminary at Bucharest, Cristea was elected bishop of Caransebeş, Rom., in 1910. In 1918, at the end of World War I, he was a member of the delegation to Budapest that sought the union of Romania and Transylvania, which had been under Hungarian rule; after the union was effected, he was unanimously chosen primate (1919), becoming metropolitan of the principality of Walachia, in southern Romania.

From 1926 to 1930 he was one of the three Romanian regents during the ill health of King Ferdinand and the period before the accession of King Carol II, under whom he became premier in 1939. In this office, he attempted to achieve political stability and unity. From his enthronement as patriarch in 1925, Cristea's influence in promoting peace and unity was felt by Christians outside Romania. On a journey to Palestine in 1927, he visited the Patriarch of Constantinople and other heads of Orthodox churches; he went to England in 1936 at the invitation of the Archbishop of Canterbury.

Cristillo, Louis Francis: *see* Abbott, Bud; and Costello, Lou.

Cristóbal, Atlantic terminal port, Colón province, north central Panama, adjoining Colón city. Both Cristóbal and Colón were named for Cristóbal Colón (Christopher Columbus). Located on an isthmus (made of artificial fill) that connects Manzanillo Island with the mainland, Cristóbal was conceived in 1914 as a port of entry for supplies used in building the Panama Canal. Until 1979 it remained under the jurisdiction of the United States, as part of the former Canal Zone, while the larger city of Colón was Panamanian. Extensive modern docks and other maritime servicing facilities, together with commodious anchorages in Limón Bay protected by breakwaters, make Cristóbal one of the key ports in the Caribbean Sea. Pop. (1980) *corregimento,* 7,959.

cristobalite, the stable form of silica (silicon dioxide, SiO_2) between its melting point of 1,728° C (3,142° F) and 1,470° C, below which tridymite is the stable form. Cristobalite has two modifications: low-cristobalite, which occurs naturally up to 268° C but is not stable; and high-cristobalite, which occurs above 268° C but is only stable above 1,470° C. Natural low-crystobalite usually occurs in sub-microcrystalline masses (*see* opal) or fibrous to columnar spherulites (*see* lussatite) in igneous rocks. Cristobalite has the same chemical composition as coesite, keatite, lechatelierite, quartz, and tridymite but has a different crystal structure. For detailed physical properties, *see* silica mineral (table).

Cristofori, Bartolomeo (di Francesco) (b. May 4, 1655, Padua, Republic of Venice—d. Jan. 27, 1731, Florence), Italian harpsichord maker generally credited with the invention of the piano, called in his time *gravicembalo col piano e forte,* or "harpsichord that plays soft and loud." The name refers to the piano's ability to change loudness according to the amount of pressure on the keys, a quality foreign to the harpsichord. Cristofori achieved this effect by replacing the plucking mechanism of the harpsichord with a hammer action capable of striking the strings with greater or lesser force.

Little is known of Cristofori's life, and his invention was not well known in his lifetime. He moved from Padua to Florence around 1690 at the request of Prince Ferdinando de'Medici, an accomplished harpsichordist, a move suggesting that Cristofori had already established a reputation as a skilled instrument builder. (A three-keyboard harpsichord dated 1702, sometimes attributed to Cristofori and bearing the arms of Ferdinando, is preserved at the Stearns Collection at the University of Michigan.) Cristofori apparently invented the piano around 1709, and, according to contemporary sources, four of his pianos existed in 1711. In 1713 Ferdinando died, and Cristofori remained in the service of the Grand Duke, Cosimo III, later (1716) becoming responsible for the care of an instrument collection assembled by Ferdinando; of 84 instruments, 7 were harpsichords or spinets of Cristofori's manufacture.

Cristofori improved his piano to the point where, by 1726, he had arrived at all essentials of the modern piano action. His frames, being made of wood in the manner of a harpsichord, were not capable of withstanding the string tension that allowed later pianos their more powerful tone. Nevertheless, to judge by surviving examples (*e.g.,* in Leipzig and New York City), his pianos were responsive and had a wide, dynamic range.

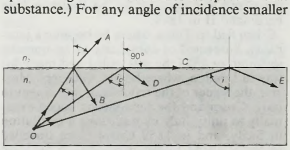
Cristofori's design was largely ignored in Italy, but it soon became known and adopted in Germany through articles in dictionaries of music.

Cristoforo Fini, Tommaso di: *see* Masolino.

Cristoval (Solomon Islands): *see* San Cristóbal.

Crithidia, genus of zooflagellate protozoan of the order Kinetoplastida. *Crithidia* is a parasite of invertebrates, living mainly in the intestines of arthropods, usually insects. It passes from host to host encysted in feces. *Crithidia* is polymorphic, but its characteristic form, which also is assumed temporarily by certain related genera, is fusiform (spindle shaped). It also has a short undulating membrane bordered by an anteriorly extending flagellum.

critical angle, in optics, the greatest angle at which a ray of light, travelling in one transparent medium, can strike the boundary between that medium and a second of lower refractive index without being totally reflected within the first medium. (The refractive index of a transparent substance is the ratio of the speed of light in a vacuum to its speed in that substance.) For any angle of incidence smaller than the critical angle, and for any angle at all if the ray strikes the boundary from the other side, part of the beam will penetrate the boundary, being refracted in the process. The Figure shows two substances, *e.g.,* water and air, with indices of refraction n_1 and n_2, respectively, n_1 being greater than n_2. From left to right, three rays of light from point *O* strike the boundary at angles less than, equal to, and greater than the critical angle. The leftmost ray, for which the angle of incidence i is less than the critical angle i_c, is partially refracted to *A* and partially reflected to *B*. The centre ray strikes the boundary at the critical angle; most of it is reflected to *D*, and a negligible part of it is refracted along the boundary toward *C*. The rightmost ray strikes the boundary at an angle greater than the critical angle and is totally reflected toward *E;* there is no refracted component. The sine of the critical angle is equal to the ratio of the two indices of refraction: $\sin i_c = n_2/n_1$.



Critical angle

critical mass, in nuclear physics, the minimum amount of a given fissile material necessary to achieve a self-sustaining fission chain reaction under stated conditions. Its size depends on several factors, including the kind of fissile material used, its concentration and purity, and the composition and geometry of the surrounding reaction system.

critical path analysis (CPA), technique for controlling and coordinating the various activities necessary in completing a major project. It utilizes a chart that consists essentially of a series of circles, each of which represents a particular part of a project, and lines representing the activities that link these parts together. The critical path is the minimum time that a project can take, represented by the greatest of the times that are obtained by totalling the individual activities on any path from start to finish.

critical point, in physics, the set of conditions under which a liquid and its vapour become identical (*see* phase diagram). For each substance, the conditions defining the critical point are the critical temperature, the critical pressure, and the critical density.

This is best understood by observing a simple experiment. If a closed vessel is filled with a pure substance, partly liquid and partly vapour, so that the average density equals the critical density, the critical conditions can be achieved. As the temperature is raised, the vapour pressure increases, and the gas phase becomes denser. The liquid expands and becomes less dense until, at the critical point, the densities of liquid and vapour become equal, eliminating the boundary between the two phases. If the average density at the start is too low, all the liquid will evaporate before the critical temperature is reached. If the initial average density is too high, the liquid will expand to fill the container.

Critius and Nesiotes (fl. late 5th century BC, Athens), Greek sculptors who executed what were perhaps the first masterpieces of free-standing sculpture of the early Classical period—the bronze figures of the tyrannicides Harmodius and Aristogiton. There are elements of motion and accurate anatomical detail in the work that mark the transition between the Archaic and Classical eras. The figure of the tyrannicides has been identified on Roman coins, vases, reliefs, and fragments. One of the finest copies is that in the Museo Archeologico Nazionale in Naples; a reconstructed statue of Aristogiton is in the Museo dei Conservatori in Rome.

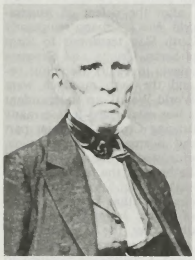
Critobulos OF IMBROS (fl. 15th century), historian whose account of the Turkish destruction of the Byzantine Empire remains as one of the few contemporary works on that period of Byzantium.

Almost nothing is known of his life. He was

probably, a native of the Aegean island of Imbros (Imroz). Although he was not an eyewitness of the Turkish siege of Constantinople (which fell in 1453), he visited the city shortly afterward and later served under the Ottoman sultan Mehmed II as governor of Imbros. Although he grieved over the downfall of Constantinople and the decline of the Byzantine Empire, he admired Mehmed and provided a nonpartisan and generally accurate history of the Turkish invasion. His *History of Mehmed the Conqueror* covers only the first 17 years (1451–68) of Mehmed's 30-year reign, but it remains a vividly descriptive and authoritative source for scholars of Byzantium.

Critolaus (fl. 2nd century BC), Greek philosopher, a native of Phaselis in Lycia and a successor to Ariston of Ceos as head of the Peripatetic school of philosophy (followers of Aristotle). During his period of office he attempted to redirect the activities of the school back to its scientific and philosophical pursuits and away from the worldly preoccupations of his predecessors. Although his teachings were basically peripatetic, he was in part influenced by the stoics. Thus, he defined the highest good in such a way as to declare pleasure to be an evil. Goods of the soul, he insisted, entirely outweighed those of the body. His writings exist only in fragments.

Crittenden, John J., in full JOHN JORDAN CRITTENDEN (b. Sept. 10, 1787, near Versailles, Ky., U.S.—d. July 26, 1863, Frankfort, Ky.), American statesman best known for the so-called Crittenden Compromise (*q.v.*), his attempt to resolve sectional differences on the eve of the American Civil War.



Crittenden

By courtesy of the Library of Congress, Washington, D.C.

Two years after his graduation (1807) in law from the College of William and Mary, Crittenden became territorial attorney general in Illinois. During the War of 1812, having returned to Kentucky, he was elected to the legislature of that state. Later he served intermittently in the U.S. Senate, from 1817 through 1861.

Crittenden left the Senate in 1840 to become U.S. attorney general in William Henry Harrison's Whig administration but resigned, along with others, after John Tyler, having acceded to the presidency on Harrison's death (April 4, 1841), had vetoed a national banking act favoured by the Whigs.

Crittenden returned to the Senate in 1842 and left again to serve as governor of Kentucky (1848–50). During his last years in the Senate (1855–61), the controversial Kansas-Nebraska Act of 1854, enunciating the doctrine of local option in the territories concerning slavery, led to the breakup of the Whig Party, whereupon Crittenden first joined the American, or Know-Nothing, Party (1856) and then switched to the Constitutional Union Party (1859), which sought to unite the sections by ignoring the slavery issue.

After Abraham Lincoln's election, Crittenden introduced his resolutions (December 1860) proposing a collection of compromises on the slavery issue, but they were defeated, and he went home to try to save Kentucky for the Union. In May 1861 he was chairman of the Frankfort convention of border-state leaders that asked the South to reconsider its position on secession from the Union. He then returned to Congress as a representative. One of his sons, Thomas, was a major general in the Union Army; another son was a major general in the Confederate Army.

Crittenden Compromise (1860–61), in U.S. history, series of measures intended to forestall the American Civil War, futilely proposed in Congress by Senator John J. Crittenden of Kentucky in December 1860. He envisioned six constitutional amendments by which the Missouri Compromise of 1820 was, in effect, to be reenacted and, more important, to be extended to the Pacific; the federal government was to indemnify owners of fugitive slaves whose return was prevented by antislavery elements in the North; "squatter sovereignty" (the right to decide if slavery should exist or not) in the territories was to be sanctioned; and slavery in the District of Columbia was to be protected from congressional action. On March 2, 1861, Crittenden's plan was narrowly defeated in the Senate. Two months earlier, Crittenden had introduced a resolution calling for a national referendum on these proposals, but the Senate never acted on this resolution.

Crivelli, Carlo (b. *c.* 1430/35, Venice [Italy]—d. *c.* 1493/95), probably the most individual of 15th-century Venetian painters, an artist whose highly personal and mannered style carried Renaissance forms into an unusual expressionism.

Presumably the son of a painter, Jacopo Crivelli, Carlo was probably initially influenced by the school of Antonio and Bartolomeo Vivarini, Paduan brothers living in Venice, whose works were characterized by soft, rounded figures, clear modeling and realistic detail, and heavy ornamentation. He later came into contact with the linearism of the Paduan tradition and may have seen the works of its most famous artist, Andrea Mantegna, a major 15th-century painter who especially emphasized precise linear definition of form. In 1457 Crivelli served a prison term in Venice for seducing a married woman and then left the city, apparently permanently. Thereafter, he worked mainly in the cities of the Provincia di Ancona, to the south of Venice, coming into little subsequent contact with major artistic trends.

Crivelli's works were exclusively sacred in subject. Although his classical, realistic figure types and symmetrical compositions follow the conventions of Renaissance painting, his unusual overall treatment transforms these conventions into a personal expression that is both highly sensuous and strongly Gothic in spirit. Crivelli's figures, clad in richly patterned brocades that are painted with an almost incredible attention to detail, are closely crowded together in sumptuously ornamental settings to produce flat, hieratic compositions that are devotional and removed from the world of the viewer. His unique use of sharp outlines surrounding every form and the excessive pallor and flawlessness of complexion in his figures give his scenes the quality of shallow sculptured relief. There is an exaggerated expression of feeling in the faces of his figures, usually pensive and dreamy but sometimes distorted with grief, and in the mannered gestures of their slender hands and spidery fingers; this expression is closer to the religious intensity of Gothic art than to the calm rationalism of the Renaissance. Some of Crivelli's more important works are "Madonna della Passione" (*c.* 1457), in which his individuality is only slightly apparent; a "Pietà" (1485); "The Virgin Enthroned with Child and Saints" (1491), the masterpiece of his mature style; and the eccentric and powerful late masterpiece "Coronation of the Virgin" (1493).

Crivelli was knighted in 1490 by Ferdinand II of Naples. He had no direct followers of note.



"The Virgin Enthroned with Child and Saints" by Crivelli, 1491; in the Prussian Cultural Property Foundation, Gallery of Paintings, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz, Gemäldegalerie, Berlin—Art Resource

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Cro-Magnon, population of anatomically modern *Homo sapiens* dating from the Upper Paleolithic Period (*c.* 35,000 to 10,000 years ago).

A brief treatment of Cro-Magnons follows. For full treatment, *see* MACROPAEDIA: Evolution, Human.

In 1868 in a shallow cave at Cro-Magnon in the Dordogne area of southern France, a number of obviously ancient human skeletons were found. The cave was investigated by the French geologist Louis Lartet, who uncovered five archaeological layers. The human bones found in the topmost layer proved to be between 10,000 and 35,000 years old. The race of prehistoric humans revealed by this find was called Cro-Magnon and has since been considered, along with Neanderthals, to be representative of prehistoric humans at that time.

Cro-Magnon was robustly built and powerful and is presumed to have been about 166 to 171 cm (about 5 feet 5 inches to 5 feet 7 inches) tall. The features were generally heavy and solid. The forehead was straight, with slight browridges, the skull long and narrow, and the face short and wide. The brain capacity was about 1,600 cubic cm (100 cubic inches), somewhat larger than average for modern humans. Although further physical characteristics are difficult to evaluate because there are few remains from which to judge, it is thought that Cro-Magnons were probably fairly tall compared with other early human species. The musculature apparently was strong.

It is still hard to say just where Cro-Magnon belongs in human evolution. This type is generally associated with the Aurignacian Tool Industry, which produced a variety of sophisticated tools such as retouched blade tools, end scrapers, "nosed" scrapers, the chisellike tool known as a burin, and fine bone tools. They also seem to have made tools for smoothing and scraping leather. Some Cro-Magnons have been associated with the Gravettian (or Upper

Perigordian) Industry, which is characterized by an abrupt retouching technique that produces tools with flat backs. The dwellings are most often found in caves and shallow caves formed by rock overhangs, although primitive huts, either lean-tos against rock walls or those completely built from stones, have been found. The rock shelters were used yearround; the Cro-Magnons seem to have been a settled people, moving only when necessary to find new hunting or because of environmental changes.

Like the Neanderthals, the Cro-Magnon people buried their dead. The first examples of art by prehistoric peoples are Cro-Magnon. The Cro-Magnons carved and sculpted small engravings, reliefs, and statuettes not only of humans but also of animals. Their human figures generally depicted large-breasted, wide-hipped, and, most often, obviously pregnant women, from which it is assumed that these figures had significance in fertility rites. Numerous depictions of animals are found in Cro-Magnon cave paintings throughout France and Spain, many of them surpassingly beautiful. It is thought that these paintings had some magic or ritual importance to the people. From the high quality of their art, it is clear that Cro-Magnons were not primitive amateurs but had previously experimented with artistic mediums and forms. Decorated tools and weapons show that they appreciated art for aesthetic purposes as well as for religious reasons.

It is difficult to determine how long the Cro-Magnons lasted and what happened to them. Presumably they were gradually absorbed into the European populations that came later. Individuals with some Cro-Magnon characteristics, commonly called Cro-Magnoids, have been found in the Mesolithic Period (8000 to 5000 BC) and the Neolithic Period (5000 to 2000 BC).

Croagh Patrick, Irish CRUACH PHÁDRAIG, quartzite peak, west of Westport and south of Clew Bay, County Mayo, Ireland. It rises to



Statue of St. Patrick with Croagh Patrick in the background, Ireland
Tourist Photo Library

2,510 feet (765 m) from a plateau 800–1,100 feet (245–335 m) high. The mountain is said to have been visited by St. Patrick (fl. 5th century), who, according to one authority, began his ministry there. In modern times, Croagh Patrick has become the site of a popular annual pilgrimage on the last Sunday in July, in which many people scale the mountain barefoot. A tiny chapel is situated on the summit.

croaker (fish family): *see* drum.

Croatia, officially REPUBLIC OF CROATIA, Serbo-Croatian HRVATSKA, or REPUBLIKA HRVATSKA, country in the west-central Balkans. For most of the period from 1919 to 1991, Croatia was part of what came to be called Yugoslavia. Croatia extends in a crescent from the fertile plains of the Danube, Drava, and Sava rivers in the east to the



Croatia

Gulf of Venice in the west and then southward along the Adriatic Sea to the border of Montenegro (in Yugoslavia). It is bounded by Slovenia in the northwest, by Hungary in the north, by Yugoslavia (the Vojvodina province of Serbia) in the east, and by Bosnia and Herzegovina in the south. To the west is the Adriatic Sea. The capital is Zagreb. Area 21,829 square miles (56,538 square km). Pop. (1993 est.) 4,826,000.

A brief treatment of Croatia follows. For full treatment, *see* MACROPAEDIA: Balkan States.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

Physical and human geography. Croatia comprises the traditional regions of Dalmatia, Istria, and Croatia-Slavonia. Physiographically it is divided roughly into three parts. Its southwestern part, the Croatian littoral, comprising Istria and Dalmatia, is a rugged coastal strip consisting largely of rocky karst mountains that plunge directly into the Adriatic Sea and emerge offshore as more than 1,000 islands. The northwestern part, known as the central mountain belt, contains Croatia's portion of the Dinaric Alps. The northeastern part is flatter, consisting of rolling hills around Zagreb and then the Pannonian plain to the east; the entire area is fertile and more suited to agriculture.

Croatia exhibits two climatic zones, Dalmatia and Istria having a relatively warm Mediterranean climate and the interior having more continental extremes. Croatia's principal rivers are the Sava, which flows through Zagreb and downstream forms a border with Bosnia and Herzegovina; the Drava, bordering Hungary; and the Danube, bordering Vojvodina (Yugoslavia). Aside from the capital of Zagreb in the centre of the country, the major cities are all Adriatic ports—Rijeka (Fiume), Zadar, Sibenik, Split, and Dubrovnik.

The people are mainly Croats, whose Serbo-Croatian language is written in the Roman (or Latin) alphabet. There is also a large Serb minority and smaller numbers of Slavic Muslims, Hungarians, Slovenes, and Italians. The Croats are predominantly Roman Catholic, whereas the Serbs are Serbian Orthodox.

In the Pannonian plains of Slavonia, grains constitute the leading crops, together with soybeans, potatoes, and sugar beets. Cattle breeding is also important. The central mountain belt is known for fruit, and the farmers of Istria and Dalmatia are traditionally growers of grapes and olives.

During the Yugoslav period after World War II, much attention was paid to the industrial use of Croatia's natural resources (petroleum, coal, and bauxite), as well as to shipping and to tourism (especially in Dalmatia). The most important industries are food processing and winemaking, textiles, chemicals, and petroleum and natural gas. Important hydroelectric stations are situated on the Cetina and Krka rivers.

Croatia's constitution, enacted in 1990, establishes a bicameral legislature (Sabor), from which the prime minister is selected. The Serb minority is guaranteed representation in the Sabor. The president is elected by popular vote.

The University of Zagreb (founded 1669) is centred in the capital but also has branches in Zadar, Split, Ostjek, and Rijeka. Education and literacy throughout the republic are at a high level.

History. The Croats arrived in their present homeland in the 7th century. In 803 the loose federation of Croatian tribes that extended from northern Dalmatia into Pannonia accepted the suzerainty of Charlemagne. They converted to Christianity soon afterward. Croatia's adherence to the Roman Catholic religion has been a continuing influence in its relations with neighbouring Orthodox Serbia. Croatia became a kingdom in the 10th century, and in 1091 Ladislas I (László I) of Hungary assumed control; the ensuing union with Hungary lasted for eight centuries. During the union with Hungary, Croatia retained its own assembly, the Sabor, and was legally an independent kingdom. In 1526 Hungary was defeated by the Ottomans at the Battle of Mohács, and most of Croatia was under Turkish rule until 1699. The remaining part of Croatia was left without a ruler, and in 1527 the Sabor elected the Habsburg Ferdinand of Austria as king. The Austrians made parts of Croatia and Slavonia into their Military Frontier, which they colonized with displaced Serbs to serve as frontiersmen in their wars with Turkey.

From 1809 until 1813 Croatia was part of Napoleon's Illyrian provinces. Following the establishment of the dual Austro-Hungarian monarchy in 1867, Dalmatia and Istria were ruled from Vienna, while Croatia-Slavonia became an autonomous Hungarian crown land. In 1918, after the defeat of Austria-Hungary in World War I, Croatia reluctantly joined other South Slav territories to form the Kingdom of Serbs, Croats, and Slovenes (renamed Yugoslavia in 1929). Relations between Croats and the Serb monarch were never easy. In World War II, an Independent State of Croatia was established by Germany and Italy. Embracing Croatia-Slavonia, part of Dalmatia, and Bosnia and Herzegovina, this state was entrusted to the leadership of Ante Pavelić, the head of the fascist terrorist organization Ustaša. Pavelić led a campaign of ethnic "purification" that killed hundreds of thousands of Serbs, Jews, Gypsies, and antifascist Croats. After the occupation of Zagreb by the communist-led Partisan resistance force in 1945, Croatia was rejoined to Yugoslavia as a people's republic. Although the socialist period initially brought unprecedented prosperity, Croatia consistently sought greater autonomy within the federation, and the eventual collapse of socialism led to the election of a noncommunist government and an outright declaration of independence on June 25, 1991. These events sparked insurrections by Croatian Serbs, who carved out autonomous regions with the help of the Serbian-led Yugoslav army.

Croatian language (South Slavic language): *see* Serbo-Croatian language.

Croatian literature, the literature of the Croats, a South Slavic people of the Balkans, speaking the Serbo-Croatian language.

Extant ecclesiastical works survive from the 11th century, and by the second half of the 15th century there was a Croatian literature of biblical stories, legends, folklore, and popular stories. In the 15th and 16th centuries the outstanding Old Croatian writers were Marko Marulić, author of the epic *Judita* (1501), a plea for the national struggle against the Turks; Hanibal Lucić, author of *Robinja* ("The Slave Girl"), the first South Slav secular play; and Marin Držić, who wrote pastoral dramas and comedies portraying Renaissance Dubrovnik (his comedy *Dundo Maroje,* written about 1551, was performed throughout western Eu-

rope). In the 17th and 18th centuries, the leading voice belonged to Ivan Gundulić, author of a stirring epic, *Osman,* describing the Polish victory over the Turks in 1621.

Romanticism in Croatian literature evolved out of the Illyrian political movement (1835–48), which aimed at a union of all South Slavs within the Habsburg federation. Ljudevit Gaj introduced the *štokavski* dialect and *ijekavski* speech as the literary language of Croatia and also a unified orthography. Personal, patriotic, and reflective lyrics were popular and were best represented by the sensitive, moving poems of Stanko Vraz and Ivan Mažuranić, the patriotic songs and poetic drama of Petar Preradović, and the dramatic works of Dimitrije Demeter. Another major figure, in the late 19th century, was August Šenoa, poet, dramatist, critic, journalist, and creator of the Croat historical novel of realism. Conditions among the lower classes became a concern of many Croat writers of the period, including Evgenij Kumičić, Ksaver Šandor Gjalski, and Silvije Strahimir Kranjčević.

In the opening years of the 20th century, poetry was the dominant genre, much of it influenced by the Aestheticism movement and concerned with the inner struggles of modern man with his world and the search for meaning in individual existence. These themes are found particularly in the work of Vladimir Vidrić and Vladimir Nazor. The leading figure of the early Modernist phase until World War I was Antun Gustav Matoš. He edited the anthology *Mlada hrvatska lirika* (1914; "The Young Croatian Lyric"), which marked the zenith of such verse. Between the wars, avant-garde poetry continued to be expressed in the verse of such poets as Augustin Ujević, while Ivan Goran Kovačić in *Jama* (1943; *The Pit*), a long poem evoking the horror of war, retained a classical elegance in his verse. The short story was represented by the work of Slavko Kolar, who humorously depicted the life of the peasant in a changing world. The dominant prose writers of the interwar period were August Cesarec and Miroslav Krleža (*Povratak Filipa Latinovicza* [1932; *The Return of Philip Latinovicz*]; and the collection of English translations *The Cricket Beneath the Waterfall and Other Stories* [1972]). Both presented contemporary social problems as the result of class exploitation and deeply explored the psychology of their characters. Krleža is known not only for his imaginative writing, which spanned the century to his death in 1981, but also as an editor of literary periodicals, as an essayist, and as a critic who dominated Croatian cultural life for much of the century.

In the less restrictive atmosphere that followed Yugoslavia's break with the Stalinist Soviet Union in 1948, new prose writers included Ranko Marinković and Vjekoslav Kaleb (*Divota prašine* [1954; *Glorious Dust*]), who wrote on the war and contemporary society in Croatia. The younger prose writer Antun Šoljan took more cosmopolitan themes for his work, as did the poet Ivan Slamnig of the same generation. Later Croatian literature became even more cosmopolitan and Western in the choice of themes, as in the feminist writing of Dubravka Ugrešić.

To make the best use of the Britannica, consult the INDEX *first*

Croce, Benedetto (b. Feb. 25, 1866, Pescasseroli, Italy—d. Nov. 20, 1952, Naples), historian, humanist, and foremost Italian philosopher of the first half of the 20th century.

Early life. Croce belonged to a family of landed proprietors with estates in the Abruzzi region of central Italy but chiefly resident in Naples. His background was religious, monarchical, and conservative. Croce spent almost



Benedetto Croce
H. Roger-Viollet

his whole life in Naples, becoming intimately identified with and a keen observer of its life and a biographer of its heroes. His life, of which he left a too-modest record in his autobiography, falls roughly into four phases; each develops the dual theme of his intellectual and moral growth and his gradual, ever-deepening identification with the moral character and destiny of the Italian nation.

The first period of Croce's life (until about 1900) was the period of Croce's agony. Orphaned (with his brother, Alfonso) by the earthquake of Casamicciola in 1883, his life became, in his words, a "bad dream." The stable world of childhood and youth was shattered, leaving him forever marked. Henceforth, he was a solitary figure, despite his considerable activity in the world.

His salvation lay in work. Disillusioned with the university, he set out upon an austere course of study, to become one of the great self-taught students of history. His writings of this period are universally alert, intelligent, and engaging; although limited in scope, they show a fine sobriety of style, as well as wit, irony, and a fiery polemical spirit, although lyricism, which he eulogized, eluded him. Ostensibly, he had little taste for politics; actually, several basic attitudes were forming. Disillusioned with the nationalistic liberal leaders of the period following the Risorgimento (the 19th-century movement for Italian unity), he began to develop his own convictions on how an ethical, democratic, liberal government should be structured. He "coquetted"—according to his autobiography—with socialism and Marxism, eventually discarding these views after a thorough examination and severe criticism of both positions. Nevertheless, he was subject to a constant and profound malaise. Subliminally, he desired but saw no public relevance for his activity; the limited world of erudition palled on him.

Founding of La Critica. He was delivered from this malaise, and the second period of his life was opened in 1903 by the founding of *La Critica,* a journal of cultural criticism, in which, during the course of the next 41 years, he published nearly all his writings and reviewed all of the most important historical, philosophical, and literary work that was being produced in Europe at the time. At this same time he began the systematic exposition of his "Philosophy of the Spirit," his chief intellectual achievement. This term designates two distinct, but related, aspects of his thought: (1) In the first aspect, philosophy of spirit designates the construction of a philosophical system on the remote pattern of the Rationalism of classical Romantic philosophy. Its principle is the "circularity" of spirit within the structure of the system and in historical time. The phases, or moments, of spirit in this system are theoretical and practical; they are distinguished, respectively, into aesthetic, logical, and economic and ethical. The circular dynamic moves between both the lesser and the greater moments. The law of this circularity is that of absolute immanence. This system is documented in the volumes *Estetica come scienza dell'espressione e linguistica generale* (1902; *Aesthetic as Science of Expression and General Linguistic*), *Logica come scienza del concetto puro* (1909; "Logic as the Science of Pure Conception"; Eng. trans. *Logic*), *Filosofia della pratica: economia ed etica* (1909; *Philosophy of the Practical: Economic and Ethic*), and *Teoria e storia della storiografia* (1917; *History: Its Theory and Practice*). (2) Croce gradually abandoned, without explicitly renouncing, this schematism in response primarily to methodological considerations in history. Its moments are not dissolved but are concretized into the flow of historical action and thought. History becomes the unique mediational principle for all the moments of spirit, while spirit—*i.e.,* human consciousness—is completely spontaneous, without a predetermined structure. This change is signaled by the publication of *La storia come pensiero e come azione* (1938; "History as Thought and Action"; Eng. trans. *History as the Story of Liberty*). To this period some have attached the term historical positivism, but Croce himself has called it absolute historicism and identified it as the definitive form of his thought. The philosophy of spirit in its asystematic form produced the effective method of Croce's later work, as in the anthology *Filosofia, poesia, storia* (1951; *Philosophy, Poetry, History*).

According to Croce, "The foundation of *La Critica* marked the beginning of a new period in my life, the period of maturity or harmony between myself and reality." Through this journal he found the larger public theatre he sought. "*La Critica* was the most direct service I could render to Italian culture. . . . I was engaged in politics in the broad sense . . . uniting the role of a student and of a citizen." Through *La Critica* Croce's public role as teacher of modern Italy emerged. Count Camillo Benso di Cavour, the prime minister who presided over the formation of a unified Italy, had said, "Having made Italy, we must make Italians." *La Critica* took up this task.

The image of the Italian which animates this work is severe and beautiful. Creative effort, a passion for freedom united to a profound sense of civic duty, a life-style purged of all rhetoric and sentimental romanticism, unambiguous norms of public and private truth, a sense of history united to an obligation to the future, unceasing but constructive self-criticism: these were its elements. This image strongly reflected the personal ideal that Croce had gradually formed for himself. But history was preparing to put this ideal to the test.

Struggle with fascism. The test was to be fascism, the political attitude that places the nation or race at the centre of life and history and disregards the individual and his rights. So gradual was this preparation that Croce himself did not at once perceive it. He confessed that he first saw in fascism a movement to the right of the political spectrum that might restrain and counteract the leftist tendencies toward unrestricted individual freedom released by World War I. But as the character of the Benito Mussolini regime revealed itself, his opposition hardened, becoming absolute, beyond compromise. He became, within and without Italy, the symbol of the opposition to fascism, the rallying point of the lovers of liberty. In fascism Croce saw not merely another form of political tyranny. He saw it as the emergence of that other Italy, in which egoism displaced civic virtue, rhetoric dislodged poetry and truth, and the pretentious gesture replaced authentic action.

His consciousness of his role as the moral teacher of Italy was strengthened. Instruction now took the form of the composition of the great histories—a history of Europe in the 19th century, of Italy from 1871 to 1915, and of the Kingdom of Naples. Their didactic

character was unmistakable; in them Croce pointed out how the historical path of Italy had become *la via smarrita* ("the lost way"). Moreover, the lesson was intended for Europe and for the entire Western world as well.

In the maelstrom of conflict and ambiguity that followed Italy's defeat in World War II, a voice of moral authority that could speak for the true Italy was demanded. Croce's was unanimously recognized as that voice. And with authority that voice recalled Italy to the inner spiritual resources through which it might renew itself. It matters little that Croce's own project for the rebuilding of Italy—the retention of the monarchy with certain dynastic changes, the return to the principles of a revived Liberal Party in government—was not the one realized in history. More important is the fact that the new Italy, in its democratic form, was inspired by his spirit.

This last public duty fulfilled, Croce returned to his studies. In his own library—one of the finest collections in Europe within its own scope—he established the Italian Institute for Historical Studies as a research centre. Asked his state of health, he replied with true stoic equanimity, "I am dying at my work." He died at age 86. (A.R.C./Ed.)

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Croce, Giovanni, also called CHIOZZOTTO (b. *c.* 1557, Chioggia, near Venice [Italy]—d. May 15, 1609, Venice), composer who, with Andrea and Giovanni Gabrieli, was one of the leading Venetian composers of his day.

Croce was a priest by 1585. About 1593 he became assistant choirmaster at St. Mark's, and in 1603 choirmaster. His madrigals and canzonets (published in seven books, 1585–1607), though conservative in style, were widely admired for their light touch and alert rhythms. His sacred music (published 1591–1622) shows a development from the even-textured style of Palestrina to the more modern Venetian style of his day, using multiple choruses, solo voices, crisp instrumental rhythms, and basso continuo (reinforced bass line and improvised chords for harmonic support).

crochet, craft that developed in the 19th century out of a form of chain-stitch embroidery done with a hook instead of a needle. In crochet work the hook is used, without a foundation material, to make a texture of looped and interlinked chains of thread. In the late 1840s crochet was introduced into Ireland as a famine relief measure. In southern Ireland the industry centred in Cork, in northern Ireland at Clones in County Monaghan. As it became more sophisticated, crochet work approximated lace, antique laces such as *gros point de Venise,* or Venetian raised lace, being successfully imitated.

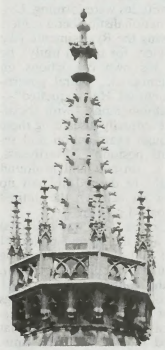
Crocker, Charles (b. Sept. 16, 1822, Troy, N.Y., U.S.—d. Aug. 14, 1888, Monterey, Calif.), American businessman and banker, chief contractor in the building of the Central Pacific (later the Southern Pacific) Railroad.

Crocker was forced to quit school at an early age to help support his family. After his family moved to Indiana, he did various jobs—farming, working in a sawmill, and serving as an apprentice in a blacksmith shop and foundry. Finally, he and his brothers Clark and Henry migrated overland to California (1850) after gold was discovered there. Crocker abandoned his attempt at prospecting in 1852 and opened a store in Sacramento, becoming extremely wealthy by 1854. In 1855 he was elected to the city council and, in 1860, to the state legislature, as a Republican.

In 1861 Crocker joined fellow merchants Collis P. Huntington, Leland Stanford, and Mark Hopkins (known collectively as the "Big Four") in a new railway company, the Central Pacific, which was appointed to build the western portion of the first American transcontinental railroad. Crocker became the contractor in charge of construction, hiring men and equipment, setting up campsites, and acting as paymaster and accountant. He was responsible for importing Chinese labourers (the "coolie system"). The line that he started building on Feb. 22, 1863, met the Union Pacific line, running from the east, at Promontory Point, Utah, on May 10, 1869.

In 1871 he became president of the Southern Pacific Railroad of California and, in 1884, oversaw the new incorporation of Southern Pacific, which absorbed the Central Pacific. Crocker also engaged in real estate, industrial properties, and banking (his Crocker First National Bank of San Francisco, chartered in 1870, was an ancestor of the modern Crocker National Bank). He built a showplace mansion in San Francisco (which burned down in 1906) and a second home in New York City. His fortune at his death was estimated at $40 million.

crocket, in architecture, a small, independent, sharply projecting medieval ornament, usually occurring in rows, and decorated with foliage. In the late 12th century, when it first



Crockets on one of the west facade spires of St. Stephen's Cathedral, Vienna, rebuilt 1359
Graphic House, Inc

appeared, the crocket had the form of a ball-like bud, with a spiral outline, similar to an uncurling fern frond; but in the later Gothic period it took the form of open, fully developed leaves that by the 15th century had evolved into richly involuted forms. Crockets are used especially on the inclined edges of spires, pinnacles, and gables and are also found on capitals and cornices.

Crockett, Davy, byname of DAVID CROCKETT (b. Aug. 17, 1786, eastern Tennessee, U.S.—d. March 6, 1836, San Antonio, Texas), American frontiersman and politician who became a legendary figure.

His father, having little means, hired him out to more prosperous backwoods farmers, and Davy's schooling amounted to 100 days of tutoring with a neighbour. Successive moves



Davy Crockett, portrait by Pierre Saint Jean, 1828; in a private collection
By courtesy of Rev. and Mrs. Robert L. Whittenburg

west to middle Tennessee brought him close to the area of the Creek War, in which he made a name for himself from 1813 to 1815. In 1821 he was elected to the Tennessee legislature, winning popularity through campaign speeches filled with yarns and homespun metaphors. In the legislature an opposing speaker referred to Crockett as the "gentleman from the cane," an allusion to the dense canebrakes of western Tennessee, where Davy hunted bears and raccoons during the winter. This image of the rough backwoods legislator caught the popular imagination during Crockett's lifetime and continued to do so after his death.

Following a second term in the state legislature in 1823, Crockett ran for the U.S. House of Representatives. He lost in 1825, won in 1827 and 1829, lost in 1831, barely won in 1833, and suffered his final defeat in 1835, owing to the concentrated opposition of the party of Andrew Jackson. He then headed west to Texas, joined the American forces, and died with those who were slaughtered at the Alamo by a Mexican army under General Santa Anna on March 6, 1836.

During his first congressional term, Crockett broke with Andrew Jackson and the new Democratic party over Crockett's desire for preferential treatment of the squatters occupying land in western Tennessee. The Whigs early courted and publicized Crockett in the hope of creating a popular "coonskin" politician to offset Jackson. In 1834 Crockett was conducted on a triumphal speechmaking tour of Whig strongholds in the East. From the many stories appearing in newspapers and books during his congressional years, the legend rapidly grew of an eccentric but shrewd "b'ar-hunting" and Indian-fighting frontiersman.

Actually Crockett engaged in several business ventures and delivered his speeches in fairly conventional English. A series of Crockett almanacs, appearing from 1835 to 1856, developed the legend along the lines of Old World folk epics. Crockett's *Autobiography,* written in 1834 with Thomas Chilton, U.S. Representative from Kentucky, played up the backwoods scene and said little about politics. It helped introduce a new style of vigorous, realistic writing into American literature.

Consult the INDEX *first*

Crockett, Samuel Rutherford, original name SAMUEL CROCKETT (b. Sept. 24, 1859, Little Duchrae, near New Galloway, Kirkcudbrightshire, Scot.—d. April 16, 1914, Tarascon, near Avignon, Fr.), Scottish novelist and a leader of the Kailyard (kitchen garden) school (*q.v.*) of writers who depicted Scottish rural life in a sentimental fashion.

After graduating from Edinburgh University in 1879 and studying for the ministry at New

Colly, Edinburgh, in 1886 he became minister of Penicuik, Midlothian. With the success of the novels *The Stickit Minister* (1893) and *The Lilac Sunbonnet* (1894), he abandoned the ministry for writing, following the vogue for novels in Scots dialect set by James M. Barrie. Crockett published more than 40 books, mainly novels.

Crockford, William (b. 1775, London—d. May 24, 1844, London), founder and proprietor of a famous English gambling establishment.

Crocker was the son of a fishmonger, and he himself practiced the trade in his youth. After winning a large sum of money (£100,000, according to one story) either at cards or by running a gambling establishment, he built in 1827 a luxuriously decorated gambling house at 50 St. James's Street in London. To ensure its social exclusiveness, he organized the place as a club with a regular membership. Crockford's Club, as it was called, quickly became the rage; almost every English celebrity from the Duke of Wellington on down hastened to become a member, as did many ambassadors and other distinguished foreigners. Hazard was the favourite game played at the club, and very large sums changed hands. Crockford retired in 1840 when, as one contemporary put it, he had "won the whole of the ready money of the then-existing generation." Crockford retired with about £1,200,000, but he subsequently lost most of this in unlucky speculations. The building housing his establishment eventually became the Devonshire Club.

crocodile, any reptile of the family Crocodilidae; the similar name crocodilian is applied to any of the Crocodilia—alligators, caimans, and gavials, as well as true crocodiles.

A brief treatment of crocodiles follows. For full treatment, *see* MACROPAEDIA: Reptiles.

Crocodiles are tropical reptiles found in Asia, the Australian region, Africa, Madagascar, and the Americas. Like other crocodilians, they are long-snouted, lizardlike, and carnivorous. Most feed on fishes, turtles, birds, and mammals; large individuals may attack domestic livestock or humans. Crocodiles swim and feed in the water but emerge onto land to bask in the sun and to breed. They frequently float at the surface of the water; in this position they wait for potential prey, often a small mammal, to come to the water's edge to drink. Crocodiles reproduce by hard-shelled eggs that are laid in nests built by the female. Baby crocodiles usually feed on insects and other small invertebrates. The diet changes as the crocodiles grow, gradually including more vertebrates and larger prey. Crocodiles have narrower snouts than alligators, and the fourth



Nile crocodile (*Crocodilus niloticus*)
M.P. Kahl

tooth in each side of the lower jaw is visible when the mouth is closed. They are reputed to be livelier than alligators and more likely to attack humans. There are about a dozen species of crocodiles, almost all of which are of the genus *Crocodilus*.

crocodile bird (*Pluvianus aegyptius*), shorebird belonging to the family Glareolidae (order Charadriiformes). The crocodile bird is a plover-like courser that derives its name from its frequent association with the Nile



Crocodile bird (*Pluvianus aegyptius*)
Kenneth W. Fink—Root Resources

crocodile, from whose hide it picks parasites for food. By their cries, the birds also serve to warn crocodiles of approaching danger. They are also called black-backed coursers.

crocoite, mineral consisting of lead chromate, $PbCrO_4$, that is identical in composition to chrome yellow, the artificial product used in paint. The element chromium was discovered in this mineral in 1797. Crocoite occurs as long, well-developed, prismatic crystals; the most beautiful specimens are from Dundas, Tasmania. Other localities include the Urals, Brazil, and the southwestern United States. Crocoite has a bright hyacinth-red to orange colour and an adamantine to vitreous lustre that dulls on exposure to sunlight.

Crocus, genus of about 75 low-growing, cormose species of plants of the iris family (Iridaceae), native to the Alps, southern Europe, and the Mediterranean area and widely grown for their cuplike blooms in early spring or fall. The spring-flowering sorts have a floral tube so long that the ovary is belowground, sheltered from climatic changes. The flowers close at night and in dull weather. Saffron, used for dye, seasoning, and medicine, is the dried, feathery, orange tip of the pistils of the lilac or white, autumn-flowering *C. sativus* of



Crocus
Grant Heilman—EB Inc.

western Asia. The alpine species, *C. vernus,* is the chief ancestor of the common garden crocus. Dutch yellow crocus (*C. flavus*), from stony slopes in southeastern Europe, is another popular spring species, as is *C. biflorus,* tinged purple and with yellow throat, sometimes striped, from the Mediterranean.

Croesus (d. *c.* 546 BC), last king of Lydia (reigned *c.* 560–546), who was renowned for his great wealth. He conquered the Greeks of mainland Ionia (on the west coast of Anatolia) and was in turn subjugated by the Persians.

A member of the Mermnad dynasty, Croesus succeeded to the throne of his father, Alyattes, after a struggle with his half brother. Croesus is said to have acted as viceroy and commander in chief before his father's death. He completed the conquest of mainland Ionia by capturing Ephesus and other cities in western Anatolia. Lack of sea power forced him to form alliances with, rather than conquer, the islanders of Ionia. His wealth was proverbial, and he made a number of rich gifts to the oracle at Delphi.

After the overthrow of the Median empire by the Persians under the Achaemenian Cyrus II the Great (550), Croesus found himself confronted by the rising power of a Persian empire. The Lydian king formed a coalition with Nabonidus of Babylon, and Egypt and Sparta promised to send troops. Taking the initiative, Croesus invaded Cappadocia, a region of eastern Anatolia. After what was evidently an inconclusive battle at Pteria, he returned to his capital, Sardis, to gather the forces of the confederacy. Cyrus pursued him, caught him completely by surprise, and stormed the city (546).

Croesus' subsequent fate is recounted in several ancient sources. According to the Greek poet Bacchylides, Croesus tried to burn himself on a funeral pyre but was captured. Herodotus claims that the King, condemned by Cyrus to be burned alive, was saved by the god Apollo and eventually accompanied Cyrus' successor, Cambyses II, to Egypt. The Greek-born Persian doctor Ctesias says Croesus subsequently became attached to the court of Cyrus and received the governorship of Barene in Media.

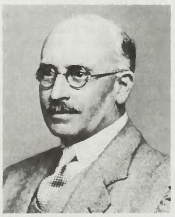
One of the most famous tales concerning Croesus is Herodotus' account of the (fictitious) meeting of Croesus with the Athenian lawgiver Solon. Solon was said to have lectured his host on how good fortune, not wealth, was the basis of happiness.

Croft, William (baptized Dec. 30, 1678, Nether Ettington, Warwickshire, Eng.—d. Aug. 14, 1727, Bath, Somerset), English organist and composer of church music in the Baroque style.

Educated under John Blow, he was organist of St. Anne's, Soho (1700–12), of the Chapel Royal from 1707, and of Westminster Abbey from 1708. In 1700 he collaborated with Blow, Jeremiah Clarke, Francis Piggott, and John Barrett in a *Choice Collection of Ayres for the Harpsichord or Spinnet.* His *Musica sacra* (1724) contains 30 anthems and a setting of the Church of England burial service that is still in use. His occasional anthems, such as "I Will Always Give Thanks" (1704), contain some of his best writing. He also wrote incidental music and works for violin, voice, and harpsichord.

Crofts, Freeman Wills (b. June 1879, Dublin—d. April 11, 1957, Worthing, Sussex, Eng.), internationally popular Irish author of detective novels whose tight plots and exact and scrupulous attention to detail set new standards in detective-fiction plotting.

Educated in Belfast, Crofts was a railroad engineer in Northern Ireland (1899–1929). During a long convalescence he wrote his first novel, *The Cask* (1920). Considered a classic of the detective genre, it was followed by



Crofts
BBC Hulton Picture Library

more than 30 detective novels, most of which featured Inspector French of Scotland Yard.

Crofts, James: *see* Monmouth, James Scott, Duke of.

Croghan, George (b. *c.* 1720, near Dublin, Ire.—d. Aug. 31, 1782, Passyunk, near Philadelphia, Pa., U.S.), American colonial trader who won the confidence of Indian tribes and negotiated numerous treaties of friendship with them in behalf of the British government. He served as deputy superintendent of northern Indian affairs for 16 years (1756–72).

Migrating from Ireland in 1741, Croghan settled on the western frontier near Carlisle, Pa., and won early success in trade with the Indians. His rapport with the Indians was helped by his early mastery of their customs and languages, and he quickly expanded his trading enterprises throughout the adjacent Ohio Territory. Appointed as Indian agent for Pennsylvania in the 1740s, he wrested the allegiance of the area Indians from the French and negotiated the Treaty of Lancaster (1748) with the Miami and the Treaty of Logstown (1752) with the Delaware, Shawnee, Iroquois, and Wyandot.

After the outbreak of the French and Indian War (Seven Years War) of 1754–63, Croghan's far-flung trading business collapsed, and he accepted appointment as chief deputy to Sir William Johnson, British superintendent of northern Indian affairs. In this capacity he conducted extensive negotiations for more than a decade with tribes that complained of abuses in the fur trade and encroachments of white settlers upon their land. Croghan undertook to negotiate an end to Pontiac's War (1763–64) and succeeded in concluding a settlement with the rebellious Ottawa chief in 1765.

Croghan espoused the patriot cause during the American Revolution; although his land speculation schemes and trading enterprises left his name on many 18th-century maps, he died impoverished.

Croissy, Charles Colbert, marquis de (b. 1625, Paris, Fr.—d. July 28, 1696, Versailles), secretary of state for foreign affairs from 1679 to 1696 who helped King Louis XIV develop the annexationist policy that involved France in the War of the Grand Alliance (1689–97) against the other major European powers.

Colbert de Croissy was the younger brother of Jean-Baptiste Colbert, Louis XIV's great financial minister (1665–83). Appointed intendant (royal agent) of Alsace in 1656, he was made president of the sovereign council of Alsace in 1657, and in 1662–63 he served as president of the Parlement (high court of justice) of Metz. From 1668 to 1674 he was ambassador to London. He helped negotiate the Treaty of Nijmegen, ending Louis XIV's war (1672–78) against the Dutch, and in 1679 his brother obtained for him the office of secretary of state for foreign affairs. Thus he was admitted to Louis XIV's inner council.

Colbert de Croissy's experience in Metz and Alsace had convinced him that France must stabilize its poorly defined eastern frontier by absorbing certain strategically located neighbouring towns and territories. To this end he devised the policy of *réunion,* by which Louis XIV claimed sovereignty over all the feudal dependencies of the territories that he already possessed in Alsace, Franche-Comté, Metz, Toul, and Verdun. *Chambres de réunion* set up by Colbert de Croissy at Metz, Besançon, and Breisach designated the regions to be annexed, and French troops then occupied these areas. Because many of the annexations were of dubious legality, Colbert de Croissy advised Louis to exercise caution, but the king went so far as to seize the Alsatian city of Strassburg (Strasbourg) illegally in September 1681. Such acts aroused the hostility of the major European powers. Eager for conciliation, Colbert de Croissy concluded alliances with several of the smaller German states, but his diplomacy



Croissy, engraving by Gérard Edelinck, 1691, after a painting by Hyacinthe Rigaud

By courtesy of the Bibliotheque Nationale, Paris

failed to prevent the formation of the coalition of great powers that engaged France in the War of the Grand Alliance.

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Croix, town, southwestern suburb of Roubaix, Nord *département,* Nord-Pas-de-Calais region, northern France, on the Roubaix Canal and Marque River. The lordship and village of Croix existed before the 12th century and was mentioned in early archives. The Château de la Fontaine (17th century) was a fief of the lordship, which became a countship in 1617. Croix remained a small village until after 1870, when the textile (wool combing) industry was introduced. Other industries have since been established and the town is a centre for mail-order sales operations. Pop. (1990) 20,308.

Croix de Guerre (French: "War Cross"), French military decoration created in 1915 and 1939 to reward feats of bravery, either by individuals or groups, in the course of the two World Wars. This medal may be conferred on any member of the armed forces, on French citizens and foreigners who have been mentioned in army dispatches, and, in special cases, on military units and towns. During World War II there was a proliferation of different conflicting medals. Marshal Philippe Pétain of the Vichy government issued a Croix de Guerre in 1941 and General Henri Giraud of the Free French Forces in North Africa issued a Croix in 1943. By the order (Jan. 7, 1944) of the French National Committee of Liberation, the Croix de Guerre instituted in 1939 was declared to be the only one valid for World War II.

There are different grades of the Croix which correspond to the level of army (or navy) dispatch that mentions the feat of valour being rewarded. A bronze palm is awarded with the Croix for mention in an army dispatch, a silver gilt star is awarded with the Croix for an army corps dispatch, a silver star for a divisional dispatch, and a bronze star for a brigade or regimental dispatch. A warship cited in a dispatch and receiving the decoration may fly a pennant with the colours of the Croix.

The Croix design is a large Maltese Cross in bronze with crossed swords; one side of the medal depicts the female head of the Republic with the inscription *République Française.* The other side has *1914–1918* or *1939–1945* (occasionally just *1939*) inscribed on it.

A Croix de Guerre des Théâtres d'Opérations Extérieures ("War Cross of Foreign Theatres of Operation") was created in 1921 to reward colonial forces serving during peacetime in foreign lands—*i.e.,* Morocco, Algeria, Indochina, etc.

Croker, John Wilson (b. Dec. 20, 1780, Galway, Ire.—d. Aug. 10, 1857, Hampton, Middlesex, Eng.), British politician and writer noted for his critical severity as a reviewer and for his rigid Tory principles.

After graduating from Trinity College, Dublin, and studying law at Lincoln's Inn, London, Croker was called to the Irish bar in 1802. He entered Parliament in 1807 and from 1810 to 1830 was secretary of the Admiralty during the long Tory predominance. From the first he had the backing of Arthur Wellesley, 1st Duke of Wellington, and the friendship continued between them until the duke's death. Strongly opposed to the Reform Bill of 1832, Croker resigned from Parliament when it was passed (though he continued thereafter his close contacts with Tory leaders). From about this period there began the lifelong antagonism between Croker and Lord Macaulay, a major champion of the Reform Bill and Whiggism.

From 1831 to 1854 Croker was one of the chief writers for the *Quarterly Review,* to which he contributed about 270 articles on a variety of subjects. His literary tastes were largely those of the 18th century, as may be seen from his severe criticism of John Keats's *Endymion,* Alfred Tennyson's *Poems* of 1832, and of course the first two volumes of Macaulay's *History of England* (1849). For some years before his death he accumulated material for an annotated edition of Alexander Pope's works; this passed to Whitwell Elwin, who began the edition later completed by W.J. Courthope. Croker also edited the collected letters or memoirs of various 18th-century figures.

Croker, Thomas Crofton (b. Jan. 15, 1798, Cork, Ire.—d. Aug. 8, 1854, London, Eng.), Irish antiquary whose collections of songs and legends formed a storehouse for writers of the Irish literary revival.



Thomas Croker, detail of a portrait by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

The son of an army major, Croker had little school education but did read widely while working in merchant trade. During rambles in southern Ireland from 1812 to 1816, Croker collected legends, folk songs, and keens (dirges for the dead), some of which he sent to the poet Thomas Moore, who acknowledged a debt to him in his *Irish Melodies.* This collection formed the basis of Croker's *Fairy Legends and Traditions of the South of Ireland* (1825–28), which was translated into German by the brothers Grimm and admired by Sir Walter Scott, who described Croker as "little as a dwarf, keen-eyed as a hawk, and of easy prepossessing manners." After 1818

Croker lived in England, working as clerk in the Admiralty until 1850. His later works included *Popular Songs of Ireland* (1839).

Croker Island, island in Northern Territory, Australia, lying 2 miles (3 km) across Bowen Strait in the Arafura Sea from Coburg Peninsula. Low and swampy, the island rises only to 50 feet (15 m). It is 30 miles (50 km) long by 4 miles (6 km) wide and has an area of 126 square miles (326 square km). Visited by Captain Phillip Parker King of the Royal Navy about 1818, the island was probably named for John Wilson Croker, then chief secretary of the British Admiralty. It was the proposed site of a government settlement, which instead was founded on the mainland. Now part of Arnhem Land Aboriginal Reserve, it is the site of a Methodist mission and produces tropical fruits and vegetables and milled cypress pine. Pop. (1976) 244.

Croly, Herbert David (b. Jan. 23, 1869, New York, N.Y., U.S.—d. May 17, 1930, New York), American author, editor, and political philosopher, founder of the magazine *The New Republic.*

The son of widely known journalists, Croly was educated at Harvard University and spent his early adult years editing or contributing to architectural journals. In 1914 he founded the liberal weekly *The New Republic,* "A Journal of Opinion." In its pages Croly attacked what he viewed as American complacency and argued that democratic institutions must constantly be revised to suit changing situations.

Of his books, the first, on social and political problems, *The Promise of American Life* (1909), was his most important. It influenced both Presidents Theodore Roosevelt and Woodrow Wilson. In his last years, Croly turned his attention chiefly to philosophic and religious questions.

Cromarty, small burgh and seaport, Ross and Cromarty district, Highland region, Scotland,



Cromarty harbour, Ross and Cromarty
Colour Library International

on a landlocked harbour. During the 17th century Cromarty became the chief burgh of a patchwork county of the amalgamated estates of the earls of Cromarty, which included land in Ross-shire on the west coast. In the late 18th century, Cromarty was bought by George Ross, who improved the town by building a harbour and establishing various industries, including a brewery and cloth and lace factories. The surrounding area has been developed for North Sea oil production. Pop. (1981 prelim.) 685.

Crome, John (b. Dec. 22, 1768, Norwich, Norfolk, Eng.—d. April 22, 1821, Norwich), English landscape painter, founder and chief representative of the Norwich school. He is often called Old Crome, to distinguish him from his son, painter and teacher John Bernay Crome (1794–1842).

During his apprenticeship to a house painter, Crome devoted what leisure time he had to sketching from nature. Through the influence of a wealthy art-loving friend he became a drawing master, which was then his lifetime vocation. In 1803 the Norwich Society of Artists was formed. Crome became its president and a major contributor.

With few exceptions his subjects were taken from the familiar scenery of his native county of Norfolk, which he depicted with techniques largely derived from his study of Dutch painters, particularly Meindert Hobbema and Jacob van Ruisdael. Fidelity to nature, his dominant aim, was rendered with Romantic breadth and intensity in a characteristically luminous, atmospheric style. Among his most important works are "Poringland Oak," "Slate Quarries," and "Moonrise on the Marshes of the Yare." Among his many etchings is the representative series entitled "Norfolk Picturesque Scenery."

Cromer, Evelyn Baring, 1st Earl of, Viscount Errington of Hexham, Viscount Cromer, Baron Cromer of Cromer, also called (1883–92) sir evelyn baring (b. Feb. 26, 1841, Cromer Hall, Norfolk, Eng.—d. Jan. 29, 1917, London), British administrator and diplomat whose 24-year rule in Egypt as British agent and consul general (1883–1907) profoundly influenced Egypt's development as a modern state.

Early career. Born of a family distinguished in politics and banking, Evelyn Baring received his training at the Royal Military Academy, Woolwich, from which he graduated at the age of 17. He received a commission in the Royal Artillery and served in Corfu (where he met his first wife, Ethel Errington), Malta, and Jamaica. He then entered the Staff College and a year later in 1869 he graduated first in his class. For a while he served in the War Office, but military life was not to his taste, and when in 1872 his cousin, Lord Northbrook, just named viceroy to India, offered to take him along as his private secretary, Baring accepted.

Service in India. In India Baring rapidly made his mark. His administrative qualities were obvious and highly appreciated by his superiors. His colleagues, however, dubbed him "Vice-Viceroy" and "Over-Baring," nicknames which clearly bespoke his self-assured efficiency and ability to command—traits invaluable in a leader of men, though not necessarily conducive to popularity among his equals. His manner was gruff to his equals, condescending and patronizing to his subordinates and to the people he chose to describe as the "subject races." Imbued with immense common sense and a profound belief in himself and his country, he could not abide cant



Lord Cromer, detail of an oil painting by John Singer Sargent, 1902; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

or hypocrisy. He was the typical Victorian colonial administrator, eminently fair and just but with little to endear him save an occasional flash of humour.

It was while serving in India that Baring buried his early notions of self-determination for colonial peoples and decided that strong rule accompanied by reform programs was the only way to help the downtrodden peasant. Baring's subsequent experiences in Egypt strengthened his views on the tyranny of native rulers and the need for reform by the British. Reform became translated into one enduring principle that governed all his administrative actions—the need for a sound financial system.

Baring first went to Egypt in 1877, when he served as representative of the British holders of Egyptian bonds on the recently created Egyptian Public Debt Commission. The commission was designed to help the Egyptian viceroy, the khedive Ismāʿīl Pasha, out of his financial difficulties, and also to safeguard the interest of the bondholders. Egyptian finances, however, were in a worse state than Baring had imagined, and he was the prime mover behind the creation of a Commission of Inquiry into Egyptian finances. When his advice was turned down by the khedive Ismāʿīl Pasha, he resigned and returned to England; but, when Ismāʿīl Pasha was deposed in 1879, Baring was invited to return to Egypt as British controller of the debt. In 1880 he became the financial member of the viceroy's council in India, where he remained for three years. After the British occupied Egypt in 1882, Baring returned to Egypt once again in 1883 as British agent and consul general with plenipotentiary powers, having in the interim been knighted.

Baring's mandate in Egypt. Baring's mandate in Egypt was to carry out wide-scale administrative reforms in a country that was bankrupt and had just gone through a popular revolution and a foreign occupation, and eventually to effect the evacuation of the British forces stationed there. Quickly he concluded that reforms and evacuation were incompatible, that reforms were of more lasting value to the mass of the Egyptians, and that evacuation should come only in the distant future when the Egyptians had been taught self-rule. He therefore instituted a form of government that came to be called the Veiled Protectorate, whereby he ruled the rulers of Egypt, with the

assistance of a group of English administrators trained in India, who were placed in key positions as advisers to the Egyptian government. Until his resignation in 1907 he remained the real ruler of Egypt. The system worked well during the first 10 years, for the khedive Tawfiq Pasha was a weakling who abdicated all responsibility to the English. Egypt was made financially solvent by 1887, and after the British forced the Egyptian government to give up its attempt to reconquer the Sudan—wrested from its control by the religious rebellion of the Mahdi—there followed a period of peace and stability that allowed the country to recover from the chaos of the previous decade. Baring's parsimony in public spending and his encouragement of public irrigation works and other agricultural projects soon increased prosperity.

In 1892 a young new ruler, 'Abbās Ḥilmī II, struggling to divest himself of the onus of the Veiled Protectorate, gave encouragement to a budding nationalist movement. Baring, who had been raised to the peerage as Lord Cromer, was as inflexible in his dealings with the young khedive as he had been with his predecessor and succeeded in intimidating him quite thoroughly.

Throughout his years in Egypt, Cromer won the respect and admiration of the many men who occupied the British foreign office and who usually deferred to his judgment in matters concerning Egypt. An exceedingly hard worker, his day began at sunrise and continued well after sunset with a two-hour break in the afternoon for physical exercise, which he pursued with as much deliberation as the rest of his duties. During his periods of relaxation he steeped himself in the classics that he so admired. As a young officer he had learned Greek and Latin as well as French and Italian; he was later to learn Turkish, the language of the Turco-Circassian elite in Egypt. Yet, in spite of his long stay in Egypt, he never attempted to learn Arabic and was never able to communicate either with the peasant whom he claimed to know so well or with the middle class that was to produce a new breed of nationalists. He had little liking for the Oriental mind, which he termed "slipshod," and even less understanding of it, despite his claims to the contrary. With age his aloofness increased, and he dismissed the young nationalist movement as unimportant. Instead he worked hard at effecting the Entente Cordiale of 1904 with France, which set the seal on the permanent occupation of Egypt. His first wife died in 1898; he married a second time in 1901, to Lady Katherine Thynne, the daughter of the 4th Marquess of Bath.

Retirement. In 1907 an incident in an Egyptian village, Dinshwai, in which a British officer was killed, resulted in brutal sentences being passed on the Egyptian peasants involved. Public outrage created a storm both in Egypt and in the British House of Commons and led the new Liberal Cabinet under Prime Minister Sir Henry Campbell-Bannerman to adopt a more accommodating attitude toward Egypt. Cromer, who had little to do with the sentences since he was on home leave at the time, realized that a change was impending and, as his health had deteriorated, resigned office in 1907.

On his return to England he spent his time writing and in the House of Lords, where he was the foremost exponent of free trade. In 1916 he presided over the Dardanelles Commission, but the strain proved too taxing and he died early the next year. (A.L.al-S.M.)

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Crommelynck, Fernand (b. Nov. 19, 1885, Brussels, Belg.—d. March 17, 1970, Saint-Germaine-en-Laye, Fr.), Belgian playwright known for farces in which commonplace weaknesses are developed into monumental obsessions.

Crommelynck came from a family connected with the theatre and was himself trained as an actor. After some early successes in Belgium, such as in *Nous n'irons plus au bois* (1906; "We'll Go No More to the Woods"), Crommelynck won international honours with his play *Le Cocu magnifique* (*The Magnificent Cuckold*). First produced in Paris in 1920 and filmed by Jean-Louis Barrault in 1921, it has been revived many times and is one of the few French-language plays from this period to have retained its appeal. The play is a penetrating study of sexual jealousy, although Crommelynck called it a farce. The subject of the play is the awakening of jealousy in a young husband and his utter incapacity to calm his suspicions about his wife's fidelity. Eventually he drives her to resolve his uncertainty by betraying him.

Of his later plays, *Tripes d'or* (1926; "Gold in the Guts") is the most striking. Crommelynck again combined farce and deep seriousness in reinterpreting one of the classic themes of French drama—avarice and greed. In the play the miser (Hermides) can never bring himself to pay proper attention to the girl he says he loves, and, though she is often on his mind, Crommelynck never lets her actually appear on the stage. In *Une Femme qui a le coeur trop petit* (1934; "A Woman with Too Little Heart"), Crommelynck portrays a perfect wife whose obsessive virtuousness and efficiency withers all love. With *Chaud et froid* (1934; "Hot and Cold"), Crommelynck returned to the theme of marital constancy.

Crompton, Rookes Evelyn Bell (b. May 31, 1845, Thirsk, Yorkshire [now in North Yorkshire], Eng.—d. Feb. 15, 1940, Ripon, Yorkshire), British inventor and pioneer in electrical development.

After military service in India, where he had introduced steam-driven road transport, Crompton in 1875 became a partner in an engineering firm at Chelmsford, Essex, and soon broadened its activity to the construction of dynamos and arc lamps and the installation of lighting apparatus. In 1878 he invented an arc lamp with an overhead support mechanism to reduce shadow; previous lamps had been constructed with the support mechanism below the electrodes, producing noticeable shadows.

Crompton is best known for his lighting installations. It is claimed that his house in Porchester Gardens was the first private residence effectively supplied with electric light (1879). He also lit the Law Courts, Buckingham Palace, and the Vienna Opera House and installed one of the first power-supply stations at Kensington Court, London (1886). He advocated the use of direct current for distribution systems, in contrast to the alternating current promoted by Sebastian Ziani de Ferranti, which was later adopted generally.

Crompton was also interested in road transportation. He had built a steam-driven road engine as early as 1860 and designed an armoured "landship" during World War I that was a forerunner of the military tank.

Crompton, Samuel (b. Dec. 3, 1753, Firwood, near Bolton, Lancashire, Eng.—d. June 26, 1827, Bolton), British inventor of the spinning mule, which permitted large-scale manufacture of high-quality thread and yarn.

As a youth Crompton spun cotton on a spinning jenny for his family; its defects inspired him to try to invent a better device. In 1779, after devoting all his spare time and money to the effort, he produced a machine



Samuel Crompton, engraving by J. Morrison after a portrait by C. Allingham, 19th century
By courtesy of the Science Museum, London

that simultaneously drew out and gave the final twisting to the cotton fibres fed into it, reproducing mechanically the actions of hand spinning. Probably the machine was called a mule because it was a cross between the machines invented by Sir Richard Arkwright and James Hargreaves.

Demand for Crompton's yarn was heavy, but he could not afford a patent. He therefore revealed the machine's secret to a number of manufacturers on the promise that they would pay him. All he received was £60. Years later (in 1812), when there were at least 360 mills using 4,600,000 mule spindles, Parliament granted him £5,000. He used it to enter business, unsuccessfully, first as a bleacher and then as a cotton merchant and spinner.

Cromwell, Henry (b. Jan. 20, 1628, Huntingdon, Huntingdonshire, Eng.—d. March 23, 1674, Spinney Abbey, Cambridgeshire), fourth son of Oliver Cromwell and British ruler of Ireland from 1657 to 1659.

Cromwell studied at Cambridge University and Gray's Inn, London. During part of the English Civil Wars he served under his father in the Parliamentary army in England and Ireland. Henry became major general of the English forces in Ireland in August 1654; and, upon the departure of Lord Deputy Charles



Henry Cromwell, portrait by an unknown artist after a contemporary portrait
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Fleetwood in September 1655 he was left in charge of the country. The title lord deputy was not conferred on him until November 1657. In contrast to Fleetwood's brutal treatment of the Irish, Henry governed with moderation. He continued the policy of forcing Irish Roman Catholics to relinquish areas to be colonized by English Protestant soldiers, but he ended the oppression of older English settlers by sectarian military leaders. When his brother Richard succeeded to the office of lord protector in September 1658, Henry became lieutenant and governor-general of Ireland. But after Richard was deposed by a group of army officers (May 1659), Henry was recalled to England. He resigned at once and retired to his estate in Cambridgeshire.

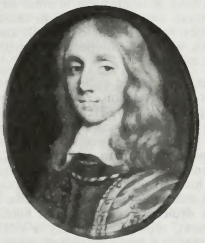
Cromwell, Oliver (b. April 25, 1599, Huntingdon, Huntingdonshire, Eng.—d. Sept. 3, 1658, London), English soldier and statesman who led parliamentary forces in the English

Civil Wars; he was lord protector of England, Scotland, and Ireland from 1653 to 1658 during the Commonwealth.

A brief account of the life and works of Oliver Cromwell follows; for a full biography, *see* MACROPAEDIA: Cromwell.

Cromwell studied at Cambridge, married Elizabeth Bourchier (1620), and inherited property from his mother's brother. His political career began with his election to Parliament in 1628. In 1641 he supported the Grand Remonstrance presented to Charles I by Parliament. The next year he became a captain in the parliamentary army at the Battle of Edgehill, and in 1643 he served in the eastern counties of England. When the new parliamentary army was formed in 1644, Cromwell was appointed second in command and fought in the battle at Marston Moor, as well as at the battles of Naseby and Langport the following year and at the siege of Oxford (1646). Two years later, following the Civil War and the execution of Charles I, Cromwell became first chairman of the Council of State of the new republic; in that position he waged campaigns against Ireland (until 1650) and Scotland (1650). In 1653, after first forcibly dissolving Parliament, he became lord protector; while serving in that office he concluded the Anglo-Dutch War (1654), sent an expeditionary force to the Spanish West Indies (1655), and opposed the monopolies established under the Tudors.

Cromwell, Richard (b. Oct. 4, 1626—d. July 12, 1712, Cheshunt, Hertfordshire, Eng.), lord protector of England from September 1658 to May 1659. The eldest surviving son of Oliver Cromwell and Elizabeth Bourchier, Richard failed in his attempt to carry on his father's role as leader of the Commonwealth.



Richard Cromwell, miniature by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

He served in the Parliamentary army and, during his father's protectorate, was a member of the Parliaments of 1654 and 1656. In 1655 he was appointed to the committee of trade, but he showed little of his father's ability, and it was not until 1657, when a new constitution gave Oliver the right to choose his successor, that the Lord Protector began to groom his son for high office. In July 1657 Richard succeeded his father as chancellor of the University of Oxford. He became a member of the council of state on December 31, and about the same time he obtained a regiment and a seat in Oliver's House of Lords. On his deathbed Oliver may have designated Richard as his successor; Oliver died on Sept. 3, 1658, and Richard was immediately proclaimed lord protector.

The new ruler soon encountered serious difficulties. He offended high-ranking army officers by taking personal charge of the army, thereby ignoring their request for the appointment of an experienced officer as commander in chief. In addition, conflict between Parliament and the army caused the army to establish a council to plot its strategy. When Parliament forbade the council to meet without Richard's permission, the council seized power and forced Richard to dissolve Parliament (April 21, 1659). The officers now recalled the Rump Parliament, which had been dissolved by Oliver in 1653. The Rump dismissed Richard, and on May 25 he officially abdicated. Having amassed large debts during his tenure of office, he escaped his creditors in 1660 by going to Paris, where he lived for a time as John Clarke. Eventually he moved to Geneva. About 1680 he returned to England and lived in seclusion at Cheshunt until he died. His career is recounted in R.W. Ramsey's *Richard Cromwell, Protector of England* (1935), and E. Hause's *Tumble-down Dick* (1972).

Cromwell, Thomas, EARL OF ESSEX, BARON CROMWELL OF OKEHAM (b. *c.* 1485, Putney, near London—d. July 28, 1540, probably London), principal adviser (1532–40) to England's Henry VIII, chiefly responsible for establishing the Reformation in England, for



Thomas Cromwell, detail of a painting by Hans Holbein, the Younger; in the Frick Collection, New York City

Copyright The Frick Collection, New York City

the dissolution of the monasteries, and for strengthening the royal administration. At the instigation of his enemies he was eventually arrested for heresy and treason and executed.

Rise to power. Cromwell's early life is obscure. It appears that he went abroad at an early age and spent some time in Italy. For several years after 1510 he was resident in the Low Countries, and he seems to have been closely connected with the London Merchant Adventurers. By 1520 he had entered Cardinal Wolsey's service as his solicitor, and from that time his career is well documented. Wolsey employed him in 1525 in the dissolution of some lesser monasteries, in which work he earned a good deal of dislike. The Cardinal, however, continued to favour him, and Cromwell soon became his confidential adviser.

When Wolsey fell into disgrace in 1529, Cromwell entered Parliament, where his remarkable ability attracted the notice of the King. For nearly three years he worked his way up in the royal favour, entering Henry's service early in 1530. He was sworn into the council toward the end of that year and reached the inner circle of confidential advisers a year later. All the time, he was establishing his ascendancy in the House of Commons. In 1532 he obtained office as master of the jewels. Other offices soon followed: principal secretary and master of the rolls in 1534 and lord privy seal in 1536. The last office was combined with a peerage, and he took the title of Lord Cromwell of Wimbledon.

Cromwell and the Reformation. Cromwell's part in the English Reformation has been much debated. At one time he was credited with supplying Henry with a complete plan of action as early as 1529; later it became usual to see in him nothing but the King's most competent executive agent. The truth seems to be that he was in no way in charge until early in 1532, taking over when the King's policy of forcing the Pope to come to terms had proved to be a failure. It was, to all appearances, Cromwell who then came forward with a clear notion of how to achieve Henry's purpose without the Pope. His policy consisted in making a reality of some large and vague claims to supreme power that Henry had uttered at intervals. He proposed to destroy Rome's power in England and to replace it by the royal supremacy in the church. He was behind the first attacks on the papacy (1532) and the act against the payment by bishops of their first year's revenue to Rome. He secured the submission of the clergy to the King in matters of legislation, and in 1533 he secured the passage of the Act in Restraint of Appeals to Rome, preventing appeals to Rome in matrimonial and testamentary cases. Its preamble embodied his political theory of the sovereign national state. Thereafter he was in complete control of the government, though he remained careful to pretend to be acting on the King's authority. In 1534 he completed the erection of the royal supremacy with the passage of the Act of Supremacy.

Because political and financial reasons made expedient an attack on the monasteries, Cromwell was appointed the King's vicar general with powers to visit and reform all monastic institutions. Despite serious opposition, especially in the north, the task was carried out relentlessly. During 1536–40 the surrender of the greater houses was obtained by pressure and persuasion, and by 1540 all monastic institutions had ceased to exist and their property had been vested in the crown. Cromwell and other crown officials obtained valuable grants as rewards, but while the minister lived, the new wealth was not squandered.

In 1536, as a newly created baron, Cromwell was also appointed the King's deputy as head of the church. Cromwell's own religious views have been in much doubt. They certainly were not very strong, and his essentially secular temper subordinated religious to political considerations. Nevertheless, he came to be firmly associated with a radical policy of reform and Reformation. In the main, this resulted from difficulties abroad. While hostility between France and Spain had prevented foreign intervention during the critical years of the Reformation, 1533–36, there seemed a danger of an alliance against England after that date. Cromwell, whose forthright and clear-sighted temper was less well suited to the conduct of foreign affairs than was Henry VIII's skillful opportunism, involved himself in projects of a Lutheran alliance distasteful to the King who wished to stand on Catholic orthodoxy. In 1539 Cromwell made the mistake of trying to force the King to his side by compelling him to marry Anne of Cleves. The King from the start hated his fourth wife, and by February 1540 it was clear that the alliance with the German princes that she represented was unnecessary. Thereafter, Cromwell's fall came quickly. He fought back for a few months, being created earl of Essex and lord great chamberlain in April 1540, but early in June his enemies persuaded Henry that his vicegerent was a heretic and a traitor. He was arrested on June 10, condemned without a hearing, and executed on July 28. His fall did not end the Reformation, but it marked the end of competent government and purposeful policy in Henry's reign.

Assessment. The basis of Cromwell's

thought was the notion of the sovereign national state that in practice he established by the expulsion of the papacy. In his conception of the English state and monarchy, his central idea was that of the supremacy and omnipotence of statute, or (as it came to be called) the legislative sovereignty of the king in Parliament. In other words, he wanted to establish unlimited sovereignty in the hands of a monarchy limited by dependence on consent. His work in Parliament—managing elections, drafting statutes, piloting legislation—makes him the first of a long line of English parliamentary statesmen. He also demonstrated his awareness of the need to provide practical management of a new kind. No minister before him exercised such pervasive influence over every detail of administration. Cromwell began, and to a large extent carried through, a reconstruction that replaced administration by the king's household with a national administration divorced from the person of the king and dependent on civil service departments. This aspect of his work endured, through many reforms, until the great changes of the 19th century. (G.R.E.)

BIBLIOGRAPHY. Biographies include Neville Williams, *The Cardinal & the Secretary* (1975), a dual biography of Thomas Wolsey and Cromwell; and B.W. Beckingsale, *Thomas Cromwell, Tudor Minister* (1978). Cromwell's contributions to the English Reformation are dealt with in A.G. Dickens, *Thomas Cromwell and the English Reformation* (1959, reissued 1969); and in three works by G.R. Elton: *The Tudor Revolution in Government* (1953, reissued 1974), analyzing his work as an administrator, *Policy and Police* (1972), showing Cromwell's solution to the problems of enforcement of the Reformation, and *Reform and Renewal* (1973), examining his program of reform and his relations with Parliament.

Cromwellian chair, sturdy, squarish chair with a leather back and seat, studded with brass-headed nails, made in England in the mid-17th century during the Puritan period and named after Oliver Cromwell. Because luxury and almost any kind of ornament were shunned in the prevailing climate of austerity, the only decoration was the pattern of bright



Cromwellian chair, oak with leather-covered back and seat, English, mid-17th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

nail heads and bobbin turning, a series of small bulbs, or bobbins, applied particularly to legs and stretchers. Such chairs were modified versions of the more comfortable Farthingale chair, a design popular in the late 16th century.

Cronaca, Il, byname of SIMONE DEL POLLAIUOLO, or POLLAIOLO (b. 1457, Florence [Italy]—d. 1508, Florence), Italian Renaissance architect whose sober style emphasizes planes and linear design.

He was not related to Antonio and Piero Pollaiuolo. According to Vasari, it was his accurate accounts of the marvels of Rome, where he studied, that earned him the nickname of "Il Cronaca" ("The Chronicler"). In 1480 he returned to Florence, where he designed the courtyard and monumental cornice of the Strozzi Palace, the cornice reflecting his study of Roman architecture. It seems likely that he built the sacristy of San Spirito in accordance with a design by Giuliano da Sangallo. His most important work is the Church of San Salvatore al Monte in Florence, which greatly impressed Michelangelo.

Cronin, A.J., in full ARCHIBALD JOSEPH CRONIN (b. July 19, 1896, Cardross, Dumbartonshire, Scot.—d. Jan. 6, 1981, Montreux, Switz.), Scottish novelist and physician whose works combining realism with social criticism won a large Anglo-American readership.

Cronin was educated at the University of Glasgow and served as a surgeon in the Royal Navy during World War I. He practiced in South Wales (1921–24) and then, as medical inspector of mines, investigated occupational diseases in the coal industry. He opened medical practice in London in 1926 but quit because of ill health, using his leisure to write his first novel, *Hatter's Castle* (1931; filmed 1941), the story of a Scottish hatmaker obsessed with the idea of the possibility of his noble birth. This book was an immediate success in Britain.

Cronin's fourth novel, *The Stars Look Down* (1935; filmed 1939), which chronicles various social injustices in a North England mining community from 1903 to 1933, gained him an international readership. It was followed by *The Citadel* (1937; filmed 1938), which showed how private physicians' greed can distort good medical practice. *The Keys of the Kingdom* (1942; filmed 1944), about a Roman Catholic missionary in China, was one of his most popular books. Cronin's subsequent novels include *The Green Years* (1944; filmed 1946), *Shannon's Way* (1948), *The Judas Tree* (1961), and *A Song of Sixpence* (1964). One of his more interesting late works is *A Thing of Beauty* (1956), a study of a gifted young painter who must break free of middle-class conventions to realize his potential.

Cronin's strengths were his narrative skill and his powers of acute observation and graphic description. Though labeled a successful middlebrow novelist, he managed to create in *The Stars Look Down* a classic work of 20th-century British fiction.

Cronin, James Watson (b. Sept. 29, 1931, Chicago, Ill., U.S.), American nuclear physicist, corecipient with Val Logsdon Fitch (*q.v.*) of the 1980 Nobel Prize for Physics for an experiment conducted in 1964 that implied that reversing the direction of time would not precisely reverse the course of certain reactions of subatomic particles. Prior to the demonstration by Cronin and Fitch, it had long been held that particle interaction should be indifferent to the direction of time.

Cronin graduated from Southern Methodist University at Dallas, Texas, in 1951 and received his Ph.D. from the University of Chicago in 1955. He then joined the staff of the Brookhaven National Laboratory, Upton, N.Y., and in 1958 became a professor at Princeton University. In 1971 he was appointed professor of physics at the University of Chicago.

Cronjé, Pieter Arnoldus (b. Oct. 4, 1836, Colesberg, Cape Colony [now in South Africa]—d. Feb. 4, 1911, Potchefstroom, Transvaal, S.Af.), Boer general who played a prominent part in the early stages of the South African War.

Cronjé was born in the Cape Colony but was taken in early life to the Transvaal, during the Great Trek. In the Transvaal, in November 1880, he began a rebellion against British rule, leading resistance to the distraint of goods of a farmer who had refused to pay taxes. In the ensuing war, he commanded at Potchefstroom and forced the surrender of the British garrison just as a general armistice was being arranged (March 1881). When the Transvaal achieved limited independence later in 1881, Cronjé entered the Volksraad (parliament), where he supported President Paul Kruger. When the South African War broke out in 1899, Cronjé, then a general, assumed supreme command in the west and began the siege of Mafeking. He successfully repulsed a general British attack on his position at Magersfontein on Dec. 11, 1899. In the campaign of February 1900 Cronjé, still at Magersfontein, opposed Field Marshal Lord Roberts' army but failed to prevent the British relief of Kimberley. Retreating eastward, he was surrounded at Paardeberg, where, after inflicting heavy losses on the British, he was forced to surrender with about 4,000 men. He was a prisoner at St. Helena until the end of the war (1902). He then retired to Klerksdorp.

Cronos (Greek god): *see* Cronus.

Cronstedt, Axel Fredrik (b. Dec. 23, 1722, Turinge, Sweden—d. Aug. 19, 1765, Säter), Swedish mineralogist and chemist noted for his work on the chemistry of metallic elements and for his efforts to establish a new mineralogical system. He is also credited with developing an experimental procedure involving the systematic use of blowpipes for analyzing the chemical composition of minerals.

Cronstedt was the first to isolate nickel (1751). He also made a detailed analysis of calcium tungstate, a previously unknown mineral of high specific gravity, and studied the properties of gypsum and a hydrous mineral he named zeolite. Such experiments revealed certain laws governing the internal structure of minerals and enabled him to establish a distinction between simple minerals and rock minerals, which are composed of a mixture of several minerals.

Cronus, also spelled CRONOS, or KRONOS, in ancient Greek religion, male deity who was worshiped by the pre-Hellenic population of Greece but probably was not widely worshiped by the Greeks themselves; he was later identified with the Roman god Saturn. Cronus' functions were connected with agriculture; in Attica his festival, the Kronia, celebrated the harvest and resembled the Saturnalia. In art he was depicted as an old man holding an implement, probably originally a sickle but interpreted as a *harpē*, or curved sword.

In Greek mythology Cronus was the son of Uranus (Heaven) and Gaea (Earth), being the youngest of the 12 Titans. On the advice of his mother he castrated his father with a *harpē*, thus separating Heaven from Earth. He now became the king of the Titans, and took for his consort his sister Rhea; she bore by him Hestia, Demeter, Hera, Hades, and Poseidon, all of whom he swallowed because his own parents had warned that he would be overthrown by his own child. When Zeus was born, however, Rhea hid him in Crete and tricked Cronus into swallowing a stone instead. Zeus grew up, forced Cronus to disgorge his brothers and sisters, waged war on Cronus, and was victorious. After his defeat by Zeus, Cronus became, according to different versions of his story, either a prisoner in Tartarus or king of the Golden Age.

Cronyn, Hume; and Tandy, Jessica (respectively b. July 18, 1911, London, Ont., Can.; b. June 7, 1909, London, Eng.—d. Sept. 11, 1994, Easton, Conn., U.S.), husband-and-wife acting team who became known as the "first couple of the American theatre."

The two came from very diverse backgrounds. Cronyn grew up in wealthy circumstances, the son of a Canadian member of Parliament. He attended the American

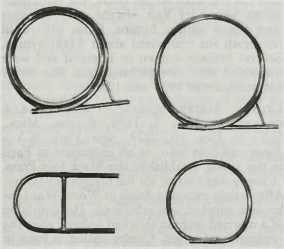
Academy of Dramatic Arts and in 1934 made his Broadway debut in *Hipper's Holiday.* His early Broadway career was marked by a number of successful character roles, among them those of Elkus in *High Tor* (1937) and Andrei in *The Three Sisters* (1939). In 1964 he received a Tony award for an outstanding performance as Polonius in *Hamlet,* directed by John Gielgud. Cronyn starred in many films, including *Brute Force* (1947) and *The Arrangement* (1968). The many plays that he directed in New York City included *Now I Lay Me Down to Sleep* (1949–50), *Hilda Crane* (1950), and *The Egghead* (1957).

Tandy was the daughter of a traveling salesman and grew up in London. She studied acting at the Ben Greet Academy. She first appeared in London in *The Rumour* (1929) and in New York City in *The Matriarch* (1930). After playing dozens of increasingly complex roles, she won rave reviews and critical acclaim for her creation of Blanche DuBois in Tennessee Williams' *A Streetcar Named Desire* (1947), for which she received a Tony award in 1948. Her film appearances were varied and included *The Desert Fox* (1951), *The Birds* (1963), and *Butley* (1973). Tandy was first married to the British actor Jack Hawkins, whom she divorced in 1940. She married Cronyn on Sept. 27, 1942. Tandy became a naturalized American citizen in 1954.

The couple appeared together on the stage in *The Fourposter* (1951), *Madame, Will You Walk* (1953), *The Honeys* (1955), *A Day By the Sea* (1955), *The Man in the Dog Suit* (1958), *The Physicists* (1964), *A Delicate Balance* (1966), *Noel Coward in Two Keys* (1974), and many of the standard classics. Their stage partnership culminated in *The Gin Game* (1977) and *Foxfire* (1982), each of which yielded Tandy another Tony award. In 1994 the couple received the first-ever Tony awards for lifetime achievement.

They worked together on radio and television and made such motion pictures as *The Seventh Cross* (1944), *The Green Years* (1946), *The World According to Garp* (1982), *Cocoon* (1985) and its sequel *Cocoon: The Return* (1988), and *Batteries Not Included* (1987). In 1990 Tandy won an Academy Award for best actress in the film *Driving Miss Daisy* (1989), and Cronyn won a television Emmy for leading actor in the television play *Age-Old Friends* (1990).

crook, in brass musical instruments, detachable piece of metal tubing inserted between the mouthpiece and the main tubing or in the middle of the tubing to lengthen the air column produced. This manipulation allows the player to obtain notes not included in the harmonic series of the original air column. Crooks were in use at least by about 1600 and were used extensively by the late 18th century. They were superseded in the 19th century by valves, which, unlike crooks, allowed instantaneous changes in basic air-column pitch.



Three crooks and (bottom left) a tuning slide, made by D. Jahn, Paris, *c.* 1825; in the Smithsonian Institution, Washington, D.C.

By courtesy of the Smithsonian Institution, Washington, D.C., on loan from Mr. Robert Sheldon

If such a piece of tubing is straight rather than curved, it is called a shank. In woodwind instruments a crook is a curved piece of tubing connecting the mouthpiece with the body and to a detachable tube that holds the reed.

Crook, George (b. Sept. 23, 1829, near Dayton, Ohio, U.S.—d. March 21, 1890, Chicago, Ill.), American army officer in the American Civil War and in the Indian conflicts of the West. General William Tecumseh Sherman called him the best of the Indian fighters and managers.

An Ohio farm boy, Crook attended West Point (1848–52), graduating near the bottom of his class. He first served in the Pacific Northwest, engaged in building forts and protecting settlers from Indians. In the Civil War he was in a number of actions in West Virginia, Virginia, and Tennessee-Georgia, most notably the Second Battle of Bull Run, the Battle of Antietam, the Chickamauga campaign, and the Shenandoah valley campaigns.

After the war he returned west, where he served as a lieutenant colonel in the Northwest and then, from 1871, served in Arizona against the Apaches, becoming a brigadier general in 1873. In 1875 he was placed in command of the Department of the Platte, taking a prominent part in the Sioux wars. In 1882 he was sent back to Arizona, where the following year he led an expedition into Mexico to round up Chiricahua Apaches under Geronimo (Geronimo escaped, but 500 of his tribe were returned to the San Carlos Reservation). In his final years, Crook headed the Department of the Platte and then the Division of the Missouri, headquartered in Chicago, when he achieved his highest rank, that of major general.

Although he spent much of his life as an "Indian fighter," in his last years he campaigned for Indian rights and criticized various injustices done to the Apaches.



Crop duster spraying herbicide on a wheat field in Texas

Grant Heilman—Grant Heilman Photography

Crookes, Sir William (b. June 17, 1832, London, Eng.—d. April 4, 1919, London), British chemist and physicist noted for his discovery of the element thallium and for his cathode-ray studies, fundamental in the development of atomic physics.

After studying at the Royal College of Chemistry, London, Crookes became superintendent of the meteorological department at Radcliffe Observatory, Oxford, in 1854, and the following year gained a post at the College of Science in Chester, Cheshire. Having inherited a large fortune from his father, he devoted himself from 1856 entirely to scientific work of various kinds at his private laboratory in London. His researches on electrical discharges through a rarefied gas led him to observe the dark space around the cathode, now called the Crookes dark space. He demonstrated that cathode rays travel in straight lines and produce phosphorescence and heat when they strike certain materials. He invented many devices to study the behaviour of cathode rays, but his theory of radiant matter, or a fourth state of matter, proved incorrect in many respects.

With the introduction of spectrum analysis by R.W. Bunsen and G.R. Kirchhoff, Crookes applied the new technique to the study of selenium compounds. In 1861 he discovered thallium in some seleniferous deposits. He continued work on that new element, isolated it, studied its properties, and in 1873 determined its atomic weight.



Crookes

BBC Hulton Picture Library

During his studies of thallium, Crookes discovered the principle of the Crookes radiometer, a device that converts light radiation into rotary motion. The principle of this radiometer has found numerous applications in the development of sensitive measuring instruments. Crookes was knighted in 1897.

crop duster, usually, an aircraft used for dusting or spraying large acreages with pesticides, though other types of dusters are also employed. Aerial spraying and dusting permit prompt coverage of large areas at the moment when application of pesticide is most effective and avoid the need for wheeled vehicles that might damage crops. The technique was greatly improved in the 1960s with the development of ultra-low-volume applicators, in which concentrated pesticides are distributed in amounts as small as 1 ounce per acre (70 grams per hectare). The method was used with outstanding success against desert locusts in East Africa, India, and elsewhere. *See also* spraying and dusting.

crop rotation, the successive cultivation of different crops in a specified order on the same fields, in contrast to a one-crop system or to haphazard crop successions.

Throughout human history, wherever food crops have been produced, some kind of rotation cropping appears to have been practiced. One system in central Africa employs a 36-year rotation; a single crop of finger millet is produced after a 35-year growth of woody shrubs and trees has been cut and burned. In the major food-producing regions of the world, various rotations of much shorter length are widely used. Some of them are designed for the highest immediate returns, without much regard for the continuing usefulness of the basic resources. Others are planned for high continuing returns with protected resources. The underlying principles for planning effective cropping systems began to emerge in the middle years of the 19th century.

Early experiments, such as those at the Rothamsted experimental station in England

in the mid-19th century, pointed to the usefulness of selecting rotation crops from three classifications: cultivated row, close-growing grains, and sod-forming, or rest, crops. Such a classification provides a ratio basis for balancing crops in the interest of continuing soil protection and production economy. It is sufficiently flexible for adjusting crops to many situations, for making changes when needed, and for including go-between crops as cover and green manures.

A simple rotation would be one crop from each group with a 1:1:1 ratio. The first number in a rotation ratio refers to cultivated row crops, the second to close-growing grains, and the third to sod-forming, or rest, crops. Such a ratio signifies the need for three fields and three years to produce each crop annually. This requirement would be satisfied with a rotation of corn, oats, and clover or of potatoes, wheat, and clover-timothy. Rotations for any number of fields and crop relationships can be described in this manner. In general, most rotations are confined to time limits of eight years or less.

The acreage devoted to sod-forming, or rest, crops should be expanded at the expense of row crops on soils of increasing slopes and declining fertility. This will provide better vegetative covering to protect sloping land from excessive erosion and supply organic matter for improving soil productivity on both sloping and level lands. With lessening slope and increasing fertility, the row crops may be expanded, but this should not be done with too much reduction in the sod-forming crops. The differing effects of crops on soils and on each other and in reactions to insect pests, diseases, and weeds require carefully planned sequences.

Broadly speaking, cropping systems should be planned around the use of deep-rooting legumes. If too little use is made of them, productivity will decline; if too much land is devoted to them, wastes may occur and other useful crops will be displaced. Rotations depending wholly on green-manure legumes should be confined to the more level and fertile lands. It is desirable to include legumes alone or in mixtures with nonlegume sod-forming crops as a regular crop in many field rotations. In general, this should occur about once in each four-year period. Short rotations are not likely to provide the best crop balances, and long rotations on a larger number of fields may introduce complications. With a moderate number of fields, additional flexibility can be provided by split cropping on some fields.

The usefulness of individual field crops is affected by regional differences in climate and soil. A major crop in one region may have little or no value in another. In each region, however, there are usually row, grain, and sod, or rest, crops that can be brought together into effective cropping systems.

In addition to the many beneficial effects on soils and crops, well-planned crop rotations also provide the business aspects of farming with advantages. Labour, power, and equipment can be handled with more efficiency; weather and market risks can be reduced; livestock requirements can be met more easily; and the farm can be a more effective year-round enterprise.

See also Norfolk four-course system; two-field system; three-field system.

croquet, also called LAWN CROQUET, popular outdoor game, played on a lawn or court, with long-handled mallets with which the players hit balls through a series of wickets, or hoops.

The game evolved from *paille-maille* (French: "pall-mall"), which was played in France at least as early as the 13th century and introduced into England in the 16th century. The game that became known as croquet combined the basic elements of *paille-maille*—running a mallet-driven ball through a hoop or hoops to touch a peg as a goal—into a somewhat more complicated sport involving a series of six or more hoops laid out in a pattern, which had to be run in a specified order.



American croquet game, *c.* 1866
The Bettmann Archive

In lawn croquet, the informal version of croquet that is played in the United States, nine wire hoops and two wooden stakes are placed on an area no more than 40 feet (12 m) wide and 75 feet (23 m) long. Each side has 32 points to make, 16 with each ball. The hardwood balls are solid or striped with colour; the mallets, also of hardwood, have handles approximately 30 inches (76 cm) long. As in other versions of croquet, the object is for a player to put the ball through all wickets, or as many as possible, before turning play over to his opponent.

In the United States, organized croquet was first sponsored by the National Croquet Association, established in 1882. At a tournament meeting in New York City in 1889, the letters *c* and *t* were dropped from the term croquet by some players, making the name roque. Roque courts and play differed markedly from Great Britain's association croquet (*q.v.*) in having a clay surface and solid boundary walls.

Cros, (Émile-Hortensius-) Charles (b. Oct. 1, 1842, Fabrezan, Fr.—d. Aug. 10, 1888, Paris), French inventor and poet whose work in several fields foreshadowed or paralleled important developments.

In 1869 Cros published a theory of three-colour photography similar to the more influential ideas advanced by Louis Ducos du Hauron in the same year. In his book *Études sur les moyens de communication avec les planètes* (1869; "Studies on the Means of Communication with the Planets"), he projected a huge concave mirror with focal length equal to the distance of Mars or Venus from the Earth. Sunlight concentrated by the mirror would fuse the planetary surface in geometric patterns that would presumably be intelligible to higher forms of life anywhere in the universe. Cros invented a phonograph (*paléophone*) in 1877, the year in which Thomas A. Edison of the United States made his first recording.

Cros's most important poetical work, *Le Coffret de santal* (1873; "The Sandalwood Chest"), in the Symbolist vein, was praised by Paul Verlaine and may have influenced Arthur Rimbaud as well as 20th-century French Symbolists. An anthology of his *Poèmes et proses,* edited by Henri Parisot, appeared in 1944.

Crosby, Bing, byname of HARRY LILLIS CROSBY (b. May 3, 1903, Tacoma, Wash., U.S.—d. Oct. 14, 1977, near Madrid, Spain), American singer and songwriter, the archetypal crooner of the period when the advent of talking pictures and the refinement of recording techniques made the climate ideal for the rise of such a figure. His easygoing stage manner and singing style influenced two generations of pop singers **and** made him the most popular entertainer of his day.

Crosby began to sing and to play the drums while studying law at Spokane, Wash. After a period with the Paul Whiteman orchestra in 1927, appearing with Harry Barris and Al Rinker as the Rhythm Boys, he appeared in the early sound film *King of Jazz* (1931). He began to make films in earnest and soon became an international star. His songwriting activities included part-authorship of "A Ghost of a Chance" and "When the Blue of the Night" (his radio theme song). He appeared in several films with the trumpeter Louis Armstrong and the trombonist Jack Teagarden, and many of his early recordings featured incidental work by them and other outstanding jazz soloists. His recording of "White Christmas" became one of the most popular songs of the century, exceeded in record sales only by his "Silent Night." In the 1940s he was the star of a popular radio variety show. He won an Academy Award for the film *Going My Way* in 1944 and won a new reputation in the 1940s for his comedy work with Bob Hope and Dorothy Lamour in the series of "Road" films. His autobiography, *Call Me Lucky,* appeared in 1953. He was a notable sportsman and died of a heart attack while on a golf course.



Bing Crosby
Brown Brothers

Crosby, Fanny, byname of FRANCES JANE CROSBY, married name VAN ALSTYNE (b. March 24, 1820, Southeast, N.Y., U.S.—d. Feb. 12, 1915, Bridgeport, Conn.), American writer of hymns, the best known of which was "Safe in the Arms of Jesus."

Crosby lost her sight at the age of six weeks as the result of negligence on the part of a doctor. In 1835 she entered the Institution for the Blind in New York City and was teacher of English there from 1847 to 1858. In her youth she published several volumes of poetry. In 1858 she married her pupil, the blind musician Alexander Van Alstyne, and six years later began writing hymns. From then until her death she composed about 6,000 hymns. Several became known in England and were translated into foreign languages. She wrote her memoirs in 1903 and 1906.

Crosby, Harry, byname of HENRY GREW CROSBY (b. June 4, 1898, Boston, Mass., U.S.—d. Dec. 10, 1929, New York, N.Y.), American poet who, as an expatriate in Paris in the 1920s, established the Black Sun Press.

Crosby was known for his bizarre behaviour. After barely escaping death in World War I, he became morbid and rebellious. His courtship of a married woman shocked society; rejecting conventional mores, Crosby settled in Paris in the early 1920s and soon joined the circle of literary expatriates.

In 1927 he and his wife, Caresse Crosby, *née* Jacob (1892–1970), began to publish their own poetry under the imprint Editions Narcisse,

later the Black Sun Press. The following year they started printing books by other writers, such as Archibald MacLeish, D.H. Lawrence, and James Joyce, for which the press is best remembered.

In his poetry—which has little artistic merit—Crosby unconsciously traced literary tradition from 19th-century Romanticism, in *Sonnets for Caresse* (1925), to automatic writing, in *Sleeping Together* (1929), descriptions of his dreams. His work includes poetry that shows his obsessive sun worship, such as *Chariot of the Sun* (1928); his diaries, *Shadows of the Sun* (1928–30); and contributions to the avant-grade magazine *transition.* Crosby took his own life in 1929.

crosier, also spelled CROZIER, also called PASTORAL STAFF, staff with a curved top that is a symbol of the Good Shepherd and is carried by bishops of the Roman Catholic, Anglican, and some European Lutheran churches and by abbots and abbesses as an insignia of their



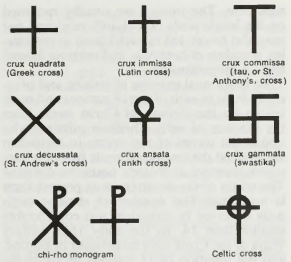
Modern crosier
Algimantas Kezys, S.J.

ecclesiastical office and, in former times, of temporal power. It is made of metal or carved wood and is often very ornate. Possibly derived from the ordinary walking stick, it was first mentioned as a sign of a bishop's ruling power in 633 at the fourth Council of Toledo. French bishops adopted it in the late 8th century, and it was gradually adopted throughout Christendom. Originally a staff with a cross, sphere, or tau cross on top, it acquired its present form by the 13th century.

Bishops of the Eastern churches carry the *baktēria* (*dikanikion*), a pastoral staff with either a tau cross or two serpents facing each other on top.

cross, the principal symbol of the Christian religion, recalling the Crucifixion of Jesus Christ and the redeeming benefits of his Passion and death. The cross is thus a sign both of Christ himself and of the faith of Christians. In ceremonial usage, making a sign of the cross may be, according to the context, an act of profession of faith, a prayer, a dedication, or a benediction.

There are four basic types of iconographic representations of the cross: the *crux quadrata,* or Greek cross, with four equal arms; the *crux immissa,* or Latin cross, whose base stem is longer than the other three arms; the *crux commissa,* in the form of the Greek letter tau, sometimes called St. Anthony's cross; and *crux decussata,* named from the Roman *decussis,* or symbol of the numeral 10, also known as



Types of crosses

St. Andrew's cross. Tradition favours the *crux immissa* as that on which Christ died, but some believe that it was a *crux commissa.* The many variations and ornamentations of processional, altar, and heraldic crosses, of carved and painted crosses in churches, graveyards, and elsewhere, are developments of these four types.

Cross forms were used as symbols, religious or otherwise, long before the Christian Era, but it is not always clear whether they were simply marks of identification or possession or were significant for belief and worship. Two pre-Christian cross forms have had some vogue in Christian usage. The ancient Egyptian hieroglyphic symbol of life—the ankh, a tau cross surmounted by a loop and known as *crux ansata*—was adopted and extensively used on Coptic Christian monuments. The swastika (*q.v.*), called *crux gammata,* composed of four Greek capitals of the letter gamma, is marked on many early Christian tombs as a veiled symbol of the cross.

Before the time of the emperor Constantine in the 4th century, Christians were extremely reticent about portraying the cross because too open a display of it might expose them to ridicule or danger. After Constantine converted to Christianity, he abolished crucifixion as a death penalty and promoted, as symbols of the Christian faith, both the cross and the chi-rho monogram of the name of Christ. The symbols became immensely popular in Christian art and funerary monuments from *c.* 350.

For several centuries after Constantine, Christian devotion to the cross centred on the victory of Christ over the powers of evil and death, and realistic portrayal of his suffering was avoided. The earliest crucifixes (crosses containing a representation of Christ) depict Christ alive, with eyes open and arms extended, his Godhead manifest, even though he is pierced and dead in his manhood. By the 9th century, however, artists began to stress the realistic aspects of Christ's suffering and death. Subsequently, Western portrayals of the Crucifixion, whether painted or carved, exhibited an increasing finesse in the suggestion of pain and agony. Romanesque crucifixes often show a royal crown upon Christ's head, but later Gothic types replaced it with a crown of thorns. In the 20th century a new emphasis emerged in Roman Catholicism, especially for crucifixes in liturgical settings. Christ on the cross is crowned and vested as a king and priest, and the marks of his suffering are much less prominent.

After the 16th-century Protestant Reformation, the Lutherans generally retained the ornamental and ceremonial use of the cross. The Reformed churches, however, resisted such use of the cross until the 20th century, when ornamental crosses on church buildings and on communion tables began to appear. The Church of England retained the ceremonial signing with the cross in the rite of Baptism. Since the mid-19th century, Anglican churches have witnessed a revival of the use of the cross. The crucifix, however, is almost entirely confined to private devotional use. *See also* True Cross; crucifixion.

Cross, Hardy (b. Feb. 10, 1885, Nansemond County, Va., U.S.—d. Feb. 11, 1959, Virginia Beach, Va.), U.S. professor of civil and structural engineering whose outstanding contribution was a method of calculating tendencies to produce motion (moments) in the members of a continuous framework, such as the skeleton of a building.

Cross was appointed professor of structural engineering at the University of Illinois, Urbana, in 1930; seven years later he became full professor at Yale, retiring in 1951. Among other honours, he received the Institution of Structural Engineers' (British) gold medal.

By the use of Cross's technique, known as the moment distribution method, or simply the Hardy Cross method, calculation can be carried to any required degree of accuracy by successive approximations, thus avoiding the immense labour of solving simultaneous equations that contain as many variables as there are rigid joints in a frame. He also successfully applied his mathematical methods to the solution of pipe network problems that arise in municipal water supply design; these methods have been extended to other pipe systems, such as gas pipelines.

Cross, Mary Ann, Mary Ann also spelled MARIAN (novelist): *see* Eliot, George.

Cross (of Broughton-in-Furness), Richard Assheton Cross, 1st Viscount (b. May 30, 1823, Red Scar, near Preston, Lancashire, Eng.—d. Jan. 8, 1914, Eccle Riggs, Broughton-in-Furness, Lancashire), British statesman responsible for the first urban renewal authorization in Great Britain, the Artizans' and Labourers' Dwellings Improvement Act (generally known as the first Cross Act) of 1875.



1st Viscount Cross, detail of a portrait by Sir Hubert Von Herkomer, 1882; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

A lawyer and banker, Cross was a Conservative member of the House of Commons from 1857 to 1862 and from 1868 (when he defeated W.E. Gladstone for a Lancashire constituency) until 1886. In 1874 Prime Minister Benjamin Disraeli appointed him home secretary. The Cross Act of 1875 empowered municipalities to buy and demolish slums and to build housing for rental. (The so-called second Cross Act, 1879, also dealt with housing.) Also in 1875 Cross carried through Parliament the Factory Act, regulating the employment of women and children in textile mills; the Public Health Act, a comprehensive sanitary code; and two statutes reinterpreting Gladstone's trade-union legislation of 1871 in a sense more favourable to the unions.

Cross left office with Disraeli in 1880, served again as home secretary in the 3rd Marquess of Salisbury's brief ministry of 1885–86, was

created viscount in 1886, and held the secretaryship for India from that year until 1892. From 1895 to 1900 he was lord privy seal.

cross, sign of the, a gesture of ancient Christian origin by which a person blesses himself, others, or objects. St. Cyprian explained the ritual in the 3rd century by reference to Christ's redemptive death on the cross. The sign of the cross is used throughout Christian liturgies, in moments of need or danger, at the beginning and end of prayer, and on numerous other occasions. In the Latin rite the sign is made in two ways: (1) the great sign, made with the five fingers outstretched (symbol of the five wounds of Christ) on the forehead, breast, and shoulders, left to right, and (2) the lesser sign, made with the thumb alone on the forehead, lips, and breast. In the Eastern churches, since the 7th century, the great sign is made with two fingers (index and middle, symbolic of the two natures in Christ as opposed to the Monophysite practice of using the index finger alone) or, since the 8th century, with the five fingers curved, index and middle fingers touching the thumb (a Trinitarian symbol). The Oriental gesture moves from right to left. The earliest invocation made with the sign seems to have been simply "The sign of the cross," or "The sign of Christ." Later a Trinitarian invocation was used—"In the name of the Father and of the Son and of the Holy Spirit." The Psalmist's invocation was "Our help is in the name of the Lord, who made heaven and earth."

Cross, Stations of the, also called WAY OF THE CROSS, a series of 14 pictures or carvings portraying events in the Passion of Christ, from his condemnation by Pontius Pilate to his entombment. The series of stations is as follows: (1) Jesus is condemned to death, (2) he is made to bear his cross, (3) he falls the first time, (4) he meets his mother, (5) Simon of Cyrene is made to bear the cross, (6) Veronica wipes Jesus' face, (7) he falls the second time, (8) the women of Jerusalem weep over Jesus, (9) he falls the third time, (10) he is stripped of his garments, (11) he is nailed to the cross, (12) he dies on the cross, (13) he is taken down from the cross, (14) he is placed in the sepulchre. The images are usually mounted on the inside walls of a church or chapel but may also be erected in such places as cemeteries, corridors of hospitals, and religious houses and on mountainsides.



Pilgrims on Good Friday stopping at the third station of the Way of the Cross in Jerusalem
David Harris

The devotional exercise of visiting and praying in front of each of the 14 stations and meditating on the Passion of Christ stems from the practice of early Christian pilgrims who visited the scenes of the events in Jerusalem and walked the traditional route from the supposed location of Pilate's house to Calvary. The origin of the devotion in its present form is not clear. The number of stations originally observed in Jerusalem was considerably smaller than 14. In the early 16th century Ways of the Cross were established in Europe, and the tradition of 14 stations probably derived from the best known of them, that at Louvain (1505). The Franciscans long popularized the practice, and in the 18th century they bowed to Western Christian devotional feeling and provided 14 stations in Jerusalem.

Cross, True (Christianity): *see* True Cross.

cross-country, also called CROSS-COUNTRY RUNNING, long-distance running over open country; unlike the longer marathon race, cross-country races usually are not run along roads or paths. Events are held during the fall or winter months, and many amateur athletes use the sport as a means of keeping fit and developing stamina.

A form of cross-country running in the early 19th century was called paper chasing, or hare and hounds—the "hares" started a few minutes before the others and left a trail of paper scraps to be followed by the "hounds." Cross-country runners came to be known as harriers, after a small hound used to chase genuine hares. A significant event was the founding of the Crick Run at Rugby School in 1837. Many other famous schools followed suit in holding annual cross-country races. Thirty years later the Thames Rowing Club held cross-country runs and races as a winter sport to condition rowers, and in a few years many other clubs were formed throughout England. English championships over the senior distance of 10 miles (16,090 m) were first held in 1877. The famous Midlands Club's Birchfield Harriers won many of these events thereafter. The number of runners in this event increased from 33 in the first race to 900 in the second half of the 20th century.

The first international race was held in 1898 between England and France, and in 1903 a championship was instituted among England, Ireland, Scotland, and Wales. In 1907 France first competed in this championship, followed by Belgium in 1924; Italy, Luxembourg, Spain, and Switzerland first competed in 1929; and other countries entered the international competition after World War II.

In 1962 the International Amateur Athletic Federation (IAAF) adopted rules governing championship and international cross-country running events both for men and for women. The first women's international cross-country event was held at Barry, Wales, in 1967. Formerly included on the Olympic program, cross-country was dropped after 1924 as not suitable for summer competition.



Intercollegiate cross-country race
By courtesy of Michigan State University, East Lansing

IAAF standard distances for international competition are not less than 12,000 m (7.5 miles) for men, and 2,000–5,000 m (1.25–3 miles) for women. Because of the varying difficulty of courses, world records are not maintained. Cross-country teams are made up of six to nine athletes. In scoring, the places in which team members finish (*e.g.,* 1 point for first place, 2 points for second) are added together, and the team with the lowest total wins. For winners of cross-country championships, *see* Sporting Record: *Athletics.*

cross-country skiing, skiing in open country over rolling, hilly terrain such as is found in the Scandinavian countries, where the sport originated as a means of travel as well as recreation and remains quite popular. The skis used are longer, narrower, and lighter than those used in more mountainous, Alpine-type terrain. Bindings allow more heel movement, and the ski poles are longer. In its noncompetitive form the sport is also known as ski touring.



Vegaro Ulvang of Norway competing in the men's 15-kilometre cross-country event in the World Nordic Skiing Championships
ALLSPORT UK/Shaun Botterill

Cross-country races, also called *langlauf* in German, *langrenn* in most Scandinavian languages, or Nordic races, are held over somewhat circular courses. The standard lengths of international races are 10, 15, 30, and 50 km (6.2, 9.3, 18.6, and 31 miles) for men, and 5, 10, 15, and 30 km (3.1, 6.2, 9.3, and 18.6 miles) for women. Many traditional contests are longer—the Vasa race in Sweden is 90 km (56 miles). Contestants usually begin at intervals, and lowest time determines the winner. In a cross-country relay race, four men each ski a 10-kilometre course, or four women a 5-kilometre course. Cross-country skiing is not as dangerous as other skiing events, but it demands much stamina, especially for the longer distances. For world champions, *see* Sporting Record: *Skiing. See also* Olympic Games.

cross-cousin, first cousin who is the child of a mother's brother or of a father's sister. For purposes of technical discussion, anthropologists distinguish the different types of first cousin as follows: in relation to any person, cousins on the father's side are patrilateral,

those on the mother's side matrilateral; the children of a mother's sister or of a father's brother are ortho-cousins (parallel cousins); the children of a father's sister or of a mother's brother are cross-cousins.

Whereas the English word cousin covers all four of these relationships, many languages place the ortho-cousins and the cross-cousins in separate categories; in such cases, the terms used to denote the ortho-cousins are frequently the same as those denoting brothers and sisters. A smaller group of languages places the ortho-cousins in one category but distinguishes the patrilateral cross-cousins from the matrilateral cross-cousins. Still another group of languages uses separate words for each of the four possible kinds of cousins: patrilateral cross-cousins, patrilateral ortho-cousins, matrilateral cross-cousins, matrilateral ortho-cousins.

Some societies consider first-cousin marriages to be ideal, but usually marriage between ortho-cousins falls under incest taboos; cross-cousin marriage is preferred or sometimes even obligatory. In exceptional cases, however, the opposite is true. Even when a cross-cousin is the preferential mate, actual instances of such marriages in a given society may be small, for such decisions are also influenced by local customs governing succession, inheritance, and residence. Cross-cousin marriage often acts as a device to hold together the clans of the parents of the cross-cousins.

cross-fertilization, also called ALLOGAMY, the fusion of male and female gametes (sex cells) from different individuals of the same species. Cross-fertilization must occur in dioecious plants (those having male and female organs on separate individuals) and in all animal species in which there are separate male and female individuals. Even among hermaphrodites—*i.e.,* those organisms in which the same individual produces both sperm and eggs—many species possess well-developed mechanisms that ensure cross-fertilization. Moreover, many of the hermaphroditic species that are capable of self-fertilization (*q.v.*) also have capabilities for cross-fertilization.

There are a number of ways in which the sex cells of two separate individuals can be brought together. In lower plants, such as mosses and liverworts, motile sperm are released from one individual and swim through a film of moisture to the egg-bearing structure of another individual. In higher plants, cross-fertilization is achieved via cross-pollination, when pollen grains (which give rise to sperm) are transferred from the cones or flowers of one plant to egg-bearing cones or flowers of another. Cross-pollination may occur by wind, as in conifers, or via symbiotic relationships with various animals (*e.g.,* bees and certain birds and bats) that carry pollen from plant to plant while feeding on nectar.

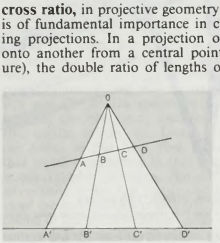
Methods of cross-fertilization are equally diverse in animals. Among most species that breed in aquatic habitats, the males and females each shed their sex cells into the water and external fertilization takes place. Among terrestrial breeders, however, fertilization is internal, with the sperm being introduced into the body of the female. Internal fertilization also occurs among some fishes and other aquatic breeders.

By recombining genetic material from two parents, cross-fertilization helps maintain a greater range of variability for natural selection to act upon, thereby increasing a species's capacity to adapt to environmental change.

cross-hatching (drawing): *see* hatching.

Cross of Gold speech (July 8, 1896), classic of American political oratory delivered by William Jennings Bryan in closing the debate on the party platform at the Democratic National Convention in Chicago in 1896. In an eloquent attack on the thesis that gold was the only sound backing for currency, Bryan closed with the peroration, "You shall not press down on the brow of labor this crown of thorns, you shall not crucify mankind on a cross of gold." The speech so electrified the convention that the delegates nominated Bryan as their candidate for president, though he was only 36 years old and his experience as an officeholder was limited to two terms in the U.S. House of Representatives. In November he lost to the Republican candidate, William McKinley. In later years Bryan delivered numerous variations on the speech, some captured on early phonograph recordings.

cross ratio, in projective geometry, ratio that is of fundamental importance in characterizing projections. In a projection of one line onto another from a central point (*see* Figure), the double ratio of lengths on the first



Cross ratio

line $(AC/AD)/(BC/BD)$ is equal to the corresponding ratio on the other line. Such a ratio is significant because projections distort most metric relationships (*i.e.,* those involving the measured quantities of length and angle), while the study of projective geometry centres on finding those properties that remain invariant. Although the cross ratio was used extensively by early 19th-century projective geometers in formulating theorems, it was felt to be a somewhat unsatisfactory concept because its definition depended upon the Euclidean concept of length, a concept from which projective geometers wanted to free the subject altogether. In 1847 the German mathematician Karl G.C. von Staudt showed how to effect this separation by defining the cross ratio without reference to length. In 1873 the German mathematician Felix Klein showed how the basic concepts in Euclidean geometry of length and angle magnitude could be defined solely in terms of von Staudt's abstract cross ratio, bringing the two geometries together again, this time with projective geometry occupying the more basic position.

cross-rhythm: *see* polyrhythm.

Cross River, river in western Africa (mostly in southeastern Nigeria) that rises in several branches in the highlands of western Cameroon. Thence it flows in a westerly direction and enters Nigeria. Turning in a southwesterly direction after its confluence with the Aya River in Nigeria, it flows south (after receiving the Western Aboine River from the Udi Hills) through dense tropical rain forest, oil-palm bush, and mangrove swamps. It completes its 304-mile (489-kilometre) course to the Bight of Biafra through its estuary, which it shares with the Calabar River. Because the estuary is not blocked by a sandbar and has only a moderate tidal range (9 feet [3 m] at Calabar), the Cross River serves as an important waterway. Palm oil and kernels, timber, cocoa, and rubber are sent by boat on the Cross River to the port of Calabar (on the Calabar River, 5 miles [8 km] upstream from its entrance into the estuary) for export.

Portuguese navigators explored the lower section of the river in the 15th century, and the British official John Beecroft ventured upstream in the early 1840s.

Cross River, formerly SOUTH-EASTERN, state, southeastern Nigeria. What is now Cross River state was part of the former Eastern region until 1967, when it became South-Eastern state; it received its present name in 1976. In 1987 the southwestern third of Cross River state became a new state called Akwa Ibom.

The Cross River, after which the state is named, rises from the Cameroon Mountains and flows southward, forming much of the state's western border; it is an important commercial artery in the rainy season. The state is bounded by the states of Benue on the north, Abia on the west, and Akwa Ibom on the southwest. It is bordered on the east by the Cameroon republic and fronts the Bight of Biafra on the south. The state has saltwater swamps, mangrove forests, oil palms, and dense tropical rain forest. Cross River state has a significant portion of the nation's forest resources and supplies a sizable amount of the country's industrial woods for export and domestic markets.

The population of Cross River state consists largely of the Efik and Ekoi peoples. Food crops including yams, cassava, rice, and corn (maize) are cultivated. Deep-sea fishing and shrimping along the coast are also important. Palm oil and kernels, timber, cocoa, and rubber are exported from Calabar, the state capital and a major seaport. Industries produce cement, palm oil, asbestos roofing sheets and pipes, and baking flour. Rivers are the principal means of inland transport. A federal university (at Calabar), a technological college, and a number of teacher-training colleges are located in the state. Its chief urban centres in addition to Calabar are the inland towns of Ugep and Ogoja. The Calabar-Ikot-Ekepene highway, by way of Oron, provides easy access to the rest of Nigeria. Area 7,800 square miles (20,200 square km). Pop. (1991 prelim.) 3,983,857.

cross section, in nuclear physics, probability that a given atomic nucleus will exhibit a specific reaction (for example, absorption, scattering, or fission) in relation to a particular species of incident particle. Cross section is expressed in terms of area, and its numerical value is chosen so that, if the bombarding particle hits a circular target of this size perpendicular to its path and centred at a nucleus, the given reaction occurs; and, if it misses the area, the reaction does not occur. The reaction cross section is usually not the same as the geometric cross-sectional area of the nucleus. The unit of reaction cross section is the barn (equal to 10^{-24} square cm). Values of cross sections for a given nucleus depend on the energy of the bombarding particle and the kind of reaction. Boron, for example, bombarded by neutrons traveling 1,000,000 cm per second (22,500 miles per hour) has a cross section for the neutron-capture reaction of about 120 barns, whereas the cross section increases to about 1,200 barns for neutrons traveling at 100,000 cm per second. These large cross sections mean that boron is a good absorber of neutrons. The metal zirconium, on the other hand, having an absorption cross section of only 0.18 barn for the low-energy neutrons that cause fission in nuclear reactors, is rather transparent to neutrons and is used to clad reactor fuel rods. The reactor fuel uranium-235 absorbs neutrons both by fission and by capture. The fission cross section is 580 barns, whereas the total cross section for neutron absorption (including the capture cross section) is 680 barns.

cross spider: *see* garden spider.

cross-stitch embroidery, type of embroidery carried out on canvas (though also done on linen in which the strands of the weave can be counted). Canvas work was executed at least as early as the Middle Ages, when it was

known as *opus pulvinarium*, or cushion work. As its name implies, cross-stitch is a double stitch diagonally crossing intersections of the horizontal and vertical threads of the canvas.



Detail of a cross-stitch embroidered linen sampler, Pennsylvania German, 1839; in the Philadelphia Museum of Art

By courtesy of the Philadelphia Museum of Art, The Whitman Sampler Collection given by Pet Incorporated; photograph, Alfred J. Wyatt

Because it is based on regular squares, it imposes a certain discipline and squaring-off of forms; flowers and the like are thus schematized rather than naturalistic.

cross-wall construction (architecture): *see* box frame construction.

crossbill, any of the three birds of the genus *Loxia*, noted for their crossed mandibles, with which they pry open conifer cones to get at

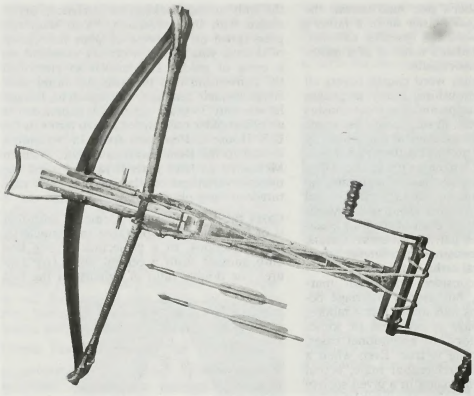


White-winged crossbill (*Loxia leucoptera*)

Karl H. Maslowski

the seeds. Crossbills are in the family Carduelidae, sometimes considered a subfamily of the Fringillidae (order Passeriformes). The red crossbill (*L. curvirostra*) and the white-winged, or two-barred, crossbill (*L. leucoptera*) occur throughout the colder regions of the Northern Hemisphere, and each has a small population isolated in the New World tropics. The parrot crossbill (*L. pytyopsittacus*) of northern Eurasia has a larger bill.

crossbow, leading missile weapon of the Middle Ages, consisting of a short bow fixed transversely on a stock, originally of wood; it had a groove to guide the missile, usually called a bolt, and a trigger to release it. The crossbow, or arbalest, was an important technical achievement that enjoyed the further distinction of being outlawed (at least for use against Christians) by the Lateran Council of 1139. Its origins are obscure, but its earliest appearance in Europe was in the technologically advanced Italian cities of the 10th and 11th centuries. The destructive power that made it so feared derived from the substitution of metal (wrought iron or mild steel) for wood in its construction. The metal bow, relatively short, was bent by one of two methods. In the earlier version the bowman placed the weapon on the ground, bow down and stock, or cross, upright. Setting his foot in a stirrup in the lower part of the stock, he bent over, caught the bowstring in a hook suspended from his belt, straightened up, and brought the string into the locking device in the groove of the stock. In the second version the stirrup was still used, but a hand crank or winch drew back the string. A small lever triggered the release of the short bolt, or quarrel, which was capable of piercing chain mail and had a range of up to 300 metres (1,000 feet).



Stirrup crossbow, French, 14th century

By courtesy of the West Point Museum Collections, United States Military Academy

Despite the introduction of the English (or Welsh) longbow, with its quicker rate of fire, the crossbow continued its reign as the supreme hand missile weapon until, and even for a long time after, the introduction of firearms. In addition to its power, it owed its long success to its versatility (it could be fired from a reclining position or from behind a parapet) and its less bulky ammunition. The slower rate of fire (compared with the longbow) may also have been an advantage in some situations. Not until the late 15th century did it definitely give way to the harquebus. The crossbow's merits have been demonstrated in modern times by sportsmen who have used it to hunt large game, although some jurisdictions forbid its use. *See also* bow and arrow; archery.

Crossett, city, Ashley county, southeastern Arkansas, U.S., on pine-forested uplands near the Ouachita River. Founded (1899) by the Crossett Lumber Company (since 1962 part of the Georgia-Pacific Corporation), it remained a company-owned town until 1946, when it became an open community. Its lumber, pulp, and paper industries are based upon a continuous reforestation program initiated in 1922. Chemicals, textiles, and concrete are manufactured. Felsenthal National Wildlife Refuge is immediately west. Inc. town, 1903; city, 1946. Pop. (1990) 6,282.

crossopterygian, any member of the subclass Crossopterygii, a group of lobe-finned, bony fishes believed to have given rise to the amphibians and all other land vertebrates. The only living representative is the coelacanth (*Latimeria chalumnae*).

A brief treatment of the crossopterygians follows. For full treatment, *see* MACROPAEDIA: Fishes.

The major characteristic of crossopterygians is that the skull is divided into anterior and posterior units. These two chambers are strongly joined at the sides. A notochord is present in varying degrees in the skull base and in the vertebral column, where ossification is not complete. The rostral organ, a specialized sensory organ, is located in the snout. The heart of the coelacanth is bilaterally symmetrical (the two sides are mirror images) and quite primitive; it is located within a pericardial cavity that is not separated from the peritoneal cavity. Blood exits the heart through a series of small valves and is pushed through the branchial arteries by contractile organs located along these vessels. Lying dorsal to the abdominal organs is a large fat deposit, probably the degenerative remnant of an ancestral lung.

Large roughened scales cover the exterior of these fish. The tail is strong and divided into three lobes. In this group the paired fins (pectoral and pelvic) are connected to their respective girdles and are carried on fleshy stalks with bone or cartilage support structures. The posterior dorsal fin and the anal fin are structurally of this type also, but the anterior dorsal fin has bony rays and lacks the fleshy stalk.

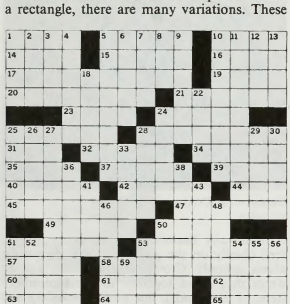
There are three orders of crossopterygians: Rhipidistia, Actinistia, and Struniiformes. The rhipidistians were ancestral to land vertebrates. In addition to a gill system, they had a lung system and a pair of nostrils that enabled them to breathe air; the paired fins were also capable of land locomotion. The Actinistia have shown almost no change through time; the abundant forms of the Devonian Period (408 million years ago) closely resemble the modern coelacanth. The Struniiformes are quite different structurally from the other crossopterygians but retain the division of the skull into two units.

crossword puzzle, popular form of word puzzle. A crossword puzzle consists of a diagram, usually rectangular, divided into blank (white) and cancelled (black, shaded, or crosshatched) squares. This diagram is accompanied by two lists of numbered definitions or clues, one for the horizontal and the other for the vertical

words, the numbers corresponding to identical numbers on the diagram. Into each of the blank squares of the diagram a certain letter of the alphabet is to be inserted, forming the words fitting the numbered definitions or clues. The words cross each other, or interlock, which gives the puzzle its name.

The first crosswords appeared in England during the 19th century. They were of an elementary kind apparently derived from the word square, a group of words arranged so the letters read alike vertically and horizontally, and printed in children's puzzle books and various periodicals. In the United States, however, the puzzle developed into a serious adult pastime. The first modern crossword puzzle was published on Dec. 21, 1913, in the New York *World's* Sunday supplement, *Fun.* It appeared as only one of a varied group of mental exercises, but it struck the fancy of the public. By 1923, crosswords were being published in most of the leading American newspapers, and the craze soon reached England. Soon almost all daily newspapers in the United States and Great Britain had a crossword feature of some kind. The *Sunday Times* of London ran perhaps the best-known puzzle.

Crosswords in various forms are found in almost every country and language. Scholars have even gone so far as to make them for Latin. Advocates claim the puzzles are both a pastime and an interesting means of improving the vocabulary. Though the majority of puzzles have the form of symmetrical patterns of shaded or blacked-out squares within a rectangle, there are many variations. These include: (1) an asymmetrical scattering of squares; (2) a plain diagram with no squares canceled and the ends of words marked simply by a thick line; (3) pictorial designs, either in outline containing the diagram or in line inside the diagram, or a combination of both; and (4) diagramless puzzles, with no squares cancelled and no word ends marked.



ACROSS

1 Incarcerate.
5 Royal name in France.
10 Distort.
14 Melville work.
15 Solo.
16 Inter ——.
17 Louisiana city.
19 Military cap.
20 Clean, as a dust mop.
21 Philadelphia Institute.
22 Dull sound.
24 Tia ——.
25 Wiry.
28 Camping gear.
31 Role for Richard Boone.
32 Tin or copper.
34 Scene of "At You Like It."
35 London stables.
37 Office machine.
39 Portuguese Miss.
40 Sneak about.
42 Adjust, as a clock.
44 Noun suffix of agency.
45 Pendant.
47 Make lower in quality.
49 —— pray."
50 Osprey's cousin.
51 Mountain ridges.
53 Sweet liqueur.
57 Tibetan sheep.
58 Louisiana city.
60 Common: Comb. form.
61 Tidal bore.
62 Put into circulation.
63 Fastener.
64 Track of the lion.
65 African township.

DOWN

1 Positions.
2 Oriental nurse.
3 Jot.
4 Take care of.
5 Painted the town red.
6 Audible.
7 Sulk.
8 Language: Abbr.
9 Got ready to drive.
10 Bugles, bells, etc.
11 Louisiana city.
12 Natures.
13 Container.
18 Biblical name.
22 Pro ——.
24 Author Verne.
25 Parts of boots.
26 French composer of "Escales."
27 Louisiana city.
28 19th cen. stylist.
29 Heads: Fr.
30 Attractive but risky thing.
33 Weight deductions.
36 Tropical American tree.
38 Valley of western song.
41 It's better than never.
43 All wound up.
46 Rumples.
48 Blew the car horn: Slang.
50 January, in Cadiz.
51 He wrote "The Nazarene."
52 Mother of Greek gods.
53 Southern constellation.
54 Volume.
55 Chip.
56 Feminine suffix.
59 Luck: Archaic.

J	A	I	L		C	A	P	E	T		W	A	R	P
O	M	O	O		A	L	O	N	E		A	L	I	A
B	A	T	O	N	R	O	U	G	E		K	E	P	I
S	H	A	K	E	O	U	T		D	R	E	X	E	L
			T	H	U	D		J	U	A	N	A		
V	I	N	O	U	S		P	U	P	T	E	N	T	S
A	B	E		M	E	T	A	L		A	R	D	E	N
M	E	W	S		D	A	T	E	R		S	R	T	A
P	R	O	W	L		R	E	S	E	T		I	E	R
S	T	R	E	A	M	E	R		D	E	B	A	S	E
		L	E	T	U	S		E	R	N	E			
A	R	E	T	E	S		A	N	I	S	E	T	T	E
S	H	A	S		S	H	R	E	V	E	P	O	R	T
C	E	N	O		E	A	G	R	E		E	M	I	T
H	A	S	P		S	P	O	O	R		D	E	M	I

Sample crossword puzzle and solution

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The general type of crossword has also been subject to variation. Some puzzles employ abstruse definitions, puns, and anagrams. A number of words in one puzzle may bear upon some announced theme, such as music, sports, literature, or geography. Many of the puzzles in this category are quite difficult. Again, some clues will be omitted altogether but a direction given that the words thus neglected belong to a particular class: jewels, for example, or words in a quotation. Sometimes every word will have some given prefix, suffix, or part in common, and only the rest of the word will actually fill the spaces in the diagram: (rat)ion, (rat)chet, etc.; unc(tion), cap(tion), etc.; qu(it)e, cr(it)ic, etc. Lester Markel, Sunday editor of *The New York Times,* insisted that puzzles appearing in that paper contain words linked to the news. Harold T. Bers, an advertising writer and puzzle constructor, devised the internal-clue crossword, in which the theme of the puzzle emerges gradually as successive definitions are solved: filling in "pussyfoot," "caterwaul," "kittenish"—together with an overall title "catalog"—would reveal the feline theme.

crotal, percussion instrument consisting of two small metal plates or clappers struck together. The crotalum of ancient Greece and Rome was a pair of finger cymbals, *i.e.,* wooden or metal shells held in one hand and manipulated like castanets, though probably not as rapidly. They were used to accompany dancing and were played almost exclusively by women. Cymbals in the form of two small saucers attached to handles or fastened with leather straps were also used in ancient times. The discovery of finger cymbals in ancient Egyptian tombs inspired modern French composers such as Claude Debussy and Maurice Ravel to include crotales in scores that required an Oriental or antique tone colour.

Crothers, Rachel (b. Dec. 12, 1878, Bloomington, Ill., U.S.—d. July 5, 1958, Danbury, Conn.), American playwright whose works reflected the position of women in American society more accurately than those of any other dramatist of her time.

Crothers graduated from the Illinois State Normal School (now Illinois State University) in 1892 and then studied dramatic art in Boston and New York City and acted in New York City. Her career as a playwright began in 1906 with the success of her first full-length play, *The Three of Us.* For the next three decades, until *Susan and God* (1937), Broadway saw an average of one new Crothers play each year, the majority of them popular and critical successes, an achievement unequaled by any other American woman playwright.

Crothers chronicled, sometimes seriously, more often humorously, such timely problems as the double standard (*A Man's World,* 1909), trial marriage (*Young Wisdom,* 1914), the problem of the younger generation (*Nice People,* 1921), Freudianism (*Expressing Willie,* 1924), and divorce (*As Husbands Go,* 1931; *When Ladies Meet,* 1932). These and other successes were marked by simplicity of plot, happy endings, and expert dialogue, which featured shrewdly combined instruction and amusement. Her comedies always advocated sanity and moderation.

Crothers took full responsibility for the entire production of almost all her plays, casting and directing many of the leading stars of the contemporary stage. The best and most instructive statement of her dramatic theory is to be found in her essay "The Construction of a Play," collected in *The Art of Playwriting* (1928).

croton, also called VARIEGATED LAUREL (*Codiaeum variegatum*), colourful-leaved plant of the spurge family (Euphorbiaceae). Its numerous varieties of shrubs or small trees with brilliantly coloured, glossy, leathery leaves are much grown as potted plants. Native to Malaysia and the Pacific, the trees reach a height of about 6 m (20 feet). Leaf colours, mostly resulting from anthocyanin in the



Croton (*Codiaeum*)
Richard Batchelor

leaf, occur solid or in combinations of green, yellow, white, orange, pink, red, crimson, and purple. The 10–15-centimetre (4–6-inch) leaves vary from linear and lance-shaped to oval and lobed, depending upon the variety.

Another plant of the same family, but of a different genus, the true croton, is purging croton (*Croton tiglium*), a small tree from the seeds of which croton oil is extracted. It is native to Southeast Asia.

croton oil, poisonous viscous liquid obtained from the seeds of a small Asiatic tree, *Croton tiglium,* of the spurge family (Euphorbiaceae). The tree is native to or cultivated in India and the Indonesian Archipelago. Croton oil is pale yellow to brown and is transparent, with an acrid persistent taste and disagreeable odour. Highly toxic and a violent irritant, it was formerly used as a drastic purgative and counterirritant in human and veterinary medicine but is now considered too dangerous for medicinal use. The use of croton oil as a drug apparently originated in China. It was introduced to the West by the Dutch in the 16th century.

Crotone, Latin CROTON, port town, capital of Crotone *provincia,* Calabria *regione,* southern Italy. It lies along the Gulf of Taranto northwest of the Cape of Colonne, and east-northeast of Catanzaro. It was known as Cotrone from the Middle Ages until the Italian form of its early name was restored in 1928.

The town was founded by Achaean Greeks led by Myscellus about 710 BC. Like Sybaris, it soon became a city of power and wealth. Croton was especially celebrated for its successes in the Olympic Games from 588 BC onward, Milo of Croton being the most famous of its athletes. The philosopher Pythagoras established himself there about 530 BC and formed a society of 300 disciples who were sympathetic toward aristocratic government. In 510 BC Croton was strong enough for its people to defeat the Sybarites and raze their city to the ground. At this time many smaller cities were allied to Croton. Shortly after the sack of Sybaris the disciples of Pythagoras were driven out, and a democracy was established in Croton. In the 4th and 3rd centuries BC it suffered successively from the attacks of Dionysius I of

Syracuse, who became its master for 12 years, of the Bruttii, of Agathocles of Syracuse, and even more from the two invasions of Pyrrhus, king of Epirus, in 280–278 and 275. In 277, between the periods of occupation by Pyrrhus, the Romans obtained possession of the city. Livy states that the city's walls had a length of 12 miles (19 km) but that after the wars with Pyrrhus about half the area between them had ceased to be inhabited. During the Second Punic War, Croton temporarily revolted from Rome after the Battle of Cannae in 216 BC.

The importance of the city in ancient times was due to its harbour, which, though not a good one, was the only port between Tarentum (Taranto) and Rhegium (Reggio di Calabria). The original settlement occupied the hill above the harbour and later became the acropolis. Croton was the seat of a famous medical school mentioned by Herodotus. On the Lacinian promontory was a famous temple of Hera Lacinia, of which only one column is standing. Additional remains were uncovered in excavations that began in 1955.

The town was included in the Kingdom of Naples until it was united with Italy in 1860. Modern Crotone is an agricultural centre and also has the most important industrial establishment in Calabria, including chemical plants and a zinc-smelting works. There are hydroelectric plants and sulfur mines nearby. Pop. (1988 est.) mun., 61,326.

croup, acute affliction of young children characterized by a harsh cough, hoarseness, and difficult breathing, most often caused by an infection of the upper airway in the region of the larynx (voice box). Some cases result from allergy or physical irritation of the larynx. The symptoms are caused by inflammation of the laryngeal membranes and spasms of the laryngeal muscles.

Viral infections are the most common cause of croup. Such infections are most prevalent among children under the age of three years, and they strike most frequently in late fall and winter. Generally, the onset of viral croup is preceded by the symptoms of the common cold for several days. Most victims can be treated at home with the inhalation of cool mist from an appropriate vaporizer. In cases of severe airway obstruction, hospitalization may be necessary.

Bacterial croup, also called epiglottitis, is a more serious condition. It generally strikes children between the ages of three and seven years. The onset is rapid, and the victim develops great difficulty in breathing and swallowing. These symptoms result from swelling of the epiglottis, which takes on a characteristic cherry-red appearance. Children with epiglottitis require prompt medical attention. An artificial airway must be opened, preferably by inserting a tube down the windpipe. Patients are given antibiotics, which generally relieve the inflammation within 24 to 72 hours.

Crousaz, Jean-Pierre de (b. April 13, 1663, Lausanne, Switz.—d. Feb. 22, 1750, Lausanne), Swiss theologian, philosopher, and controversialist whose greatest importance lies in his letters to a wide range of correspondents revealing the intellectual climate of his time.

He was professor in Lausanne from 1700 to 1724 (being twice rector of the university) and again from 1738 to 1749. In the interval, having left Switzerland as a result of a theological disagreement, he held a chair at Groningen, Neth., for two years and was tutor to Prince Frederick of Hesse-Kassel (1726–32). Crousaz wrote numerous mathematical and philosophical works. His *Traité du beau* (1714; "Treatise on Beauty") was an attempt to explain subjective differences in aesthetic outlooks. With the encouragement of Cardinal Fleury, he sought to refute the doctrines of the French philosopher Pierre Bayle and the German philosopher Gottfried Wilhelm Leibniz. His critique of Alexander Pope's *Essay on Man* was translated into English by



Crousaz, engraving
By courtesy of the Bibliotheque Nationale Suisse, Bern

Samuel Johnson (1742). His correspondence was unpublished, although about 2,000 letters had been located.

Crouse, Russel (American playwright): *see* Lindsay, Howard; and Crouse, Russel.

crouth (musical instrument): *see* crwth.

Crow, North American Plains Indian people of Siouan linguistic stock, historically affiliated with the Hidatsa (*q.v.*) of the upper Missouri River; they occupied the area around the Yellowstone River and its tributaries, particularly the valleys of the Powder, Wind, and Bighorn rivers. Probably lured by the trade in horses, the Crow broke with the Hidatsa and moved westward early in the 18th century. By 1740 they had emerged as middlemen engaged in the trading of horses, bows, shirts, and featherwork to the village Indians in return for guns and metal goods that they carried to the Shoshoni in Idaho. They were divided into three bands known as the Mountain, River, and Kicked-in-Their-Bellies; the last was most likely a recent offshoot from the Mountain band and was never fully independent.

Much of Crow life revolved around the buffalo and the horse. The former provided them with food, clothing, robes, tepee covers, sinew thread, containers, and shields. In Crow society, the processing and preparation of food, housing, and clothing were women's tasks. Warfare was carried on by men and was largely a matter of raiding for horses. For a man to be ranked as a chief, performance of four coups was required: (1) leading a war party without loss of life, (2) taking a tethered horse from an enemy camp, (3) striking an enemy with a coupstick, and (4) wresting a weapon from an enemy. One man from the chief class became the head of the camp.

A basic element in Crow religious life was the supernatural vision, induced by fasting in isolation, waiting, and tormenting the body with skewers. The man who attained a vision was "adopted" by a supernatural guardian who instructed him in gathering objects into a medicine bundle. He was permitted to sell part of his power to other men who had not received visions and to create replica bundles for them. The Crow grew tobacco ceremonially; according to myth, it had been given to them to overcome their enemies. Unlike other clubs and societies among the Crow, tobacco societies involved an entrance fee and an elaborate initiation rite; they were joined both by men and by their wives.

The Crow continually suffered losses from wars with the Blackfoot and Dakota tribes and sided with the whites in the Indian wars of the 1860s and '70s. In 1868 they accepted a reservation carved from former tribal lands in southern Montana. In the late 20th century they numbered about 5,000, many living off the reservation.

crow, any of several black birds belonging to the family Corvidae (order Passeriformes) that are smaller and less heavily billed than most ravens. They are named for their typical call: "caw" or "crah." More than 20 of the 30 species of the genus *Corvus* are known as crows, and the name has been widely borrowed.

The common crows are *C. brachyrhynchos* of North America and *C. corone* of Eurasia. The latter has two races (sometimes considered separate species): the carrion crow (*C. c. corone*) of western Europe and eastern Asia and the hooded crow (*C. c. cornix*), occupying the region between and occurring also in the northern British Isles. All crows are about 50 cm (20 inches) long and are coloured glossy black; the hooded crow has touches of gray. Other species include the house crow (*C. splendens*) of India to Malaysia (introduced in eastern Africa); the pied crow (*C. albus*), with white nape and breast, of tropical Africa; and the fish crow (*C. ossifragus*) of southeastern and central North America.

Crows are omnivorous and eat grain, berries, insects, carrion, and the eggs of other birds. The crow's habit of eating cultivated grains has made it very unpopular with farmers, who often try to kill the birds. Crows also eat many



Carrion crow (*Corvus corone corone*)
Eric Hosking

economically harmful insects, though. They feed chiefly on the ground, where they walk about sedately. Crows are gregarious, and at times they roost together in great numbers (tens of thousands), but most species do not nest in colonies. Each mating pair has its own nest of sticks and twigs, usually high up in a tree, in which are laid five or six greenish-to-olive eggs that have darker speckles. A crow may live 13 years in the wild and more than 20 years in captivity. Some pet crows "speak," and in the laboratory some have learned to count to three or four and to find food in boxes marked with symbols.

For birds of this name in other families, *see* currawong, or piping-crow; drongo, or king crow; kokako, or wattled crow; rockfowl, or bald crow.

crow-blackbird: *see* grackle.

crow-shrike: *see* currawong.

crow step (architecture): *see* corbie step.

crow-tit: *see* parrotbill.

crowberry, any of various plants of the family Empetraceae, particularly *Empetrum nigrum*, an evergreen shrub native to cool regions of North America, Asia, and Europe. The plant thrives in mountainous regions and rocky soil. It grows about 25 cm (10 inches) tall and is somewhat trailing in habit. The narrow, simple leaves are about 1 cm (0.4 inch) long; the sides curl backward until they meet. The solitary flowers are very small and purplish. The fruit, about 1 cm long, is black, berrylike, juicy, and edible but somewhat acid in taste.



Crowberry (*Empetrum nigrum*)
John Kohout from Root Resources—EB Inc

Local names of *E. nigrum* include black crowberry, crakeberry, crowpea, black-berried heath, and wire ling. In Canada the berries are sometimes called camerines.

Crowborough, parish, Wealden district, county of East Sussex, England, 40 mi (64 km) southeast of London. It serves as headquarters of its district. A hilltop town, it is situated on the highest of the wooded ridges that comprise The Weald (between 500 and 800 ft [150 and 240 m]). Located in a forest area where settlement is typically in small hamlets linked by a maze of narrow lanes, Crowborough has grown by the joining together of a number of these hamlets so that the present urban area is a diffuse, disjointed spread of houses and shops. Pop. (1971) 13,236.

Crowe, Sir Eyre (Alexander Barby Wichart) (b. July 30, 1864, Leipzig—d. April 28, 1925, Swanage, Dorset, Eng.), British diplomat who strongly urged an anti-German policy in the years before World War I.



Sir Eyre Crowe
By courtesy of Sibyl Crowe, St. Hilda's College, Oxford

Crowe was the third son of Sir Joseph Crowe, an art historian. He was educated in Germany and France and, when he entered the British foreign service in 1885, could claim to be trilingual. His subsequent career was spent almost entirely at Whitehall, and he never held a diplomatic post abroad, his ambition being to become head of the Foreign Office. He entered the British Foreign Office in 1885.

In January 1907 Crowe wrote a "Memorandum on the present state of British relations with France and Germany," directed to the foreign secretary Sir Edward Grey (afterward 1st Viscount Grey of Fallodon), on whom it made a strong impression. In the communication Crowe stated that Germany aimed at the domination of Europe, that concessions would only increase the German appetite for power, and that the entente with France must not be abandoned. He also asserted that favourable Anglo-German relations would best be strengthened by a forceful defense by Great Britain of her foreign interests.

Crowe, who was knighted in 1911, became assistant undersecretary of state for foreign affairs in 1912. On July 25, 1914, he urged a show of force by the British Navy to forestall war; when World War I began a few days later, he induced a reluctant government to seize German vessels in British ports. In 1915, despite his patent hostility toward Germany, he was attacked by the British "yellow press" for his German connections (his mother and wife were born German subjects).

In 1920, Crowe was appointed permanent under secretary of state for foreign affairs, a post that he held until his death. In 1919 he was one of the British plenipotentiaries at the Versailles Peace Conference, where his fluency in both French and German proved invaluable. In October 1924, in the absence of the prime minister (Ramsay MacDonald), he made the decision to publish the Zinoviev Letter (addressed to the Communist Party in Britain and advising on revolutionary procedures), which contributed to the defeat of the Labour Party in the parliamentary election shortly thereafter.

Crowfoot, Indian name SAHPO MUXIKA (b. *c.* 1836—d. April 24, 1890, Blackfoot Crossing, near Calgary, District of Alberta, Can.), head chief of the Blackfoot tribe of Indians and a strong advocate of peace and subservience to whites.

Crowfoot was only 13 when he took part in his first raid. He became a noted warrior and was appointed head chief of the Blackfoot. He tried to discourage tribal warfare, and he refused to join other Indians in attacks against the North West Mounted Police. The Canadian Pacific Railway pensioned him for keeping peace when survey parties attempted to cross western Canada in 1883. During the 1885 Northwest Rebellion—an uprising of Métis (persons of mixed European and Indian ancestry) and Indians against the Canadian government—Crowfoot refused to submit to heavy pressure from his tribe and his adopted son Poundmaker to join with the rebels. In 1866 he rescued Father Albert Lacombe from hostile Cree Indians in the Northwest Territories.

crowfoot (plant): *see* buttercup.

Crowland, parish and abbey, South Holland district, county of Lincolnshire, England. It lies in the low-lying Fens north of Peterborough. The first abbey, built 719–860 over the cell of the hermit Guthlac on an island in the then-unreclaimed marshes, was destroyed by the marauding Danes and rebuilt in the 10th century. Some Norman work survives, but the main period of building, in Perpendicular style, was between 1392 and 1469. The abbey was besieged by Parliamentary forces in 1643 during the English Civil War, and much of it subsequently fell into ruins. From the 17th century onward, the surrounding fens were drained and converted into rich arable land. In the parish are the remains of a unique triangular bridge constructed in the 14th century. Pop. (1971) 2,859.

Crowley, Robert (b. *c.* 1518, Gloucestershire, Eng.—d. June 18, 1588), English Puritan, social reformer, and Christian Socialist prominent in the vestiarian disputes (over the alleged "Romishness" of the vestments worn by Anglican clergy) of Elizabeth I's reign. His writings include *The Way to Wealth* (1550), in which he attributed the government's failure to stop enclosure of common land to the organized resistance of the rich. Other works include *An informacion and Peticion agaynst the oppressours of the pore Commons of this Realme* (1548), remarkable for its attack on the "more than Turkish tyranny" of the landlords and capitalists of that day; *A briefe discourse against the outwarde apparell and Ministring garmentes of the popishe church* (1566); and three works in verse.

Crowley, who was educated at, and later fellow of, Magdalen College, Oxford, also published tracts from his own printing office but abandoned printing when ordained in 1551. During the reign of the Catholic queen Mary I, he was in exile at Frankfurt am Main. After Elizabeth I's accession he was incumbent of various London parishes, though in 1566 his objection to surplices (he forbade his choir to wear them) caused his deprivation and imprisonment.

crown, from the earliest times, a distinctive head ornament that has served as a reward of prowess and a sign of honour and dominion. Athletes, poets, and successful warriors were awarded wreaths of different forms in Classical times, and the chief of a barbarian tribe customarily wore a distinctive helmet. In the earliest English coronation ritual, dating back more than 1,000 years, the king was invested



Royal crown of Denmark, a helmet form crown of gold, enamel, and precious stones, *c.* 1670; in the collection of Rosenborg Castle, Copenhagen
By courtesy of the Royal Collection at Rosenborg Castle, Copenhagen

with a helmet instead of a crown, and a helmet with an ornamental frame surmounts the unwarlike head of Edward the Confessor on his great seal.

Another crown form in England and abroad followed the principle of the wreath and might consist of a string of jewels tied at the back with a ribbon or set in a rigid band of gold. When this type of chaplet was adopted by the nobility in general, the royal crown was distinguished by a number of ornaments upstanding from its rim; by the 15th century the helmet form was incorporated by the addition of one or more arches. These rose from the rim and, crossing in the centre, supported a finial—usually a ball and cross but in France, from the time of Louis XIV, a fleur-de-lis.

Many of the early European crowns were made in sections hinged together by long pins, which enabled them to be taken apart for transport or storage and, when worn, to adapt themselves to the shape and size of the wearer's head. A circlet was made for Queen Victoria on the same principle, with its sections hinged but not detachable.

The practice of grounding the arches not on the rim of the circlet but on the tops of the surrounding ornaments began in the 17th century. This led to a change in shape and a flattening or depression in the centre that later was explained away as having a royal or imperial significance. Many crowns are to be found in continental cathedrals, museums, and royal treasuries. Some are associated with early figures of history or romance; others—*e.g.*, the steel crown of Romania—are comparatively modern. The only European states in which the crown is still imposed in the course of a religious ceremony of consecration are Great Britain and the Vatican.

Crown Court, a court system sitting in England and Wales and dealing largely with criminal cases. Created under the Courts Act of 1971, the Crown Court replaced the Crown Court of Liverpool, the Crown Court

of Manchester, the Central Criminal Court in London (the Old Bailey), and all the other old assize and quarter sessions courts. From 1966 to 1969 a royal commission chaired by Richard Beeching, Baron Beeching, studied the feasibility of converting all the existing assizes and quarter sessions courts into a system of Crown Courts to meet the growing case loads across the nation, and the commission's recommendations became the Courts Act of 1971.

The Crown Court hears trials on indictment, as well as sentencings and appeals from the magistrates' courts. There are six court circuits: southeastern (with London as the administrative centre); Wales and Chester (with Cardiff as the centre); western (Bristol); midland and Oxford (Birmingham); northeastern (Leeds); and northern (Manchester). The Crown Court is governed under the directives of the lord chief justice, with the agreement of the lord chancellor.

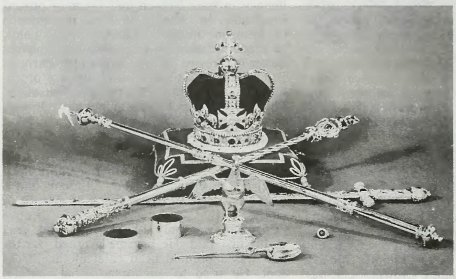
crown gall, disease of plants caused by the bacterium *Agrobacterium tumefaciens.* Thousands of plant species are susceptible; they include especially rose, grape, pome and stone fruits, shade and nut trees, many shrubs and vines, and perennial garden plants. Symptoms include roundish, rough-surfaced galls, several inches or more in diameter, usually at or near the soil line, graft or bud union, or on roots and lower stems. The galls, at first cream coloured or greenish, later turn brown or black. As the disease progresses, plants lose vigour and may eventually die.

Crown gall can be avoided by using nursery stock free of suspicious bumps near the crown, former soil line, or graft union; practicing five-year rotation or avoiding replanting for that period; removing severely infected plants (including as many roots as possible); protecting against injury; keeping down weeds; controlling root-chewing insects and nematodes; cutting away large galls on trees, and disinfecting the wounds.

crown glass, handmade glass of soda-lime composition for domestic glazing or optical uses. The technique of crown glass remained standard from the earliest times: a bubble of glass, blown into a pear shape and flattened, was transferred to the glassmaker's pontil (a solid iron rod), reheated and rotated at speed, until centrifugal force formed a large circular plate of up to 60 inches in diameter. The finished "table" of glass was thin, lustrous, highly polished (by "fire-polish"), and had concentric ripple lines, the result of spinning; crown glass was slightly convex, and in the centre of the crown was the bull's eye, a thickened part where the pontil was attached. This was often cut out as a defect, but later it came to be prized as evidence of antiquity. Nevertheless, and despite the availability of cheaper cylinder glass (cast and rolled glass had been invented in the 17th century), crown glass was particularly popular for its superior quality and clarity. The crown process, which may have been Syrian in origin, was in use in Europe since at least the 14th century, when the industry was centred in Normandy, where a few families of glassblowers monopolized the trade and enjoyed a kind of aristocratic status. From about the mid-17th century the crown glass process was gradually replaced by easier methods of manufacturing larger glass sheets. Window glass of note, however, was made by this method in the U.S. by the Boston Crown Glass Company from 1793 to about 1827.

Crown glass has optical properties that complement those of the denser flint glass when the two kinds are used together to form lenses corrected for chromatic aberration. Special ingredients may be added to crown glass to achieve particular optical qualities.

crown jewels, royal ornaments used in the actual ceremony of consecration, and the formal ensigns of monarchy worn or carried on occasions of state, as well as the collections of rich personal jewelry brought together by various European sovereigns as valuable assets not of their individual estates but of the offices they filled and the royal houses to which they belonged. The practice is not yet obsolete, notably in England with the personal possessions of the late queen Mary and of Queen Victoria. The term is one that can lead to confusion, as with the crown jewels of Ireland, which were not connected with any coronation ceremony and included no crown. Rather, they comprised a jewelled star of the Order of St. Patrick and a diamond brooch and five gold collars of that order, all of which were crown property and were stolen from Dublin Castle in 1907.



The British Crown Jewels
(From top) St. Edward's Crown, Royal Sceptre with the Star of Africa diamond, Sword of Offering, coronation ring, anointing spoon, ampulla, coronation bracelets, and the Sceptre or Rod of Equity and Mercy, 12th–20th century; in the Tower of London Treasury
By permission of the Controller of Her Majesty's Stationery Office, Crown copyright

Many such collections of hereditary royal jewelry have been assembled, confiscated, and dispersed in the last few centuries, but certain items of particular splendour have been recorded and some even illustrated, *e.g.,* watercolour drawings on vellum of four magnificent jewelled ornaments given by Edward IV of England in 1475 to Charles the Bold, duke of Burgundy, on the occasion of the Duke's marriage to Edward's sister Margaret. Further, a 17th-century inventory of the abbey treasures of Saint-Denis in France has engraved illustrations of many valuable objects that were dispersed through sale or theft during the French Revolutionary period. Napoleon I traced and recovered only some of the missing objects, but in 1887 most of the collection was sold by public auction. Similarly, the magnificent collection of crown jewels, mostly diamonds, owned by the tsars of Russia was catalogued and illustrated in 1926, when the Soviet government proposed to sell it in its entirety; some of the stones found their way to a London sales room, but the scheme as a whole was abandoned, and the crown jewels are displayed in the Kremlin in Moscow. Diamond brooches, badges, necklaces, orders, tiaras, sword-hilts, and coronets also were acquired by the royal houses of Saxony, Bavaria, and Portugal, in particular, and are still to be seen in Dresden, Munich, and Lisbon, respectively.

crown land, in Great Britain, land owned by the crown, the income from which has been, since the reign of George III (1760–1820), surrendered to Parliament in return for a fixed Civil List, an agreed sum provided annually for the maintenance of the sovereign's expenses. In Anglo-Saxon times the king's personal lands were differentiated from those held by the crown as such, but after the Norman Conquest (1066) they became merged as the estates of the crown, over which he had full power of disposal. Because the king was the feudal overlord, his lands were increased from time to time by estates forfeited by convicted rebels or escheating from lack of heirs. Management of crown lands is now entrusted to the commissioners of crown lands, who have statutory powers with regard to leasing, selling, or exchanging estates.

Crown of Charlemagne: *see* Imperial Crown.

crown of thorns, also called CHRIST THORN (*Euphorbia splendens* or *E. milii*), thorny vinelike plant of the spurge family (Euphorbiaceae), popular as a houseplant and in the tropics as a garden shrub. Flowering is year-round, but most plentiful in wintertime in the Northern Hemisphere. The sprawling, branching, vinelike stems attain lengths of more than two metres (seven feet). Native to Madagascar, crown of thorns has stout, gray spines, oval leaves that drop as they age, and paired clusters of small flowers surrounded by two light-red bracts (leaflike structures attached just below flowers). Various forms are available with yellow or deep-red bracts.



Crown of thorns (*Euphorbia splendens*)
Sven Samelius

Crown of Thorns (Christianity): *see* Thorns, Crown of.

crown-of-thorns starfish (*Acanthaster planci*), reddish and heavy-spined species of the phylum Echinodermata. It has from 12 to 19 arms, is often 45 centimetres (18 inches)



Crown-of-thorns starfish
A. Giddings—Bruce Coleman Inc./EB Inc

across, and feeds on coral polyps. Beginning about 1963 it increased enormously on Australia's Great Barrier Reef. The population explosion was attributed to the decimation of its chief predator, a large marine snail, the Pacific triton (*Charonia tritonis*), by shell collectors. Thereafter, the starfish multiplied throughout the southern Pacific (to Hawaii about 1970), seemingly threatening the destruction of coral reefs and islands.

Concern among scientists and environmentalists prompted an attempt to control the animals' proliferation; many were killed by injection with formaldehyde, while others were simply removed from the reefs and destroyed. In the late 1970s, however, new research data indicated that similar expansions, or blooms, had occurred previously, followed by periods of decline. Thus it seemed likely that the sudden growth of the starfish population during the 1960s represented a phase in the organism's natural cycle.

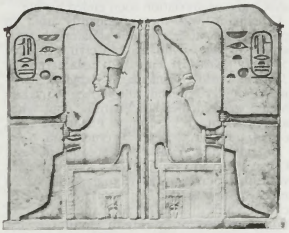
Crown Point, town (township), Essex county, northeastern New York, U.S., on Lake Champlain, just north of Ticonderoga. Putnam's Creek, named for Israel Putnam, of American Revolutionary War fame, flows through the town. In 1609 the French explorer Samuel de Champlain fought the Iroquois Indians there and began the enmity between the Five (later Six) Nations and the French. Dutch and English traders later travelled in the vicinity. In 1731 the French constructed a stone fort (Fort-Saint-Frédéric) on the peninsula, which they called Point à la Couronne (Crown Point). Despite English–Colonial expeditions sent against it, Crown Point remained in French hands until 1759, when it was occupied by forces commanded by Sir Jeffrey (later Lord) Amherst, who began the construction near old Fort-Saint-Frédéric of a larger fort, which was garrisoned but never completed. At the outbreak of the American Revolution the fort was captured by Col. Seth Warner and a force of Green Mountain Boys. It remained in American hands except for a brief period in 1777, when it was occupied by a detachment of Gen. John Burgoyne's invading British Army. The ruined forts now comprise a state historic site. Champlain Memorial Lighthouse (1909) is 7½ mi northeast.

The town is now a summer resort with some lumber-based industries. Inc. 1868. Pop. (1990) 1,963.

crown vetch (*Coronilla varia*), vigorous trailing plant, of the pea family (Fabaceae), native to the Mediterranean region but widely grown in temperate areas as a ground cover. It has fernlike leaves and clusters of white to pink flowers. The sturdy roots are useful in binding the soil of steep slopes and roadside embankments. As a legume, crown vetch draws nitrogen from the air, trapping it in the roots, and thus improves soil fertility.

Crown vetch dies back to the crown each fall in cold areas, resuming growth in spring. Quick growth of the plant is encouraged by cutting it back in the fall or early spring. The varieties *C. varia* 'Penngift' and 'Emerald' are dense, deep-green plants with large attractive flower clusters.

Crowns of Egypt, part of the sovereign emblem of the kings of ancient Egypt. The crown of Upper Egypt was white and cone-shaped, with a model of the uraeus serpent in front, while that of Lower Egypt was red and shaped more like a cap with two projections—a tall straight one in back and a spiral one in front. Often these two crowns were worn together, forming the Double Crown and symbolizing the unification of both parts of Egypt under the divine king.



(Left) the Crown of Lower Egypt, (right) the Crown of Upper Egypt, both worn by King Sesostris III, relief on door lintels at Madāmūd; in the Egyptian Museum, Cairo
Hirmer Fotoarchiv, München

Crowsnest Pass, pass in the Canadian Rockies at the Alberta–British Columbia border, Canada, 7 mi (11 km) south of Crowsnest Mountain. One of the lower passes of the Continental Divide, it has an elevation of 4,449 ft (1,356 m). Noted by Capt. John Palliser's expedition in 1858, it was used for many years by the North West Mounted Police. In return for a federal subsidy to build a line through the pass, the Canadian Pacific Railway signed the Crow's Nest Pass Agreement (1897). This route reduced freight rates on grain shipped east to the lake ports and on certain goods shipped west. The agreement, modified in 1925 to reduce rates on grain shipped in both directions, boosted Vancouver as a grain-shipping port.

Crowther, Samuel (Adjai) (b. *c.* 1809, Oshogbo, Yoruba region—d. Dec. 31, 1891, Lagos, Southern Nigeria), the first African to be ordained by the Church Missionary Society, who was in 1864 consecrated bishop of the Niger territory.



Crowther, charcoal drawing by an unknown artist
The Mansell Collection

Sold into slavery at the age of 12, Crowther was rescued in midpassage by a British cruiser and landed at Sierra Leone, where he was educated in a mission school and baptized. In 1842 he went to the Church Missionary College in London, and received holy orders. Back in the Yoruba country, Crowther worked among his people as a missionary from 1843 to 1851. After accompanying several expeditions to the Niger, he devoted the rest of his life to administrative and evangelistic duties in his newly created diocese of the Niger territories.

Croydon, outer borough of Greater London, occupying 33 sq mi (87 sq km) on the southern edge of the metropolis. It was established in 1965 by amalgamation of the former county borough of Croydon and the adjacent district of Coulsdon and Purley.

The manor of Croydon, where the River Wandle rises at the foot of the chalk hills, was presented by William I the Conqueror to Archbishop Lanfranc, founder of the archiepiscopal palace (now part of a girls' school) that, from 1086 to 1758, was a summer residence of the archbishops of Canterbury. From 1808 to 1896 they lived nearby at Addington Palace, now the Royal College of Church Music. Six archbishops of Canterbury are buried in Croydon's parish Church of St. John, including John Whitgift, who founded the school and almshouses (1596–99) that bear his name.

Croydon was an old Surrey market town on the London–Brighton road before being engulfed by the suburban spread of south London that followed the development of modern transport. It has exceptionally good communication with central London. Since 1956 its central area adjoining the main suburban railway stations has been transformed by development of multi-story office blocks, a large shopping precinct, and a cultural centre (including technical college, concert hall, and theatre). This area comprises England's largest concentration of office space outside central London, and Croydon has become London's major shopping and cultural centre outside the West End. Although mainly residential in character, the borough has extensive light industries, especially engineering and electronics. The Surrey Iron Railway (1803) between Croydon and Wandsworth was the first public goods railway (with horse-drawn wagons) and was followed in 1809 by the Croydon Canal and, partly on the line of the latter, by the London and Croydon railway in 1839. Croydon Aerodrome, established in 1915 (closed in 1959), was the predecessor of Heathrow as London's civil airport. Pop. (1982 est.) 321,500.

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Crozet Islands, archipelago in the southern Indian Ocean, 1,500 mi (2,400 km) off the coast of Antarctica, administratively a part of Terres Australes et Antarctiques Françaises (*q.v.*). It consists of several small uninhabited islands of volcanic origin. Discovered by Capt. Nicolas-Thomas Marion-Dufresne in 1772, the islands cover an area of 195 sq mi (505 sq km). Rising to 6,560 ft (2,000 m) on the Île de la Possession, they are rugged, with steep cliffs, and have been the scene of many shipwrecks. They have been designated a national conservation area.

crozier (insignia of bishops): *see* crosier.

Cruach Phádraig (Ireland): *see* Croagh Patrick.

Crucé, Émeric (b. *c.* 1590—d. 1648), French writer, perhaps a monk, pioneer advocate of international arbitration. Crucé's principal

work, *Le Nouveau Cynée* (1623; *The New Cyneas of Émeric Crucé*, 1909), in which he represented himself in the peacemaking role of Cineas at the court of King Pyrrhus (319–272 BC) of the Molossians, called for a permanent assembly of princes or their delegates to arbitrate international disputes. As envisioned by Crucé, such a body would rely on moral pressure, employing sanctions only rarely, to enforce settlements. It would include the nations of Asia and Africa as well as those of Europe. Crucé was also an early proponent of free trade.

Cruces, city, east central Cienfuegos province, central Cuba. Cruces is a railroad junction and commercial centre for the surrounding agricultural and pastoral lands. The area is known primarily for sugarcane, although large quantities of tobacco are also produced there. The city's principal industry is sugar refining. There are mineral springs nearby. Pop. (1981 prelim.) 20,324.

crucible, pot of clay or other refractory material. Used from ancient times as a container for melting or testing metals, crucibles were probably so named from the Latin word *crux*, "cross" or "trial." Modern crucibles may be small laboratory utensils for conducting high-temperature chemical reactions and analyses or large industrial vessels for melting and calcining metal and ore; they may be made of clay, graphite, porcelain, or a relatively infusible metal.

crucible furnace, metallurgical furnace consisting essentially of a pot of refractory material that can be sealed. Crucibles of graphite or of high-grade fire clay were formerly used in the steel industry, heated directly by fire; modern high-quality steel is produced by refining in air-evacuated crucibles heated by induction. Metals such as titanium, which must be protected from air while hot, are melted and annealed in hermetically sealed crucibles.

crucible process, technique for producing fine or tool steel. The process was invented in Britain about 1740 by Benjamin Huntsman, who heated small pieces of carbon steel in a closed fireclay crucible placed in a coke fire. The temperature he was able to achieve (2,900° F, or 1,600° C) was high enough to permit melting steel for the first time, producing a homogeneous metal of uniform composition that he used to manufacture watch and clock springs. After 1870 the Siemens regenerative gas furnace replaced the coke-fire furnace; it produced even higher temperatures. The Siemens furnace had a number of combustion holes, each holding several crucibles, and heated as many as 100 crucibles at a time. All high-quality tool steel and high-speed steel was long made by the crucible process, but in the 20th century the electric furnace has replaced it in countries in which electric power is cheap.

Cruciferae (plant family): *see* Brassicaceae.

crucifixion, an important method of capital punishment, particularly among the Persians, Seleucids, Jews, Carthaginians, and Romans from about the 6th century BC to the 4th century AD. Constantine the Great, the first Christian emperor, abolished it in the Roman Empire in AD 337, out of veneration for Jesus Christ, the most famous victim of crucifixion.

Punishment. There were various methods of performing the execution. Usually, the condemned man, after being whipped, or "scourged," dragged the crossbeam of his cross to the place of punishment, where the upright shaft was already fixed in the ground. Stripped of his clothing either then or earlier at his scourging, he was bound fast with outstretched arms to the crossbeam or nailed firmly to it through the wrists. The crossbeam was then raised high against the upright shaft and made fast to it about 9 to 12 feet (approximately 3 metres) from the ground. Next, the feet were tightly bound or nailed to the upright shaft. A ledge inserted about halfway up the upright shaft gave some support to the body; evidence for a similar ledge for the feet is rare and late. Over the criminal's head was placed a notice stating his name and his crime. Death, apparently caused by exhaustion or by heart failure, could be hastened by shattering the legs (*crurifragium*) with an iron club, so that shock and asphyxiation soon ended his life.

Crucifixion was most frequently used to punish political or religious agitators, pirates, slaves, or those who had no civil rights. In 519 BC Darius I, king of Persia, crucified 3,000 political opponents in Babylon; in 88 BC Alexander Jannaeus, the Judaean king and high priest, crucified 800 Pharisaic opponents; and in about AD 32 Pontius Pilate had Jesus of Nazareth put to death by crucifixion.

Crucifixion of Jesus. The account of Jesus Christ's Crucifixion in the Gospels begins with his scourging. The Roman soldiers then mocked him as the "King of the Jews" by clothing him in a purple robe and a crown of thorns and led him slowly to Mount Calvary, or Golgotha; one Simon of Cyrene was allowed to aid him in carrying the cross. At the place of execution he was stripped and then nailed to the cross, at least nailed by his hands; and above him at the top of the cross was placed the condemnatory inscription stating his crime of professing to be King of the Jews. (The Gospels differ slightly in the wording but agree that the inscription was in "Hebrew," or Aramaic, as well as Latin and Greek.) On the cross Jesus hung for three hours of agony. The soldiers divided his garments and cast lots for his seamless robe; various onlookers taunted him. Crucified on either side of Jesus were two convicted thieves, whom the soldiers dispatched at eventide by breaking their legs. The soldiers found Jesus already dead; but, to be certain, one of them drove a spear into his side, from which poured blood and water. He was taken down before sunset (in deference to Jewish custom) and buried in a rock-hewn tomb.

Crucifixion in art. The representation of Christ on the cross has been an important subject of Western art since the early Middle Ages. Concerned primarily with simple symbolic affirmations of salvation and eternal life, and repelled by the ignominy of the punishment, the early Christians did not represent the Crucifixion realistically before the 5th century; instead, the event was symbolized first by a lamb and, after the official recognition of Christianity by the Roman state in the early 4th century, by a jewelled cross. By the 6th century, however, representations of the Crucifixion became numerous as a result of current church efforts to combat a heresy that Christ's nature was not dual—human and divine—but simply divine and therefore invulnerable. These early Crucifixions were nevertheless triumphant images, showing Christ alive, with open eyes and no trace of suffering, victorious over death. In the 9th century, Byzantine art began to show a dead Christ, with closed eyes, reflecting current concern with the mystery of his death and the nature of the incarnation. This version was adopted in the West in the 13th century with an ever increasing emphasis on his suffering, in accordance with the mysticism of the period.

Parallel to this development in the representation of Christ himself was the growth of an increasingly complex iconography involving other elements traditionally included in the scene. The principal mourners, the Virgin and St. John the Apostle, are frequently the only other figures included in the composition. In various expanded versions of the theme, however, there are several other pairs of figures, both historical and symbolic, that traditionally appear to the right and left of the cross: the two thieves, one repentant, who were crucified with Christ; the centurion who pierced Christ's side with a lance (and afterward declared him to be the Son of God); and the soldier who offered him vinegar on a sponge; small personifications of the Sun and Moon, which were eclipsed at the Crucifixion; and allegorical figures of the church and the synagogue. Other figures might include the soldiers who cast lots for Christ's garments and St. Mary Magdalene.

With the growth of devotional art at the end of the Middle Ages, depictions of the Crucifixion became vehicles for the portrayal of Christ's sufferings; calculated to inspire piety in the viewer, this spectacle became the main concern of artists, who often depicted the scene with gruesome realism and sometimes included the horror of a mass of jeering spectators. Some of the Crucifixions from this period include the figure of John the Baptist, pointing to Christ and his sacrifice as he had earlier heralded his coming. Renaissance art restored a calm idealization to the scene, however, which was preserved, with a more overt expression of emotion, in the Baroque period. Like most of Christian religious art, the theme of the Crucifixion suffered a decline after the



"The Crucifixion," painting by Andrea Mantegna, 1456–59; in the Louvre, Paris
Giraudon—Art Resource/EB Inc.

17th century; some 20th-century artists, however, have created highly individual interpretations of the subject.

crucifixion thorn, also called CORONA DE JESUS (Spanish: "crown of Jesus"), either of two nearly leafless, very spiny shrubs or small trees of the southwestern North American deserts. *Koeberlinia spinosa,* the only species of the family Koeberliniaceae, with green thorns at



Crucifixion thorn (*Koeberlinia spinosa*)
Walter Dawn

right angles to the branches, produces small, four-petaled, greenish flowers and clusters of black berries. *Canotia holacantha,* of indeterminate family relationship, has ascending green spines and rushlike green branches; it bears five-petaled flowers and oval, brown, one- or two-seeded capsules. Also called Mojave thorn, *Canotia* contains highly flammable resins in its stems. Both species bear scalelike leaves.

Other similar shrubs of the same area that also are called crucifixion thorn or corona de Jesus are *Castela emoryi* of the family Simaroubaceae and *Dalea spinosa,* a blue-flowered shrub of the family Fabaceae.

Among the spiny or thorny plants of Palestine are Christ's-thorn (*Paliurus spina-christi*) and the jujube (*Ziziphus jujuba*), both of the buckthorn family (Rhamnaceae).

crude oil, mixture of comparatively volatile liquid hydrocarbons (compounds composed mainly of hydrogen and carbon with some nitrogen, sulfur, and oxygen) that occurs in the Earth's crust and is extracted for use as fuel and various petroleum products. Because crude oil is a mixture of widely varying constituents and proportions, its physical properties also vary widely. For example, the specific gravity, as measured on the American Petroleum Institute (API) gravity scale, may range from 10° to more than 60° and the colour from colourless to black. Crude oil occurs underground, at various pressures from tens to hundreds of kilograms per square centimetre, depending on the depth. Because of the pressure, it contains considerable natural gas in solution. The oil underground is much more fluid than it is on the surface, because the elevated temperatures there (on the average, the temperature rises 1° C for every 33 m [108 feet] of depth) decrease the viscosity.

Cruden Bay, village on the North Sea coast of Scotland, in Banff and Buchan district, Grampian region. It is situated at the head of Cruden Bay and is overlooked by Slains Castle (1664). The Bullers of Buchan (2 miles [3 km] north) is a famous roofless cave, some 200 feet (60 m) high and 50 feet (15 m) wide. Cruden Bay is now a landfall terminal for North Sea Oil, which became operational in 1975, when crude oil from the Forties field was pumped ashore. From Cruden Bay the oil is pumped via a land pipeline to a refinery at Grangemouth. Pop. (1981) 1,453.

Cruelty, Theatre of, project for an experimental theatre that was proposed by the French poet, actor, and theorist Antonin Artaud and that became a major influence on avant-garde 20th-century theatre. Artaud, influenced by Symbolism and Surrealism, along with Roger Vitrac and Robert Aron founded the Théâtre Alfred Jarry in 1926; they presented four programs before disbanding in 1929. Between 1931 and 1936 Artaud formulated a theory for what he called a Theatre of Cruelty in a series of essays published in the *Nouvelle Revue Française* and collected in 1938 as *Le Théâtre et son double* (*The Theatre and Its Double*).

Artaud believed that civilization had turned man into a sick and repressed creature and that the true function of the theatre was to rid man of these repressions and liberate his instinctual energy. He proposed removing the barrier of the stage between performers and audience and producing mythic spectacles that would include verbal incantations, groans and screams, pulsating lighting effects, and oversized stage puppets and props. Although only one of Artaud's plays, *Les Cenci* (1935), based on works by Percy Bysshe Shelley and Stendhal, was ever produced to illustrate these theories, his ideas influenced the productions of Jean-Louis Barrault, Jerzy Grotowski, Jean Vilar, and The Living Theatre as well as the work of such playwrights as Arthur Adamov, Jean Genet, and Jacques Audiberti.

cruelty to animals: *see* animals, cruelty to.

Crüger, Johannes (b. April 9, 1598, Gross-Breesen, near Guben, Lower Lusatia [Germany]—d. Feb. 23, 1663, Berlin), German composer and theorist noted for his compilations and arrangements of several important choral collections, the best-known being *Praxis pietatis melica* (earliest extant edition, 1647), which was reprinted in numerous later editions. Crüger also contributed many original chorale melodies to these collections, including *Jesu, meine Freude; Nun danket alle Gott; Herzliebster Jesu, was hast du verbrochen;* and other well-known chorales. His most influential theoretical work was *Synopsis musica* (1630, enlarged 1654). From 1622 until his death he held the post of kantor at the Nikolai Church, in Berlin.

Cruikshank, George (b. Sept. 27, 1792, London, Eng.—d. Feb. 1, 1878, London), English artist, caricaturist, and illustrator who, beginning his career with satirical political cartoons and later illustrating topical and children's books, became one of the most prolific and popular masters of his art.

His father was Isaac Cruikshank (1756?–1811), a popular illustrator and caricaturist. In 1811, when George was still in his teens, he gained popular success with a series of political caricatures that he created for the periodical *The Scourge, a Monthly Expositor of Imposture and Folly.* This publication lasted until 1816, during which time Cruikshank came to rival James Gillray, the leading English caricaturist of the preceding generation. For the next 10 years Cruikshank satirized with fine irreverence the political policies of the Tories and Whigs.



Cruikshank's "Mr. Bumble and Mrs. Corney," illustration for *Oliver Twist* by Charles Dickens, 1838
Mary Evans Picture Library

Although Cruikshank continued to publish political cartoons in periodicals and separately until about 1825, he began to do book illustrations as well in 1820. In these he showed his more genial side. It is estimated that he illustrated more than 850 books, and he was one of the first artists to provide humorous, spirited illustrations in books for children. Perhaps his most famous book illustrations were for the novelist Charles Dickens in the latter's *Sketches by "Boz"* (1836–37) and *Oliver Twist* (1838). Cruikshank published a number of books himself, notably his serial *The Comic Almanack* (1835–53). In the late 1840s he became an enthusiastic propagandist for temperance, publishing a series of eight plates entitled *The Bottle* (1847) and its sequel, eight plates of *The Drunkard's Children* (1848). Between 1860 and 1863 he painted a huge canvas illustrating "The Worship of Bacchus."

cruise missile, type of low-flying strategic guided missile. The German V-1 missile used in World War II was a precursor of the cruise missile, which was developed by the United States and the Soviet Union in the 1960s and '70s. Capable of carrying either a nuclear or a conventional warhead, the cruise missile was designed to have a very low radar cross section and to hug the ground while traveling at a relatively slow speed to its target.

Three main versions of the cruise missile were being manufactured in the United States during the mid-1980s. All were single-stage, turbofan jet-propelled missiles with a cruising speed of 885 km per hour (550 miles per hour) and weighed from 1,200 to 1,800 kg (2,700 to 3,900 pounds) each. The missiles were guided by an inertial navigation system that was updated during flight by a technique called Tercom (terrain contour matching), using contour maps stored in the system's computerized memory. The air-launched cruise missile (ALCM) had a length of 6.3 m (20.7 feet); it attained a range of 2,500 km (1,500 miles). It was designed for deployment on the B-52 bomber. The Tomahawk sea-launched cruise missile (SLCM) and the Tomahawk ground-launched cruise missile (GLCM) had a length of 6.4 m (21 feet), a diameter of 53 cm (21 inches), and a range of 2,500 km (1,550 miles).

The Soviet Union also produced a series of sea-, air-, and ground-launched cruise missiles. It is thought that Soviet cruise missiles had a length of about 7 m (23 feet) and a range of about 3,000 km (1,860 miles); the power plant was probably a turbojet.

cruiser, warship built for high speed and great cruising radius, smaller than a battleship but larger than a destroyer.

The word cruiser was applied originally to frigates of the sailing era, which, being smaller and faster than ships of the line, scouted for enemy fleets and cruised the seas hunting enemy convoys. As the designation for a specific type of warship, cruiser did not become current until about 1880, when navies had settled on iron-hulled ships powered solely by steam. Cruisers became the frigates of the steam era.

By about 1900, cruisers were of two principal kinds; protected cruisers had steel armour plating only on their decks, while armoured

cruisers also had armour extending down the sides of the hull. In the decades before World War I, armoured cruisers were eclipsed by cruisers as large as battleships (displacing up to 20,000 tons) and carrying dreadnought-style armament of big guns of uniform calibre. These so-called battle cruisers achieved greater speed—about 25 knots—by limiting the thickness of their armour. At the Battle of the Falkland Islands in December 1914, the advantages of speed and big guns were demonstrated when two British battle cruisers destroyed two German armoured cruisers. But the weakness of light armour became apparent at the Battle of Jutland in 1916, when Britain lost three battle cruisers to heavy German battleships.

The Washington Treaty of 1922 limited cruisers to 10,000 tons, but many nations violated the treaty even before it was abandoned shortly before World War II. By then, cruisers had been deprived of their scouting functions by naval aircraft, and submarines had largely usurped their role as convoy raiders. During the war they served mostly as floating batteries for amphibious assaults and as part of air-defense screens protecting aircraft-carrier task forces. For this latter role, special antiaircraft cruisers were built, carrying as main armament about a dozen rapid-fire guns of only four to five inches.

After the war gun armament was replaced by guided missiles. U.S. cruisers, which carried surface-to-air missiles, became the first line in a fleet's air-defense screen, while Soviet cruisers carried long-range antiship missiles and retained some of the ship-killing functions of earlier cruisers. A modern guided-missile cruiser typically has a length of about 600 feet (about 180 m), a displacement of 7,000 to 10,000 tons, a top speed of over 30 knots, and a crew of about 500.

Another important postwar development has been nuclear propulsion, which has given some cruisers virtually unlimited range.

Crumb, George (Henry) (b. Oct. 24, 1929, Charleston, W.Va., U.S.), American composer known for his innovative techniques in the use of vivid sonorities obtained from an enormous range of instrumental and vocal effects, such as hissing, whispering, tongue clicking, and shouting at specified points in the composition. Crumb received many awards and grants and won the Pulitzer Prize in 1968 for his orchestral *Echoes of Time and the River.*

Most of his vocal music consists of settings of poetry by Federico García Lorca, such as the song cycle *Ancient Voices of Children* (1970). His other works include *Black Angels* (1970), for electric string quartet; *Star-Child* (1977), a huge choral and orchestral composition that requires the use of four conductors; *Celestial Mechanics, Makrokosmos IV* (1978); and *Apparition* (1980). Crumb taught at the University of Colorado (1959–64) and, from 1965, at the University of Pennsylvania (from 1983, Annenberg professor).

crumhorn, also spelled KRUMMHORN (from Middle English *crump:* "crooked"), double-reed wind instrument that flourished between the 15th century and about 1650. It consists of a small boxwood pipe of cylindrical bore, curved upward at the lower end and pierced with finger holes like those of a recorder. Its reed is enclosed in a wooden cap with a blowing orifice in the top. The tone is reedy and nasal. Crumhorns were built in families, from great bass to sopranino, each instrument having a compass of a ninth. Their manufacture was resumed in the 20th century.

Crus, Lucius Cornelius Lentulus: *see* Lentulus Crus, Lucius Cornelius.

crusade, any of a series of European military expeditions, often counted at eight although numbering many more than that, which were directed against Muslim control of Jerusalem and the Christian shrine of the Holy Sepulchre and that took place from 1095 to 1270.

A brief treatment of the crusades follows. For full treatment, *see* MACROPAEDIA: Crusades.

During the 11th century, feudal Europe underwent revivals of both expansive commerce and religion. Pilgrimages to Jerusalem and other holy places in the East became increasingly popular. At the same time, the Byzantine Empire, with its capital at Constantinople (now Istanbul), was being threatened by the rising power of the Seljuq Turks. The Byzantine emperor Alexius I Comnenus turned to Europe, specifically to the pope of the Roman church, for aid.

At the church council meeting at Clermont in 1095, Pope Urban II called for a Christian army to aid Alexius and to recapture the Holy Sepulchre. Armies were raised by such knights as Hugh of Vermandois, Bohemond, Raymond of Saint-Gilles, and Robert of Flanders. Smaller, generally ill-organized bands were collected by sundry lesser warriors, adventurers, and zealots. Over the next two years they assembled in and around Constantinople and prepared to march south across what today is Turkey. After a long siege they captured the heavily fortified town of Antioch in 1098. On July 15, 1099, Jerusalem fell to the crusaders, and its Muslim and Jewish inhabitants were slaughtered. In the following decades the crusaders gained control of a narrow strip of the Palestine coast and established the kingdom of Jerusalem, the county of Tripoli, the principality of Antioch, and the county of Edessa, the so-called crusader states, under various European rulers.

In 1144 the Seljuq ruler Zangī, who had established a strong Muslim state at Mosul, captured the city of Edessa from the crusaders. When news of Edessa's fall reached Europe, Pope Eugenius III called for the Second Crusade. During this Crusade, armies led by Emperor Conrad III of Germany and King Louis VII of France joined forces in Jerusalem in the spring of 1148 and with 50,000 men struck north at Damascus. They began a siege at Damascus but were forced to retreat by an army led by Zangī's successor, Nureddin, and the Second Crusade ended in humiliating failure. Nureddin occupied Damascus in 1154, and his nephew Saladin gained control of all of Egypt in 1169 and occupied Aleppo in 1183, thus encircling the crusader states. In 1187 Saladin destroyed most of Jerusalem's army in a battle at Ḥaṭṭīn near the Sea of Galilee and on October 2 captured Jerusalem and most of the other European strongholds.

Shocked by the fall of Jerusalem, Pope Gregory VIII called for the Third Crusade. The largest crusader army yet assembled set out under the command of Emperor Frederick Barbarossa in May 1189, but Frederick's death by drowning a year later saved Saladin from having to confront him. In 1191 Richard I the Lion-Heart of England conquered the Byzantine province of Cyprus and then joined Phillip II Augustus of France in the siege of Acre. In July Acre fell and its inhabitants were slaughtered. After failing to reach Jerusalem, in 1192 Richard I negotiated a five-year peace treaty with Saladin that permitted European pilgrims access to holy shrines.

The Fourth Crusade, called in 1198 by Pope Innocent III to strike against Egypt, took a bizarre course. The crusader army was unable to pay for ships and outfitting obtained from Venice and so agreed to assist the Venetians in capturing the city of Zara, in Hungary (now Zadar, Croatia), and then moving against Constantinople. Constantinople fell on April 13, 1204, and the crusaders sacked the city. The crusaders and Venetians then established the Latin Empire of Constantinople, which was to last a little over 60 years. Although the crusaders were repudiated by Pope Innocent III, the Fourth Crusade destroyed any hope of alliance between the Byzantine and Latin churches. It also mortally wounded the Byzantine Empire.

A wave of revived crusading fervour in Europe produced the pathetic Children's Crusade of 1212, in which thousands of children were lost or sold into slavery. Three years later Innocent III called for another strike at the Muslim world. The Fifth Crusade, manned chiefly by French and German crusaders, captured Damietta, near the Nile, in 1219. Floods stopped a march on Cairo, and the crusade ended indecisively with an eight-year truce. This was the last crusade organized directly by the papacy. On the Sixth Crusade, Emperor Frederick II of Germany, who had been excommunicated for his many delays in setting out, negotiated in 1229 a treaty which returned Jerusalem to the Europeans for 10 years. In 1244, forced west by the advancing Mongols, the Khwārezmian Turks sacked Jerusalem with Egyptian help. King Louis IX of France launched another crusade in 1248, but the Seventh Crusade, like the Fifth, failed in Egypt. King Louis led the last of the numbered crusades, the Eighth, 22 years later, but shortly after landing in Tunis, most of the army, and Louis, died of disease.

Although ill-starred expeditions continued to be launched, even into the 15th century, the era of the Crusades had come to an end. After the Mamlūks of Egypt succeeded in driving back the Mongols from Syria, the Mamlūk sultan Baybars I dealt harshly with the crusaders, many of whom had formed alliances with the Mongols. In 1268 the Mamlūks captured Antioch and slaughtered all its inhabitants. Tripoli fell in 1289, and Acre, the last Latin outpost on the mainland, fell in 1291.

Crusca Academy, Italian ACCADEMIA DELLA CRUSCA ("Academy of the Chaff"), Italian literary academy founded in Florence in 1582 for the purpose of purifying Tuscan, the literary language of the Italian Renaissance. Partially through the efforts of its members, the Tuscan dialect, particularly as it had been employed by Petrarch and Boccaccio, became the model for Italian literature in the 16th and 17th centuries.

Founded by five members of the Florentine Academy, with the purpose of sifting the impure language (*crusca,* literally, "bran" or "chaff") from the pure, the Crusca Academy set itself up immediately as the arbiter of the literature of its time. Cruscans wrote many commentaries on Petrarch and Boccaccio, their models for linguistic usage; compiled dictionaries and lists of acceptable phrases and images from these authors; and translated many works into what they judged to be pure Tuscan. Members of the academy became known as linguistic conservatives, and in 1612 they began publication of their official dictionary, *Vocabolario degli Accademici della Crusca,* which continues to be published.

Though the academy was suppressed in the late 18th century, Napoleon reestablished it in 1808, and it gained autonomy in 1811. In the early 20th century legislation by the Italian government limited the academy to the publication of classical authors and linguistic documents and periodicals.

cruse lamp, small, iron hanging lamp with a handle at one end and a pinched spout for a wick at the other. It had a round bowl, about 3 inches (7.5 cm) in diameter and 1 inch (2.5 cm) deep. The fuel used in it was probably hard fat.

The cruse lamp was a development from floating-wick pan lamps used by Mediterranean peoples in pre-Christian times. It was used intermittently in Europe, first during the Middle Ages and then in the 18th century, as an alternative to rushlights (candles made

of the pith of various rushes and dipped in grease) and candles.

crust, the outermost solid part of the Earth (*q.v.*), essentially composed of rocky materials.

crustacean, any member of the subphylum Crustacea (phylum Arthropoda), a group of invertebrate animals consisting of nearly 30,000 species distributed worldwide. Crustaceans differ from other arthropods by having two pairs of antenna-like appendages in front of the mouth and other paired appendages near the mouth that act as jaws.

A brief treatment of crustaceans follows. For a full treatment, *see* MACROPAEDIA: Crustaceans.

The majority of crustaceans are marine forms, the most notable of which are shrimp, lobsters, crabs, and barnacles. Some crustaceans, including most crayfish, live in freshwater habitats. Still others, such as sand fleas, land crabs, and sow bugs, live in moist terrestrial environments. The class Malacostraca contains the larger and better-known crustaceans, including lobsters, shrimp, crabs, and crayfish, and encompasses more than two-thirds of all living species in the subphylum. There is little general agreement on the status or interrelationships of the other groups of crustaceans, chief among which are the Branchiopoda (fairy shrimps, water fleas), Cephalocarida (horseshoe shrimps), Ostracoda (mussel, or seed, shrimps), Mystacocarida (mustache shrimps), Copepoda (copepods), and Cirripedia (barnacles). It is believed that the ancestral crustacean resembled either a cephalocarid or a branchiopod.

The typical adult crustacean body is composed of a series of segments, called somites, which either are fused or are linked to each other by flexible areas that form movable joints. The typical form of a somite is seen in the segments that make up the abdomen, or "tail," of a lobster or crayfish. The first four somites fuse with the presegmental region, or acron, to form the head (cephalon). The two segments that are in front of the mouth carry two pairs of appendages called antennules and antennae, which are used as sensory organs in the adult and as aids to swimming and feeding in larvae. The feeding and chewing mandible is found on somites behind the mouth.

The carapace, or shell, begins at the maxillary somite and varies in thickness and size among the orders. It must be periodically molted because the hard structure prohibits growth. Varying from a thin, undifferentiated sac, as in the barnacles, to a massive shell, as in crabs and lobsters, the carapace is composed of an epicuticle and a chitinous cuticle and can be stiffened by deposits of calcium salts. Ingrowths of the integument, called apodemes, provide an internal skeleton. When the integument is thin, gas exchange occurs through the inner wall of the carapace. Gills formed by modified parts of the appendages serve as respiratory organs in some species.

The great diversity in the shapes of crustaceans' appendages or limbs results from modifications of a peduncle, or stalk (the protopodite), that bears two branches, the exopodite and the endopodite. On the inner and outer margins of the protopodite there may be additional lobes that can function as gills or assist in mastication.

The antennules, or first antennae, are also considered to be appendages. The biramous (or double-branched) antennae, because of their position near the mouth, are also able to assist the mandibles in pushing food. Mandibles, in most cases, have masticatory lobes on the protopodites, with distinctive cutting and grinding capabilities. There is little differentiation in the limbs behind the head region of most species, but some are specially adapted for such functions as walking and swimming or as additional mouthparts or weapons.

A continuation of the carapace lines the gut, which generally runs straight through the body. Ceca, or tubular outgrowths, increase the functions of digestion and absorption. Blood flows through channels without definite walls and is pumped by rhythmic body motions or by the heart, a long tube with valvular openings in each somite.

The nervous system consists of a ganglionic mass, or brain, which is united with a double chain of segmentally arranged ganglia that has nerve connections to the eyes and the antennules. The eyes may consist of a small group of three or four simple eyes (ocelli), or they may be compound eyes that have visual elements separated by pigment, similar to those of insects.

The sexes are separate in most crustaceans. Frequently, the males have prehensile appendages for clasping the female while mating. Crustaceans of most species hatch from eggs and then pass through a series of free-swimming larvae stages. In less-primitive crustaceans, the earlier transformations may take place within the egg, resulting in an acceleration of the appearance of the appendages, the beginning of the carapace, and the segmentation of its posterior parts.

In the oceans crustaceans play a part not unlike that taken by insects on land. The most familiar crustaceans are the larger crabs and lobsters that are used as food by humans, but these play a relatively small role in oceanic life compared to amphipods and isopods (class Malacostraca), which are ubiquitous in most seas. These small crustaceans serve as scavengers, feeding on all kinds of animal and vegetable debris and forming, in their turn, the food of many fishes. An even more important group of crustaceans is the copepods (class Maxillopoda), which form an important constituent of plankton, the assemblage of tiny floating animal and vegetable life in the surface waters of the ocean. Copepods feed upon diatoms and other microscopic plant plankton and themselves form the food of many economically important fishes.

crustacean louse, plural CRUSTACEAN LICE, any of various small aquatic invertebrates of the subphylum Crustacea (phylum Arthropoda) that are parasites of fish. Crustacean lice include fish lice (subclass Branchiura), copepod fish parasites (subclass Copepoda), and amphipod and isopod fish parasites (class Malacostraca). Of the latter, the family Cymothoidae (order Isopoda) is of special interest, as it is exclusively parasitic and infests both marine and freshwater fishes. Crustacean lice may live on the outer skin of the fish, under the bony covering protecting the gills, in the mouth cavity, and even within the host's abdominal cavity in some South American freshwater species. The main adaptation of the cymothoids is the development of powerful thoracic claws for secure attachment. These claws are so efficient that the parasites occasionally turn up in tinned fish products, having survived the canning process.

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Crutzen, Paul (b. Dec. 3, 1933, Amsterdam, Neth.), Dutch chemist who received the 1995 Nobel Prize for Chemistry for demonstrating, in 1970, that chemical compounds of nitrogen oxide accelerate the destruction of stratospheric ozone, which protects the Earth from the Sun's ultraviolet radiation. He shared the honour with American chemists Mario Molina and F. Sherwood Rowland (*qq.v.*), for their discovery, in 1974, that manufactured chlorofluorocarbon gases also contribute to ozone depletion.

Crutzen received a doctorate in meteorology from Stockholm University in 1973. He worked at the Max Planck Institute for Chemistry in Mainz, Ger. In 1970 he discovered that nonreactive nitrous oxide (N_2O), produced naturally by soil bacteria, rises into the stratosphere, where solar energy splits it into two reactive compounds, NO and NO_2. These compounds, which remain active for some time, react catalytically with ozone (O_3), breaking it down into molecular oxygen (O_2). His research was published that year in the *Quarterly Journal of the Royal Meteorological Society.* Although Crutzen's work was not widely accepted initially, it helped pave the way for the atmospheric research of Molina, Rowland, and other chemists. Crutzen was elected to academic societies in both Europe and the United States.

Cruveilhier, Jean (b. Feb. 9, 1791, Limoges, France—d. March 10, 1874, Sussac), French pathologist, anatomist, and physician who wrote several important works on pathological anatomy.

Cruveilhier trained in medicine at the University of Montpellier and in 1825 became professor of anatomy at the University of Paris. He became the first occupant of the chair of pathology at Paris when that teaching post was established in 1836. Cruveilhier possessed a broad knowledge of morbid anatomy and published a series of multivolume works on the subject. The greatest of these, an atlas of pathology titled *Anatomie pathologique du corps humain,* 2 vol. (1829–42; "Pathological Anatomy of the Human Body"), had many coloured illustrations whose beauty remains unrivaled in the history of medical illustration. In the *Anatomie pathologique* Cruveilhier gave the first description of multiple sclerosis, depicted several cases of gastric ulcer, and left an early account of progressive muscular atrophy, which is sometimes called Cruveilhier's atrophy, or Cruveilhier's disease. His name is included in the (French) medical names for congenital cirrhosis of the liver and for stomach ulcers caused by excess acid.

Crux (Latin: "Cross"), also called THE SOUTHERN CROSS, constellation lying at about 12 hours 30 minutes right ascension (the coordinate on the celestial sphere analogous to longitude on the Earth) and 60° south declination (angular distance south of the celestial equator), now visible only from south of about 30° north latitude (*i.e.,* the latitude of North Africa and Florida). It appears on the flags of Australia, New Zealand, and Western Samoa.

Augustine Royer first described it as a constellation in 1679, but it has been written about since antiquity. The constellation has five bright stars, one badly placed from the viewpoint of symmetry so that the shape of the cross formed by the stars is somewhat irregular.

Cruz, Sor Juana Inés de la, original name JUANA INÉS DE ASBAJE (b. Nov. 12, 1651, San Miguel Nepantla, Viceroyalty of New Spain [now in Mexico]—d. April 17, 1695, Mexico City), poet, scholar, and nun, an outstanding lyric poet of Mexico's colonial period.

An intellectual prodigy, at eight she composed a *loa* (short dramatic poem) in honour of the Blessed Sacrament. At the same time, she begged her parents to disguise her as a boy and send her to the University of Mexico but had to be content with reading her grandfather's books. At nine she went to live in Mexico City, where she studied Latin, mastering the language in 20 lessons.

The fame of her learning reached the viceroy, who invited her to court, where her wit, beauty, and magnetic personality won her great popularity. In an oral examination arranged by the viceroy, Juana Inés (then 17) astonished 40 professors with her knowledge.

In order to dedicate her life to learning she

rejected the idea of marriage and entered the convent of San Jerônimo on Feb. 24, 1669. There she assembled a library of about 4,000 volumes, experimented in the sciences, and wrote poems and religious and secular plays.



Sor Juana Inés de la Cruz, detail of a portrait by Agustin Velázquez Chávez, 18th century; in the Museo Nacional de Historia, Mexico City

By courtesy of the Museo Nacional de Historia, Mexico City

Attempts were made to curb her scholastic activities. Her daring criticism of a sermon of the famed Brazilian Jesuit Antônio Vieyra prompted a letter from the Bishop of Puebla, under the pseudonym of Sor Filotea, admonishing her to concentrate on religious studies.

In her *Respuesta a Sor Filotea* ("Reply to Sister Philotea"), a long letter and a revealing autobiographical fragment, written March 1, 1691, she defended her desire for broad knowledge at a time when women were expected to shun intellectual pursuits. She became famous for a poem "Hombres necios que acusés" ("Foolish Men Who Accuse [Women]"). Two years later, however, she gave up all contact with the world, signed a confession with her own blood, sold her books, scientific and musical instruments, distributed the money to the poor, and devoted her time exclusively to religious duties. She died the victim of an epidemic, while nursing her sister nuns.

The three volumes of her works were printed in Spain: the first, *Inundación castálida* (1689; "Flood from the Muses' Springs"), appeared in Madrid; the second, *Segundo volumen de las obras de Soror Juana Inés de la Cruz* (1692; "Second Volume of the Works of Sister Juana Inés de la Cruz"), in Seville; and the third, *Fama y obras pósthumas de Fénix de México y Décima Musa* (1700; "Fame and Posthumous Works of the Mexican Phoenix and Tenth Muse"), in Madrid. Several editions appeared during the 18th century. Other of her productions were printed separately. Although the stylistic affectations of the Baroque Spanish poet Góngora invade some of her work, most of her lyrics have a simple beauty and direct emotional appeal.

Cruz Alta, city, central Rio Grande do Sul *estado* ("state"), southern Brazil, lying at 1,552 feet (473 m) above sea level, in the Coxilha Grande (Grand Ridge). Founded in 1834, it was given city status in 1879. Cruz Alta is the commercial centre for a cattle-raising and agricultural (wheat, *feijão* [beans]) area. Industrial activities include meat-packing, the manufacture of farm machinery, and flour milling. It is linked by rail, road, and air to Pôrto Alegre, the state capital, and to other major cities in the state. Pop. (1980 prelim.) 53,315.

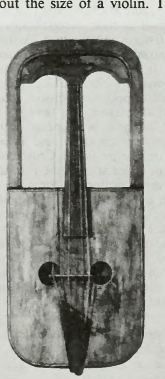
Cruz e Sousa, João da (b. Nov. 24, 1861, Desterro, Braz.—d. March 19, 1898, Sítio), poet, the leading figure of the Symbolist movement in Brazil.

Cruz e Sousa was the son of freed slaves. He traveled widely throughout Brazil in early adulthood, both as a member of a theatrical company and in abolitionist campaigns. His first poems were published in 1877, but his career gained momentum shortly after 1890, when he came in contact with the literary circle of Rio de Janeiro. His three best-known collections of poetry were published in the 1890s: *Broquéis* (1893; "Shields"), *Missal* (1893; a volume of poetic prose), and *Faróis* (1900, posthumous; "Beacons"). He died of tuberculosis.

Called the *Cisne Negro* ("Black Swan") by his contemporaries, he was the chief poet and luminary of the Symbolist movement throughout his relatively short life. His poetry weds the technical principles of French Symbolism to themes drawn from his social concerns and his own personal suffering. He was widely admired and emulated by younger poets of his own country, as well as those involved in the Modernist movement in Latin America.

Cruzeiro, city, southeastern São Paulo *estado* ("state"), Brazil, on the Paraíba do Sul River, at 1,686 feet (514 m) above sea level. Known variously as Embaú, Boa Vista, and Vila Novais, the settlement was given town status in 1801 and was made the seat of a municipality in 1871. Cruzeiro's industries include food processing (principally coffee, rice, corn [maize], *feijão* [beans], and sugarcane cultivated in the hinterland) and manufacturing (ceramics, railway cars, and brooms). Situated midway between the cities of São Paulo and Rio de Janeiro, Cruzeiro is easily accessible by railroad and highway. Pop. (1980 prelim.) 55,175.

crwth, Latin CHORUS, Middle English CROUTH, bowed Welsh lyre played from the European Middle Ages to about 1800. It was about the size of a violin. Though originally



Crwth; in the Museum of Fine Arts, Boston

Leslie Lindsay Mason Collection of Musical Instruments (formerly the Galpin Collection), Museum of Fine Arts, Boston

plucked, it was played with a bow from the 11th century, and a fingerboard was added behind the strings in the last part of the 13th century.

Its original four strings (in two pairs) were increased by the 15th century to six, two lying off the fingerboard. The treble string was used for melody, the other strings serving as drones; the off-fingerboard strings were bowed or occasionally plucked by the thumb of the bow hand. One foot of the bridge passed through a sound hole and transmitted the vibrations of the strings to the back of the instrument.

Cry of Dolores (Mexican battle cry): *see* Grito de Dolores.

crying bird: *see* limpkin.

cryoflora, also called CRYOVEGETATION, or CRYOPHYTE, algae that live in snow and ice. The well-known and widely distributed red snow (*q.v.*) is caused by *Chlamydomonas* and diatoms; brown snow by desmids, diatoms, and blue-green algae; green snow by *Euglena* and *Chlamydomonas;* yellow snow by *Protoderma* and blue-green algae; and black snow by *Scotiella nivalis* and *Raphidonema.*

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cryogenics, production and application of low-temperature phenomena.

The cryogenic temperature range has been defined as from −150° C (−238° F) to absolute zero (−273° C or −460° F), the temperature at which molecular motion comes as close as theoretically possible to ceasing completely. Cryogenic temperatures are usually described in the absolute or Kelvin scale, in which absolute zero is written as 0 K, without a degree sign. Conversion from the Celsius to the Kelvin scale can be done by adding 273 to the Celsius scale.

Cryogenic temperatures are considerably lower than those encountered in ordinary physical processes. At these extreme conditions, such properties of materials as strength, thermal conductivity, ductility, and electrical resistance are altered in ways of both theoretical and commercial importance. Because heat is created by the random motion of molecules, materials at cryogenic temperatures are as close to a static and highly ordered state as is possible.

Cryogenics had its beginning in 1877, the year that oxygen was first cooled to the point at which it became a liquid (−183° C, 90 K). Since then, the theoretical development of cryogenics has been connected to the growth in capability of refrigeration systems. In 1895, when it had become possible to reach temperatures as low as 40 K, air was liquefied and separated into its major components; in 1908 helium was liquefied (4.2 K). Three years later, the propensity of many supercooled metals to lose all resistance to electricity—the phenomenon known as superconductivity—was discovered. By the 1920s and 1930s temperatures close to absolute zero were reached, and by 1960 laboratories could produce temperatures of 0.000001 K, a millionth of a degree Kelvin above absolute zero.

Temperatures below 3 K are primarily used for laboratory work, particularly research into the properties of helium. Helium liquefies at 4.2 K, becoming what is known as helium I. At 2.19 K, however, it abruptly becomes helium II, a liquid with such low viscosity that it can literally crawl up the side of a glass and flow through microscopic holes too small to permit the passage of ordinary liquids, including helium I. (Helium I and helium II are, of course, chemically identical.) This property is known as superfluidity.

The most important commercial application of cryogenic gas liquefaction techniques is the storage and transportation of liquefied natural gas (LNG), a mixture largely composed of methane, ethane, and other combustible gases. Natural gas is liquefied at 110 K, causing it to contract to 1/600th of its volume at room temperature and making it sufficiently compact for swift transport in specially insulated tankers.

Very low temperatures are also used for preserving food simply and inexpensively. Produce is placed in a sealed tank and sprayed with liquid nitrogen. The nitrogen immedi-

ately vaporizes, absorbing the heat content of the produce.

In cryomedicine a low-temperature scalpel or probe can be used to freeze unhealthy tissue. The resulting dead cells are then removed through normal bodily processes. The advantage to this method is that freezing the tissue rather than cutting it produces less bleeding. A scalpel cooled by liquid nitrogen is used in cryosurgery; it has proved successful in removing tonsils, hemorrhoids, warts, cataracts, and some tumours. In addition, thousands of patients have been treated for Parkinson's disease by freezing the small areas of the brain believed to be responsible for the problem.

The application of cryogenics has also extended to space vehicles. In 1981 the U.S. space shuttle "Columbia" was launched with the aid of liquid hydrogen/liquid oxygen propellants.

Of the special properties of materials cooled to extreme temperatures superconductivity is the most important. Its chief application has been in the construction of superconducting electromagnets for particle accelerators. These large research facilities require such powerful magnetic fields that conventional electromagnets could be melted by the currents required to generate the fields. Liquid helium cools the cable through which the currents flow to about 4 K, allowing much stronger currents to flow without generating heat by resistance.

cryoglobulinemia, presence in the blood of proteins called cryoglobulins that precipitate at temperatures below 98.6° F (37° C), both in the laboratory and in the body (where the precipitation could cause circulatory impairment or blockage or sometimes hemorrhage). Cryoglobulinemia is usually symptomatic of an underlying disease, such as multiple myeloma or chronic lymphocytic leukemia; it may disappear, sometimes permanently, after the primary disease abates. The condition in patients with no other disease (essential cryoglobulinemia) is treated by avoidance of cold temperatures.

cryolite, colourless to white halide mineral, sodium aluminum fluoride (Na_3AlF_6). It occurs in a large deposit at Ivigtut, Greenland, and in small amounts in Spain, Colorado, U.S., and elsewhere. It is used as a solvent for bauxite in the electrolytic production of aluminum and has various other metallurgical applications, and it is used in the glass and enamel industries, in bonded abrasives as a filler, and in the manufacture of insecticides. A large amount of synthetic cryolite is made from fluorite. For detailed physical properties, *see* halide mineral (table).

cryosurgery, therapeutic technique in which localized freezing is used to remove or destroy diseased tissue. Rapid cooling of body tissues to a temperature of −60° C or lower causes ice crystals to form, disrupting cell structure and, ultimately, killing the cell. Freezing may also destroy tissues by triggering an immune response, releasing intracellular proteins that attract natural antibodies. These antibodies, in turn, destroy the diseased cells.

Various attempts to freeze tissue—using ice, liquid air, and solid or superchilled carbon dioxide—date to the 1850s, but the first efficient cryosurgical system applicable to internal tissues was developed by a U.S. neurosurgeon, Irving Cooper, in 1961. Cooper used liquid nitrogen to destroy brain tumours. Cryosurgery is now used in the removal of skin lesions, control of gynecologic and urologic tumours, lens extractions in ophthalmology, elimination of hemorrhoids, and other conditions involving diseased tissue.

crypt, vault or subterranean chamber, usually under a church floor. In Latin, *crypta* designated any vaulted building partially or entirely below the ground level, such as sewers, the stalls for horses and chariots in a circus, farm storage cellars, or a long gallery known as a cryptoporticus, like that on the Palatine Hill in Rome. It was natural, therefore, for the early Christians to call their catacombs crypts;



Crypt, Canterbury cathedral, England, 12th century
A.F. Kersting

and, when churches came to be erected over the tombs of saints and martyrs, subterranean chapels, known as crypts or *confessiones,* were built around the actual tomb. The most famous of these was St. Peter's, built over the circus of Nero, the site of St. Peter's martyrdom.

As early as the reign of the Roman emperor Constantine the Great (306–337), the crypt was considered a normal part of the church building. Further incentive to the building of crypts was provided by growth of ecclesiastical sanction of burials within the church walls. The Council of Mainz (813) officially approved the interment of bishops, abbots, worthy priests, or loyal laymen in a church, and from that time burials within the building, usually in the crypt, multiplied.

Later the size of the crypt was increased to include the entire space under the floor of the church choir or chancel, as in the 10th-century crypt of S. Ambrogio at Milan. With the increased desire for richness in all parts of the church, the general plan became more complex. The choir floor, for example, was raised, thereby opening the front of the crypt to the nave, which then was on an intermediate level between the crypt and the choir. Monumental flights of steps were often designed to lead down to the crypt in the centre and up to the choir on either side. The arcaded fronts of these crypts frequently became an important decorative feature, as in the 12th-century church of S. Zeno Maggiore in Verona, and in S. Miniato at Florence (1013).

Where Byzantine influence was strong, crypts were less common and, when built, were of a totally different type, frequently as cellars under the entire church area, as in Trani cathedral in southern Italy (12th century). St. Mark's at Venice has a remarkable crypt of Greek-cross plan, which, in fact, functioned as a secondary church.

Outside Italy there was great variation in both commonness and size of crypts. Rhenish churches followed the Lombard Italian precedent of an appreciably raised choir with an important crypt beneath it, but the end beneath the nave was usually closed. Elsewhere in western Europe the choir level was much less raised, and the crypt, where present, tended more and more to become a lower church.

Crypts were highly developed in England throughout the Romanesque and Gothic periods. At Canterbury the crypt (dating from 1100) forms a large and complex church, with apse and chapels, and the extreme east end, under Trinity chapel, is famous as the original burial place of Thomas Becket. The earlier (late 11th century) crypts of Winchester, Worcester, and Gloucester are similarly apsidal but simpler in plan.

Many medieval secular buildings were built over vaulted substructures, and remains of such crypts occur widely throughout Europe. The German *Rathäuser* (town halls) have many fine and richly decorated crypts, such as the famous cellar of the Bremen *Rathaus.* Notable English examples of nonecclesiastical crypts are in Gerard's hall, now destroyed, and the Guildhall (1411), in London. Crypts often occur in traditionally designed cathedrals of the 19th and 20th centuries. The Cathedral of St. John the Divine in New York City, for example, contains an elaborately decorated crypt.

Cryptanthus, genus of epiphytes (plants that are supported by other plants and have aerial roots exposed to humid atmosphere) of the pineapple family (Bromeliaceae), composed of about 10 to 20 South American species. The prickly-edged, stemless leaves grow in a rosette directly from the root. The flowers, usually white, are in a stalkless, dense bunch at the centre of the rosette.

A few species, especially *C. acaulis* and *C.*



Cryptanthus
G.R. Roberts

zonatus, are grown indoors for their attractive foliage. Both species have wavy-edged leaves that are silvery or whitish underneath. *C. acaulis* grows to about 15 centimetres (6 inches) and has several to many leaves. The strap-shaped leaves of *C. zonatus* are greenish brown or coppery on top with bands of tan or brown; the plant is about 22 cm tall.

Cryptoblastus, extinct genus of blastoids, a primitive group of echinoderms related to the modern sea lilies, found as fossils in Early



Cryptoblastus, collected from the Burlington Limestone, Iowa
By courtesy of the trustees of the British Museum (Natural History); photograph, Imifor

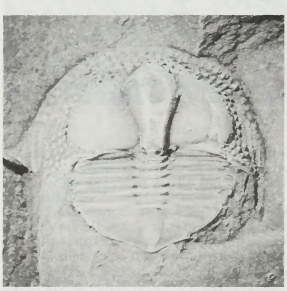
Carboniferous marine rocks (the Early Carboniferous Period occurred from 360 to 320 million years ago).

cryptococcosis, also called EUROPEAN BLASTOMYCOSIS, or TORULOSIS, a chronic fungal

infection of humans caused by *Cryptococcus neoformans* and *C. bacillispora*. The organism may be present in soil or dust and is often found in pigeon droppings, with resulting high concentrations on window ledges and around other nesting places. How humans become infected is not certain, but it is probably by inhalation of fungus-bearing dust. A large number of pulmonary infections due to cryptococcosis may go unreported; its symptoms include fever, malaise, and a dry cough. Nine-tenths of those cases of infection that are reported are of the more serious type known as disseminated cryptococcosis. In such cases, the fungus spreads from the respiratory system to the central nervous system, where it causes meningitis (inflammation of the membranes surrounding the brain), though it infects other organs as well. The principal symptoms of the meningitis are headache, blurred vision, and confusion, lethargy, or personality change. The *Cryptococcus* fungus can also spread to and cause lesions in the skin, bones, and visceral organs.

All forms of cryptococcosis respond to amphotericin B, the survival rate of patients treated being approximately 80–90 percent. Before this therapy was available, there were few reported survivors of cryptococcal meningitis.

Cryptolithus, genus of trilobites (extinct arthropods) found as fossils in Europe and North America in the Ordovician period (505



Cryptolithus

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

million to 438 million years ago). Its distinctive appearance makes the genus a useful guide fossil for Ordovician rocks and time. The head region, or cephalon, in *Cryptolithus* is large, with margins pitted in a distinctive pattern; two long spines project back from the lateral margins. The adults lack eyes.

cryptology, science concerned with communications in secure and usually secret form. It encompasses both cryptography and cryptanalysis. The former involves the study and application of the principles and techniques by which information is rendered unintelligible to all but the intended receiver, while the latter is the science and art of solving cryptosystems to recover such information.

A brief treatment of cryptology follows. For full treatment, see MACROPAEDIA: Cryptology.

Cryptography initially developed as a means of disguising written messages. Today, however, its principles are applied to the encryption of facsimile and television signals, as for example those relayed by communications satellites to and from ground stations. More important, cryptography is pivotal for securing data communications between computers and for authenticating such transmissions—*i.e.,* providing assurance to the authorized receiver that the message is not a forgery. The latter function is of particular importance in banking and other commercial applications.

Transformation of an intelligible message (plaintext) into an encrypted message (cipher, or ciphertext) typically requires the use of an algorithm (set of procedures) and a key. The algorithm may be public knowledge, but some or all of the key information must be kept secret from everyone other than the transmitter of the message and the legitimate receiver. In the transformation process, the algorithm is applied to the plaintext information, and the key employed to control how it is encrypted. The inverse operation—*i.e.,* decryption—by which the authorized receiver recovers the concealed information from the cipher is performed in a similar manner.

Many varied cipher systems have been developed over the centuries. Fundamental to them is either of two basic mathematical operations, transposition or substitution, or a combination of both. Transposition rearranges the elements of the plaintext without altering the elements themselves. Substitution involves the replacement of plaintext elements such as letters or pairs of letters with other symbols without changing the sequence in which they occur. In more complex systems, both transposition and substitution are cascaded, yielding product ciphers. A highly sophisticated and widely used variation of such a cryptosystem is the Data Encryption Standard (DES), which was developed during the mid-1970s in the United States. The DES is a product block cipher, in which 16 rounds of substitutions and transpositions are cascaded. It encrypts a block of 64 bits of binary encoded plaintext under the control of a 56-bit key, producing a 64-bit ciphertext. The DES is readily implemented through the use of large-scale integrated and very large-scale integrated circuit chips. These miniature electronic devices are able to encrypt and decrypt a wide variety of data at rates ranging from tens of bits per second to tens of millions of bits per second.

Cryptosystems may be either symmetric or asymmetric. In a symmetric cryptosystem, encryption and decryption are performed with a single key, so that both the sender and receiver use the same key. In an asymmetric system, by contrast, two different keys are employed—one for each function.

One-key cryptosystems, including the DES, have been associated with what is commonly referred to as the key-distribution problem. Specifically, the key has to be sent to all authorized users before messages can be exchanged. This results in a time delay and raises the possibility of the key's falling into unauthorized hands. Asymmetric, or two-key, cryptosystems circumvent the key-distribution problem for the most part. A user of this type of system can make one key (*e.g.,* that for encryption) public, while keeping the second (for decryption) secret or private. Even if an unauthorized party were to duplicate the public key, it would not affect signal security, since only the legitimate user with the secret key could unscramble the ciphertext. These two-key (often called public-key) cryptosystems also exhibit considerable flexibility. They can be used to create digital signatures for messages, thereby providing the receiver with a means of readily authenticating transmissions for a third party. This feature lends itself well to certain kinds of computer data communications, most notably electronic funds transfers.

Unlike one-key cryptosystems, which have been employed for hundreds of years, two-key systems are a relatively recent development, having received serious consideration since about the mid-1970s. At present, the only viable forms of two-key systems appear to be those whose cryptosecurity derives primarily from the infeasibility of factoring large composite integers. The most publicized example is the Rivest–Shamir–Adleman (RSA) cryptoalgorithm. Its major drawback is its limited channel capacity—*i.e.,* the number of bits of message information that can be communicated per second. Whereas some single-chip implementations of the DES one-key algorithm can process information at several million bits per second, the throughput of a comparably secure RSA chip is only a few thousand bits per second.

cryptomonad, any small biflagellate organism considered both as a protozoan (order Cryptomonadida) and as an alga (class Cryptophyceae). Occurring in both fresh and salt water, cryptomonads contain pigments found only in red and blue-green algae, and sometimes they live harmlessly as zooxanthellae within other organisms. *Cryptomonas,* a typical photosynthetic genus, has two unequal flagella attached at one end of a flattened oval cell. *Chilomonas* does not have chromatophores (pigment-containing structures) and ingests organic matter; under certain conditions it may survive on minerals alone. Cryptomonads encyst in a spherical cellulose case and reproduce asexually in either the motile or inactive state. *See also* zooxanthella.

cryptophagid beetle: *see* silken fungus beetle.

cryptoporticus, a covered gallery that was a characteristic feature of the ancient Roman palazzo. It was usually designed to provide shade and a cool place for walking. Such a gallery was part of the Roman emperor Diocletian's Palace at Spalatro (Split, Croatia) and the House of the Cryptoporticus in Pompeii. Sometimes the cryptoporticus served a dual purpose; a vaulted passage, partly decorated with fine stucco, was built by the emperor Nero in about AD 65, primarily to connect his palace, the so-called Golden House of Nero, with other imperial palaces on the Palatine Hill.

cryptorchidism, also called CRYPTORCHISM, UNDESCENDED TESTES, or UNDESCENDED TESTICLES, physical disorder in which one or both of the testes do not descend spontaneously to the usual position in the scrotum. (The testes normally descend around the time of the male infant's birth.) Usually only one testis fails to descend into the scrotum; the other, descended testis suffices to ensure the individual's normal male sexuality. Cases in which both testes fail to descend are rare and are more serious, since undescended testes are usually nonfunctional (*i.e.,* produce few or no sperm), and the development of normal male sexuality is thus threatened. An undescended testis remains within the inguinal canal or in the abdominal cavity. Besides being nonfunctional, an undescended testis is more likely to be injured, and the blood supply to it is more likely to be cut off by twisting. Also, cancer develops about 20 times more often in an undescended testis.

Gonadotropin and surgical therapy are the chief medical means used to make a testis descend to its proper place in the scrotum. Human chorionic gonadotropin can help evoke maturation of the external genitals, and, in many cases of testes located in the inguinal canal, the testes move into the scrotum subsequent to this drug therapy. If medication fails, surgical treatment is used to manually move the undescended testis down into the scrotum. Both drug therapy and this operation are best performed before the patient is 9 years of age. The sperm production of the now-descended testis after therapy may be lower than normal in some cases, but fertility is usually unimpaired.

Cryptostomata, order of bryozoans (small colonial animals) found as fossils in rocks of Ordovician to Permian age (between 505 million and 245 million years old). Many holes

are exhibited, which probably contained individual animals of the colony. Cryptostome colonies consist of groups of short, individual tubes.

Crysler's Farm, Battle of (Nov. 11, 1813), British victory in the War of 1812 that helped to prevent the capture of Montreal by U.S. forces; it was fought between approximately 1,600 U.S. troops under General John Boyd and 600 British troops under Colonel J.W. Morrison.

In October 1813 a U.S. force of more than 7,000 men set out in ships from Sacketts Harbor, N.Y., to attack Montreal. Encountering rapids on the St. Lawrence River at the Long Sault, now in Ontario, the Americans disembarked on the Canadian shore at that point. They divided into a main body, under General James Wilkinson, which advanced toward Cornwall, and a rear guard commanded by General Boyd. The rear guard made contact with the British force under Colonel Morrison, and Wilkinson ordered Boyd to attack.

The resulting action was fought on farmlands beside the river. British casualties numbered 200; American losses were more than 400, including 100 taken prisoner. The battle ended with the withdrawal of the Americans. Learning that another U.S. force, under General Wade Hampton, had been turned back at Châteauguay on October 26, Wilkinson retreated across the river to St. Regis, N.Y.

Crysler's Farm Battlefield Memorial Park was officially opened in 1961.

crystal, any solid material in which the component atoms are arranged in a definite pattern and whose surface regularity reflects its internal symmetry.

A brief treatment of crystals follows. For full treatment, *see* MACROPAEDIA: Matter: Its Properties, States, Varieties, and Behaviour.

Structure. A crystal consists of millions of individual structural units of atoms called unit cells. These cells are repeated in all directions to form a geometric pattern, which is manifested by the number and orientation of external planar surfaces called crystal faces. A fundamental property of crystals is symmetry, and all crystals can be classified on the basis of their dominant symmetry elements. There are seven basic systems: isometric, trigonal, hexagonal, tetragonal, orthorhombic, monoclinic, and triclinic systems. (Some classifications consider hexagonal and trigonal to be subdivisions of the hexagonal system.)

These systems are based in part on the performance of a geometric operation that will repeat a given crystal face in another position. The simple isometric (or cubic) crystal, for example, possesses three fourfold axes of symmetry and four threefold axes of symmetry—that is, if the axes pass through the centres of opposite faces of a cube, one complete rotation (360°) of the cube on each axis will cause a crystal face to be repeated four times (thus "fourfold"); by extension, one complete rotation of the cube about any of the four axes that may be drawn through opposite corners of a cube would produce a threefold repetition (see Figure 1). Thus, assignment of a crystal to

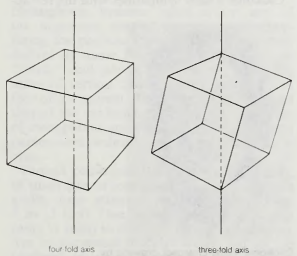


Figure 1: Examples of axes of symmetry

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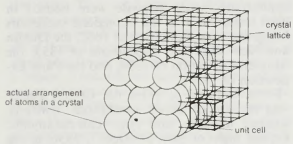


Figure 2: Typical crystal lattice

From A.C. Bishop, *An Outline of Crystal Morphology* (1967); Hutchinson Publishing Group Ltd

any one of these systems depends on the symmetry characteristics that have been identified. The orthorhombic unit cell has three axes of twofold symmetry, about which rotations of 180° produce no change in appearance. The monoclinic unit cell has one twofold axis, and the triclinic cell has none (this may also be expressed as one onefold axis). Other elements used in classification include the number of planes of symmetry (or "mirror" planes—a cube, for example, has nine), the relative lengths of three noncoplanar edges of the unit cell (a, b, and c), and the angles between these edges (alpha, beta, and gamma; α, β, and γ). The Table lists the properties of the seven systems.

The primitive, or simple, unit cell in each system has lattice points only at its corners. (Every constituent atom is represented by a lattice point in a diagram, or as in Figure 2.) In some systems, cells with additional lattice points are possible. These points may be in the centre of the cell (body-centred), on two opposite faces of the cell (end-, or base-, centred), or on all faces (face-centred). The rhombohedral unit cell, found only in the hexagonal crystal system, has two additional lattice points inside each cell.

Classification of crystals

system	number of axes of symmetry	characteristics of sides	characteristics of angles
triclinic	one onefold axis	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma$
monoclinic	one twofold axis	$a \neq b \neq c$	$\alpha = \beta = 90° \neq \gamma$
orthorhombic	three twofold axes	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90°$
tetragonal	three twofold axes	$a = b \neq c$	$\alpha = \beta = \gamma = 90°$
trigonal	one threefold axis	$a = b = c$	$\alpha = \beta = \gamma \neq 90°$
isometric	one threefold axis	$a = b = c$	$\alpha = \beta = \gamma = 90°$
hexagonal	one sixfold axis	$a = b \neq c$	$\alpha = \beta = 90°, \gamma = 120°$

Growth. Crystals are generally formed when a liquid solidifies or when a vapour or liquid solution becomes supersaturated (saturated to the point at which it can no longer retain dissolved material and the material is precipitated). For many simple substances, the solid state embodies a crystalline structure. This is true, for example, of metals and alloys, minerals, and semiconductors. Sometimes, for more complex materials such as rubber or glass, there are two solid forms: one that is amorphous or glassy and the other crystalline. If a substance in a liquid state is cooled to a rigid condition without any crystallization having occurred, the solid that forms is amorphous. It may gradually change into a crystal, though the process is often very slow.

A crystalline structure is not necessarily visible to the eye because a number of substances are made up of crystallites—*i.e.,* tiny pieces of matter, each in itself a perfect crystal, packed together in random orientations. The crystal forms involved in many of these polycrystalline materials can be identified only by means of X-ray diffraction or electron microscopy. In X-ray diffraction, the distinctive markings made on an X-ray film serve as "fingerprints" that permit identification of a mineral substance from a very small sample. Crystallographers have created an extensive library of such fingerprints against which they can check the markings of a particular sample.

Under certain very special conditions, a single crystal structure can grow large enough to be seen. Such is the case with naturally occurring gemstones. Ice, too, can form large single crystals if water freezes slowly enough. Methods of artificially growing single crystals have also been devised. In a popular technique known as crystal pulling, a seed crystal is placed at the end of a rotating rod at the surface of a melt. As the rod is slowly raised, a crystal grows at the melt-solid interface. Artificially produced crystals exhibit extraordinary regularity, which enables scientists to extract more information about what lies inside the constituent unit cells.

Defects. Crystals are not always perfect; defects may result from deformation of the solid, rapid cooling from high temperature, or high-energy radiation (X rays or neutrons) striking the solid. Located at single points, along lines, or on whole surfaces in the solid, these defects influence its mechanical, electrical, and optical behaviour.

Point defects include the Frenkel type, the Schottky type, and the impurity type. The Frenkel defect involves a single ion, which is displaced from its normal lattice point to a nearby interstice, or space, between atoms in the lattice. In the Schottky defect, two ions of opposite sign leave the lattice. Impurity defects are foreign atoms that replace some of the atoms making up the solid or that squeeze into the interstices; they are important in the electrical behaviour of the materials used in transistors (semiconductors).

Line defects, or dislocations, are lines along which whole rows of atoms in a solid are arranged anomalously. The resulting irregularity in spacing is most severe along a line called the line of dislocation. Line defects can weaken or strengthen solids.

Surface defects may arise at the boundary between two grains, or small crystals, within a larger crystal. The rows of atoms in two different grains may run in slightly different directions, leading to a mismatch across the grain boundary. The actual external surface of a crystal is also a surface defect because the atoms on the surface adjust their positions to accommodate for the absence of neighbouring atoms outside the surface.

crystal (glass): *see* flint glass.

crystal cameo (glass): *see* crystallo ceramie.

Crystal City, city and seat (1884) of Zavala county, southern Texas, U.S. It is a processing, packing, and shipping centre for vegetables, especially spinach, grown in the surrounding area. (A statue of a popular cartoon character named Popeye—a sailor who eats spinach for instant strength—was erected in 1937 in the city square.) Named for the many crystal-clear springs (used for irrigation) in the area, Crystal City was incorporated as a town in 1910. Pop. (1990) 8,263.

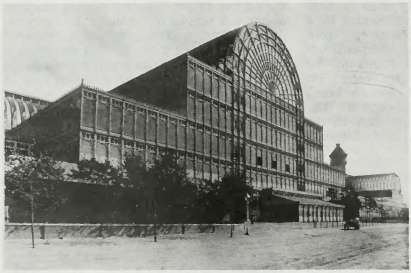
crystal gazing, also called SCRYING, divination of distant or future events based on vi-

sions seen in a ball of rock crystal. Divination based on an analysis of reflections in water, on polished metal, or on precious stones was practiced by early humans, who probably interpreted these phenomena as a vision of the spirit world. Scrying became widespread by the 5th century AD and was condemned by the medieval Christian church as the work of the devil.

Crystal gazing was a popular pastime in the Victorian era, together with palmistry and astrology, and it involved elaborate rituals for cleaning the crystal ball and for conducting crystal-gazing sessions, which are said to work best when the Sun is at its northernmost declination. Immediately before the appearance of a vision (which may be realistic or a mere wispy swirl), the globe is said to mist up from within.

Crystal Palace, giant glass-and-iron exhibition hall in Hyde Park, London, that housed the Great Exhibition of 1851. The structure was taken down and rebuilt (1852–54) at Sydenham Hill, at which site it survived until 1936.

In 1849 Prince Albert, husband of Queen Victoria and president of the Royal Society of Arts, conceived the idea of inviting exhibitors from all civilized nations to participate in an exposition. Plans were developed, and the necessary funds speedily raised, with Queen Victoria heading the list of subscribers. The exhibition opened in the Crystal Palace on May 1, 1851.



The rebuilt Crystal Palace at Sydenham Hill, redesigned by Joseph Paxton after the Great Exhibition of London of 1851 (built 1852–54; destroyed 1936)

BBC Hulton Picture Library

The Crystal Palace, designed by Sir Joseph Paxton, was a remarkable construction of prefabricated parts. It had a long rectangular stepped form intersected in the middle by a vaulted transept and consisted of an intricate network of slender iron rods sustaining walls of clear glass. The main body of the building was 1,848 feet (563 m) long and 408 feet (124 m) wide; the height of the central transept was 108 feet (33 m). The building contained a floor area of about 990,000 square feet (about 92,000 square m, or about 23 acres [9 hectares]). On the ground floor and galleries there were more than 8 miles (13 km) of display tables.

The number of exhibitors was about 14,000, nearly half of whom were non-British. France sent 1,760 exhibits and the United States 560. Among the U.S. exhibits were false teeth, artificial legs, Colt's repeating pistol, Goodyear india-rubber goods, chewing tobacco, trotting sulkies, and McCormick's reaper. More than six million visitors attended the exhibition, which was open to the public until October 11. The exhibition showed a total profit of $750,000, and a closing ceremony was held on October 15. Thereafter the building was taken down and was rebuilt to a more elaborate design at Sydenham Hill in Upper Norwood, overlooking London from the south.

The Crystal Palace established an architectural standard for later international fairs and exhibitions, which likewise were housed in glass conservatories, the immediate successors being the Cork Exhibition of 1852, the Dublin and New York City expositions of 1853, the Munich Exhibition of 1854, and the Paris Exposition of 1855.

For a number of years the Crystal Palace was the site of shows, exhibitions, concerts, football matches, and other entertainments. On the night of Nov. 30–Dec. 1, 1936, it was virtually destroyed by fire; the towers that survived were finally demolished in 1941 because they were deemed a dangerous landmark for incoming German bombers.

crystalline rock, any rock composed entirely of crystallized minerals without glassy matter. Intrusive igneous rocks—those that congeal at depth—are virtually always crystalline, whereas extrusive igneous rocks, or volcanic rocks, may be partly to entirely glassy. Many factors influence the ability of a magma to crystallize, but the length of time during which cooling occurs is the controlling factor. Metamorphic rocks are almost always crystalline; the term crystalline schists has been applied to indicate all rocks of metamorphic origin, and thus the term crystalline rocks may be taken to mean an igneous origin. Sedimentary rocks can also be crystalline, such as the crystalline limestones precipitated directly from solution; the term is not generally applied to the clastic sediments, even though they are formed largely from the accumulation of crystalline materials.

crystallite, any of a type of microscopic body occurring in such glassy igneous rocks as obsidian and pitchstone. Crystallites are regarded as incipient or embryonic crystals, though they often have no recognizable crystallographic form and are too small to polarize light. They occur when magma (molten rock material) congeals so rapidly that crystallization remains incomplete. Crystallites are distinguished from microlites, which are slightly larger forms recognizable as mineral species.

There are several varieties of crystallites, and names have been assigned to indicate their particular shapes. Globulites, for example, are oval or spherical; scopulites may be feathery or flowerlike. The faster-growing faces of a crystallite become smaller, so that the slower-growing faces are the longer ones. Rodlike crystallites composed of a number of smaller elongate forms are called bacillites. Belonites are elongated with pointed or rounded ends; they include the forms called longulites (elongated), spiculites (tapered toward both ends), and clavalites (dumbbell-shaped).

crystallo ceramie, also called CAMEO INCRUSTATION, CRYSTAL CAMEO, OF SULPHIDES, cut crystal glass in which a decorative ceramic object is embedded. A Bohemian invention of the 18th century, cameo incrustation was taken up in Paris but had no vogue until Apsley Pellatt, an English glassmaker, developed a technique that resulted in specimens of genuine beauty. In 1819 Pellatt patented his process under the name *crystallo ceramie* and began to issue his ware from the Falcon Glasshouse in Southwark. His cast bas-relief decorations—which usually were profile portraits of royalty and celebrities or coats-of-arms—were made of a fine white china clay and supersilicate of potash that would not fracture in contact with molten glass. The objects, which have a silvery appearance, are



Crystallo ceramie portrait of Queen Charlotte, embedded in a cut-glass scent bottle, probably by Apsley Pellatt, c. 1830; in the Victoria and Albert Museum, London

V & A Picture Library, reproduced with permission of the Victoria and Albert Museum, London

embedded in exceptionally clear flint glass; refraction and illumination from behind are often enhanced by crosscutting and faceting, and outer curves magnify the image. *Crystallo ceramie* was made in forms such as paperweights, decanters, stoppers, scent bottles, pendants, and various ornamental tableware items.

Pellatt's work is sometimes referred to as incrusted glass, or incrusted cameos; crystal cameos; or sulphides. The term sulphides, however, is particularly associated with such cameo paperweights as those issued by John Ford & Co., of Edinburgh, about 1875, which were of a quality comparable to Pellatt's and to equally successful work from Baccarat, in France.

Csermanck, János (Hungarian premier): *see* Kádár, János.

Csokonai Vitéz, Mihály (b. Nov. 17, 1773, Debrecen, Hung.—d. Jan. 28, 1805, Debrecen), the outstanding poet of the Hungarian Enlightenment.

Csokonai's early sympathies with the revolu-



Csokonai Vitéz, charcoal drawing by Félegyházi

Interfoto MTI, Hungary

tionary trends of his age made life difficult for him in the wave of reaction that accompanied Napoleon's invasion of Europe. Dismissed after a brief career as an assistant master at the Calvinist college in Debrecen, he became a wandering poet. For the sake of a wealthy girl (the "Lilla" of his poems), he tried to secure a permanent post, but by the time he had obtained such a position, in a small town, she had already married. Csokonai returned to Debrecen poor and consumptive. He died there without having seen his poems published.

Csokonai's prime interest was poetic form: he was one of the first Hungarian theorists of prosody and successfully adapted the rhymed metrics of western Europe to Hungarian verse forms. His poetry breathes the spirit of the Enlightenment. He was also a playwright and the author of the first Hungarian comic epic, *Dorottya* (1804), his most popular work.

Csongrád, *megye* (county), southeastern Hungary. It occupies an area of 1,646 square miles (4,263 square km) in the southern part of the Great Hungarian Plain, where swamp-draining projects have added large tracts of cultivable land, and water-conservation works have reduced the danger of crop losses from severe drought. Light soils and the hot, dry summers favour the cultivation of paprika; corn (maize), rye, onions, poultry, and fruit are other major crops. Commercial freshwater fishing is significant in the artificial lakes and the Tisza River. The first Hungarian land reforms after World War II took place at Pusztaszer in 1945. Petroleum exploitation in the region is extensive, with many developments in the 1970s; oil fields were developed at Kiskunhales and Algyő. Szeged is the capital but is an administratively independent city within the *megye.* Other major cities are Szentes, Hódmezővásárhely, Csongrád, and Makó. Pop. (1990 prelim.) 450,000.

CSU (German political party): *see* Christian Social Union.

CSX Corporation, company formed by the merger of the Chessie System, Inc., and Seaboard Coast Line Industries, Inc., in 1980. It operates railroads in 18 states, located mainly east of the Mississippi River, and in Ontario.

The Chessie System was created as a holding company for the Chesapeake and Ohio Railway Company (*q.v.*), which had gained control of the Baltimore and Ohio Railroad Company (*q.v.*) and the Western Maryland Railway Company in 1960 and 1967, respectively. Its routes extend from the Great Lakes to the Chesapeake Bay and the Ohio Valley, with lines to Philadelphia and St. Louis.

Seaboard Coast Line Industries controls Seaboard System Railroad, Inc., which operates lines from the Gulf of Mexico to the Chesapeake Bay and the Ohio Valley, with others extending to Chicago and St. Louis.

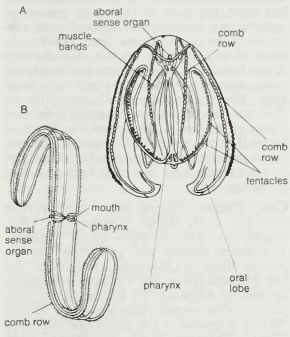
ctenophore, byname COMB JELLY, any of the numerous marine invertebrates constituting the phylum Ctenophora. The phylum derives its name (from the Greek *ctene,* or "comb," and *phora,* or "bearer") from the series of vertical ciliary combs over the surface of the animal. The body form resembles that of the cnidarian medusa. Various forms of ctenophores are known by other common names—sea walnuts, sea gooseberries, cat's-eyes.

Though comb jellies are, for the most part, of small size, at least one species, the Venus's girdle, may attain a length of more than 1 m (3 feet). One parasitic species is only 3 mm (1/8 inch) in diameter. Some ctenophores live in somewhat brackish water, but all are confined to marine habitats. They live in almost all ocean regions, particularly in surface waters near shores. At least two species (*Pleurobrachia pileus* and *Beroe cucumis*) are cosmopolitan, but most have a more restricted distribution.

Apart from a few creeping and parasitic species, ctenophores float freely suspended in the water. They are frequently swept into vast swarms, especially in bays, lagoons, and other coastal waters. Except for one parasitic species, all of them are carnivorous, eating myriads of small planktonic animals. When abundant in a region, ctenophores consume most of the young of fish, larval crabs, clams, and oysters, as well as copepods and other planktonic animals that would otherwise serve as food for such commercial fish as sardines and herring. In turn, however, comb jellies are themselves consumed by certain fish.

Natural history. Ctenophores are hermaphroditic; eggs and sperm (gametes) are produced in separate gonads along the meridional canals that house the comb rows. In most ctenophores, these gametes are released into the water, where fertilization and embryonic development take place. In *Pleurobrachia* and in other Cydippida, the larva closely resembles the adult, so that there is little change with maturation. Most ctenophores, however, have a so-called cydippid larva, which is ovoid or spherical with two retractable tentacles. The metamorphosis of the globular cydippid larva into an adult is direct in ovoid-shaped adults and rather more prolonged in the members of flattened groups. Only the parasitic *Gastrodes* has a free-swimming planula larva comparable to that of the cnidarians.

Form and function. Most ctenophores are colourless, although *Beroe cucumis* is pink and



Diversity among ctenophores
(A) *Mnemiopsis,* (B) *Velamen,* (C) *Beroe*

From *Invertebrate Zoology* by Paul A. Meglitsch, copyright © 1967 by Oxford University Press, Inc.; reprinted by permission

the Venus's girdle (*Cestum veneris*) is delicate violet. The colourless species are transparent when suspended in water, except for their beautifully iridescent rows of comb plates. Most of the comb jellies are bioluminescent; they exhibit nocturnal displays of bluish or greenish light that are among the most brilliant and beautiful known in the animal kingdom.

Most of the nearly 90 known species of comb jellies are spherical or oval, with a conspicuous sense organ (the statocyst) at one end (aboral) of the body and a mouth at the other end (oral). The eight comb rows that extend orally from the vicinity of the statocyst serve as organs of locomotion. Each comb row is made up of a series of transverse plates of very large cilia, fused at the base, called combs. When the cilia beat, the effective stroke is toward the statocyst, so that the animal normally swims oral end first. The more primitive forms (order Cydippida) have a pair of long, retractable branched tentacles that function in the capture of food. The tentacles are richly supplied with adhesive cells called colloblasts, which are found only among ctenophores. These cells produce a sticky secretion, to which prey organisms adhere on contact.

The mouth leads into a tubular pharynx, from the aboral end of which arises a complex, branched series of canals that make up the digestive tract. Since this structure serves both digestive and circulatory functions, it is known as a gastrovascular cavity. Ctenophores have no true anus; the central canal opens toward the aboral end by two small pores, through which a small amount of egestion can take place.

Gonads develop as thickenings of the lining of the digestive canals. The nervous system is a primitive nerve network, somewhat more concentrated beneath the comb plates. It is similar to the cnidarian nervous system. There is no trace of an excretory system.

The outside of the body is covered by a thin layer of ectodermal cells, which also line the pharynx. A second thin layer of cells, constituting the endoderm, lines the gastrovascular cavity. Between the ectoderm and the endoderm is a thick gelatinous layer, the mesoglea. Because it contains not only many mesenchymal cells (or unspecialized connective tissue) but also specialized cells (*e.g.,* muscle cells), the mesoglea forms a true mesoderm. In this respect the comb jellies are more highly evolved than even the most complex cnidarians.

Classification. Ctenophores and cnidarians were formerly placed together in the phylum Coelenterata. Modern authorities, however, have separated the cnidarians and ctenophores on the basis of the following ctenophore characteristics: (1) the lack of the stinging cells (nematocysts) that are characteristic of cnidarians; (2) the existence of a definite mesoderm in the ctenophores; (3) fundamental differences in embryological development between the two groups; and (4) the biradial symmetry of ctenophores. It is, however, generally thought that ctenophores and cnidarians share a common evolutionary ancestor.

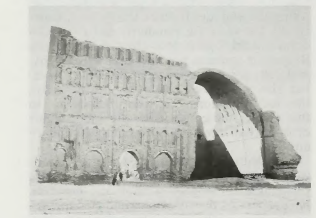
Ctesias (b. *c.* 416 BC, Cnidus, Caria), Greek physician and historian of Persia and India whose works were the only historical writings of his time based on official Persian sources. Ctesias traveled to the Persian court, where he remained as physician for 17 years under the rulers Darius II and Artaxerxes Mnemon. He apparently accompanied the latter to the Battle of Cunaxa in 401. Returning to Greece in 398, Ctesias began writing his *Persicha,* a history of Assyria-Babylonia in 23 books covering the period of the ancient Assyrian monarchy, the founding of the Persian king-

dom, and the history of Persia down to 398 BC. Although his material was gathered from Persian archives and state records, its credibility is dubious because of its legendary quality and the fact that Ctesias was writing expressly to contradict the chronology of the Greek historian Herodotus. The work no longer exists, except in an abstract compiled by the patriarch Photius of Constantinople (fl. *c.* 860). Ctesias also wrote a history of India based on reports of Persian visitors and of Indian merchants and envoys to the Persian court. Although legendary and fabulous, it was the only systematic account of India until Alexander the Great's invasion of that country.

Ctesibius OF ALEXANDRIA, Ctesibius also spelled KTESIBIOS (fl. *c.* 270 BC), Greek physicist and inventor, the first great figure of the ancient engineering tradition of Alexandria, Egypt.

Ctesibius was the son of a barber. The discovery of the elasticity of air is attributed to Ctesibius, as is the invention of several devices using compressed air, including force pumps and an air-powered catapult. His most famous invention, however, was an improvement of the clepsydra, or water clock, in which water dripping at a constant rate raised a float that held a pointer to mark the passage of the hours. Another notable invention was a hydraulis, or water organ, in which air was forced through the organ pipes by the weight of water rather than by falling lead weights. Ctesibius' writings have not survived, and his inventions are known only from references to them by Vitruvius and Hero of Alexandria, but he laid the foundations for the engineering tradition that culminated in the works of Hero of Alexandria and of Philo of Byzantium.

Ctesiphon, also spelled TUSBUN, OR TAYSAFUN, ancient city located on the left (northeast) bank of the Tigris River about 20 miles (32 km) southeast of modern Baghdad, in east-central Iraq. It served as the winter capital of



Palace of Khosrow I at Ctesiphon
By courtesy of the Oriental Institute, the University of Chicago

the Parthian empire and later of the Sāsānian empire. The site is famous for the remains of a gigantic vaulted hall, the Ṭāq Kisrā, which is traditionally regarded as the palace of the Sāsānian king Khosrow I (reigned AD 531–579), although Shāpūr I (reigned AD 241–272) also undertook work on the site. The hall has one of the largest single-span brick arches in the world.

Classical writers claimed that Ctesiphon was founded by the Parthian king Vardanes. The first reliable mention of Ctesiphon, however, is as a Greek army camp on the east bank of the Tigris River opposite the Hellenistic city of Seleucia. Since then the course of the river has shifted, no longer flowing between the ruins of the two cities but instead dividing Ctesiphon itself. In 129 BC, when the Arsacids (Parthians) annexed Babylonia, they found Ctesiphon a convenient residence and cantonment, and under their rule Seleucia and its royal suburb of Ctesiphon came to form a twin city and a capital of the empire. A discontinuous Roman occupation of Seleucia and Ctesiphon began under the emperor Trajan in AD 116. During the Roman sack of the city complex in AD 165 by the general Avidius Cassius, the palaces of Ctesiphon were destroyed and Seleucia was depopulated. The Sāsānian monarchy, which replaced the Arsacids in AD 224, resettled Ctesiphon.

The Arabs in AD 637 conquered the city and at first used the Ṭāq Kisrā as an improvised mosque. But by 763 Ctesiphon had been superseded by the newly founded city of Baghdad, and Ctesiphon's deserted ruins were used as a quarry for building materials.

Ču (river, Kyrgyzstan–Kazakhstan): *see* Chu River.

Cú Chulainn, also called CUCHULAIN, CUCHULINN, OR CUCHULLIN, in ancient Irish Gaelic literature, the central character of the Ulster (Ulaid) cycle. He was the greatest of the Knights of the Red Branch, *i.e.*, the warriors loyal to Conor (Conchobar mac Nessa), who was reputedly king of the Ulaids of northeast Ireland at about the beginning of the 1st century BC. Cú Chulainn, born as Sétante, the son of the god Lug (Lugh) of the Long Arm and Dechtire, the sister of Conor, was of great size and beauty and won distinction for his exploits while still a child. His prowess was increased by the gift of seven fingers on each hand, seven toes on each foot, and seven pupils in each eye. Favoured by the gods and exempt from the curse of periodic feebleness laid upon the men of Ulster, he performed superhuman exploits and labours comparable to those of the Greek hero Achilles. In times of rage he took on the characteristics of the Scandinavian berserkers and would become monstrously deformed and uncontrollable. *The Cattle Raid of Cooley* (*Táin Bó Cuailnge*) records his single-handed defense of Ulster at the age of 17 against the forces of Medb (Maeve), queen of Connaught. According to the best-known legends, he was tricked by his enemies into an unfair fight and slain at the age of 27.

Cua, Paulus, original name HUYNH TINH CUA (b. 1834, Baria, Vietnam—d. 1907, Saigon [now Ho Chi Minh City], Vietnam), Vietnamese scholar who contributed to the popular usage of Quoc-ngu, a romanized system of transcribing the Vietnamese language devised by Alexandre de Rhodes in the 17th century. Cua helped make it popular by employing it instead of the traditional system of Chinese ideographs in his many literary works and textbooks.

Paulus Cua was among Vietnam's early converts to Christianity and was educated at a French mission at Penang (now Pinang, Malaysia). After graduation he served the French colonial administration as an interpreter. He also rendered the *Giadinh Bao,* the official colonial journal, into Quoc-ngu. By passing the mandarin examinations, Paulus Cua achieved a rank within the traditional Confucian-based hierarchy of the Vietnamese court and served later on a board that examined candidates' knowledge of Vietnamese and Chinese and conferred degrees.

Paulus Cua wrote many plays as well as a dictionary, novels, and mathematical texts, all in Quoc-ngu. He was also the author of a number of ethnological works that detailed the customs and mores of his people. *Rites familiaux* (1886; "Family Rites"), describing the Confucian-influenced, familial ancestor cult, is among his frequently cited books.

Cuando River (southern Africa): *see* Kwando River.

Cuanza River (Angola): *see* Kwanza River.

cuataquil (mammal): *see* olingo.

cuatequil (Spanish land system): *see* repartimiento.

Cuauhtémoc, also called GUATIMOZIN (b. *c.* 1495—d. Feb. 26, 1522), 11th and last Aztec emperor, nephew and son-in-law of Montezuma II.

Cuauhtémoc became emperor in 1520 on the death of Montezuma's successor, Cuitláhuac. Hernán Cortés, with powerful Indian allies, was then marching on Tenochtitlán, the Aztec capital. Cuauhtémoc's frontier forces were forced to retreat in 1521, and he defended his capital in a four-month siege that left most of the city destroyed and few Indians surviving. Captured by the Spanish, he was at first treated with deference. Later, Cuauhtémoc was tortured to reveal the location of hidden Aztec wealth. His stoicism and refusal to speak became legendary. Fearing trouble if he left Cuauhtémoc behind, Cortés took the emperor with him to Honduras. En route, hearing of a plot against the Spaniards, he ordered Cuauhtémoc hanged.

In 1949 bones purported to be Cuauhtémoc's were discovered at Ixcateopan, Mex.

Cuba, officially REPUBLIC OF CUBA, Spanish REPÚBLICA DE CUBA, island state of the West Indies, consisting of one large island and numerous smaller islands, islets, and cays, and situated in the Atlantic Ocean, 90 miles (145 km) south of the tip of Florida, U.S. Cuba lies just south of the Tropic of Cancer at the entrance to the Gulf of Mexico and covers a land area of 42,804 square miles (110,861 square km)—more than one-half of the total land area of the West Indies. The capital is Havana. Cuba extends approximately 777 miles (1,250 km) from east to west and has a width of 19 miles (31 km) in the northwest to 119 miles (191 km) in the southeast. The population in 1992 was estimated at 10,797,000.



Cuba

A brief treatment of Cuba follows. For full treatment, *see* MACROPAEDIA: West Indies.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. About one-quarter of Cuba's total land area is mountainous. The three distinct mountain systems trending east–west are known as oriental (eastern), central, and occidental (western). The oriental system, the Sierra Maestra, is the most extensive and complex and includes Real del Turquino Peak, at 6,476 feet (1,974 m) above sea level the highest point in the country. The small central system consists of a number of low ranges and hills (*alturas*). The occidental system, the Cordillera de Guaniguanico, is a region of rugged mountains and hills with karst topography. The remaining three-fourths of the island's surface is composed of extensive plains and basins. The Cauto River in the southeast is the country's longest (230 miles [370 km]) river and its principal inland waterway.

Cuba has a semitropical climate with two sea-

sons, dry (November–April) and wet (May–October). The mean annual temperature is 79° F (26° C), ranging from 73° F (23° C) in January to 82° F (28° C) in August. Annual precipitation, mostly rain falling during tropical storms, averages 54 inches (1,380 mm) and ranges from more than 70 inches (1,780 mm) in the mountains to 40 or 50 inches (1,000 or 1,300 mm) in the lowlands. Hurricanes, occurring between June and November, are occasionally devastating. Tropical forests of pine, mahogany, ebony, royal palm, and ceiba (kapok) produce valuable timber, and lemon, orange, avocado, and papaya trees grow in profusion. Extensive sugarcane, coffee, and rice plantations are maintained in those regions of the island where the soil is most fertile. Cattle ranches and tobacco farms are located in the savannas of the central and western parts of the country. Cuba's fauna chiefly consists of small animals including tropical bats, rodents, migratory birds, reptiles, tortoises, and crocodiles. The mineral resources of the country are modest, with the exception of extensive nickel reserves.

The people. Before the Spanish conquest, the Indian population was estimated at about 112,000, but the Indians subsequently became nearly extinct. About one-third of the population are mulatto (of black-Spanish descent) or black, descendants of approximately 750,000 African slaves who were imported by the Spanish. Considerable white (mostly Spanish) immigration took place during the early 1900s, and white Cubans now constitute about two-thirds of the total population. Whites and mestizos have traditionally dominated Cuba's economy, politics, and culture, but the society has been moving toward racial integration.

Spanish is the official language. Roman Catholicism has traditionally been the major religion and is still the largest faith avowed, despite communist disapproval. About 40 percent of the populace continued to profess Roman Catholicism.

Cuba's population is growing slowly. Health services were greatly improved after 1959, and the birth and death rates have declined. Heavy migration from rural areas to Havana's slums was ended by the government during the 1970s. More than 70 percent of the population is urban.

The economy. Cuba was the first communist republic in the Western Hemisphere. The nation has a centrally planned economy that is heavily dependent on the production and export of sugar (from sugarcane) and, to a much lesser extent, of tobacco and nickel. Cuba's economic development was heavily subsidized by the Soviet Union, from the 1960s to the late 1980s, but there were still frequent shortages of consumer goods. The disintegration of the Soviet Union in 1990–91 left isolated Cuba in economic distress.

Agriculture accounts for about one-sixth of the total material product and employs a comparable fraction of the work force. The state owns most of the farmland, and private holdings are limited to 163 acres (66 hectares). Production of rice and beans, the chief staples, does not meet domestic demand.

Sugar, which is produced mostly on highly mechanized state farms, is the principal cash crop. Much of it was exported to the Soviet Union and, later, to Russia. Tobacco is grown principally to produce cigars for export. The government has had considerable success in increasing the production of citrus fruits and coffee. The eastern and central savannas support large herds of cattle. The fishing industry has received extensive government investment; lobster and tuna are the major species caught. A renewed promotion of tourism in the 1990s contributed some measure of support to the economy.

Mineral industries are dominated by the production of nickel, which is exported. Cuba was able to purchase most of its petroleum from the Soviet Union at a discount until the 1990s. The nation's industries centre on food processing (including sugar), beverages, and tobacco. Other manufactures include the production of steel, cement, fertilizers, textiles, domestic consumer goods, and agricultural machinery. Electricity is generated almost entirely from imported fuels, with a small fraction from hydroelectric plants.

The Confederation of Cuban Workers is the only labour union permitted to exist; it does not function on the Western model. There is a shortage of skilled labour in Cuba.

Government and social conditions. Cuba is a socialist state governed by the only legal political party, the Communist Party of Cuba (Partido Comunista de Cuba [PCC]). The PCC's supremacy is recognized in the 1976 constitution, and its structure is similar to that of other former Communist parties; the PCC's Political Bureau is the highest policy-making body and controls all formal government institutions. Legislative power is vested in the National Assembly of the People's Power, consisting of 510 members elected by municipal assemblies to five-year terms. The National Assembly elects from among its membership the State Council to serve as its permanent organ. Executive and administrative power is vested in the appointed Council of Ministers. The president of the Council of State is also the president of the Council of Ministers, acting as head of both state and government. The judicial system is headed by the People's Supreme Court.

Cuba's social-security programs provide a wide range of benefits, including sickness, maternity, and work-injury benefits and old-age, disability, and survivor pensions. Medical care is free to all citizens. Health conditions in Cuba are generally good as reflected in the average life expectancy of more than 74 years and one of the lowest infant mortality rates in Latin America. Modern and well-staffed medical facilities are widely available.

Education is free at all levels and compulsory between the ages of 6 and 12. It is based on Marxist-Leninist principles, combining study with manual work. The government controls the communications media. *Granma,* the organ of the PCC, has the highest circulation of any daily newspaper. Both radio and television broadcasting are used extensively to disseminate educational and political information.

Cultural life. The most prominent Cuban writer of the 19th century was the poet and essayist José Martí, whose works continue to be read in the 20th century. The most prominent Cuban writers of the 20th century have been Nicolás Guillén, Alejo Carpentier, and José Lezama Lima. The Cuban national theatre has produced several important works. Cuban music has Spanish and African roots.

History. Several Indian groups inhabited Cuba at the time of the first Spanish contact: the Ciboney and Guanahetabey and the Arawak (or Taino), who had arrived later. Christopher Columbus claimed Cuba for Spain in 1492 during his first voyage to the Americas. Diego Velázquez established the first permanent European settlement at Baracoa in 1511.

Cuba was soon divided by the Spanish into seven municipalities, and the colony became a staging area for expeditions to Central America, such as Hernan Cortés' incursion into Mexico (1519–21). The decline of Cuba's Indian population made the system of *encomiendas* (estates of land with the Indians inhabiting it as labourers) uneconomical in the late 16th century. During the 17th century colonial life was difficult because of raids and attacks from rival European powers.

During the 18th and 19th centuries Cuba prospered primarily from the development of sugarcane cultivation, the importation of slaves for labour, and the growth of the sugar industry. In the 19th century the Cuban sugar industry became the world's most mechanized, and by 1860 it produced nearly one-third of the world's sugar. In 1865 the slave trade ended, but Mexican Indians and Chinese augmented the labour force. Slavery was abolished in Cuba in 1886. During the late 19th century the United States became a major trading partner and financier. Spain's failure to grant political autonomy, together with an increasing tax burden, led to the first war of Cuban independence—the Ten Years' War (1868–78)—which resulted in a military stalemate. A second war of independence erupted in 1895, in which Spain deployed more than 200,000 soldiers. In 1898 the United States became involved in the war against the Spaniards following a mysterious explosion aboard the USS *Maine,* anchored in Havana harbour.

Cuban independence in 1899 was followed by a period of U.S. occupation, during which order was restored and a number of schools, roads, and bridges were built. In 1901 the United States obtained the right to oversee Cuban foreign and internal affairs as well as to establish a naval base at Guantánamo Bay.

Tomás Estrada Palma was elected the first Cuban president in 1902. A period of rebellion in 1905–06 was followed by a second U.S. occupation in 1906–09. In 1909 a new Cuban administration took office with the Liberal president José Miguel Gómez. The Gómez presidency established a pattern of graft, corruption, and social injustice toward Afro-Cubans that succeeding presidents and dictators followed. Cuba continued to attract American investment, and this investment, combined with the growing sugar industry, tourism, and gambling, caused the economy to prosper. Inequalities in the distribution of wealth persisted in the Cuban economy, however, as did political corruption. In 1958, following a prolonged period of exile and guerrilla warfare against the Cuban government, the communist revolutionary Fidel Castro overthrew the longtime dictator Fulgencio Batista.

Castro soon aligned Cuba with the Soviet Union, abolished capitalism, nationalized foreign-owned enterprises, and instituted many Soviet-styled agrarian and industrial measures, finally converting his own revolutionary party into the PCC. Relations with the United States deteriorated, reaching a low point with the U.S.-backed Bay of Pigs invasion in 1961 and the Cuban Missile Crisis in 1962. During the 1960s and '70s Cuba became a stalwart Soviet satellite and surrogate for spreading communist revolution in the Third World. Cuba encouraged revolutionary movements in Latin America and sent troops to help prop up Soviet client states in Angola and Ethiopia. At home, Castro's government was notably successful in providing educational and medical services to all segments of Cuban society, but the Cuban economy remained stagnant and became heavily dependent on Soviet aid. Castro attempted to alter Cuba's image by attempting to assume a leadership role in the nonaligned-countries movement. The collapse of communism in eastern Europe and the Soviet Union, however, severely wounded Cuba politically and economically.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Cuban Independence Movement, nationalist uprising in Cuba against Spanish rule. It began with the unsuccessful Ten Years' War (Guerra de los Diez Años; 1868–78) and culminated in the U.S. intervention that ended the Spanish colonial presence in the Americas (*see* Spanish-American War).

Dissatisfied with the corrupt and inefficient Spanish administration, lack of political representation, and high taxes, Cubans in the eastern provinces united under the wealthy planter Carlos Manuel de Céspedes, whose declaration of independence in October 1868 (*El Grito de Yara,* "The Cry of Yara") signaled the beginning of the Ten Years' War, in which 200,000 lives were lost. Céspedes had the support of landowners, whose main interest was economic and political independence from Spain, whereas the farmers and labourers were more concerned with the immediate abolition of slavery and greater political power for the common man.

In 1876 Spain sent General Arsenio Martínez Campos to crush the revolution. Lacking organization and significant outside support, the rebels agreed to an armistice in February 1878 (Pact of Zanjón), the terms of which promised amnesty and political reform. A second uprising (La Guerra Chiquita, "The Little War"), engineered by Calixto García, began in August 1879 but was quelled by superior Spanish forces in autumn 1880. Spain gave Cuba representation in the Cortes (parliament) and abolished slavery in 1886. Other promised reforms, however, never materialized.

In 1894 Spain canceled a trade pact between Cuba and the United States. The imposition of more taxes and trade restrictions prodded the economically distressed Cubans in 1895 to launch the Cuban War of Independence, a resumption of the earlier struggle. Inspired by José Martí—poet, journalist, and ideological spokesman of the revolution—and employing sophisticated guerrilla tactics under the leadership of Máximo Gómez and Antonio Maceo, the revolutionary army took control of the eastern region, declared the Republic of Cuba in September 1895, and sent Maceo's forces to invade the western provinces.

By January 1896 rebel forces controlled most of the island, and the Spanish government replaced Martínez Campos with General Valeriano Weyler y Nicolau, who soon became known as El Carnicero ("The Butcher"). In order to deprive the revolutionaries of the rural support on which they depended, Weyler instituted a brutal program of "reconcentration," forcing hundreds of thousands of Cubans into camps in the towns and cities, where they died of starvation and disease by the tens of thousands.

In 1897 Spain recalled Weyler, offered home rule to Cuba, and, the next year, ordered the end of reconcentration. All this failed to prevent the Spanish-American War. By the time of the American intervention in April 1898, Maceo had been killed and Spain had control of most of the urban areas, but the rebels still controlled about three-fourths of the island's area, and Cuban resistance to Spanish rule was virtually universal. The war was over by August 12, when the United States and Spain signed a preliminary peace treaty. By the Treaty of Paris of Dec. 10, 1898, Spain withdrew from Cuba. A U.S. occupation force remained for over three years, until the Republic of Cuba was effected on May 20, 1902.

To make the best use of the Britannica, consult the INDEX *first*

Cuban missile crisis (October 1962), major confrontation that brought the United States and the Soviet Union close to war over the presence of Soviet nuclear-armed missiles in Cuba.

Having promised in May 1960 to defend Cuba with Soviet arms, the Soviet premier Nikita Khrushchev assumed that the United States would take no steps to prevent the installation of Soviet medium- and intermediate-range ballistic missiles in Cuba. Such missiles could hit much of the eastern United States within a few minutes if launched from Cuba. The United States learned in July 1962 that the Soviet Union had begun missile shipments to Cuba. By August 29 new military construction and the presence of Soviet technicians had been reported by U.S. U-2 spy planes flying over the island, and on October 14 the presence of a ballistic missile on a launching site was reported.

After carefully considering the alternatives of an immediate U.S. invasion of Cuba (or air strikes of the missile sites), a blockade of the island, or further diplomatic maneuvers, President John F. Kennedy decided to place a naval "quarantine," or blockade, on Cuba to prevent further Soviet shipments of missiles. Kennedy announced the quarantine on October 22 and warned that U.S. forces would seize "offensive weapons and associated matériel" that Soviet vessels might attempt to deliver to Cuba. During the following days, Soviet ships bound for Cuba altered course away from the quarantined zone. As the two superpowers hovered close to the brink of nuclear war, messages were exchanged between Kennedy and Khrushchev amidst extreme tension on both sides. On October 28 Khrushchev capitulated, informing Kennedy that work on the missile sites would be halted and that the missiles already in Cuba would be returned to the Soviet Union. In return, Kennedy committed the United States never to invade Cuba. Kennedy also secretly promised to withdraw the nuclear-armed missiles that the United States had stationed in Turkey in previous years. In the following weeks both superpowers began fulfilling their promises, and the crisis was over by late November. Cuba's communist leader, Fidel Castro, was infuriated by the Soviets' retreat in the face of U.S. power but was powerless to act.

The Cuban missile crisis marked the climax of an acutely antagonistic period in U.S.-Soviet relations. The crisis also marked the closest point that the world had ever come to global nuclear war. It is generally believed that the Soviets' humiliation in Cuba played an important part in Khrushchev's fall from power in October 1964 and in the Soviet Union's determination to achieve, at the least, a nuclear parity with the United States.

cubanite, a copper and iron sulfide mineral ($CuFe_2S_3$) that characteristically occurs with chalcopyrite or pyrrhotite in deposits formed at high temperatures, as in Barracanao, Cuba; Sudbury, Ont., Can.; and Fierro, N.M., U.S. The mineral forms opaque, brassy or bronze-yellow crystals that belong to the orthorhombic system. For detailed physical properties, *see* sulfide mineral (table).

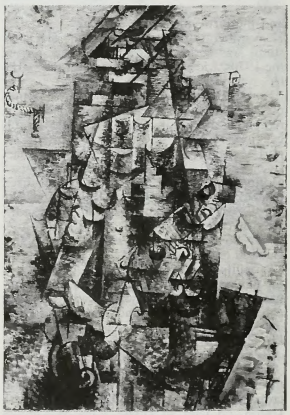
Cubatão, city, eastern São Paulo *estado* ("state"), southeastern Brazil. It is situated on the Atlantic coastal lowlands 16 miles (26 km) northwest of the port of Santos. Created in 1948 from several municipalities of Santos, Cubatão has become one of the state's principal banana producers as well as an important industrial centre. One of the largest petroleum refineries in the country is located in Cubatão, producing oil, asphalt, plastic, synthetic rubber, and propane and butane gas, in addition to petroleum fuels. Cubatão also has a large steel plant and two major hydroelectric generating facilities. The negative result was initially one of industrial pollution, earning the area the name of Valley of Death; but pollution controls and other environmental efforts cleaned up the city in the late 1980s and '90s. The city is linked to Santos by highway, and both a highway and a railroad extend northward from Cubatão to São Paulo city, the state capital. Pop. (1985 est.) 98,322.

cubic system (crystallography): *see* isometric system.

Cubism, highly influential visual arts style of the 20th century that was created principally by the painters Pablo Picasso and Georges Braque in Paris between 1907 and 1914. The Cubist style emphasized the flat, two-dimensional surface of the picture plane, rejecting the traditional techniques of perspective, foreshortening, modeling, and chiaroscuro and refuting time-honoured theories of art as the imitation of nature. Cubist painters were not bound to copying form, texture, colour, and space; instead, they presented a new reality in paintings that depicted radically fragmented objects, whose several sides were seen simultaneously.

Cubism derived its name from remarks that were made by the painter Henri Matisse and the critic Louis Vauxcelles, who derisively described Braque's 1908 work "Houses at L'Estaque" as composed of cubes. In Braque's work, the volumes of the houses, the cylindrical forms of the trees, and the tan-and-green colour scheme are reminiscent of Paul Cézanne's landscapes, which deeply inspired the Cubists in their first stage of development, until 1909. It was, however, "Les Demoiselles d'Avignon," a work painted by Picasso in 1907, that forecast the new style; in this work, the forms of five female nudes became fractured, angular shapes. As in Cézanne's art, perspective was rendered by means of colour, the warm reddish browns advancing and the cool blues receding.

The period from 1910 to 1912 often is referred to as that of Analytical Cubism. Paintings executed during this period showed the breaking down, or analysis, of form. Right-angle and straight-line construction were favoured, though occasionally some areas of the painting appeared sculptural, as in Picasso's "Girl with a Mandolin" (1910). Colour schemes were simplified, tending to be nearly monochromatic (hues of tan, brown, gray, cream, green, or blue preferred) in order not to distract the viewer from the artist's primary



"Man with a Guitar," Analytical Cubist oil painting by Georges Braque, 1911; in the collection of the Museum of Modern Art, New York City

© by A.D.A.G.P. Paris, 1974

interest—the structure of form itself. The monochromatic colour scheme was suited to the presentation of complex, multiple views of the object, which was now reduced to overlapping opaque and transparent planes. These planes appear to ascend the surface of the canvas rather than to recede in depth. Forms are generally compact and dense in the centre of the Analytical Cubist painting, growing

larger as they diffuse toward the edges of the canvas, as in Picasso's "Portrait of Ambroise Vollard" (1909–10; State Pushkin Museum of Fine Arts, Moscow). Paintings frequently combine representational motifs with letters, the latter emphasizing the painter's concern with abstraction; favourite motifs are musical instruments, bottles, pitchers, glasses, newspapers, still lifes, and the human face and figure.

Interest in this subject matter continued after 1912, during the phase generally identified with Synthetic Cubism. Works of this phase emphasize the combination, or synthesis, of forms in the picture. Colour assumes a strong role in the work; shapes, while remaining fragmented and flat, are larger and more decorative. Smooth and rough surfaces may be contrasted with one another; and frequently foreign materials, such as newspapers or tobacco wrappers, are pasted on the canvas in combination with painted areas. This technique, known as collage, further emphasizes the differences in texture and, at the same time, poses the question of what is reality and what is illusion in nature and in painting.



"The Sunblind," Synthetic Cubist collage on canvas with crayon by Juan Gris, 1914; in the Tate Gallery, London

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While Picasso and Braque are credited with creating the new visual language, it was adopted and further developed by numerous painters, such as Fernand Léger, Robert and Sonia Delaunay, Juan Gris, Roger de la Fresnaye, Marcel Duchamp, Albert Gleizes, and Jean Metzinger. Though primarily a style associated with painting, Cubism also exerted a profound influence on 20th-century sculpture and architecture. Chief among the sculptors who worked in this style are Alexander Archipenko, Raymond Duchamp-Villon, and Jacques Lipchitz. The adoption of the Cubist aesthetic by the architect Le Corbusier is reflected in the shapes of the houses he designed during the 1920s.

cubit, also called COVID, unit of linear measure used by many ancient peoples. It may have originated in Egypt around 3000 BC; it thereafter became ubiquitous in the ancient world. The cubit, usually equal to about 18 inches (457 millimetres), was based on the length of the arm from the elbow to the extended finger tips. The Egyptian royal cubit (20.6 inches, or 524 millimetres) was subdivided into 28 digits, with 4 digits equalling a palm and 5 a hand. Twelve digits was a small span, 14 digits a large span, 16 digits a *t'ser,* and 20 digits a small cubit.

The basic Babylonian measure of length, the *kus,* was also called the cubit and measured about 20.9 inches (531 millimetres). The Greeks possessed an Olympic cubit equalling 24 fingers. The Romans and the ancient Hebrews also used the cubit.

Cuchilla Grande, range of granite hills, eastern Uruguay, forming the eastern limit of the Río Negro drainage basin and the watershed between it and that of the Mirim Lagoon (Laguna Merín) to the northeast at the Brazil–Uruguay border. The Cuchilla Grande (Spanish, Big Knife) extends about 220 mi (350 km) southward from the Brazilian border, almost to the Atlantic seaboard in the south, and rarely exceeds 600 ft (180 m), although it reaches almost 1,300 ft at Aceguá. Its relief, though low, is sharp, angular grey rocks often protruding through the soil along the ridges. A westward extension, the Cuchilla Grande del Durazno, separates the basins of the Negro (north) and Yi (south).

Cuchullins, The (Scotland): *see* Cuillin Hills.

cuckoo, any of numerous birds of the family Cuculidae (order Cuculiformes). Usually, the name is reserved for some 60 arboreal members of the subfamilies Cuculinae and Phaenicophaeinae. In western Europe the term cuckoo is applied without modifiers to the most common local form, elsewhere called the common, or European, cuckoo (*Cuculus canorus*). Many cuckoos are known by specialized names, such as ani, coua, coucal, guira, and roadrunner (*qq.v.*). Members of the subfamily Neomorphinae are called ground cuckoos (*see* ground cuckoo).

The family Cuculidae is worldwide, found in temperate and tropical regions but is most diverse in the Old World tropics. Cuculids tend to be shy inhabitants of thick vegetation, more often heard than seen. Many species are named for the sounds they make, *e.g.,* "brain-fever" bird (a hawk cuckoo, *Cuculus varius*), koel (*Eudynamys scolopacea*), and the term cuckoo itself, the latter two being imitations of the bird's song.

Cuculids range in length from about 16 centimetres (6½ inches) in the glossy cuckoos (*Chrysococcyx* and *Chalcites*) to about 90 cm (36 in.) in the larger ground cuckoos. Most are coloured in drab grays and browns, but a few have striking patches of rufous (reddish) or white, and the glossy cuckoos are largely or partially shining emerald green. Some of the tropical cuckoos have strongly iridescent bluish plumage on their backs and wings. With the exception of a few strongly migratory species, most cuckoos are short winged. All have long (sometimes extremely long), graduated tails, usually with the individual feathers tipped with white. The legs vary from medium to rather long (in the terrestrial forms) and the feet are zygodactyl; *i.e.,* the outer toe is reversed, pointing backward. The bill is rather stout and somewhat downcurved.

The attribute for which the cuckoos are best known is the habit of brood parasitism, found in all of the Cuculinae and three species of Phaenicophaeinae. It consists of laying the eggs singly in the nests of certain other bird species to be incubated by the foster parents, who rear the young cuckoo. Among the 47 species of cuculines, various adaptations enhance the survival of the young cuckoo: egg mimicry, in which the cuckoo egg resembles that of the host, thus minimizing rejection by the host; removal of one or more host eggs by the adult cuckoo, reducing both the competition from host nestlings and the danger of recognition by the host that an egg has been added to the nest; and nest-mate ejection, in which the young cuckoo heaves from the nest the host's eggs and nestlings. Some species of *Cuculus* resemble certain bird-eating hawks (*Accipiter*) in appearance and mannerisms, apparently frightening the potential host and allowing the cuckoo to approach the nest unmolested.



Cuckoo (*Cuculus*)
Graeme Chapman—Ardea, London

The nonparasitic phaenicophaeine cuckoos are represented in North America by the widespread yellow-billed and black-billed cuckoos (*Coccyzus americanus* and *C. erythropthalmus*) and the mangrove cuckoo (*C. minor*), which is restricted in the United States to coastal southern Florida (also found in the West Indies and Mexico to northern South America); they are represented in Central and South America by about 12 other species, some placed in the genera *Piaya* (squirrel cuckoos) and *Saurothera* (lizard cuckoos). The 13 Old World phaenicophaeine species are divided among nine genera.

The phaenicophaeine cuckoos build flimsy stick nests in low vegetation. Both parents share in incubation and feeding the young.

cuckoo, ground: *see* ground cuckoo.

cuckoo roller, also called COUROL (*Leptosomus discolor*), little-known bird found in Madagascar and the neighbouring Comoros, named for its superficial resemblance to cuckoos but usually considered the sole member of the family Leptosomatidae (sometimes treated as a subfamily of the Coraciidae [rollers]). It is about 43 centimetres (17 inches) long. Males are iridescent green above and gray below;



Cuckoo roller (*Leptosomus discolor*)
Painting by H. Douglas Pratt

females are brown above with tan and black spots below.

cuckoo-shrike, any of several Old World songbirds of the family Campephagidae (*q.v.*; order Passeriformes). In the genus *Coracina* (including *Edolisoma*), found from Africa to Pacific islands, the plumage is gray, often with cuckoo-like barring or a shrike-like mask (sexes similar); many of the 41 species are known as graybirds. An example is the large, or black-faced, cuckoo-shrike (*C. novaehollandiae*), about 30 centimetres (12 inches)



Cuckoo-shrike (*Campephaga*)
Painting by Murrell Butler

long, of India and China to Australasia. In *Campephaga*, mainly an African genus, males are glossy black, females brownish and barred. An example is the 20-cm (8-in.) black cuckoo-shrike (*C. phoenicea*, including *sulphurata*), which has red- and yellow-shouldered races. African forms, sometimes separately classified as *Lobotos*, have bill wattles. The ground cuckoo-shrike (*Pteropodocys maxima*) of Australia is the only cuckoo-shrike that is not arboreal.

cuckoo spit insect: *see* froghopper.

cuckoo wasp, also called RUBY-TAILED WASP, any member of the insect family Chrysididae (Chrysalidae) of the order Hymenoptera. The family is large, common, and widely distributed. More than 1,000 species of the genus *Chrysis* alone have been described. Most cuckoo wasps are small, seldom exceeding 1.2 centimetres (about ½ inch) in length. The



Cuckoo wasp (family Chrysididae)
William E. Ferguson

colour is usually metallic green or blue. The flexible abdomen allows the insect to curl into a ball when disturbed or attacked.

All cuckoo wasps are solitary (nonsocial), external parasites, mostly of full-grown bee or wasp larvae. Species of the genus *Cleptes* are parasitic on sawfly larvae; those of *Mesitiopterus* are parasitic on the eggs of the walkingstick.

The cuckoo wasps are so called because some species lay eggs in the nests of other solitary wasps and bees in a manner analogous to some cuckoos (bird order Cuculiformes), which lay eggs in the nests of other birds. The cuckoo wasp female places her egg in the unfinished and untended nest of another wasp or bee. The nest is later sealed by the owner after she has placed her own egg there along with food for her future larva. The cuckoo wasp larva either eats the other larva or starves it to death by devouring all the food.

cucujid beetle: *see* flat bark beetle.

cuculiform, any member of an order of birds (Cuculiformes) containing two distinct families, the cuckoos (Cuculidae), and the turacos (Musophagidae).

A brief treatment of cuculiforms follows. For full treatment, *see* MACROPAEDIA: Birds.

The approximately 127 species of cuckoos occur throughout the world, except for Antarctica and some oceanic islands; the 20 musophagid species are found only in tropical Africa. The cuckoos include the typical arboreal cuckoos of the Eastern and Western hemispheres, the terrestrial roadrunners (*Geococcyx*) of the southwestern United States and Mexico, and the terrestrial coucals (*Centropus*) of Africa and Australasia.

The smallest cuculids are the glossy or emerald cuckoos (*Chrysococcyx*), only 6 inches (15 centimetres) in length; the ground cuckoos (*Carpococcyx*) and some coucals (*Centropus*) may reach 3 feet (0.9 metre). These slender-bodied birds have fairly long wings and medium to very long tails. The bill is usually slender and downcurved although in ground cuckoos and coucals it is quite stout. In the anis (*Crotophaga*) the bill is heavy and laterally compressed. Except for the roadrunners, cuckoos have fairly short legs. All cuculiform birds have the distinctive trait of zygodactylous feet (the outer toe is directed backward). Many species are coloured in grays and browns, but some species appear in bright, iridescent greens, purples, and yellows.

The musophagids are all fairly large birds. Turacos have relatively short, rounded wings and very long tails which widen toward the tip. Musophagids typically have long legs and strong, short, downcurved bills, frequently brightly hued. The plumage of the forest forms is generally brightly coloured in iridescent greens and purples. Scrubland musophagids such as the go-away birds (*Crinifer*) are generally gray. Two unique pigments are found in the wing feathers of *Musophaga* and *Turaco*—turacin, a crimson pigment containing copper, and turacoverdin, a green pigment. Almost all turacos have large feathered crests on the head.

Most of the cuculiforms are forest birds, but some members of the group inhabit other environments. The cuckoos of the genus *Cuculus* inhabit open woodlands, while South American guiras (*Guira guira*) and some members of the Old World genera *Clamator* and *Chrysococcyx* occur in savannas where some trees are present. Only the roadrunners can be found where there is no treelike vegetation. The temperate zone cuckoos are migratory and some species travel up to 2,000 miles (3,200 kilometres) in each direction.

Cuckoos are almost totally insectivorous; a few species are among the few birds that will readily eat the hairy caterpillars. The larger cuckoos also take lizards, snakes, and even small birds. The only cuckoos known to eat any fruit are the couas (*Coua*) of Madagascar. Turacos, in contrast, subsist almost entirely on fruits and berries, although they may take some insect life as well.

Except for the communal nesters *Crotophaga* (anis) and *Guira*, the cuckoos are shy, solitary birds, while most turacos go about in noisy flocks and create an incredible cacophony when they observe a predator. The typical turaco call is a series of laughing or barking notes. The cuckoos are also highly vocal. Their repertoire includes various contact calls, alarm notes, and territorial songs. These calls run the gamut of sound, from melodious to extremely discordant. The familiar call of the common cuckoo (*Cuculus canorus*) is produced only by the male.

The reproductive behaviour of the cuckoos is interesting as about 50 species are parasitic breeders; they lay their eggs in the nests of other species and let the foster parents do the work of raising the young cuckoos. Brood parasitism is found in all members of the subfamily Cuculinae and three species in the Neomorphinae. The rest of the cuckoos and all the turacos nest and care for the young in a regular manner.

The turacos build twig nests high up in trees. Incubation lasts 16–18 days and the young hatch thickly covered with down. They are fed regurgitated fruit pulp and fledge at about six weeks.

A female cuckoo of a parasitic species must find suitable host nests within her territory. She will usually lay one egg in each of many different nests, waiting until after the host female has started laying but before incubation has begun. As birds will often build new nests or remove strange objects found in their nest, egg mimicry has evolved in some cuckoos. For example, cuckoos that prey on a particular host species have a selective advantage if they lay eggs that resemble those of the host. The characteristic shell pattern is a female trait, unaffected by the male.

Shortly after hatching, while still blind and naked, young cuckoos of parasitic species will evict other objects—such as eggs and smaller hatchlings—from the host nest. The young bird does this by pushing its way under the object and shoving it up and over the edge of the nest. This clears away any competition that might arise for the food brought by the foster parents. Surprisingly this adaptive behaviour does not appear in all parasitic cuckoos; it is lacking, for instance, in the crested cuckoos (*Clamator*).

cucumber (*Cucumis sativus*), creeping plant of the Cucurbitaceae family, probably originating in northern India and widely cultivated for its fruit. It is a tender annual with a rough, succulent, trailing stem and hairy leaves with three to five pointed lobes; the stem bears branched tendrils by which the plant can be trained to supports.



Cucumber (*Cucumis sativus*)
Walter Chandoha

In northern Europe the cucumber is extensively grown in frames or on trellises in greenhouses; in the milder climate of the United States it is cultivated as a field crop and in home gardens. An excess of seed is sown, and the small plants are thinned to the number desired. The heat requirement is one of the highest among the common vegetables. There are three groups of varieties:

the very large-fruited, strong-growing varieties adapted only to greenhouse or frame culture; the large-fruited, outdoor-grown plants generally having white spines, which are used primarily for slicing and pickling; and the small-fruited, prolific kinds with spines, including the gherkin, which are grown outdoors principally for pickling.

The food value of the cucumber is low, but its delicate flavour makes it popular for salads and relishes. Fresh cucumbers should be firm, well-shaped, and bright green in colour. They may be kept in refrigerated storage for about two weeks.

cucumber beetle, any of several important pests of the genus *Diabrotica* belonging to the



Spotted cucumber beetle (*Diabrotica undecimpunctata*)
Stephen Collins

subfamily Galerucinae of the leaf beetle family Chrysomelidae (order Coleoptera). They are greenish yellow in colour, between 2.5 and 11 mm (up to 0.5 inch) long, and marked with black spots or stripes.

The striped cucumber beetle (*Acalymma vittata*) has two black stripes on each wing cover (elytron), and the spotted cucumber beetle (*D. undecimpunctata*) has black spots on each wing cover. They both feed on garden plants, and their larvae feed on the roots. The green-coloured *D. longicornis* eats corn pollen and silk; the root-feeding larvae are known as corn rootworms.

cucumber fish: *see* pearlfish.

Cucurbitaceae, the gourd family of flowering plants, belonging to the order Violales and containing about 90 genera and 700 species of food and ornamental plants. It includes the gourds, melons, squashes, and pumpkins and



Cucurbits
Walter Chandoha

is occasionally placed in its own order (Cucurbitales).

Most species are prostrate or climb by tendrils. They are annual herbs native to temperate and tropical areas. No member of the family tolerates frost or cold soil. Most species are extremely sensitive to temperatures near freezing, a factor that limits their geographic distribution and area of cultivation. The family includes such economically important food plants as pumpkin, cucumber, gherkin, watermelon, muskmelon, summer squash, winter squash, chayote, cassabanana, squash, and gourd. Cucurbits have a generally low nutrient content; one exception is the winter squash (certain cultivars of *Cucurbita maxima, C. moschata, C. pepo,* etc.).

Members of the family are fast-growing, with long-stalked, palmate leaves that alternate along the stem. Most species have unisexual flowers, which are borne in the leaf axils and have five white or yellow petals. At the side of the leafstalk in annual species there is a simple, sometimes branched, spirally coiled tendril. It is generally regarded by most botanists to be a modified shoot. There are five sepals in each flower; male flowers have five anthers, and female flowers have five carpels. The fruit in most species is a fleshy, many-seeded berry with a tough rind, often attaining considerable size.

Cúcuta, in full SAN JOSÉ DE CÚCUTA, capital of Norte de Santander *departamento,* north-eastern Colombia, on the Venezuela border. Founded in 1733 as San José de Guasimal,



Cúcuta, Colombia, and its Cathedral of San José
Carl Frank

it became San José de Cúcuta in 1793. In 1875 it was destroyed by an earthquake but then was rebuilt with parks and wide avenues. The nucleus of a livestock and agricultural (primarily coffee and tobacco) zone, Cúcuta has many small industries, is the closest urban centre to the oil fields to the north, and is the home of the Francisco de Paula Santander University (1962). The city, reputed to be a centre of activities involving contraband, has highway (including the Pan-American Highway), railway, river, and air connections to Venezuela, as well as to other cities in north-eastern Colombia. Pop. (1992 est.) 450,300.

Cucuteni-Tripolye culture, Neolithic European culture that arose in Ukraine between the Seret and Bug rivers, with an extension to the Dnieper River, about 3000 BC. The culture's characteristic pottery was red or orange and was decorated with curvilinear designs painted or grooved on the surface. Its makers occupied villages of long, rectangular houses that were sometimes arranged in concentric circles. In the centre, cattle were fenced in an enclosure. The Tripolye people practiced shifting agriculture, frequently moving their settlements.

cudbear, violet, red, or bluish dyestuff, considered similar to orchil and used in colouring pharmaceuticals; also any colour obtained from this dye. Cudbear is also the common name for the lichens (*Ochrolechia, Roccella, Lecanora*) from which the dye is derived.

Cuddalore, city, northeastern Tamil Nādu state, southeastern India, on the Bay of Bengal coast. Its name is derived from *kūṭṭal-ūr* ("junction town") and refers to its location near the junction of the Ponnaiyār River with its tributary, the Gadilam. Both rivers frequently flood, causing damage to the city.

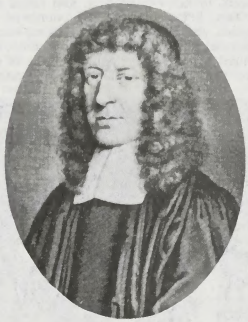
An ancient seaport, Cuddalore developed rapidly after trading rights were obtained by the British East India Company in 1682, but it later declined with the expansion of Madras. It now handles only a small percentage of Tamil Nādu's foreign trade, dealing almost exclusively with Malaysia and Singapore. Its fishing and shipbuilding industries are slowly expanding. Cuddalore has several colleges affiliated with the University of Madras. Pop. (1991 prelim.) 143,774.

Cuddapah, city, south-central Andhra Pradesh state, southern India. The name Cuddapah is derived from the Telugu word *kaḍapa* ("gate"). The city is so named because it is the gateway from the north to the sacred hill pagoda Śrī Veṅkateśvara of Tirupati. Located 5 miles (8 km) south of the Penner River, the city is surrounded on three sides by the Nallamalai and Pālkonda hills. Peanuts (groundnuts), cotton, and melons dominate Cuddapah's agricultural economy. Several government colleges, associated with Sri Venkateswara University at Tirupati, are located there.

The surrounding region, part of the southern section of the Eastern Ghāts, is the source of Cuddapah slabs, fine-grained limestones used for floor tiles and tabletops. Pop. (1991 prelim.) city, 121,422; metropolitan area, 215,545.

Cudworth, Ralph (b. 1617, Aller, Somerset, Eng.—d. June 26, 1688, Cambridge, Cambridgeshire), English theologian and philosopher of ethics who became the leading systematic exponent of Cambridge Platonism.

Reared as a Puritan, Cudworth eventually adopted such Nonconformist views as the notion that church government and religious



Cudworth, engraving by G. Vertue after D. Loggan, 1684
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

practice should be individual rather than authoritarian. In 1639 he was elected to a fellowship at Cambridge and three years later wrote his first book, *A Discourse Concerning the True Notion of the Lord's Supper,* and the tract called *The Union of Christ and the Church.* In 1645 he was named master of Clare Hall, Cambridge, where he was elected unanimously as regius professor of Hebrew. His increasing opposition to Puritanism in government was expressed in his widely reprinted sermon to the House of Commons in March 1647. He left Cambridge in 1650 to serve as

rector at North Cadbury, Somerset, but returned in 1654 as head of Christ's College, a position he held until his death.

Cudworth's first major work, *The True Intellectual System of the Universe: The First Part: Wherein All the Reason and Philosophy of Atheism Is Confuted and its Impossibility Demonstrated* (1678), aroused considerable theological opposition. John Dryden characterized its impact in his comment that Cudworth "has raised such strong objections against the being of a God and Providence that many think he has not answered them," though such answers were indeed Cudworth's goal.

Only manuscript fragments remain of the unpublished second and third parts of the work, "Of Moral Good and Evil" and "Of Liberty and Necessity." Two short published works, *A Treatise Concerning Eternal and Immutable Morality* (1731) and *A Treatise of Freewill* (1838), are evidently summaries of the second and third parts.

In ethics, Cudworth's outstanding work is *A Treatise Concerning Eternal and Immutable Morality*, directed against Puritan Calvinism, against the divine omnipotence discussed by René Descartes, and against the Hobbesian reduction of morality to civil obedience. Cudworth stressed the natural good or evil inherent in an event or an act in contrast to the Calvinist-Cartesian notion of divine law or to Hobbes's concept of a secular sovereign. "Things are what they are," he wrote, "not by Will but by Nature." This premise led Cudworth to develop an ethical system emphasizing the rational, spontaneous, disinterested, and public-spirited character of the good life.

Cudworth's daughter, Damaris, Lady Masham, published her own *Discourse Concerning the Love of God* (1696) and did much to spread her father's moral and religious ideas. His life and thought have been studied by John Passmore, a modern Australian philosopher, in *Ralph Cudworth* (1951).

cueca, in full ZAMACUECA, also called MARINERA, folk dance of Chile, northern Argentina, and Peru. A courtship dance known since the period of Spanish colonization, it is danced to the rapid, rhythmic music of guitars. The dancing couple pursue and retreat,



Cueca
Culver Pictures

pass and circle about each other, twirling handkerchiefs as they dance. Chilean sailors took the dance to Mexico (where it is called *chilena*).

cuejo (bird): *see* pauraque.

Cuenca, in full SANTA ANA DE CUENCA, capital of Azuay province, south central Ecuador. The city lies in an intermontane basin (*cuenca*), at an altitude of 8,517 ft (2,596 m), on the Río Matadero, a tributary of the Río Paute. The Spanish colonial city was founded in 1557 by the conquistador Gil Ramírez Davalos on the ruins of Tumi pampas, the former residence of the Inca ruler Huayna Capac, who had conquered the Kingdom of Quitu in the 15th century.



The cathedral at Cuenca, Ecuador
Loren McIntyre—Audio Visual Productions

The commercial centre for most of southern Ecuador and third largest city in the nation, Cuenca trades in agricultural products, cattle, hides, and marble. Principal industries include the manufacture of Panama hats, textiles and lace, leather goods, jewelry, and food products. The weekly Indian market, in addition to serving an important economic function, is a popular tourist attraction. Low grade copper deposits have been discovered west of Cuenca.

Outstanding examples of Spanish colonial architecture include La Concepción convent (founded 1599) and Las Carmelitas Descalzas convent (founded 1682). Other notable landmarks are the Gothic cathedral (still under construction), the Government House (where the German geographer and traveller Alexander von Humboldt stayed in 1802), and the Municipal Museum. Cuenca became an episcopal see in 1786 and an archbishopric in 1957. It is the seat of the University of Cuenca (1868) and of a Catholic university (1970). The 91-mi (146-km) southern spur of the Guayaquil–Quito railway runs to Cuenca and the Pan-American Highway passes through the city. Pop. (1982 prelim.) 155,711.

Cuenca, province, in the autonomous community (region) of Castile-La Mancha, east central Spain, formed in 1833 from part of the ancient Kingdom of New Castile; it lies on the southern Meseta Central (plateau) and has an area of 6,587 sq mi (17,061 sq km). The population density is low because of the large area of mountainous terrain; much of the land is uncultivated. The Serranía de Cuenca, a region of great mountain blocks, pine forests, and pastures, occupies the eastern and central parts of the province. The Júcar and Tagus rivers run through deep valleys in an eroded limestone zone, called Ciudad Encantada (Enchanted City), a fantastic formation of rocks resembling a city, near Cuenca (*q.v.*), the provincial capital.

The undulating hills of the Alcarria, an arid region having less than 20 in. (500 mm) of rain per year lie to the north; to the south the plain of La Mancha begins. Westward lies the Sierra de Altamira. Agriculture (cereals, vines, olives, saffron, fruit) predominates in Cuenca, but the main natural source of wealth is timber, used for casks, carpentry, and construction work. Sheep and goats are grazed. Honey, beeswax, goat cheese, and wool are exported. Pop. (1982 est.) 215,975.

Cuenca, city, capital of Cuenca province, in the autonomous community (region) of Castile-La Mancha, east central Spain. It lies on a pyramid-like hill above the confluence of the Júcar and Huécar rivers. Originating as the Roman Conca, the city was finally captured from the Moors in 1177 by Alfonso VIII of Castile, who made it an episcopal see in 1182. It served as a cultural and textile centre in the Middle Ages. During the 19th century, the city expanded onto nearby lowland and in fact became two cities: the upper, or old, city; and the lower, or modern, one. Viewed from below, the Casas Colgantes (Hanging Houses) of the old city appear to be suspended.

The Romanesque–Gothic cathedral (13th century) is notable, and the city is the site of the Provincial Archaeological and the Spanish Abstract Art museums.

Industrial development is slight (tanning, sawmilling, paper milling, and flour milling); manufactured goods include furniture, soap, leather, and woollen goods. Pop. (1982 est.) 39,860.

Cuenca carpet, any Spanish floor covering handwoven at the city of Cuenca, between Madrid and Valencia, especially in the 17th and 18th centuries but also more recently. They generally are coarser and heavier bodied than Alcaraz carpets; their foundation may be partially or wholly of a bast fibre; and in certain later examples the Ghiordes knot is used instead of the Spanish. A good red dye did not appear in these rugs until the 18th century, when a bright cherry red was sometimes used. Usually, the colour range is limited and muddy, as if several hues had proved fugitive,



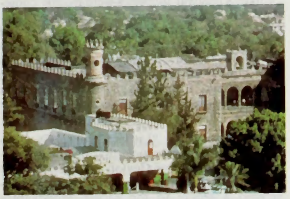
Cuenca carpet from Spain, 17th century: in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, gift of J.F. Bellard; photograph, Otto E. Nelson—EB Inc.

but some of the later rugs show bold colouring.

Cuera (Switzerland): *see* Chur.

Cuernavaca, city, capital of Morelos *estado* ("state"), south-central Mexico. It is in the Cuernavaca Valley of Mount Ajusco, 37 miles (60 km) south of Mexico City. As the capital city of the Tlahuica Indians, it was known as Cuauhnáhuac, but it was captured and the name changed in about 1521 by the Spanish conquistador Hernán Cortés. During the colonial era, Cuernavaca was the seat of the marquessate of the valley of Oaxaca.

Cuernavaca was the site of Cortés' Palace (*c.* 1531; now the Morelos State House, decorated with murals by Diego Rivera, 1929) and a Franciscan cathedral (begun 1529). Nearby are the pre-Columbian ruins of Teopanzolco and Tepozteco and the village of Tepoztlán.



Cortés' Palace, Cuernavaca, Mex.
Wallace Kirkland from Rapho/Photo Researchers

In the 18th century, José de la Borda, the silver magnate, established residence in Cuernavaca and laid out the Borda Gardens, which later served as a favourite retreat of the emperor Maximilian and his wife, Carlota. Later, wealthy Mexicans and members of the international set made the city popular as a retreat.

Cuernavaca is also an agricultural and industrial centre. Local crops include corn (maize), beans, wheat, and numerous fruits. Floriculture and apiculture are of considerable importance. Bottling plants, flour mills, cement factories, and textile mills are among Cuernavaca's industries. The University of Morelos was established in the city in 1953.

Cuernavaca is linked with Mexico City by expressway and is on the narrow-gauge Mexico City–Rio Balsas railroad. Pop. (1980) 192,770.

cuesta (Spanish: "slope"), also called HOMOCLINAL RIDGE, physical feature that has a steep cliff or escarpment on one side and a gentle dip or back slope on the other. This landform occurs in areas of tilted strata and is caused by the differential weathering and erosion of the hard capping layer and the soft underlying cliff maker, which erodes more rapidly. Cuestas with dip slopes of 40°–45° are usually called hogback ridges.

Cuesta escarpments tend to be cut into rough, hilly country with numerous ravines and steep valleys, because the short streams flowing down the steep scarp face erode rapidly. The back slopes commonly are smooth. Cuestas are common in the United States, notably in Arizona and New Mexico and along the Atlantic and Gulf coasts.

Cueva (de Garoza), Juan de la (b. *c.* 1550, Seville—d. 1610, Spain?), Spanish dramatist and poet, one of the earliest Spanish writers to depart from classical forms and use national historical subjects.

Cueva differed from his contemporaries in having his plays published, thus transmitting to posterity intact examples of early, albeit mediocre, Spanish drama. Cueva's plays in the collection *Primera parte de las comedias y tragedias* (1583; "First Part of the Comedies and Tragedies"), including such works as *Tragedia de Ayax Telamón* ("Tragedy of Ajax Telamon") and *Tragedia de la muerte de Virginia* ("Tragedy of the Death of Virginia"), drew on Greco-Roman themes. Cueva was particularly skilled at adapting medieval Spanish legends and ballads; his *Tragedia de los siete infantes de Lara* ("Tragedy of the Seven Princes of Lara") and *La muerte del rey don Sancho* ("The Death of King Don Sancho") were later used by Lope de Vega and the Romantic novelists, and his treatise in verse, *Ejemplar poético* (1606), was an important antecedent of Lope de Vega's *Arte nuevo de hacer comedias* ("New Art of Writing Comedies"). Other important plays by Cueva include the mythological farces *El saco de Roma* and *El infamador* (1581).

cuff link, small ornamental device, generally a pair of linked buttons or one button that fastens with a bar or shank, inserted through buttonholes to keep the cuff of a shirt or blouse closed. Cuff buttons took the place of cuff strings in the 17th century, and the word link appeared as early as 1788.

By the 1840s, cuff links were usually in the form of gold, silver, or pearl buttons held together by chain links. There have been many variations in cuff-link design, and they are no longer limited to the button form and may be made of any number of materials.

Cufra (Libya): *see* Kufrah, al-.

Cugnot, Nicolas-Joseph (b. Sept. 25, 1725, Poid, Fr.—d. Oct. 2, 1804, Paris), French military engineer who designed and built the world's first true automobile, a huge, heavy, steam-powered tricycle.

After serving in the Austro-Hungarian army in the Seven Years' War, Cugnot returned to Paris in 1763 to devote his time to writing military treatises and tinkering with a number of inventions he had conceived while campaigning. He built two steam-propelled tractors for hauling artillery, the first in 1769, the second in 1770. The second alone survived and is preserved in the National Conservatory of Arts and Crafts, Paris. This vehicle's two-piston steam engine was designed independently of Thomas Newcomen and James Watt and was based directly on the theoretical descriptions of the French physicist Denis Papin. The engine in it was the first to employ high-pressure steam expansively without condensation. The carriage was tricycle-mounted, with the single front wheel performing both steering and driving functions. The problems of water supply and maintaining pressure severely handicapped the vehicle, which nevertheless proved the feasibility of steam-powered traction.

Cui, César (Antonovich) (b. Jan. 18 [Jan. 6, Old Style], 1835, Vilna, Lithuania, Russian Empire—d. March 24, 1918, Petrograd [St. Petersburg], Russia), Russian composer of operas, songs, and piano music. He was a music critic and military engineer who, with Aleksandr Borodin, Mily Balakirev, Modest Mussorgsky, and Nikolay Rimsky-Korsakov, made up "The Five" in Russian music.

Cui was the son of a French officer, taken prisoner during Napoleon's campaign of 1812, who remained in Russia after the war; his mother was Lithuanian. Cui began to compose while he was still a boy, imitating Chopin, and received lessons in composition. But in 1851 he was sent to St. Petersburg, where he entered the school of engineering and, in 1855, the academy of military engineering, becoming a lecturer there in 1857. In 1878 he became professor of fortification—his pupils included General M.D. Skobelev, a hero of the Russo-Turkish war, and Tsar Nicholas II—and he retired with the rank of lieutenant general.



Cui, drawing by I. Repin, 1900
Novosti Press Agency

Cui's friendship with Balakirev and another nationalist composer, A.S. Dargomyzhsky, developed his musical interests: he began to compose copiously and, although he had no Russian ancestry, became a pugnacious journalistic champion of Russian nationalism. From 1864 to 1877 he was music critic for the *St. Peterburgskiye vedomosti,* and later he became a successful propagandist of Russian music in Belgium and France, notably with his *La Musique en Russie* (1881). Cui's own music has little Russian flavour, and of his 10 operas only the first, *The Prisoner of the Caucasus* (begun 1857, produced 1883); the last, *The Captain's Daughter* (St. Petersburg, 1911); and the one-act *Feast in the Time of the Plague* (Moscow, 1901) are on Russian subjects, taken from Aleksandr Pushkin's writings. He turned more readily to French sources—Victor Hugo, Jean Richepin, Alexandre Dumas *père,* Guy de Maupassant, and Prosper Mérimée—and his only moderately successful operas are based on Heinrich Heine's *William Ratcliff* (St. Petersburg, 1869) and Maupassant's *Mademoiselle Fifi* (Moscow, 1903). Cui is at his best in the miniature forms, notably his short piano compositions and his songs.

Cuiabá, city, capital of Mato Grosso *estado* ("state"), southwestern Brazil. It lies along the Cuiabá River, a tributary of the Paraguay River, at 541 feet (165 m) above sea level. Founded by gold hunters in 1719, the settlement was given the status of a town in 1727 and of a city in 1818. Agriculture and stock raising are now the main economic activities in the surrounding area; the city is a collecting centre for rubber and palm nuts. Thermal electric and hydroelectric plants are located in the area. The city is the seat of the Federal University of Mato Grosso (1970). Cuiabá can be reached by riverboat from Corumbá (400 miles [640 km] south-southwest) and by road from Campo Grande (550 miles [885 km] south-southeast); it is also on the road from Brasília to Pôrto Velho and Rio Branco. Pop. (1980 prelim.) 167,894.

Cuiabá River, Portuguese RIO CUIABÁ, river, central Mato Grosso state, Brazil, rising northeast of Rosário Oeste, between the basins of the Amazon and Paraguay rivers, and flowing for 300 miles (480 km) south-southwest to join the Saõ Lourenço River. These two rivers' combined courses, sometimes called the Cuiabá, continue across the Paraguay floodplain in a braided fashion to enter the Paraguay River, north of Corumbá. The river forms part of the boundary between Mato Grosso and Mato Grosso do Sul states. Gold deposits are found in the Cuiabá's headwaters.

Cuicatec, Meso-American Indian people of northeastern Oaxaca in southern Mexico. They live in a hilly area, partly arid and partly rainy; their neighbours are the Mazatec (*q.v.*) to the north, the Chinantec (*q.v.*) to the east, and the Mixtec (*q.v.*) to the south. The language of the Cuicatec, which also is called Cuicatec, is a member of the Mixtecan language family. The Cuicatec are agricultural; staples are corn (maize), beans, squash, and chilies. Chickens and turkeys are raised and provide a major meat source. The people live in semicongregated villages in houses with thatched roofs

and walls of sticks or reed grass. Pottery, baskets, ropes, and nets are made. Weaving is no longer widely practiced, although serapes and *huipiles* (long cotton overblouses or tunics) are still woven in some areas. Clothing varies from village to village, although most is now made of machine-made fabric.

The Cuicatec worship native idols and a deity known as the Lord of the Hill. Elves and goblins are believed to live in caves and on hills. Ritual kinship rites are practiced, associated with a washing-of-hands ritual; many gifts are exchanged. A small number of Cuicatec have embraced Roman Catholicism.

Cuijp (Dutch surname): *see under* Cuyp.

Cuilapa, also called CUAJINIGUILAPA, city, southeastern Guatemala. The city lies in a bend of the southward-flowing Los Esclavos River on the southern flanks of the central highlands at an elevation of 2,916 feet (889 m). In 1913 Cuilapa was destroyed by an earthquake; rebuilding was completed in 1920. Cuilapa is known primarily for its coffee and sugarcane plantations and for its processing plants. It is on the Pan-American Highway 40 miles (65 km) from Guatemala City. Pop. (1981) city, 5,669; (1981 prelim.) mun., 17,086.

Cuillin Hills, also called THE COOLINS, or CUCHULLINS, mountain range, south-central portion of the Atlantic coastal island of Skye, Inner Hebrides island group, Highland region, Scotland. The mountains are among the most precipitous in the United Kingdom and include 15 peaks above 3,000 feet (900 m). There are two main ridges—the magnificent Black Cuillins, some peaks of which remained unclimbed until the late 19th century, and the Red Cuillins around Loch (lake) Coruisk to the south.

cuirass, body armour that protects the torso of the wearer above the waist or hips. Originally it was a thick leather garment covering the body from neck to waist, consisting of a breastplate and a backpiece fastened together with straps and buckles and a gorget, a collar protecting the throat. In Homeric and Hellenistic times, it was made of bronze. Cuirasses of leather as well as metal were worn by officers in the armies of the Roman Empire. Later made of steel, the cuirass was forerunner to the body armour worn to deflect bullets.

Cuisian Stage, subdivision of Eocene rocks and time (the Eocene Epoch began about 54,000,000 years ago and lasted about 16,000,000 years) in western Europe. The Cuisian Stage, which precedes the Lutetian Stage and follows the Ypresian Stage, was named for Cuise, Fr., where the Cuisian consists largely of sands. In France the Cuisian and Ypresian have sometimes been considered to be facies of the same strata. In Great Britain the Cuisian is represented in the London Basin by the Lower Bagshot Beds and in the Hampshire Basin by the lower portions of the Lower Bracklesham Beds.

cuisine, the foods and methods of preparation traditional to a region or population. The major factors shaping a cuisine are climate, which in large measure determines the native raw materials that are available to the cook; economic conditions, which regulate trade in delicacies and imported foodstuffs; and religious or sumptuary laws, under which certain foods are required or proscribed.

A brief treatment of cuisine follows. For full treatment, *see* MACROPAEDIA: Gastronomy.

Climate also affects the supply of fuel; the characteristic Chinese food preparation methods, in which food is cut into small pieces before being cooked, was shaped primarily by the need to cook food quickly to conserve scarce firewood and charcoal. Foods preserved for winter consumption by smoking, curing, and pickling have remained important in world cuisines for their altered gustatory properties even when these preserving techniques are no longer strictly necessary to the maintenance of an adequate food supply.

World cuisine is traditionally divided into regions according to the common use of major foodstuffs, especially grains and cooking fats. In Central and South America, corn (maize), both fresh and dried, is the staple. In northern Europe, wheat, rye, and fats of animal origin predominate, while in southern Europe olive oil is ubiquitous and rice becomes important. In Italy the cuisine of the north, featuring butter and rice, stands in contrast to that of the south, with its wheat pasta and olive oil. China likewise can be divided into rice regions and noodle regions. Throughout the Middle East and Mediterranean there is a common thread marking the use of lamb, olive oil, lemons, peppers, and rice. The vegetarianism practiced in much of India has made pulses such as chickpeas and lentils as important as wheat or rice. From India to Indonesia the lavish use of spices is characteristic; coconuts and seafood are used throughout the region both as foodstuffs and as seasonings.

The use of staple foods cuts across economic and class distinctions. Even where the contrast between the haute cuisine of the professional chef and the simple fare of home cooking is marked, food preferences constitute a unifying factor in regional culture.

Cuitláhuac, also called QUETLAVACA (d. October 1520, Tenochtitlán, near modern Mexico City), 10th Aztec ruler, who succeeded his brother Montezuma II in June 1520. Cuitláhuac rebelled against the Spanish occupation of Tenochtitlán, decimating Hernán Cortés' forces in their retreat from the city on the *noche triste* (Spanish: "sad night") of June 30, 1520. During his four-month reign Cuitláhuac tried to form a federation against the Spaniards, but his efforts failed because of the hatred of other Indian peoples for the Aztec. He died of smallpox during the subsequent Spanish siege of Tenochtitlán and was succeeded by his nephew Cuauhtémoc, the last Aztec ruler.

Cuitzeo, Lake, Spanish LAGO DE CUITZEO, lake located in Michoacán state, south-central Mexico. It is on the central plateau at 5,974 feet (1,821 m) above sea level. The lake level rises and falls depending upon rainfall, but it generally covers an area of approximately 160 square miles (410 square km). Lake Cuitzeo is in an agricultural region 19 miles (31 km) north of Morelia, the state capital, and is a popular resort area accessible by highway and railroad.

Cujavia (Poland): *see* Kujavia.

Cukor, George (Dewey) (b. July 7, 1899, New York City—d. Jan. 24, 1983, Los Angeles), American motion-picture director whose combined skill in working with actors and, especially, actresses and careful attention to details produced films of high quality for 50 years.



Cukor
Keystone

Beginning as an assistant stage manager in 1918, Cukor worked as a stage director and manager in Rochester, N.Y., and in New York City before going to Hollywood in 1929, at the beginning of the sound era in motion pictures. He was the dialogue director for the motion pictures *River of Romance* (1929) and *All Quiet on the Western Front* (1930). *Tarnished Lady* (1931) was the first film he directed, and he achieved his first major success in 1933 with *Little Women.* His other commercial and artistic achievements include *Dinner at Eight* (1933), *David Copperfield* (1935), *Sylvia Scarlett* (1935), *Camille* (1936), *Romeo and Juliet* (1936), *Holiday* (1938), *The Women* (1939), *The Philadelphia Story* (1940), *Keeper of the Flame* (1942), *Gaslight* (1944), and *Born Yesterday* (1950).

Cukor's postwar successes were mainly comedies with Spencer Tracy and Katharine Hepburn, such as *Adam's Rib* (1949) and *Pat and Mike* (1952), and dramas such as *A Star Is Born* (1954) and *Justine* (1969). Among his later films were *Travels With My Aunt* (1973) and *Rich and Famous* (1981). He received an Academy Award for his direction of *My Fair Lady* in 1964.

Cūlavaṃsa (Pāli: "Little Chronicle"), Ceylonese historical chronicle that details the history of the island of Ceylon (now Sri Lanka) from about the 4th to the 16th century, considered a sequel to the earlier *Mahāvaṃsa* ("Great Chronicle"). The entire *Cūlavaṃsa* is written in Pāli, the sacred language of Buddhism, and displays a variety of epic styles.

The portion of the *Cūlavaṃsa* dealing with Ceylon's history until the late 12th century was probably written by the Buddhist monk Dhammakitti in the 13th century. Succeeding portions, although they have not been assigned definite authorship, are generally considered inferior—both in style and in factual reliability—to Dhammakitti's portion.

Culbertson, Ely (b. July 22, 1891, Ploeşti, Rom.—d. Dec. 27, 1955, Brattleboro, Vt., U.S.), American authority on the card game known as Contract Bridge who later abandoned the game to work for world peace.

Culbertson was the son of an American oil explorer and lived as a boy in Russia. He was educated in Geneva and Paris. In his youth he was a revolutionary agent in the Russian Caucasus, Mexico, and Spain. When his father's fortune was lost in the Russian Revolution, he immigrated to the United States, where he had earlier studied at Yale University. He had also been a newsboy, a construction worker, a union leader, and a gambler.

Culbertson early became expert at Contract Bridge, which replaced Auction Bridge in popularity. In 1929 he founded the magazine *Bridge World* and from the early 1930s played tournament Bridge (partnered by his wife, Josephine Murphy Dillon), lectured and published books on Bridge, and became a syndicated Bridge columnist. He also published books on his bidding system and on Canasta, a card game of the Rummy family.

In the late 1930s the threat of war led him to abandon Bridge and resume his political activities. He founded the World Federation, Inc., and in 1946 the Citizens Committee for United Nations Reform, which advocated world peace by means of an international policing organization. He wrote *Total Peace* (1943) and *Must We Fight Russia?* (1946). His autobiography, *The Strange Lives of One Man,* was published in 1940.

Culebra Cut (Panama): *see* Gaillard Cut.

Culebra Island, Spanish ISLA DE CULEBRA, island, Puerto Rico, 20 miles (30 km) east of Puerto Rico island and 15 miles west of St. Thomas, Virgin Islands. The island fronts north on the Atlantic Ocean and south and

west on Vieques Sound, which connects the Atlantic with the Caribbean Sea. About 7 miles (11 km) long and 2 miles (3 km) wide, Culebra Island is 10 square miles (26 square km) in area. Its hilly, almost barren mass of limestone and igneous intrusions rises to 646 feet (197 m) at Mount Resaca. The island's deep bay, Puerto Grande, on the southeast, was used as a U.S. naval base until 1975. Culebra has sparse, thin soils and no permanent streams; grazing and fishing are the principal activities of its few inhabitants. Pop. (1990) 1,542.

Culiacán, city, capital of Sinaloa *estado* ("state"), western Mexico. It is on a small coastal plain (276 feet [84 m] above sea level) at the foot of the lofty Sierra Madre Occidental, on the Culiacán River. Founded in 1531, Culiacán played an important role in early colonial days as a base for Spanish expeditions. An elaborate irrigation system in the valley provides for a great variety of crops, including corn (maize), sugarcane, tobacco, and many fruits and vegetables. It is the seat of the Autonomous University of Sinaloa (founded 1873). The city is connected by rail with the port of Guaymas, on the Gulf of California, and is on the Pan-American Highway. Pop. (1990) 415,046.

Culion Island, island, one of the Calamian Group (*q.v.*), west-central Philippines. The island has an area of 150 square miles (389 square km) and is the site of Culion Reservation, a therapeutic community founded in 1906 for the treatment of leprosy (Hansen's disease). Rice and coconuts are grown on the island. Culion, the main settlement, is located on the northeastern coast. Pop. (latest census) 4,785.

Cullen, Countee, in full COUNTEE PORTER CULLEN (b. May 30, 1903, Louisville, Ky.?, U.S.—d. Jan. 9, 1946, New York, N.Y.), American poet, one of the finest of the Harlem Renaissance (*q.v.*).

Reared by a woman who was probably his paternal grandmother, Countee at age 15 was unofficially adopted by the Reverend F.A. Cullen, minister of Salem M.E. Church, one of Harlem's largest congregations. He won a citywide poetry contest as a schoolboy and saw his winning stanzas widely reprinted. At New York University (B.A., 1925) he won the Witter Bynner Poetry Prize and was elected to Phi Beta Kappa. Major American literary magazines accepted his poems regularly, and his first collection of poems, *Color* (1925), was published to critical acclaim before he had finished college.

Cullen received an M.A. degree from Harvard University in 1926 and worked as an assistant editor for *Opportunity* magazine. In 1928, just before leaving the United States for France (where he would study on a Guggenheim Fellowship), Cullen married Yolande Du Bois, daughter of W.E.B. Du Bois (divorced 1930). After publication of *The Black Christ and Other Poems* (1929), Cullen's reputation as a poet waned. From 1934 until the end of his life he taught in New York City public schools. Most notable among his other works are *Copper Sun* (1927), *The Ballad of the Brown Girl* (1928), and *The Medea and Some Poems* (1935). His novel *One Way to Heaven* (1932) depicts life in Harlem.



Countee Cullen, 1941

Beinecke Rare Book and Manuscript Library, Yale University, and the Estate of Carl Van Vechten; photograph, Carl Van Vechten

Cullen's use of racial themes in his verse was striking at the time, and his material is always fresh and sensitively treated. He drew some criticism, however, because he was heavily influenced by the Romanticism of John Keats and preferred to use classical verse forms rather than rely on the rhythms and idioms of his black American heritage.

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Cullen, Paul (b. April 29, 1803, near Ballitore, County Kildare, Ire.—d. Oct. 24, 1878, Dublin), archbishop of Dublin who became the first Irish cardinal.

Educated at the Quaker School, Carlow, Cullen joined the Urban College of Propaganda, Rome, and was ordained priest in 1829. He became rector of the Irish National College in Rome. During the Mazzini revolution of 1848 he was rector of the Urban College. In 1850 he became successor to the important archdiocese of Armagh. Taking a strong position on the educational question that was then agitating Ireland, Cullen played a leading part in the national movement of 1850–52. In May 1852 he went to Dublin, where a divergence of opinion soon erupted between him and the extreme nationalists. His distrust of the national movement intensified, and in 1853 he forbade his clergy to publicly participate in politics. In 1866 Cullen was appointed cardinal, and he was a celebrated infallibilist at the first Vatican Council (1869–70). The Catholic University of Ireland is a memorial to his zeal.

Cullen, William (b. April 15, 1710, Hamilton, Lanarkshire, Scot.—d. Feb. 5, 1790, Kirknewton, near Edinburgh), Scottish physician and professor of medicine, best known for his innovative teaching methods.

After attending the University of Glasgow and the new medical school at Edinburgh, Cullen returned to Hamilton. He spent eight years in private clinical practice, attending without fee those too poor to afford his services. In 1740 he received his M.D. from Glasgow and several years later obtained permission to deliver a series of independent lectures on chemistry and medicine, the first to be offered in Great Britain. He was elected to the chair of medicine at Glasgow in 1751. In 1755 Cullen returned to the University of Edinburgh, where he was later appointed to the chair of the institutes (theory) of medicine and eventually became sole professor of medicine, the position he held until shortly before his death.

Cullen taught that life was a function of nervous energy and that muscle was a continuation of nerve. He organized an influential classification of disease (nosology) consisting of four major divisions: pyrexiae, or febrile diseases; neuroses, or nervous diseases; cachexiae, diseases produced by bad bodily habits; and locales, or local diseases. He was most famous, however, for his innovative teaching methods and forceful, inspiring lectures, which drew medical students to Edinburgh from throughout the English-speaking world. He was one of the first to teach in English rather than in Latin, and he delivered his clinical lectures in the infirmary, lecturing not from a text but from his own notes.

Cullinan diamond, world's largest gem diamond, which weighed about 3,106 carats in rough form when found in 1905 at the Premier mine in Transvaal, S.Af. Named for Sir Thomas Cullinan, who had discovered the mine three years earlier, the colourless stone was purchased by the Transvaal government and was presented (1907) to the reigning British monarch, King Edward VII. It was cut into 9 large stones and about 100 smaller ones by I.J. Asscher and Company of Amsterdam, famed for their cutting of the Excelsior diamond, which until the discovery of the Cullinan had been the largest known diamond. The stones cut from the Cullinan diamond, all flawless, are now part of the British regalia. The two largest are the largest cut diamonds known, and the larger of these is the Great Star of Africa, or Cullinan I, a 530.2-carat, pear-shaped gem set in the English sceptre. The other is the most valuable stone in the imperial state crown, the 317-carat Cullinan II, sometimes called the Second Star of Africa.

Culloden, Battle of, also called BATTLE OF DRUMMOSSIE (April 16, 1746), the last battle of the "Forty-five Rebellion," when the Jacobites, under Charles Edward, the Young Pretender ("Bonnie Prince Charlie"), were defeated by British forces under William Augustus, Duke of Cumberland. Culloden is a tract of moorland in the county of Inverness, Scotland, forming a part of the northeast of Drummossie Moor and lying about 6 miles (10 km) east of Inverness.

The battle, which lasted only 40 minutes, resulted in bitter defeat for the heavily outnumbered Jacobites. Some 1,000 of the Young Pretender's army of 5,000 weak and starving Highlanders were killed by the 9,000 Redcoats, who lost only 50 men. The devastating slaughter of the Jacobites was the result of the opening British cannonade and subsequent tactics of the Redcoats during the attack of the Highlanders, when each British soldier, instead of attacking the Highlander directly in front of him, bayoneted the exposed side of the man to his right. The Highlanders finally broke and fled, and some 1,000 more were killed in subsequent weeks of hounding by British troops. Hunted by troops and spies, Prince Charles wandered over Scotland for five months before escaping to France and final exile. The Battle of Culloden marked the end of any serious attempt by the Jacobites to restore the Stuart dynasty to the British throne.

George Frideric Handel composed "See the Conquering Hero Comes" in honour of the victorious Duke of Cumberland. The flower sweet William was named after the latter in England, but in Scotland it is still known as stinking Willie or sour Billy.

Culmann, Carl (b. July 10, 1821, Bergzabern, Rhenish Palatinate [Germany]—d. Dec. 9, 1881, Zürich, Switz.), engineer whose graphic methods of structural analysis have been widely applied to engineering and mechanics.

In 1841 Culmann entered the Bavarian civil service as a cadet bridge engineer with the Hof railway construction division. He was eventually appointed professor of engineering sciences at the Swiss Federal Institute of Technology, Zürich (1855–81). In 1864 he made a valuable report on his investigation of the wild mountain streams of Switzerland, the control of which was a seasonal problem. His most important book, *Die graphische Statik* (1865; "Graphic Statics"), presented a survey of all known work on the graphic method of solving static problems and laid the foundation for its use as an exact science.

Culpeper's Rebellion (1677–79), early popular uprising against proprietary rule in

the Albemarle section of northern Carolina, caused by the efforts of the proprietary government to enforce the British Navigation acts. These trade laws denied the colonists a free market outside England and placed heavy duties on commodities. The colonists' resentment found an object in the deputy governor, Thomas Miller, who was also customs collector. Led by John Culpeper and George Durant, the rebels imprisoned Miller and other officials, convened a legislature of their own, chose Culpeper governor, and for two years capably exercised all powers and duties of government. Culpeper was finally removed by the proprietors and tried for treason and embezzlement but was never punished.

Culpepper, John Culpepper, 1st Baron: *see* Colepeper, John Colepeper, 1st Baron.

Culross, small, picturesque royal burgh (1588) in Fife region, Scotland, on the northern bank of the Firth of Forth. The burgh has early religious associations with the Celtic saints Servan and Mungo (5th century), and a Cistercian abbey was founded in 1217; the tower and choir remain as the parish church.

The burgh is a remarkable example of 16th- and 17th-century Scottish architecture. Attractive restored red-roofed houses huddle at various angles and levels along steep cobbled streets. They include the Palace (*c.* 1597 and 1611), Abbey House (1608), Tolbooth, and The Study, which contains a collection of local furniture and pottery. Pop. (1981) 4,793.

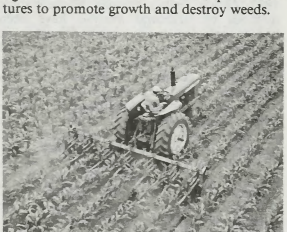
culteranismo, in Spanish literature, an esoteric style of writing that attempted to elevate poetic language and themes by re-Latinizing them, using classical allusions, vocabulary, syntax, and word order.

Announced as a theory by Luis Carrillo y Sotomayor in 1611 with his *Libro de la erudición poética, culteranismo* reached its height in the 17th century with the poetry of Luis de Góngora y Argote. Góngora's complex imagery, unusual grammatical constructions, and obscure mythological allusions in *Soledades* (1613; "Solitudes") carried *culteranismo* to such extremes that *gongorismo* entered the language as a synonym for literary affectation. Lesser imitators of Góngora deliberately cultivated obscurity in their work, thus overshadowing the original aim of the style, which was to create a poetry that would be timeless and universally appealing.

After 300 years of almost universal ridicule, *culteranismo* was rediscovered by early 20th-century avant-garde poets in Spain as a fruitful method of poetic expression, and Góngora himself was reevaluated by modern critics as one of Spain's greatest poets.

Cultivation System (Indonesian history): *see* Culture System.

cultivator, farm implement or machine designed to stir the soil around a crop as it matures to promote growth and destroy weeds.



Six-row, rear-mounted, row crop cultivator
By courtesy of John Deere

Horse-drawn cultivators were introduced in the mid-19th century; by 1870 a farmer with two horses could cultivate as much as 15 acres (6 hectares) a day with a machine the shovels (blades) of which straddled the crop rows. In the 20th century, with tractor power substituted for horses, the number of rows a single machine could cultivate grew to equal the capacity of multiple-row planters. Typical shovels are short, narrow, slightly curved, pointed steel pieces with polished front surfaces that dig into the soil in proportion to the pressure applied. The kind and number used per gang (in a single mounting) depend on crop and soil characteristics. Rotary hoes, used for early cultivation of corn, cotton, soybeans, potatoes, and small grain, have as many as 12 sections, each mounting several hoe wheels, with the whole machine up to 40 feet (12 m) wide. When the rotary hoe is drawn backward, it gives a treading action that crushes clods and pulverizes stalks.

Spring-tooth weeders have light spring teeth that flick out shallow-rooted weeds without injuring growing plants and can therefore be operated directly over planted rows in an early stage, ridding the field of many weeds as they emerge. Rod weeders are used for weed control in open unplanted fields; their working element is a square-section rod that revolves a few inches below the soil surface. Field cultivators, essentially light plows, are equipped with spring teeth, shovels, or sweeps.

cultural anthropology, a major division of anthropology that deals with the study of culture in all its aspects and that uses the methods, concepts, and data of archaeology, ethnography and ethnology, folklore, and linguistics in its descriptions and analyses of the diverse peoples of the world.

A brief treatment of cultural anthropology follows. For full treatment, *see* MACROPAEDIA: Social Sciences.

Modern cultural anthropology as a field of research has its roots in the Age of Discovery, when technologically advanced European cultures came into extended contact with various "traditional" cultures, which for the most part the Europeans grouped indiscriminately under the general rubrics "savage" or "primitive." By the mid-19th century, such questions as the origins of the world's diverse cultures and peoples and their languages had become matters of great interest in western Europe. The concept of evolution, as formally proposed by Charles Darwin with the publication in 1859 of *The Origin of Species*, lent considerable impetus to this research into the development of societies and cultures over time.

Anthropology was dominated in the latter 19th century by a linear conception of history, in which all human groups were said to pass through specified stages of cultural evolution (*q.v.*), from a state of "savagery" to "barbarism" and finally to that of "civilized man" (*i.e.*, western European man). At the onset of the 20th century, the strong cultural biases of the early western European and North American anthropologists were gradually discarded in favour of a more pluralistic, relativistic outlook in which each human culture was viewed as a unique product of physical environment, cultural contacts, and other divergent factors. Out of this orientation came a new emphasis on empirical data, fieldwork, and hard evidence of human behaviour and social organization within a given cultural environment. (*See* ethnography.) The prime exemplar of this approach was a German-born American, Franz Boas, known as the founder of the culture history school of anthropology. Boas and his followers—notably, Ruth Benedict, Margaret Mead, and Edward Sapir—dominated American anthropology throughout much of the 20th century. The culture history school was rooted in a functionalist approach to culture materials and sought an expression of unity between the various patterns, traits, and customs within a particular culture.

Meanwhile, in France, Marcel Mauss, founder of the Institute of Ethnology of the University of Paris, studied human societies as total systems, self-regulating and adaptive to changing circumstances in ways designed to preserve the integrity of the system. Mauss exerted considerable influence over such disparate figures as Claude Lévi-Strauss in France and Bronislaw Malinowski and A.R. Radcliffe-Brown in England. While Malinowski went on to pursue a strictly functionalist approach, Radcliffe-Brown and Lévi-Strauss developed the principles of structuralism. The functionalists asserted that the only valid method of analyzing social phenomena was to define the function they performed in a society. The structuralists, by contrast, sought to identify a system or structure underlying the broad spectrum of social phenomena in particular cultures, a system of which the members of a society maintain only a dim awareness through the use of myths and symbols.

Studies of Southwest American Indian groups in the 1930s by Ruth Benedict marked the emergence of the subdiscipline of cultural anthropology known as cultural psychology. Benedict proposed that cultures in their slow development imposed a unique "psychological set" on their members, who interpreted reality along lines oriented by the culture, regardless of environmental factors. The interrelation of culture and personality, as exemplified in the cultural value-systems of both traditional and modern societies, has become the subject of extensive research.

In their fieldwork, early 20th-century cultural anthropologists produced many studies of family life and structure, marriage, kinship and local grouping, and magic and witchcraft. During the second half of the century, while kinship studies remained a central concern, social status and power attracted more attention as researchers investigated the political and legal systems of different societies from an anthropological standpoint. More serious attention was paid to religious ideas and rituals as well. Interest shifted from African peoples, who had occupied cultural anthropologists for a quarter of a century, to peoples in India, Southeast Asia, Latin America, and the Pacific Ocean islands. The analysis of social change became a prominent area of research in the decades after World War II as many Third World countries undertook programs of economic development and industrialization. Since then, the application of computers has made possible a much greater use of quantitative data, as in studies of family and domestic group relations, marriage, divorce, and economic transactions.

cultural area: *see* culture area.

cultural evolution, the development of a culture from simpler to more complex forms, by a continuous process. The subject may be viewed unilinearly, tracing the evolution of humankind as a whole; or it may be viewed multilinearly, treating the evolution of each culture or society (or of given parts of a culture or society) individually. Cultural evolution was an important concept in the emerging field of cultural anthropology during the 18th and 19th centuries.

The Age of Discovery following the voyages of Columbus, an age that introduced Europeans to "primitive" (*i.e.*, traditional) cultures around the world, witnessed the beginnings of modern anthropology, as intellectuals sought to explain the existence of these cultures and to theorize about the evolution of European society from people assumed to be very much like them. When the 17th-century English philosopher Thomas Hobbes described primeval man as living in conditions in which there are "no arts, no letters, no society" and his life as "solitary, poor, nasty, brutish, and

short," he was very much proclaiming a popular conception of the "savage." Everything that was good and civilized resulted from the slow development *out* of this lowly state. Even rationalistic philosophes like Voltaire implicitly assumed that enlightenment gradually resulted in the upward progress of humankind.

Together with the idea of progress there grew the notion of fixed "stages" through which human societies progress, usually numbering three—savagery, barbarism, and civilization—but sometimes many more. The Marquis de Condorcet listed 10 stages, or "epochs," the final one having started with the French Revolution, which was destined, in his eyes, to usher in the rights of man and the perfection of the human race.

Nineteenth-century unilinear theory. The anthropologists E.B. Tylor (1832–1917) in England and Lewis H. Morgan (1818–81) in the United States were the chief exponents of cultural stages in the evolution of humankind. (Morgan, though, used the term ethnical periods rather than stages.) Theirs was often a concern with culture in general, not with individual cultures, except as they might be fitted in as illustrations of their theories, including their theories of the overall evolution of humanity and civilization.

Although Tylor is perhaps the better-known anthropologist and the more influential, the work of Morgan sums up the stages approach quite well. Morgan first became interested in the Iroquois Indians, a study that eventually led him to investigations of cultures around the world, particularly in terms of their kinship systems. In studying these systems, he became convinced that he had found what he called survivals in modern society—customs and practices belonging to an earlier age but surviving in some residual form even in the most modern societies. Thus, for him, social man seemed to progress in evolutionary stages—seven of them, from "lower savagery" to civilization—and Morgan gave his "proof" by citing contemporary societies characteristic of each stage (except the very lowest). In *Ancient Society* (1877) he epitomized his view:

> Since mankind were one in origin, their career has been essentially one, running in different but uniform channels upon all continents, and very similarly in all the tribes and nations of mankind down to the same status of advancement. It follows that the history and experience of the American Indian tribes represent, more or less nearly, the history and experience of our own remote ancestors when in corresponding conditions.

Such a historical thesis is now rejected by most modern anthropologists.

The development of concepts of progress and cultural evolution was enormously influenced in the mid-19th century by the wider acceptance of the theory of biological evolution put forward by Charles Darwin in *The Origin of Species* in 1859. The world of social science took the ideas of biological evolution as an attractive solution to similar questions regarding the origins and development of social behaviour. Indeed, the idea of a society as an evolving organism was a biological analogy that was taken up by many anthropologists and sociologists and that persists in some quarters even today. The English philosopher Herbert Spencer (1820–1903) worked out a general evolutionary scheme that included human society. He held that humans evolved from less-complex species and at first lived in undifferentiated hordes; various social functions then developed so that there were priests, kings, scholars, workers, and so forth; and knowledge was differentiated into the various sciences. Thus, together with all other changing things, human societies evolved, by means of an increasing division of labour, into complex civilizations.

Twentieth-century multilinear theory. As early as the turn of the century in the United States, and somewhat later in Europe, there began what was eventually to become a widespread reaction against sweeping generalizations about cultural evolution. Theories regarding "stages" of evolution were especially criticized as illusions. All cultures were to be regarded as unique in time and place. In the United States this movement was led by the German-born anthropologist Franz Boas (1858–1942), who, along with a generation of students—including Ruth Benedict and Margaret Mead—turned completely away from broad interpretations and concentrated on fieldwork among primitive peoples, harvesting a great variety of facts and artifacts as empirical evidence of cultural processes within existing societies. This "culture history" approach dominated American anthropology for the first half of the 20th century and so influenced anthropology elsewhere that high-level generalization and "systems building" became far less common than in the past.

After mid-century, however, there developed a modest revival of evolutionary theory among a few American anthroplogists, among them Leslie A. White, Julian H. Steward, Marshall D. Sahlins, and Elman R. Service. These new evolutionists rejected universal stages outright and conceived of cultural evolution as multilinear and consisting of a number of forward paths of different styles and lengths. Though there is no specific process of evolution for all peoples, humankind does generally evolve or progress, with specific peoples providing breakthroughs that make all humankind more adaptable to and dominant over the environment and socially more complexly organized. Only in this sense can the whole of world civilization be viewed as the product of a unitary process.

Cultural Revolution, in full GREAT PROLETARIAN CULTURAL REVOLUTION, Wade-Giles romanization WU-CH'AN CHIEH-CHI WEN-HUA TA KE-MING, Pinyin WUCHANJIEJI WENHUA DAGEMING, upheaval launched by Chinese Communist Party chairman Mao Zedong during his last decade in power (1966–76) to renew the spirit of the Chinese revolution. Fearing that China would develop along the lines of the Soviet model and concerned about his own place in history, Mao threw China's cities into turmoil in a monumental effort to reverse the historic processes underway.

During the early 1960s, tensions with the Soviet Union convinced Mao that the Russian revolution had gone astray, which in turn made him fear that China would follow the same path. Programs carried out by his colleagues to bring China out of the economic depression caused by the Great Leap Forward (*q.v.*) made Mao doubt their revolutionary commitment and also resent his own diminished role. He especially feared urban social stratification in a society as traditionally elitist as China. Mao thus ultimately adopted four goals for the Cultural Revolution: to replace his designated successors with leaders more faithful to his current thinking; to rectify the Chinese Communist Party; to provide China's youths with a revolutionary experience; and to achieve some specific policy changes so as to make the educational, health care, and cultural systems less elitist. He initially pursued these goals through a massive mobilization of the country's urban youths. They were organized into groups called the Red Guards (*q.v.*), and Mao ordered the party and the army not to suppress the movement.

Mao also put together a coalition of associates to help him carry out the Cultural Revolution. His wife, Jiang Qing, brought in a group of radical intellectuals to rule the cultural realm. Defense Minister Lin Biao made certain that the military remained Maoist. Mao's longtime assistant, Chen Boda, worked with security men Kang Sheng and Wang Dongxing to carry out Mao's directives concerning ideology and security. Premier Zhou Enlai played an essential role in keeping the country running, even during periods of extraordinary chaos. Yet there were conflicts among these associates, and the history of the Cultural Revolution reflects these conflicts almost as much as it reflects Mao's own initiatives.

Mao formally launched the Cultural Revolution at the Eleventh Plenum of the Eighth Central Committee in August 1966. He shut down China's schools, and during the following months he encouraged Red Guards to attack all traditional values and "bourgeois" things and to test party officials by publicly criticizing them. Mao believed that this measure would be beneficial both for the young people and for the party cadres that they attacked.

The movement quickly escalated; many elderly people and intellectuals were not only verbally attacked but were physically abused. Many died. The Red Guards splintered into zealous rival factions, each purporting to be the true representative of Maoist thought. Mao's own personality cult, encouraged so as to provide momentum to the movement, assumed religious proportions. The resulting anarchy, terror, and paralysis completely disrupted the urban economy. Industrial production for 1968 dipped 12 percent below that of 1966.

During the earliest part of the Red Guard phase, key Politburo leaders were removed from power—most notably President Liu Shaoqi, Mao's designated successor until that time, and Party General Secretary Deng Xiaoping. In January 1967 the movement began to produce the actual overthrow of provincial party committees and the first attempts to construct new political bodies to replace them. In February 1967 many remaining top party leaders called for a halt to the Cultural Revolution, but Mao and his more radical partisans prevailed, and the movement escalated yet again. Indeed, by the summer of 1967 disorder was widespread; large armed clashes between factions of Red Guards were occurring throughout urban China.

During 1967 Mao called on the army under Lin Biao to step in on behalf of the Red Guards. Instead of producing unified support for the radical youths, this political-military action resulted in more divisions within the military. The tensions inherent in the situation surfaced vividly when Chen Zaidao, a military commander in the city of Wuhan during the summer of 1967, arrested two key radical party leaders.

In 1968, after the country had been subject to several cycles of radicalism alternating with relative moderation, Mao decided to rebuild the Communist Party to gain greater control. The military dispatched officers and soldiers to take over schools, factories, and government agencies. The army simultaneously forced millions of urban Red Guards to move to the rural hinterland to live, thus scattering their forces and bringing some order to the cities. This particular action reflected Mao's disillusionment with the Red Guards because of their inability to overcome their factional differences. Mao's efforts to end the chaos were given added impetus by the Soviet invasion of Czechoslovakia in August 1968, which greatly heightened China's sense of insecurity.

Two months later, the Twelfth Plenum of the Eighth Central Committee met to call for the convening of a party congress and the rebuilding of the party apparatus. From that point, the issue of who would inherit political power as the Cultural Revolution wound down became the central question of Chinese politics.

When the Ninth Party Congress convened in April 1969, Defense Minister Lin Biao was

officially designated as Mao's successor, and the military tightened its grip on the entire society. Both the Party Central Committee and the revamped Communist Party were dominated by military men. Lin took advantage of Sino-Soviet border clashes in the spring of 1969 to declare martial law and further used his position to rid himself of some potential rivals to the succession. Several leaders who had been purged during 1966–68 died under the martial law regimen of 1969, and many others suffered severely during this period.

Lin quickly encountered opposition. Mao himself was wary of a successor who seemed to want to assume power too quickly, and he began to maneuver against Lin. Premier Zhou Enlai joined forces with Mao in this effort, as possibly did Mao's wife Jiang Qing. Mao's assistant Chen Boda, however, decided to support Lin's cause. Thus, despite many measures taken in 1970–71 to return order and normalcy to Chinese society, increasingly severe strains were splitting the top ranks of leadership.

These strains first surfaced at a party plenum in the summer of 1970. Shortly thereafter Mao began a campaign to criticize Chen Boda as a warning to Lin. Chen disappeared from public in August 1970. Matters came to a head in September 1971 when Lin himself was killed in what the Chinese asserted was an attempt to flee to the Soviet Union after an abortive assassination plot against Mao. Virtually the entire Chinese high military command was purged in the weeks following Lin's death.

Lin's demise had a profoundly disillusioning effect on many people who had supported Mao during the Cultural Revolution. Lin had been the high priest of the Mao cult, and millions had gone through tortuous struggles to elevate this chosen successor to power and throw out his "revisionist" challengers. They had in this quest attacked and tortured respected teachers, abused elderly citizens, humiliated old revolutionaries, and, in many cases, battled former friends in bloody confrontations. The sordid details of Lin's purported assassination plot and subsequent flight cast all this in the light of traditional, unprincipled power struggles, and vast numbers of Chinese people began to feel that they simply had been manipulated for personal political purposes.

Initially, Premier Zhou Enlai benefited the most from Lin's death, and from late 1971 through mid-1973 Zhou tried to nudge China back toward stability. He encouraged a revival of the educational system and brought back into office a number of people who had been cast out. China began again to increase its trade and other links with the outside world, and the economy continued the forward momentum that had begun to build in 1969. Mao personally approved these general moves but remained wary lest they call into question the basic value of having launched the Cultural Revolution in the first place.

During 1972, however, Mao suffered a serious stroke, and Zhou learned that he had a fatal malignancy. These events highlighted the continued uncertainty over the succession. In early 1973 Zhou and Mao brought back to power Deng Xiaoping. Zhou hoped to groom him to be Mao's successor. Deng, however, had been the second most important purge victim at the hands of the radicals during the Cultural Revolution. His reemergence made Jiang Qing and her followers desperate to firmly establish a more radical path.

From mid-1973 until Mao's death in September 1976, Chinese politics shifted back and forth between Jiang Qing and those who supported her (notably Wang Hongwen, Zhang Chunqiao, and Yao Wenyuan, who with Jiang Qing were later dubbed the Gang of Four, *q.v.*) and the Zhou-Deng group. The former favoured ideology, political mobilization, class struggle, anti-intellectualism, egalitarianism, and xenophobia, while the latter promoted economic growth, stability, educational progress, and a pragmatic foreign policy. Mao tried unsuccessfully to maintain a balance between these two forces while he struggled to find a successor who would embody his preferred combination of each.

From mid-1973 until mid-1974 the radicals were ascendant; they whipped up a campaign that used criticism of Lin Biao and of Confucius as a thinly veiled vehicle for attacking Zhou and his policies. By July 1974, however, the resulting economic decline and increasing chaos made Mao shift back toward Zhou and Deng. With Zhou hospitalized, Deng assumed increasing power from the summer of 1974 through the late fall of 1975, when the radicals finally convinced Mao that Deng's policies would lead eventually to a repudiation of the Cultural Revolution and of Mao himself. Mao then sanctioned criticism of these policies by means of wall posters (*ta-tzu-pao*), which had become a favoured method of propaganda for the radicals. Zhou died in January 1976, and Deng was formally purged (with Mao's backing) in April. Only Mao's death in September and the purge of the Gang of Four by a coalition of political, police, and military leaders in October 1976 paved the way for Deng's subsequent reemergence in 1977.

Although the Cultural Revolution largely bypassed the vast majority of the people who lived in rural areas, it had serious consequences for China as a whole. In the short run, of course, the political instability and the constant shifts in economic policy produced slower economic growth and a decline in the capacity of the government to deliver goods and services. Officials at all levels of the political system learned that future shifts in policy would jeopardize those who had aggressively implemented previous policy. The result was bureaucratic timidity. In addition, with the death of Mao and the end of the Cultural Revolution (the Cultural Revolution was officially ended by the Eleventh Party Congress in August 1977, but it in fact concluded with Mao's death and the purge of the Gang of Four in the fall of 1976), nearly three million party members and countless wrongfully purged citizens awaited reinstatement. Bold measures were taken in the late 1970s to confront these immediate problems, but the Cultural Revolution left a legacy that continued to trouble China.

There existed, for example, a severe generation gap; individuals who experienced the Cultural Revolution while in their teens and early twenties were denied an education and taught to redress grievances by taking to the streets. Post-Cultural Revolution policies—which stressed education and initiative over radical revolutionary fervour—left little room for these millions of people to have productive careers. Indeed, the fundamental damage to all aspects of the educational system itself took several decades to repair.

Another serious problem was the corruption within the party and government. Both the fears engendered by the Cultural Revolution and the scarcity of goods that accompanied it forced people to fall back on traditional personal relationships and on bribery and other forms of persuasion to accomplish their goals. Concommitantly, the Cultural Revolution brought about general disillusionment with the party leadership and the system itself as millions of urban Chinese witnessed the obvious power plays that took place under the name of political principle in the early and mid-1970s. The post-Mao repudiation of both the objectives and the consequences of the Cultural Revolution made many people turn away from politics altogether.

Among the people themselves, there remained bitter factionalism, as those who opposed each other during the Cultural Revolution often shared the same work unit and would do so for their entire careers.

Perhaps never before in human history has a political leader unleashed such massive forces against the system that he created. The resulting damage to that system was profound, and the goals that Mao sought to achieve ultimately remained elusive. (K.G.L.)

Consult the INDEX *first*

culture, the integrated pattern of human knowledge, belief, and behaviour. Culture, thus defined, consists of language, ideas, beliefs, customs, taboos, codes, institutions, tools, techniques, works of art, rituals, ceremonies, and other related components. The development of culture depends upon humans' capacity to learn and to transmit knowledge to succeeding generations.

A brief treatment of culture follows. For full treatment, *see* MACROPAEDIA: Culture, The Concept and Components of.

Social scientists and anthropologists have offered a number of definitions of human culture, reflecting various schools of thought. Edward Burnett Tylor, in his *Primitive Culture* (1871), provided what has been termed the classic definition, according to which culture includes all capabilities and habits acquired by man as a member of society.

Every human society has its own particular culture, or sociocultural system, which overlaps to some extent with other systems. Variation among sociocultural systems is attributable to physical habitats and resources; to the range of possibilities inherent in various areas of activity, such as language, rituals and customs, and the manufacture and use of tools; and to the degree of social development. The attitudes, values, ideals, and beliefs of the individual are greatly influenced by the culture in which he lives, and an individual may, of course, live in or travel among several different cultures.

In comparing cultures, ethnocentrism is the tendency to interpret or evaluate other cultures in terms of one's own. Cultural relativism, on the other hand, is a comparative approach that derives from an understanding and appreciation of cultures different from one's own. Changes take place within and among cultures by means of ecological and environmental changes; by diffusion of advantageous cultural traits among societies at approximately equivalent stages of cultural development; by acculturation, or the acquisition of a foreign culture by a relatively subject people; or by the evolution of cultural elements over a period of time.

Culture may be viewed in terms of component patterns (cultural traits, cultural areas, and cultural types) and in terms of institutional structure and functions (social organization, economic systems, education, religion and belief, and custom and law). Culture may also be subdivided for study into nonurban culture as compared with modern urban culture and into peasant or tribal societies as distinct from modern industrial society.

culture, pure (microbiology): *see* pure culture.

culture-and-personality studies, also called PSYCHOLOGICAL ANTHROPOLOGY, branch of anthropology that seeks to determine the nature of the interaction between the individual and his culture. It applies the methods of psychology to the field of anthropology in an effort to analyze the differing behaviour patterns of individuals who live in the same culture. Depth interviews, role playing, Rorschach tests, elaborate biographies, studies of family

roles, and dream interpretation are among the methods used.

Psychological anthropology, as it is sometimes called, has directed the attention of anthropologists to the symbolic meanings and emotional significance of cultural features that were hitherto treated only formally; at the same time, it has led psychologists to recognize the existence of an inevitable cultural component in all processes of perception, motivation, and learning.

culture area, also called CULTURAL AREA, or CULTURE PROVINCE, in anthropology, a contiguous geographic area comprising a number of societies that possess the same or similar traits or that share a dominant cultural orientation. The concept of culture area originated in the ethnographic work of Otis T. Mason at the turn of the 20th century.

Among the most important writers on the subject of culture areas were Sir Halford Mackinder in Great Britain and Paul Vidal de La Blache in France. Such scholars were interested in the interplay of human society and nature as it served to organize the Earth's surface into analytically recognizable areal units.

Mackinder held that the "pivot region of the world's politics [is] that vast area of Euro-Asia which is inaccessible to ships, but in antiquity lay open to the horse-riding nomads, and is to-day about to be covered with a network of railways." This pivot area was now being reformed into a cohesive region by rail communication, and its peoples were moving into more and more southerly and easterly territories. Mackinder postulated that this expanded resource base, if ever coupled with access to the sea and the development of sea power, would then form the heartland of a worldwide political system.

Vidal de La Blache held that societies eventually establish regions that are reflections of social purpose. He emphasized that the environment offers human society a variety of possibilities rather than a fixed, determinate path. To be sure, there are restrictions, but these are cultural—the values of the culture, the social organization, and the technology. Roughly similar to what the anthropologists called culture, this mix of attributes Vidal called a society's *genre de vie,* or "way of life." Over long periods of time, society and environment develop a series of unique regions, each reflecting the initial environmental conditions chosen as well as the effects of the cultural instruments involved in that choice.

Archaeologists and anthropologists long recognized the need for an areal classification system that would reflect patterns of similarity found in artifacts and fieldwork. Some museum exhibits were ordered in areal fashion, and there had been attempts to organize American Indian populations into culture-area complexes. There was significant debate, however, over whether these groupings were real and objective or merely analytical constructs. Alfred Kroeber claimed that the spatial distinctions are real, that they represent "a nonphilosophical, inductive, mainly unimpeachable organization of phenomena analogous to the 'natural' classification of animals and plants on which systematic biology rests."

Clark Wissler postulated an age–area hypothesis (*q.v.*). In this view, culture elements diffuse outward from an initial central point, the development of which is accidental, or "historical." Once it is established, however, culture and environment interact, although the dominant feature is environmental because of the relative unchangeability of the natural environment. Nonetheless, argued Wissler, culture elements have a tendency to diffuse equally in all directions from this centre. It can therefore be inferred that, all things being equal, the element or elements having the widest distribution are the oldest—that is, have been in the process of diffusion the longest. This distribution was the basis for inferring age, and this was called the age–area hypothesis.

Culture areas were conceived of as time-specific; that is, they attempted to organize cultural elements in a spatial framework frozen at a single instant in time. The age–area hypothesis was an attempt to place the findings of fieldwork in a temporal framework by pure inference. In some parts of the New World, South America in particular, there exist chronological sequences of culture areas. It was suggested that whenever such a sequence existed simultaneously for more than one culture area and wherever it could be shown or inferred that the cultures had been interacting through time, it should be called an area cotradition. The application of the concept was limited to the New World.

In Europe, where there was much more archaeological and historical evidence upon which to base typological constructs, the spatially oriented culture-area concept got little attention compared to that of the concept of Kulturkreis (*q.v.*; German: "culture circle"). Whereas both approaches were attempts to explain the distribution of culture traits, they approached the phenomena from opposite philosophical and methodological directions. The culture-area concept suggested, among other things, that there existed a body of interrelated culture elements that, in interaction with the environment, produced a culture complex that may or may not have been unique but that was produced in situ. Those who believed in Kulturkreis held that migration and diffusion accounted for the distribution of most culture traits and, thus, that independent invention was extremely rare. There were, in fact, only a limited number of Kulturkreise, or fonts of diffusion.

By the late 20th century, however, the concept of culture area and such related concepts as Kulturkreis are perhaps best known as teaching devices or as simple typological structures for ordering data. As such, they remain useful analytical concepts. The fundamental areal assumptions of the concepts are still reflected in the curricular structure of courses in schools; and most professional scholars in geography and anthropology are identified as specialists in one, or perhaps two, culture areas. This is becoming less true in both disciplines, however, as systematic concepts are replacing what are now viewed as typological ones.

culture medium: *see* growth medium.

Culture System, also called CULTIVATION SYSTEM, Dutch CULTUUR-STELSEL, revenue system in the Dutch East Indies (Indonesia) that forced farmers to pay revenue to the treasury of The Netherlands in the form of export crops or compulsory labour. It was introduced in 1830 by Johannes van den Bosch, then governor-general of the Dutch East Indies.

According to the system, a villager should provide land rent to the government by setting aside one-fifth of his rice field for the cultivation of such export crops as sugar, coffee, and indigo or by working in a government field for one-fifth of a year (66 days) if he had no land. Labour spent on the cultivation should not exceed the amount needed for producing rice on the same acreage. Any surplus above the prescribed land revenue that accrued from the sale of the produce was credited to the villager; crop failure resulting from any cause other than the fault of the cultivator was debited to the government.

In practice the system was burdensome. More than one-fifth of the rice fields were used for the growing of export crops, and considerably more than 66 days of labour were required of the landless. Transportation of the produce was difficult and time-consuming. In case of crop failure, the people were left responsible for the loss. Contrary to van den Bosch's intention, production was also demanded of the people who had paid taxes by working under the Culture System.

The system resulted in sharp criticism in the mid-1850s; one of the most outspoken critics was Multatuli (pseudonym of Dutch writer Eduard Douwes Dekker), who condemned the system in his book *Max Havelaar* (1860). The practice, however, was not abolished until 1870, by which time it had brought significant returns to the government exchequer and served the purpose of promoting Dutch commerce and shipping. Between 1830 and 1877 the treasury of The Netherlands received 823,000,000 guilders from the Indies.

cultured pearl, natural but cultivated pearl produced by a mollusk after the intentional introduction of a foreign object inside the creature's shell. The discovery that such pearls could be cultivated in freshwater mussels is said to have been made in 13th-century China, and the Chinese have been adept for hundreds of years at cultivating pearls by opening the mussel's shell and inserting into it small pellets of mud or tiny bosses of wood, bone, or metal and returning the mussel to its bed for about three years to await the maturation of a pearl formation. Cultured pearls of China have been almost exclusively blister pearls (hemispherical pearls formed between the mussel and its shell), which require addition of a half sphere of mother-of-pearl to create the assembled gem, called a pearl doublet.

The production of whole cultured pearls was perfected by the Japanese. The research that led to the establishment of the industry was started in the 1890s by Mikimoto Kōkichi, who, after long experimentation, concluded that a very small mother-of-pearl bead introduced into the mollusk's tissue was the most successful stimulant to pearl production. It possesses the added virtue of providing a pearl entirely of nacreous content. Cultured pearls closely approximate natural pearls. If the covering of nacre is too thin, however, it will deteriorate upon prolonged contact with the acids of the human body and eventually will reveal the mother-of-pearl matrix.

Once a shore-based activity, pearl farms now generally use a vessel as an operating platform. Immature pearl oyster shells (usually *Pinctada fucata* or *Pteria penguin* in Japan and *Pinctada maxima* in Australia) are reserved in barrels until maturation (2 to 3 years) and, when the shells reach certain size, are implanted with a tiny polished sphere of mother-of-pearl. The implanted oysters are suspended in wire nets from floating rafts or contained in some other way and are tended by divers until they are ready for harvesting; readiness is often determined by X ray.

Northern Australia established its first pearl farms in the 1960s, principally with Japanese collaboration, and by the mid-1970s were an established industry, producing pearl shell as well as pearls. Japan and Australia are the largest producers of cultured pearls, though Fiji also produces some. *See also* pearl.

Culver City, city, Los Angeles county, California, U.S. Part of Rancho La Ballona, it was laid out in 1914 by Harry H. Culver and promoted as a site for motion-picture production, becoming the home of Metro-Goldwyn-Mayer and Hal Roach studios. Television shows were produced at what were the Desilu and before that the RKO studios. Petroleum, aircraft, and electronic industries are the other economic mainstays of the city. It is also the site of West Los Angeles College (1968). Inc. 1917. Pop. (1990) 38,793.

culverin, medieval cannon of relatively long barrel and light construction. It fired light (8–16-pound [3.6–7.3-kg]) projectiles at long ranges along a flat trajectory.

The culverin was adapted to field use by the French in the mid-15th century and to naval use by the English in the late 16th century. During the 17th century, cannons were classified according to the weight of projectiles fired, and the name culverin became obsolete.

Culverwel, Nathanael (b. 1618?, London, Eng.—d. 1651?), English empiricist philosopher who specialized in the application of reason to ethical problems, remembered as a probable influence on John Locke.

Details of Culverwel's life are obscure. Though it is known that he was elected to a fellowship at the University of Cambridge in 1642, he is thought to have suffered a mental breakdown in his last years. His writings were published posthumously as *Spiritual Opticks* (1651), a set of six sermons, and a one-volume edition of collected works (1652).

Culverwel's best-known essay, *An Elegant and Learned Discourse of the Light of Nature* (1652), was intended as the introduction to a larger work in which he hoped to defend reason against its more extreme opponents and faith against rationalist reductionists. Reared in the strict spiritual climate of Calvinism, he stopped short of a complete embrace of rationalism. Reason is necessary, he asserted, because it shows men the need for revelation and the existence of divine law. God's will, however, rather than reason, is the "rule of good and evil." This retention of Calvinist attitudes distinguishes Culverwel from the Cambridge Platonists. Contrary to the Platonists' view, he believed that human reason does not participate in divine reason but merely reflects it dimly.

Cumae, ancient city about 12 miles (19 km) west of Naples, probably the oldest Greek mainland colony in the west and home of a sibyl (Greek prophetess) whose cavern still exists. Founded about 750 BC by Greeks from Chalcis, Cumae came to control the most fertile portions of the Campanian plain. Although the Etruscans were their special enemy during the last half of the 6th century and first half of the 5th, it was the Samnites who, after destroying Etruscan supremacy about 440, overwhelmed the Greeks of Cumae in 428 or 421. Crucial aspects of the Greek culture were then eliminated, although in many respects the Greek character of the town survived. The beautiful coins of Cumae were no longer produced, and an Italic dialect, Oscan (and later Latin), replaced the Greek language. Rome subjugated Cumae in 338; under the empire it became a quiet country town, and in 1205 it was destroyed. Remains of fortifications and graves from all these periods have been found on the city's acropolis hill and elsewhere throughout the area.

Cuman, Hungarian KUN, member of a nomadic Turkish people, comprising the western branch of the Kipchak confederation until the Mongol invasion (1237) forced them to seek asylum in Hungary. During the 12th century the Cumans acted as auxiliary troops for the Russian princes and in that capacity clashed with Hungarian expeditionary forces; but, by the beginning of the 13th century, they had become more aggressive and launched their own raids into southeastern Transylvania. Soon afterward the Cuman prince Barc and 15,000 of his people were baptized (1227). The first bishopric of Cumania was established in 1228, and King Béla IV of Hungary assumed the title "king of Cumania." In 1239 he granted asylum to the Cumans and their prince Kuthen, who had earlier tried unsuccessfully to organize Russian resistance to the Mongols. Just before the Mongol invasion of Hungary in 1240–41, however, Kuthen, who was considered a dangerous alien, was murdered; the Cumans left Hungary but were resettled there by Béla in 1245. Béla's son, the future Stephen V, married a Cuman princess, and, under the rule of their son (Ladislas IV [László]; 1272–90), Cuman influence in Hungarian affairs was great. Nevertheless, the Cumans did not become completely assimilated into Hungarian society for centuries.

Cumaná, city, capital of Sucre *estado* ("state"), northeastern Venezuela. On the Manzanares River, 1 mile (1.6 km) inland from its port, Puerto Sucre, on the Caribbean Sea at the mouth of the river, Cumaná has an elevation of 52 feet (16 m) and an average temperature of 83° F (28° C). Founded as Nueva Córdoba in 1523, Cumaná claims to be the oldest European settlement on the South American mainland. Despite attacks by foreign corsairs and repeated severe earthquakes, Cumaná enjoyed a profitable trade with neighbouring settlements and with Spain throughout much of the colonial period. It has become a commercial and manufacturing centre for an agricultural hinterland, where



Eastern University, Cumaná, Venezuela
Carl Frank—Photo Researchers/EB Inc.

coffee, cacao, sugarcane, tobacco, beans, and a variety of fruits are cultivated. A major cotton mill is located near the city, and it has an important sardine-canning industry. The Eastern University was established in Cumaná in 1958. The city has an airport and is connected by highway with Barcelona, 55 miles (90 km) southwest. Pop. (1989 est.) 227,411.

Cumanagoto, Indians of northeastern Venezuela at the time of the Spanish conquest. Since the 17th century they have not existed as a tribal or cultural unit. The Cumanagoto spoke a Cariban language, related to that of the Palenque. They were agricultural, growing corn (maize), manioc, sweet potatoes, and other native crops, as well as coca trees, source of the drug cocaine. Wild foods were also gathered, and hunting was important. Domesticated animals were uncommon, except for turkeys. Their villages often had wooden palisades for defense. Dress was minimal, consisting of a small genital covering and decorative ornaments of feathers, pearls, gold, shell, clay beads, coral beads, bones, teeth, or flowers. Polygyny was practiced by chiefs, whose wives lived together in a kind of harem. Religion centred on worship of the sun and moon.

Cumanus, Sinus (Mediterranean Sea): *see* Naples, Bay of.

Cumberland, former county, extreme northwestern England. Since the reorganization of 1974, Cumberland and its neighbouring county of Westmorland to the south and east form the county of Cumbria. Cumberland had an area of 1,521 square miles (3,939 square km) and was bounded on the west by the Irish Sea, on the north by Scotland, on the east by the Pennines, and on the south by Westmorland and Lancashire.

The region gives evidence of Bronze Age occupation; stone circles, of which Long Meg and Her Daughters (near Little Selkeld) and Castlerigg Circle (near Keswick) are the best preserved, are thought to be of this period. The cultural isolation of the region was such that it was still at a Bronze Age level of development at the time of Roman conquest. In 122–126 the emperor Hadrian constructed the great wall complex between Wallsend in Northumberland and Bowness-on-Solway. The Roman occupation was chiefly military in character, with Luguvallium (Carlisle) as the main civilian settlement. Christianity was brought to Cumberland by Ninian, who founded Candida Casa (Whithorn) in about 397 on the north shore of the Solway. In the late 7th century, the district then known as Cumbria was in Northumbrian hands. Cumbria was originally the same as Cambria, a Latinized derivative of Cymry, or Cymru (Wales). The two names were subsequently differentiated.

The Danes raided Cumbria in 875, and the region also was threatened from the northwest. In 945 Edmund I ravaged all "Cumbraland" (first mentioned under that name), handing it over to Scots king Malcolm I in return for a promise of military support. The earls of Northumbria controlled part of the county in the first half of the 11th century, but by 1068 the area had been taken by the king of the Scots and formed no part of William the Conqueror's kingdom, the three manors that appear in Domesday Book being regarded as part of Yorkshire. In 1092 Gospatric II, son of Dolfin, was ruling from Carlisle, under the Scots king, when the city was captured by William II, surnamed Rufus. This king repaired the city, gave orders for the castle to be built, and sent settlers to claim the land. Immigration from the south about this time is evidenced by the occurrence of place-names ending in *by* to which a Norman personal name is prefixed. The land was once recaptured by the Scots, but the county of Cumberland as it existed until 1974 dated from 1177.

Because of its border position, Cumberland was the scene of constant strife and much bloodshed until after the union of England and Scotland in 1603. Though many of the inhabitants of the region were loyal to the Stuart cause, active support in the Jacobite risings of 1715 and 1745 was meagre. It was after the 1745 rebellion that Cumberland became known to England as a whole. Roads were built or improved, trade was extended, and the Lake District became popular throughout England for its picturesque scenery.

Cumberland, city, seat (1789) of Allegany county, northwestern Maryland, U.S. (squeezed between the Pennsylvania and West Virginia state lines). It lies in a bowl-shaped valley bounded by the Potomac River and Wills Creek, at the entrance to Cumberland Narrows, a natural gateway through the Appalachians to the Ohio Valley. Settled in 1750 as a trading post by the Ohio Company, it was known as Will's Creek until 1763, when the town was laid out and renamed after Fort Cumberland, built in 1754 by Colonel James Ames and later headquarters for Lieutenant George Washington and General Edward Braddock in the French and Indian War. Cumberland became a transportation centre after it was made the eastern terminus of the Cumberland (or National) Road and the western terminus of the Chesapeake and Ohio Canal and when in 1842 the Baltimore and Ohio Railroad came through.

Cumberland was occupied by Union troops during the American Civil War. On Feb. 21, 1865, two sleeping Union generals, Benjamin Kelley and George Crook, were captured there by McNeill's Rangers. Coal mining, the economic mainstay, is augmented by diversified manufactures including rubber, textiles, paper products, glass, and railroad equipment. Allegany Community College opened (1961) in

Cumberland. Inc. town, 1815; city, 1856. Pop. (1992 est.) city, 24,333; Cumberland MSA, 103,894.

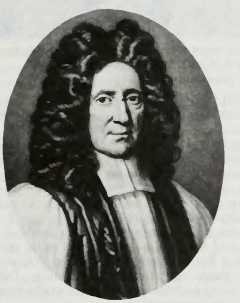
Cumberland, Ernest Augustus, Duke of: *see* Ernest Augustus (II).

Cumberland, Richard (b. July 15, 1631, London, Eng.—d. Oct. 9, 1718, Peterborough, Cambridgeshire), English theologian, Anglican bishop, and philosopher of ethics.

In 1658 Cumberland left the study of medicine at the University of Cambridge to serve in the rectory of Brampton House in Northamptonshire and three years later became one of the 12 official preachers at Cambridge. In 1667 he joined the rectory of Allhallows at Stamford. He was named bishop of Peterborough in 1691.

Cumberland, like others at Cambridge in his time, was strongly interested in Hebraic antiquities, and in 1686 he published *An Essay Toward the Recovery of the Jewish Measures and Weights. . . .* Similarly, his *Origines Gentium Antiquissimae . . .* (1724) and *Sanchoniatho's Phoenician History* (1720) were efforts to shed light on historical events related by the Old Testament; both were published posthumously by his son-in-law, Squier Payne.

Cumberland's reputation, however, rests on his *De Legibus Naturae, Disquisitio Philosophica* (1672; *A Philosophical Enquiry into the Laws of Nature,* 1750). Although it is basically an attack on the views of Thomas Hobbes, the book begins by a consideration of those of Hugo Grotius, Dutch jurist and theologian. Grotius had based the authenticity of the laws of nature on the general agreement of civilized nations, but Cumberland sought a more secure philosophical foundation than



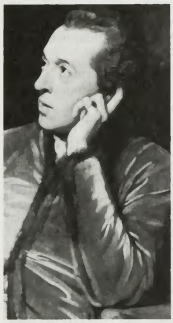
Richard Cumberland, engraving by J. Smith after a portrait by T. Murray, 1706

By courtesy of the trustees of the British Museum: photograph, J.R Freeman & Co. Ltd.

this doctrine of "common consent." In contrast to Hobbes, he set out to show that there are firmly established laws of nature that make it desirable for men to pursue the common good rather than their own particular advantage. The basic doctrine on which his theory depends is that the whole is exactly the same as all of its parts taken together, from which it follows that whatever preserves the whole preserves the parts. Thus Cumberland's reply to Hobbes's egoism is that in fact the happiness of the individual is ensured only if he works for the common good.

Since he defines moral action in terms of ends and puts great stress on happiness, Cumberland has sometimes been called the father of English utilitarianism. Essential to his thought is his belief in the applicability of mathematical qualities of moral philosophy. The pursuit of the common good, he wrote, is "naturally fitting for a rational being." As one of the first philosophers to develop a quasi-mathematical morality, or "moral calculus," Cumberland greatly influenced subsequent ethicists such as Jeremy Bentham, Francis Hutcheson, Samuel Clarke, Benedict de Spinoza, and Gottfried Leibniz.

Cumberland, Richard (b. Feb. 19, 1732, Cambridge, Cambridgeshire, Eng.—d. May 7, 1811, London), English dramatist whose plays were in tune with the sentimental spirit that became an important literary force during the latter half of the 18th century. He was a master of stagecraft, a good observer of men and



Richard Cumberland, detail of an oil painting by George Romney; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

manners, but today perhaps is chiefly famous as the model for the character of Sir Fretful Plagiary in Richard Brinsley Sheridan's play *The Critic; or a Tragedy Rehearsed.*

After leaving Trinity College, Cambridge, Cumberland in 1761 became private secretary to the Earl of Halifax in the Duke of Newcastle's ministry and later held other government positions. His first success as a dramatist came with *The Brothers* (1769), a sentimental comedy whose plot is reminiscent of Henry Fielding's novel *Tom Jones,* and he continued to write prolifically. *The West Indian* (1771) was first produced by the great actor-manager David Garrick and held the stage throughout the 18th century. Despite its fantastic plot and crude psychology, a great deal of feeling is extracted from the situations. *The Fashionable Lover,* another sentimental comedy, achieved success in 1772.

Cumberland, however, hankered after the grand style. He regarded an early tragedy, *Tiberius in Capreae,* as his masterpiece but could persuade no management to produce it. His serious works (which included an adaptation of William Shakespeare's *Timon of Athens*) were not successful, with the exception of *The Jew* (1794) and *The Wheel of Fortune* (1795). Cumberland was querulous in the face of criticism and quarreled with many famous contemporaries, notably Sheridan and Oliver Goldsmith, both of whom were opposed to sentimentalism in the drama.

The *Memoirs of Richard Cumberland Written by Himself* (1806–07) is notable for Cumberland's reminiscences of Garrick and of the theatrical manager Samuel Foote.

Cumberland, William Augustus, Duke of (b. April 15, 1721, London, Eng.—d. Oct. 31, 1765, London), British general, nicknamed "Butcher Cumberland" for his harsh suppression of the Jacobite rebellion of 1745. His subsequent military failures led to his estrangement from his father, King George II (reigned 1727–60).

During the War of the Austrian Succession (1740–48), he became commander of the allied forces (1745) and was severely defeated by France's Marshal Maurice de Saxe at the Battle of Fontenoy (May 11, 1745). Later that year Cumberland was recalled to England to oppose the invasion of Jacobites under Charles Edward, the Young Pretender, grandson of the deposed Stuart king James II. After triumphing over Charles at the decisive Battle of Culloden Moor in Inverness-shire on April 16, 1746 (at which about 1,000 Scots died), he remained in Scotland for three months, rounding up some 3,500 men and executing about 120.

He then returned to the war against the French; in July 1747 he lost the Battle of Lauffeld to Saxe. During the Seven Years' War (1756–63) he was defeated by the French at the Battle of Hastenbeck (July 1757) in Hanover, one of George II's possessions. Because he signed the Convention of Klosterzeven (September 1757), promising to evacuate Hanover, he was dismissed by his father, who repudiated the agreement. His refusal to serve as commander in chief unless William Pitt was dismissed as prime minister led to Pitt's fall in April 1757.

Cumberland Gap, natural pass (elevation 1,640 feet [500 m]) that was cut through the Cumberland Plateau in the eastern United States by former stream activity. It is located near the point where Kentucky, Virginia, and Tennessee meet between Middlesboro, Ky., and the town of Cumberland Gap, Tenn. The pass was discovered in 1750 by Thomas Walker, and the Wilderness Road blazed by Daniel Boone runs through it. Named for the Duke of Cumberland, son of George II, it became the main artery of trans-Allegheny migration that opened the Northwest Territory for settlement and permitted the extension of the western boundary of the 13 colonies to the Mississippi River. During the American Civil War the strategic gap was held alternately by Confederate and Union troops.

In 1940, 32 square miles (83 square km) of the plateau, with the gap as the central feature, were authorized to be set aside as the Cumberland Gap National Historical Park.

Cumberland House, unincorporated settlement and historic site on the south shore of Cumberland Lake (formerly Pine Island Lake, part of the Saskatchewan River system), eastern Saskatchewan, Canada. It lies near the Manitoba boundary, 85 miles (137 km) northeast of Nipawin. The house, built in 1774 by Samuel Hearne of the Hudson's Bay Company, was the company's first major inland trading post and the focus of the first permanent white settlement in what is now Saskatchewan. Probably named for Prince Rupert, Duke of Cumberland (1617–87), who was first governor of the company, it quickly became a key trading centre because of easy water routes to The Pas, Manitoba (38 miles east), and elsewhere. In 1780 another trading post was built nearby by the North West Company. The original house was reconstructed (1789–92) and before 1821 also served as residence of the governor of Rupert's Land (*i.e.,* the Hudson's Bay region). It still operates a fur trade (mainly muskrat) and is preserved within Cumberland House National Historic Park. The house is the focus of a small resort-fishing community. Pop. (1991) 738.

Cumberland Islands, archipelago in the Great Barrier Reef, off the eastern coast of Queensland, Australia. The group comprises more than 70 inner continental islands (land, not coral), including Whitsunday, Lindeman, Brampton, Molle, Long, Hook, Dent, and Hayman. The high-cliffed wooded chain, once inhabited by squatters and timber cutters, is now a reserve area. Discovered in 1770 by Captain James Cook, they were surveyed by

Captain Phillip King in 1820 and were named for the Duke of Cumberland (Henry Frederick), a brother of George III.

Cumberland Narrows, scenic gorge, 1,000 feet (305 m) deep, in Allegany county, northwestern Maryland, U.S., just beyond Cumberland. Cut by Wills Creek, it provides a natural east–west gateway between Wills and Haystack mountains across the Appalachians. The gap, which was initially an Indian footpath, was discovered in 1754 by a vanguard unit of General Edward Braddock's British army in an ill-fated attempt to move westward across the mountains and expel the French from the Ohio River valley. The route was later developed into the Cumberland (or National) Road, also known as the National Pike, the first federally funded highway (authorized in 1806 by Congress and built between Cumberland and Wheeling, W.Va.). It is now improved as part of U.S. Route 40, which runs from New Jersey to California. A tollhouse at La Vale has been preserved.

Cumberland Plateau, westernmost of three divisions of the Appalachian Mountains, U.S., extending southwestward for 450 miles (725 km) from southern West Virginia to northern Alabama. The plateau is 40 to 50 miles (65 to 80 km) wide and lies between the Appalachian Ridge and Valley region to the east and the rolling plains to the west. It merges with the Allegheny Plateau on the north and with the Gulf Coastal Plain on the south. The region is dissected mainly by headstreams of the Cumberland and Kentucky rivers and by tributaries of the Tennessee River, the valley of which in northern Alabama holds Tennessee Valley Authority reservoirs. Other notable features on the plateau include the Cumberland, Pine, Lookout, and Sand mountains, Cumberland Gap, and Walden Ridge.

The roughest and highest portion of the plateau is a narrow linear ridge about 140 miles (225 km) long that forms its eastern margin in eastern Kentucky and northeastern Tennessee; the name Cumberland Mountains is generally applied to this area. These mountains vary in elevation from 2,000 feet (600 m) to 4,145 feet (1,263 m) at Big Black Mountain, the highest point in Kentucky. The plateau is underlain by large deposits of coal, limestones used for cement, and fine-grained sandstones suitable for construction and decorative purposes. The region is well-covered by hardwood trees, which constitute a major resource and are concentrated in the Daniel Boone and part of the Jefferson national forests in Kentucky. The rough topography, especially in Kentucky and Tennessee portions, has resulted in isolated settlements and local economies based on subsistence agriculture.

Much of the plateau's history centres on the Cumberland Gap (now a national historical park), which provided westward passage for the early settlers and was of strategic importance in the American Civil War.

Cumberland Presbyterian Church, denomination organized in 1810 by a group of Presbyterians on the Kentucky–Tennessee frontier who left the Presbyterian Church in the U.S.A. The immediate cause of the separation was a religious revival in the Kentucky area (1799–1802) that brought many converts into the church and led to a shortage of ordained ministers. The Cumberland Presbytery of the Presbyterian Church in the U.S.A. ordained some men who were considered by the church's Synod of Kentucky to be unqualified because they lacked education. The Synod of Kentucky dissolved the Cumberland Presbytery in 1806, and four years later some of the rejected ministers organized the independent Cumberland Presbytery, which grew rapidly and developed into the Cumberland Presbyterian Church. This church stressed evangelism, repudiated predestination, and avoided highly centralized authority in their church government.

Early in the 20th century the Presbyterian Church in the U.S.A. revised its Confession of Faith and included interpretations of predestination that the Cumberland Presbyterian Church found acceptable. Negotiations for union resulted in a majority of the Cumberland Presbyterians rejoining the Presbyterian Church in the U.S.A. in 1906. Members who rejected the merger elected to continue as the Cumberland Presbyterian Church, with headquarters in Memphis, Tenn.

Cumberland River, river formed on the Cumberland Plateau by the confluence of Poor and Clover forks in Harlan county, southern Kentucky, U.S. Looping through northern Tennessee, it joins the Ohio River after a course of 687 miles (1,106 km) at Smithland, Ky., 12 miles (19 km) upstream from the mouth of the Tennessee River. From its headwaters to the Cumberland (or Great) Falls, in Whitley county, Ky. (site of a state park), the river is a mountain stream that is of little volume during late summer but is subject to heavy floods during winter and spring. From Williamsburg, Ky., above the falls, to the Kentucky–Tennessee state line, the Cumberland crosses a highland bench in the Cumberland Plateau and flows in a gorge between cliffs 300–400 feet (90–120 m) high. Thence the river enters the central limestone basin of Tennessee and, turning north, crosses the plain of western Kentucky to the Ohio River. At one point it is less than 2 miles (3 km) from the lower Tennessee River. The Cumberland's drainage area is 18,080 square miles (46,830 square km).

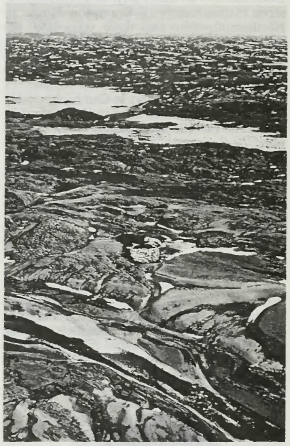
The Cumberland's chief tributaries, all entering downstream from the falls, are the Laurel, Rockcastle, and South Fork in Kentucky; the Obey, Caney Fork, Stones, Harpeth, and Red in Tennessee; and the Little River in western Kentucky. Nashville, Tenn., is the largest city along the river. Other centres include Pineville, Barbourville, and Williamsburg in eastern Kentucky; Carthage, Clarksville, and Dover in Tennessee; and Eddyville in western Kentucky.

The development of a series of lakes on the Cumberland took place as part of the Tennessee Valley Authority (TVA) system. Wolf Creek Dam (1952) for flood control and power, in Russell county, Ky., created Lake Cumberland, which extends to the base of Cumberland Falls. Large power dams are in operation on two tributaries: Dale Hollow Dam (1953) on the Obey River near Celina, Tenn.; and Center Hill Dam (1951) on Caney Fork, southeast of Carthage. Old Hickory Dam, upstream from Nashville, ponds the water to Carthage, the head of navigation on the river. Cheatham Dam is upstream from Clarksville. Barkley Dam (in operation since 1966) controls the lower river.

Fort Donelson National Military Park, in northern Tennessee on the Cumberland, commemorates the American Civil War battle that opened the Tennessee River to Union troops.

Cumberland Road, also called NATIONAL ROAD, first federal highway in the United States and for several years the main route to what was then the Northwest Territory. Built (1811–37) from Cumberland, Md. (western terminus of a state road from Baltimore and of the Chesapeake and Ohio Canal), to Vandalia, Ill., it forms part of the present U.S. Route 40. In April 1802 Congress appropriated land-sale funds to finance an overland link between the Atlantic Coast and the new state of Ohio. A macadam pavement was completed to Wheeling, Va. (now West Virginia), on the Ohio River, by 1818. From 1833 the various sections of the road became the financial responsibility of the states in which they were situated. Under this arrangement, the use of the Cumberland Road, intended to be free, was subject to state-imposed tolls.

Cumberland Sound, inlet (170 miles [270 km] long, 100 miles [160 km] wide) of Davis Strait and the Atlantic Ocean, indenting the southeast coast of Baffin Island, in southeastern Baffin region, Northwest Territories, Canada. John Davis, an English navigator, sailed into the sound in 1585 in search of the Northwest Passage. By the late 19th century, Blacklead Island, in Cumberland Sound, was noted for whaling. The Anglican church established missions early in the 20th century at many settlements, including Pangnirtung, on the northern shore of the sound. Now primarily a trading post and gateway to Auyuittuq National Park (8,394 square miles [21,470 square km]), Pangnirtung has a medical centre and hospital, a weather and radio station, and a Royal Canadian Mounted Police post. Economic activities include sealing, fishing, hunting, and the marketing of crafts through the local cooperative.



Shale deposits in Cumberland Sound, off Baffin Island, in the Canadian Arctic Archipelago
J.L. Stage—Photo Researchers/EB Inc.

Cumberland wrestling, form of wrestling developed in northern England and southern Scotland, also called the North Country style. The wrestlers stand chest to chest, each grasp-



Cumberland wrestling match
BBC Hulton Picture Library

ing the other with locked hands around the body, each opponent's chin on the other's right shoulder. The right arm is placed below and the left above the adversary's. When the hold has been firmly taken, an umpire gives the word to start and the bout proceeds until one man touches the ground with any part of his person except his feet or fails to retain his hold. In either case he loses. If both fall together, the one who is underneath or first touches the ground loses. If both fall simultaneously side by side (a dogfall), the bout begins anew. The maneuvers used to throw an adversary are called chips. There is but a single foul—direct kicking. British championships in this style are held annually.

Cumbernauld, new town and seat of the district authority of the district of Cumbernauld and Kilsyth, Strathclyde region, southwestern Scotland. Cumbernauld was designated in 1956 as a new town to accommodate overspill population from Glasgow. The town is situated 14 miles (22 km) northeast of Glasgow in the centre of the Forth-Clyde Valley, the main industrial belt of Scotland, with easy access to port facilities and the cities of Glasgow and Edinburgh to the west and east. Cumbernauld was planned as a well-balanced community with a population of 50,000 (later increased to 100,000), the majority of whom would come from Glasgow. The exposed, sloping site, restricted by coal mining in the northwest and fireclay working in the southeast, made necessary high-density housing, unusual in a new town, linked by walkways to a hill-top multistoried town centre. Peripheral areas of flat land in the northeast and southwest are devoted to industry. The town has won many awards for the originality of its design, its architectural adaptation to a difficult site, and its successful, almost total, segregation of pedestrians and vehicles. It also succeeded in attracting both residents (80 percent from Glasgow) and new industries. Manufacturing includes electrical engineering and the production of office equipment and carpets. Pop. (1961) 5,162; (1971) 31,784; (1982 est.) 49,-100; (1991 est.) 50,700.

Cumbernauld and Kilsyth, district, Strathclyde region, southwestern Scotland. It was created by the reorganization of 1975 from part of the former county of Dunbarton and a small part of the former county of Stirling. The district includes the new town of Cumbernauld (*q.v.*), seat of the district authority, and the small 19th-century coal-mining town of Kilsyth and part of the Kilsyth Hills as far north as the Carron Valley Reservoir. Until the building of the new town of Cumbernauld (designated 1956), the economy of the district, despite its proximity to Glasgow and its major coal and fireclay deposits, was largely agricultural, with an emphasis on dairy farming. Sheep farming is the main occupation on the higher land in the north, while pigs, poultry, and fodder crops are important at lower elevations. Area 37 square miles (95 square km). Pop. (1993 est.) 63,930.

Cumbres de Monterrey National Park, park in the Sierra Madre Oriental, Nuevo León *estado* ("state"), northeastern Mexico. Established in 1939, it has a total area of 952 square miles (2,465 square km). Among the attractions are its mountainous setting (more than 7,000 feet [2,100 m] above sea level), with scenic pine and oak forests on the lower slopes; Santa Catarina Canyon; and Cola de Caballo (Spanish: "Horse Tail") Falls, southwest of Santiago.

Cumbria, county in the northwest of England. It has six districts: Allerdale, the borough of Barrow-in-Furness, the city of Carlisle, the borough of Copeland, Eden, and South Lakeland. Cumbria comprises the former counties of Cumberland and Westmorland.

The county extends along the Irish Sea coast from Morecambe Bay to Solway Firth. It includes the famous scenic Lake District (*q.v.*), where a deeply dissected dome of ancient volcanic and slate rocks produces a landscape of mountain peaks and lake-filled valleys. Newer outcrops of limestone and sandstone form the surrounding lowlands of the Carlisle plain and the valleys of the Rivers Eden and Kent. In the extreme east a series of high fells (including Cross Fell and Knock Fell) is part of the Pennine uplands, the great relief "spine" of the north of England.

Human occupation of the region dates from the Neolithic Period. Roman occupation, chiefly military in character, resulted in the construction of several roads, a series of forts (including Brough and Crackenthorpe), and the great complex of Hadrian's Wall.

Christianity was established in the region by St. Ninian in the late 4th century. Cumbria was under Northumbrian control in the 7th century. Subsequent Scandinavian settlement left its mark in the numerous place-names containing Norse elements. After 945 the northern part of Cumbria alternated between Scottish and English rule until it was finally taken by the latter in 1157. The region was popularized in the early 19th century by the Lake poets, William Wordsworth, Samuel Taylor Coleridge, and Robert Southey. Improved rail and road communications have stimulated a growing tourist industry centred at Keswick and Kendal. The Lake District National Park is included within the county.

The main rural occupations are sheep farming on the rough grazing lands of the uplands and agriculture in the more fertile lowlands. The Rivers Eden, Derwent, and Esk are important for salmon fishing.

The industries of Cumbria are linked with mineral extraction. Since the 12th century, lead and silver have been mined at Alston and iron ore at Egremont. Anhydrite and gypsum are also important. Coal mining, formerly extensive, is now restricted to the northwest of the county.

The principal population centres are Carlisle, Penrith, Keswick, Kendal, and the ports of Barrow-in-Furness, Whitehaven, and Workington. Carlisle serves as the county town (seat). The main western railway to Scotland passes through Penrith and Carlisle. Area 2,629 square miles (6,810 square km). Pop. (1992 est.) 490,200.

cumin, also spelled CUMMIN (*Cuminum cyminum*), small, slender annual herb of the family Apiaceae (Umbelliferae) with finely dissected leaves and white or rose-coloured flowers. Native to the Mediterranean region, cumin is also cultivated in India, China, and Mexico for its fruits, called seeds, which are used to flavour a variety of foods.

Cumin, or comino, seeds are actually dried fruits. They are thin, yellowish brown, elongated ovals about 0.25 inch (6 mm) long with five prominent longitudinal dorsal ridges interspersed with less-distinctive secondary ridges forming a tiny, gridlike pattern. An essential ingredient in many mixed spices, chutneys, and chili and curry powders, cumin seeds are especially popular in Asian, North African, and Latin American cuisines. Their distinctive aroma is heavy and strong; their taste warm and reminiscent of caraway. At one time cumin seeds were widely used as home medicinals; their medicinal use today is chiefly veterinary. The seeds contain between 2.5 and 4.5 percent essential oil, the principal component of which is cumaldehyde. The oil is used in perfumery, for flavouring a variety of liquors, and for medicinal purposes.

Black cumin, or fennel flower (*Nigella sativa*), a similar Eurasian herb of the family Ranunculaceae, also is used as a seasoning.

Cummings, Bruce Frederick, pseudonym WILHELM NERO PILATE BARBELLION (b. Sept. 7, 1889, Barnstaple, Devon, Eng.—d. Oct. 22, 1919, Gerard's Cross, Buckinghamshire), English author who wrote *The Journal of a Disappointed Man* (1919), extracts from diaries that he had kept between 1903 and 1917. The book was immediately acclaimed upon publication, a few months before Cummings' death, not only for providing a vivid insight into his passion for zoology and music but also as a poignant revelation of the sense of failure and thwarted ambitions of a sensitive yet objectively minded man.

Frail and shy, Cummings was determined by a childhood love of nature for a career as a naturalist. After years of private study he won a post at the British Museum of Natural History, which enabled him to abandon his journalism career, work that he found disagreeable. Posthumous books were *Enjoying Life and Other Literary Remains* (1919) and *A Last Diary* (1920).

Cummings, E.E., in full EDWARD ESTLIN CUMMINGS (b. Oct. 14, 1894, Cambridge, Mass., U.S.—d. Sept. 3, 1962, North Conway, N.H.), American poet and painter who first attracted attention, in an age of literary experimentation, for his eccentric punctuation and phrasing. The spirit of New England dissent and of Emersonian "Self-Reliance" underlies the urbanized Yankee colloquialism of Cummings' verse. Cummings' name is often styled "e.e. cummings" in the mistaken belief that the poet legally changed his name to lowercase letters only. Cummings used capital letters only irregularly in his verse and did not object when publishers began lowercasing his name, but he himself capitalized his name in his signature and in the title pages of original editions of his books.

Cummings received his B.A. degree from Harvard University in 1915 and was awarded his M.A. in 1916. During World War I he served with an ambulance corps in France, where he was interned for a time in a detention camp because of his friendship with an American who had written letters home that the French censors thought critical of the war effort. This experience deepened Cummings' distrust of officialdom and was symbolically recounted in his first book, *The Enormous Room* (1922).

In the 1920s and '30s he divided his time between Paris, where he studied art, and New York City. His first book of verse was *Tulips and Chimneys* (1923), followed by *XLI Poems* and *&* (1925); in the latter year he received the Dial award for distinguished service to American letters.

In 1927 his play *him* was produced by



E.E. Cummings
© Marion Morehouse

the Provincetown Players in New York City. During these years he exhibited his paintings and drawings, but they failed to attract as much critical interest as his writings. *Eimi* (1933) recorded, in 432 pages of experimental prose, a 36-day visit to the Soviet Union, which confirmed his individualist repugnance for collectivism. He published his discussions as the Charles Eliot Norton lecturer on poetry at Harvard University (1952–53) under the title *i: six nonlectures* (1953).

In all he wrote 12 volumes of verse, assembled in his two-volume *Complete Poems* (1968). Cummings' moods were alternately satirical and tough or tender and whimsical. He frequently used the language of the streets and material from burlesque and the circus. His erotic poetry and love lyrics had a childlike candour and freshness.

cummingtonite, an amphibole mineral, an iron and magnesium silicate that occurs in metamorphic rocks. For chemical formula and detailed physical properties, *see* amphibole (table).

Cummins, Albert Baird (b. Feb. 15, 1850, Carmichaels, Pa., U.S.—d. July 30, 1926, Des Moines, Iowa), American lawyer, state governor, and U.S. senator, a noted progressive during the first quarter of the 20th century.

Educated at Waynesburg (Pa.) College, Cummins studied surveying, worked in railroad construction, and then studied law in Chicago, practicing there for three years. In 1878 he moved to Des Moines and soon became its leading lawyer. Beginning in the Iowa House of Representatives in 1888, he served the Republicans as state central committee chairman (1892–96), member of the national committee (1896–1900), and delegate to four national conventions. Between 1902 and 1908 he was elected governor for three terms in succession and became the recognized spokesman for Iowa's progressive Republicans. These progressives owed nothing to populism; the leaders, successful urban businessmen, wanted political power and a new moral tone in Iowa government. Cummins' three terms brought further regulation of the railroads, abolition of the free-pass system, and enactment of a senatorial primary law.

In 1908 he became U.S. senator and with Senator Jonathan P. Dolliver fought the progressive fight against the archconservative Senator Nelson W. Aldrich. Cummins opposed President Woodrow Wilson on the arming of merchantmen in 1917 and on the Treaty of Versailles. In 1920 the Esch-Cummins Act provided for the return of the railroads to private control—after their government operation during the war—but did not include Cummins' plan for consolidation of the roads into a few national, truly competitive companies. His last years were embittered by the rebellion of his erstwhile lieutenant, Smith W. Brookhart, who defeated him in the Republican primary election for U.S. senator in June 1926.

Cummins, George David (b. Dec. 11, 1822, near Smyrna, Del., U.S.—d. June 26, 1876, Lutherville, Md.), dissident American clergyman who founded and became the first bishop of the Reformed Episcopal Church.

After three years in charge of the Bladensburg, Md., circuit of the Methodist Episcopal Church, Cummins began study for the ministry of the Protestant Episcopal Church. Ordained a priest in 1847, he became a distinguished preacher and served several important parishes in the eastern United States and in Chicago. Consecrated an assistant bishop of Kentucky in 1866, he was one of the younger leaders of the evangelicals and soon found himself in the midst of the controversy over ritual, which reached its peak in the Episcopal church in the years following the American Civil War (1861–65). Those who despaired of the future of evangelicalism within the church appealed to him as early as 1869, seeking to persuade him to begin organizing a new body. At first reluctant to make a break, he organized the Reformed Episcopal Church in December 1873 in New York City and became its first presiding bishop.

Cumnock, small burgh and coal-mining and agricultural centre in the district of Cumnock and Doon Valley, Strathclyde region (until May 1975 in the county of Ayr), Scotland. Auchinleck House was built by the father of James Boswell, the noted biographer, who is buried in the church. James Keir Hardie, the father of Scottish socialism, was born in Cumnock. Pop. (1981) 9,812.

Cumnock and Doon Valley, district, Strathclyde region, southwestern Scotland, created by the reorganization of 1975 from part of the former county of Ayr. The district is a predominantly rural area of 340 square miles (881 square km), centred on the burgh of Cumnock and Holmhead. Dairy farming on lower ground and cattle and sheep raising at higher elevations are the main agricultural enterprises. Coal mining and textiles are the industrial occupations of the small towns of Cumnock, Muirkirk, and Dalmellington. Mauchline in the northwest has close associations with the poet Robert Burns. The seat of the district authority is at Ayr in the neighbouring district of Kyle and Carrick. Pop. (1989 est.) 43,010.

Cumont, Franz (-Valéry-Marie) (b. Jan. 3, 1868, Aalst, Belg.—d. Aug. 25, 1947, Brussels), Belgian archaeologist and philologist who strongly influenced the modern Protestant school of the history of religions through his fundamental studies, particularly on Roman pagan cults.

After studying at Ghent, Bonn, Berlin, Vienna, and Paris, Cumont was from 1892 to 1910 professor at the University of Ghent and from 1899 to 1912 curator of the Brussels Royal Museum. His expeditions to Syria and Turkey for astrological research led to discoveries of drawings and inscriptions on monuments and revealed a significant relation between the Mediterranean cult of Mithra and the Eastern practice of Zoroastrian Mazdaism. Among his chief writings are *Textes et monuments figurés relatifs aux mystères de Mithra* (1894–1901; "Texts and Monuments Relating to Mithraic Mysteries"); *After Life in Roman Paganism* (1922); *Les Religions orientales dans le paganisme romain* (1929; "Eastern Religions in Roman Paganism"); and *L'Égypte des astrologues* (1937; "Egypt of the Astrologers").

cun (Chinese painting): *see* ts'un.

Cuna, Chibchan-speaking Indian people who once occupied the central region of what is now Panama and the neighbouring San Blas Islands and who still survive in marginal areas.

In the 16th century they were an important group, living in federated villages under chiefs, who had considerable power, and engaging in warfare with each other and with neighbouring tribes. Agriculture was primarily based on slash-and-burn techniques, and there was extensive trade, mainly by canoe along the coast. They had a well-developed class system, with captives generally being enslaved. Important chiefs were carried in hammocks; their bodies were preserved after death and buried in large graves with their wives and retainers. Metallurgy was well developed, and numerous gold ornaments have been found in the graves, along with fine ceramics and ornaments of shell.

The principal effects of European contact were to destroy the political superstructure of the Cuna and to modify the social and religious systems. In modern times they live in small villages and depend primarily on agriculture for subsistence, supplemented by fishing and hunting. Marriage is matrilocal, giving rise to extended families of several generations in which the son-in-law is under the authority of his wife's father. Religion centres on shamans who cure the sick and practice various types of witchcraft. The sun and moon were formerly major deities, but the mythology has been much affected by European conceptions. The so-called white Indians of San Blas are actually albinos who constitute about 0.7 percent of the Cuna population and are not permitted to intermarry.

Cunard, Sir Samuel, 1ST BARONET (b. Nov. 21, 1787, Halifax, Nova Scotia [Canada]—d. April 28, 1865, Kensington, London, Eng.), British merchant and shipowner who founded the first regular Atlantic steamship line.

The son of a merchant, Cunard himself became prosperous in commerce. From 1830 he laid plans to establish a mail service between



Cunard, lithograph
BBC Hulton Picture Library

England and North America, running steamers from Liverpool to Halifax, and thence to Boston. Cunard went to England in 1838, and the following year, in partnership with Sir George Burns of Glasgow and David MacIver of Liverpool, he established the British and North American Royal Mail Steam Packet Company, generally known as the Cunard Line. He was created a baronet in 1859.

Cunaxa, Battle of (401 BC), battle fought between Cyrus the Younger, satrap of Anatolia, and his brother Artaxerxes II over the Achaemenian throne. Attempting to overthrow Artaxerxes, Cyrus massed his forces and marched inland from Sardis against his brother. The two armies met unexpectedly at Cunaxa, on the left bank of the Euphrates River north of Babylon. Greek mercenaries under Clearchus, nearly 13,000 strong and the best trained and equipped troops in Cyrus' army, routed the Persian left with few casualties, while Cyrus himself charged Artaxerxes' centre with 600 cavalry. Cyrus succeeded in wounding his brother but was killed. When the Greeks returned, they found that the rest of Cyrus' troops had been routed and his camp plundered. They formed ranks again, thus discouraging Artaxerxes from attacking them, and, in their famous "Retreat of the Ten Thousand" under Xenophon, they succeeded in marching through hostile country to the Black Sea.

Cundinamarca, *departamento,* central Colombia, in the Andean Cordillera Oriental, bounded west by the Magdalena River. Much of its 9,347 square miles (24,210 square km) consists of intermontane basins, from 8,000 to 9,000 feet (2,400 to 2,700 m) above sea level, which have a temperate to cool climate. Their fertile but poorly drained soils support herds of blooded European dairy cattle and produce fruits and cereals. Part of Cundina-

marca lies in the hot, dry Río Magdalena Valley; the densely populated slopes between these two regions are especially celebrated for their coffee plantations. The department has extensive bituminous coal reserves; it is estimated that about half of the country's total coal reserves lie within a 120-mi (190-km) radius of Bogotá.

Cundinamarca was a centre of the Chibcha empire. Bogotá, founded in 1538, was from the start the most important city in the Viceroyalty of New Granada, later to become Colombia. It has remained the economic, cultural, and political capital of Colombia despite its inaccessible interior location. In 1955 it was separated from Cundinamarca as a special district for administrative purposes, though it remains the department capital.

Tourist attractions include the Salto (falls) de Tequendama, 300 ft high, on the Río Bogotá and Laguna (lake) de Guatavitá, celebrated for the legend of Eldorado, or the golden man, which eventually evolved to mean an entire area of great wealth. Pop. (1981 est.) 1,224,456.

cuneiform law, the body of laws revealed by documents written in cuneiform script, a writing invented by the ancient Sumerians and used in the Middle East in the last three millennia BC. It includes the laws of the majority of the ancient inhabitants of the Middle East—especially the Sumerians, Babylonians, Assyrians, Elamites, Hurrians, Kassites, and Hittites—who, in spite of many ethnic differences, were in sufficient contact with one another to develop similar civilizations. In certain periods this cultural community was reinforced by the diffusion of Akkadian, a diplomatic and scholastic language written in cuneiform. Thus to group together a certain body of laws and name them cuneiform, far from being arbitrary, is a scientific necessity. No other term would do: "Mesopotamian law" would cover only part of the range of laws involved; the notion of ancient "Middle Eastern laws" is too vast, for it would also include, for instance, both Judaic and Egyptian laws, which were separate developments.

The various collections of cuneiform laws developed by the several nations and kingdoms have certain features in common: (1) The text of several collections contains a prologue and an epilogue in which the prince emphasizes the importance of his actions, explains the object of his work, and commands its observance by blessings or threats. (2) Though written as if inspired by the gods, the legislation is secular, composed of dispositions fixed and codified by the temporal lord. (3) Though the laws may derive from different sources—custom, judicial decisions, or deliberate legislation—the fact that they are introduced by the prince gives them all the character of legislation or enactment. (4) In contrast to modern codes, these ancient Oriental "codes" do not systematically treat all the rules applicable to a given area of law; that is, they treat a variety of matters but often ignore many highly important rules simply because such rules were so grounded in custom that they went unquestioned. (5) Because legal customs were generally known, the collections focussed on explaining individual cases, setting them up as examples or precedents, and did not represent an attempt to devise general, abstract formulas. (6) Because of this absence of doctrinal intent, the order of presentation of the cases often seems, at least to modern eyes, erratic. Although sometimes it appears that the draftsman arranged the material according to some juridical criteria or some association of ideas or concrete subjects, the arrangements often defy modern interpretation.

Here it is possible only to illustrate some of the major laws or codes extant. The most ancient legislator known is Ur-Nammu, the founder of one of the Sumerian dynasties at the city of Ur. His code, dating about 2100 BC, dealt with witchcraft, the flight of slaves, and bodily injuries. A more ample vestige of Sumerian law is the so-called Code of Lipit-Ishtar (*c.* 1934–24 BC), which contains the typical prologue, articles, and epilogue and deals with such matters as the rights of persons, marriages, successions, penalties, and property and contracts.

Although earlier Babylonian codes are known, unquestionably the most perfect monument of Babylonian law is the Code of Hammurabi (*c.* 1758 BC), the main record of which was discovered on a stele, or stone monument, only in 1901–02. At the top of the stele a low relief represents the king in prayer before the god of justice; beneath it, engraved, is the text of laws, consisting, apart from the prologue and epilogue, of no less than 282 paragraphs. The fact that copies of parts of the code have been discovered elsewhere, in nations scattered over a millennium of time, confirms that the code had a lasting interest in the ancient Orient, even in countries where it no longer had force. Like some other Middle Eastern codes, the Code of Hammurabi deals consecutively with penal law, the law of persons, family law, and price lists. It differs from earlier codes, as well as from the earliest laws of the Western world of Greece and Rome, with regard to the relative importance given to laws concerning property and other economic matters. Indeed, Babylonian society of the 1st dynasty is, in terms of its individualism, wealth of private property, and development of commercial exchange, far more "modern" than, for example, Roman society of the early republic.

Though developed later in time, the Assyrian laws summon up the image of a society of a lower cultural standard. The existing tablets, reflecting legal conditions of the 15th to the 13th century BC, before the Assyrian age of empire, deal with personal property, with questions of landed property, and with women and family law. The law is that of the patriarchal society, rather strict in its rules.

Among the laws of other peoples who invaded the area may be mentioned the Hittite Law Code, dating from about the 14th century BC. It reflects a society that had remained largely on the level of a rather closed rural economy, dominated by a feudal aristocracy. The penal laws, though less severe than those in Assyria, were nevertheless rather barbarous insofar as pecuniary compensations were concerned.

cuneiform writing, system of writing used most extensively in the ancient Middle East. Cuneiform was employed for writing a number of languages from about the end of the 4th millennium BC until about the 1st century BC.

The earliest attested documents in cuneiform were written in Sumerian, the language of the inhabitants of southern Mesopotamia and Chaldea from the 4th until the 2nd millennium BC. Discovered at the site of the ancient city of Uruk (biblical Erech), they were in a pictographic type of cuneiform in which objects were represented by pictures, numbers were represented by the repetitional use of strokes or circles, and proper names were indicated by combinations of pictures used according to the rebus principle; *i.e.,* the pictures were to be interpreted according to their usual pronunciations rather than according to the objects they depicted.

During the 3rd millennium BC the pictures gradually changed to conventionalized linear drawings and, because they were pressed into soft clay tablets with the slanted edge of a stylus, came to have a wedge-shaped appearance. Earlier cuneiform was written in columns from top to bottom but during the 3rd millennium came to be written from left to right with the cuneiform signs turned on their sides. At about the same time these changes in the cuneiform writing system were occurring, it was adopted by the Akkadians, Semitic invaders of Mesopotamia, for writing their language. The earliest Akkadian cuneiform inscriptions date from the Old Akkadian or Early Akkadian period (*c.* 2450 to *c.* 1850 BC), during which the inscriptions of Sargon, the great ruler of Akkad, were written. Cuneiform continued to be used for writing the Assyrian and Babylonian dialects descended from Akkadian.



Persian cuneiform from the Xerxes inscription at Persepolis
By courtesy of the Oriental Institute, the University of Chicago

Cuneiform was borrowed by the Elamites, the Kassites, the Persians, the Mitanni, and the Hurrians. The Hurrians passed the cuneiform writing system on to the Hittites, who spoke an Indo-European language; cuneiform was also used for the languages (*e.g.,* Luwian, Hattian) spoken in areas under Hittite control.

With the spread of Aramaic as the lingua franca of the Near East in the 7th and 6th centuries BC, the increasing use of the Phoenician script, and the loss of political independence in Mesopotamia with the growth of the Persian Empire, cuneiform came to be used less and less, although it continued to be written by many conservative priests and scholars for several more centuries. The latest known tablet in cuneiform dates from *c.* AD 75.

The Old Persian part of the trilingual royal inscriptions of the Achaemenid kings of Persia were the first cuneiform documents to be deciphered. The inscriptions were also written in Elamite, which still has not been completely deciphered and investigated, and Akkadian, which was deciphered as soon as scholars recognized it to be a Semitic language. Once Akkadian had been deciphered, the complete cuneiform system became intelligible and the other languages written in cuneiform could be read. Sumerian, at first believed to be a special way of writing Akkadian rather than a separate language, was among the last of the languages written in cuneiform to be deciphered.

Cunene River (Africa): *see* Kunene River.

Cuneo, French CONI, city, capital of Cuneo *provincia*, Piemonte *regione*, northwestern Italy, on a plateau in the wedge (*cuneo*) formed by the confluence of the Stura di Demonte and Gesso rivers, south of Turin. Founded in 1198 by fugitives from baronial feuds and Lombard refugees after the destruction of Milan by Emperor Frederick I Barbarossa, it later became the seat of a countship held by the house of Anjou, from 1259 until it was bought by the house of Savoy in 1382. Strongly fortified, Cuneo withstood seven sieges in the 16th–18th century. It was ceded to France by the Armistice of Cherasco (1796) but was returned to Savoy in 1814.

The old and modern cities are linked by the great Soleri viaduct over the Stura di Demonte. Notable landmarks include the Gothic cathedral (10th century, restored in the 18th and 19th), the Church of San Francesco (1227), the 18th-century town hall, and the 18th-century Audiffredi Palazzo, containing the civic museum.

Cuneo is a rail junction and noted market for raw silk and chestnuts; its industries include food processing, distilling, metallurgy, and silk spinning. Pop. (1988 est.) mun., 55,807.

Cunha, Euclides (Rodrigues Pimenta) da (b. Jan. 20, 1866, Santa Rita do Rio Negro, Braz.—d. Aug. 15, 1909, Rio de Janeiro), Brazilian author of the classic historical narrative *Os Sertões* (1902; *Rebellion in the Backlands*), the first written protest in behalf of the forgotten inhabitants of Brazil's frontier.

Originally a military engineer, Cunha left the army to become a civil engineer and later a journalist. As a reporter in 1896–97, he accompanied the army to Canudos, a village in the backlands of Bahia state, where the messianic Antônio Conselheiro ("the Counselor") and his followers had established their own "empire." Five successive government expeditions were required to subdue the rebels, who resisted to the last man. Cunha's eyewitness account of the drama of rebellion and reprisal has the vividness of a novel. With insights he developed as an amateur geographer and geologist and as a keen social observer, Cunha perceived not only the particular event but the larger significance of the inhospitable backlands and its rude inhabitants in the national life. In defiance of the common 19th-century pseudoscientific belief in the inferiority of mixed races (a theme that haunts Brazilian literature), Cunha concludes with a strongly worded plea that the republic commit itself to assimilating its backward countrymen into the mainstream of Brazilian life.

Cunha died tragically, shot in a personal quarrel. Every August Brazilians observe a Semana Euclideana ("Euclides Week") in his honour.

Consult the INDEX *first*

Cunibert, SAINT (b. *c.* 590, Moselle, Austrasia [now in France]—d. *c.* 663, Cologne [Germany]; feast day November 12), prelate, bishop of Cologne and chief minister of King Sigebert III of Austrasia.

Educated at the court of the Frankish king Clotaire II and at Trier, where he became archdeacon, Cunibert was made bishop of Cologne in 623. He took part in the Synods of Clichy (626–27) and Reims (627–30), later serving as counselor to the Carolingian king Pepin I the Old and King Dagobert I, whose son, Sigebert, he tutored. Cunibert exercised great political influence at the Merovingian court, especially under Sigebert. He encouraged missions to the Frisians and avidly founded numerous monasteries and churches.

Cunliffe (of Headley), Walter Cunliffe, 1st Baron (b. Dec. 4, 1855, London, Eng.—d. Jan. 6, 1920, Epsom, Surrey), English banker who established in London the merchant banking business of Cunliffe Brothers (afterward Goschens and Cunliffe).

The son of Roger Cunliffe, a banker of the City of London, he was educated at Harrow and Trinity College, Cambridge, and became a banker in 1880, establishing Cunliffe Brothers in 1890. He became a director of the Bank of England in 1895, deputy governor in 1911, and governor in 1913, an office that he held until 1918. He was raised to the peerage in December 1914. Lord Cunliffe was associated with the working out of all the chief financial problems during World War I and, in 1917, accompanied A.J. Balfour on his financial mission to the United States.

Cunningham, Sir Alan Gordon (b. May 1, 1887, Dublin, Ire.—d. Jan. 30, 1983, Royal Tunbridge Wells, Kent, Eng.), British army officer who scored important victories over Italian forces in eastern Africa during World War II, enabling the exiled emperor Haile Selassie to return to power in Ethiopia.

A commissioned officer from 1906, Cunningham had been promoted to major general by November 1940, when he took command of British troops (recruited mainly from various parts of Africa) in Kenya. Marching north into Italian Somaliland in February 1941, his force showed remarkable mobility despite great geographical and administrative difficulties. After occupying the Red Sea ports of Chisimaio (now Kismaayo) and Mogadiscio (Mogadishu), he pursued the Italians into the mountainous interior, and on April 6, 1941, he entered the Ethiopian capital, Addis Ababa. On May 20, 1941, in cooperation with General Sir William Platt's army advancing from the north, he received the surrender, at Amba Alagi, of the main Italian armies under Amadeo di Savoia, Duke d'Aosta.

In August 1941 Cunningham went to Egypt to lead the 8th Army in the first phase of General Sir Claude Auchinleck's Libyan Desert offensive, beginning November 18 of that year. The early failures in this campaign led him to advocate its termination, whereupon he was relieved of command and returned to England. He was knighted in 1941.

After the war he served as high commissioner in Palestine during the last years of the British mandate, from 1945 until the proclamation of the independent nation of Israel in 1948. He became a full general in 1945.

Cunningham, Alexander: *see* Glencairn, Alexander Cunningham, 5th Earl of.

Cunningham, Sir Alexander (b. Jan. 23, 1814, London, Eng.—d. Nov. 28, 1893, London), British army officer and archaeologist who excavated many sites in India, including Sārnāth and Sānchi, and served as the first director of the Indian Archaeological Survey.

At age 19 he joined the Bengal Engineers and spent 28 years in the British service in India, retiring as major general in 1861. Early in his career he met James Prinsep, a British numismatist and Indian scholar, who ignited his interest in Indian history and coins. In 1837 Cunningham excavated at Sārnāth, outside Vārānasi (Benares), one of the most sacred Buddhist shrines, and carefully prepared drawings of the sculptures. In 1850 he excavated Sānchi, site of some of the oldest surviving buildings in India. In addition to a study of the temple architecture of Kāshmir (1848) and a work on Ladākh (1854), he published *The Bhilsa Topes* (1854), the first serious attempt to trace Buddhist history through its architectural remains.

In 1861 he agreed to become director of the Indian Archaeological Survey and remained with it until it was dissolved (1865). He resumed his post when the survey was restored (1870) and during the next 15 years carried out many archaeological explorations among the ruins of northern India. He published *The Ancient Geography of India* (1871), the first collection of the edicts of the 3rd-century-BC Indian emperor Aśoka, and *The Stûpa of Bharhut* (1879). Over the years he gathered a large collection of Indian coins, the choicest of which were purchased by the British Museum. After his retirement from the survey (1885), he devoted himself to Indian numismatics and wrote two books on the subject. He was knighted in 1887.

Cunningham, Allan (b. Dec. 7, 1784, Keir, Dumfriesshire, Scot.—d. Oct. 30, 1842, London, Eng.), Scottish poet, a member of the brilliant circle of writers that included Thomas De Quincey, Charles Lamb, William Hazlitt, John Keats, and Thomas Hood, who were contributors to the *London Magazine* in its heyday in the early 1820s.

His father was a neighbour of Robert Burns, and Allan became a friend of the self-taught rural bard James Hogg, "the Ettrick Shepherd." Apprenticed to a stonemason at the age of 11, he nourished his literary appetite on the works of Scott. After publishing some poems disguised as old ballads in *Remains of Nithsdale and Galloway Songs* (1810), he went to London where he became assistant and right-hand man (1814–41) to the sculptor Sir Francis Chantrey. In his spare time he was a hard-working writer and editor. He collected old ballads and stories, published as *Traditional Tales of the English and Scottish Peasantry* (1822) and *The Songs of Scotland, Ancient and Modern* (1825). He wrote *The Lives of the Most Eminent British Painters, Sculptors, and Architects,* 6 vol. (1829–33). He edited



Allan Cunningham, detail of a portrait by Henry Room; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

The Works of Robert Burns (1834), prefacing it with a biography of Burns that contained much valuable new material. He also wrote romances and dramatic poems of little merit, but his lyrical poems, though lacking the unselfconsciousness of the true ballad, are memorable for their rhythm and their verbal felicity.

Cunningham, Glenn, byname THE KANSAS IRONMAN, OR THE KANSAS FLYER (b. Aug. 4, 1909, Atlanta?, Kan., U.S.—d. March 10, 1988, Menifee, Ark.), American middle-distance runner who repeatedly broke world and national records for the mile in the 1930s.

At the age of 7, Cunningham and his older brother Floyd were badly burned in a schoolhouse fire; Floyd died and Glenn was not expected to be able to walk. Cunningham overcame this adversity, running—and winning—races in high school, though he never ran particularly smoothly and his legs required extensive massage and lengthy warm-up throughout his career as a runner. He ran for the United States in the 1932 Olympic Games, placing fourth in the 1500-metre race, and won the

silver medal in the 1,500-metre race during the 1936 Olympic Games. He was the fastest miler in the Amateur Athletic Union in 1933, 1935, 1936, 1937, and 1938. In 1934 he set a world record that was not broken for three years, running a mile in 4:06.7 minutes. His last season of competition was 1940. Having attended the University of Kansas (B.A., 1933), University of Iowa (M.A., 1936), and New York University (Ph.D.), Cunningham taught physical education at Cornell College from 1940 to 1944 and then served in the navy for two years. In 1947 he established the Glenn Cunningham Youth Ranch, at which he helped thousands of troubled youths over a period of more than 30 years.

Cunningham, Imogen (b. April 12, 1883, Portland, Ore., U.S.—d. June 24, 1976, San Francisco, Calif.), American photographer who is best known for her photographs of plants and for her portraits.



"Two Callas," by Imogen Cunningham, *c.* 1929
Imogen Cunningham

Cunningham began taking photographs in 1901, when she enrolled in a correspondence course in photography. Her earliest prints, such as "Marsh at Dawn" (1901), were in the tradition of Romantic Pictorialism, a style of photography that imitated academic painting of the turn of the century.

After studying photographic chemistry in Dresden, Ger., she opened a portrait gallery in Seattle, Wash., and soon established a national reputation. Although her commercial work was now straightforward, she continued to produce soft-focused, allegorical prints, such as "The Woods Beyond the World" (*c.* 1912). After her marriage, she moved to San Francisco. She met Edward Weston, and, through his recommendation, 10 of her plant photographs were included in the "Film und Foto" exhibition (1929), sponsored by the Deutsche Werkbund, an association of German designers and architects.

In 1932 Cunningham joined the association of West Coast photographers known as Group *f*.64 (*q.v.*). Like other members of the group, she rejected the soft-focused, sentimental photography then popular in favour of sharply focused prints, such as "Two Callas" (*c.* 1929), that conveyed a sensuous delight in nature.

After the breakup of Group *f*.64, Cunningham ran a portrait gallery and taught at the San Francisco Art Institute. A retrospective monograph, *Imogen! Imogen Cunningham Photographs, 1910–1973*, appeared in 1974, and her final photographs were published in *After Ninety* in 1977.

Cunningham, Merce (b. April 16, 1919, Centralia, Wash., U.S.), American modern dancer and choreographer who developed new forms of abstract dance movement.

Cunningham began to study dance at 12 years of age and after high school studied for two years at the Cornish School of Fine and Applied Arts in Seattle, Wash., with Lester Horton at Mills College (1938), and at Bennington College (1939), where he was invited by Martha Graham to join her group. As a soloist for her company, he created many important roles.

Encouraged by Graham, Cunningham began to choreograph in 1943. Among his early works were *Root of an Unfocus* (1944) and *Mysterious Adventure* (1945). Leaving Graham's company in 1945, he began a long association with the composer John Cage, which included annual recitals in New York City and collaboration on such works as *The Seasons* (1947) and *Inlets* (1978). In 1952 he formed his own company.

Because of his interest in pure movement as devoid as possible of emotional implications, Cunningham developed "choreography by chance," a technique in which selected isolated movements are assigned sequence by such random methods as tossing a coin. The sequential arrangement of the component dances in *Sixteen Dances for Soloist and Company of Three* (1951) was thus determined, and in *Suite by Chance* (1952) the movement patterns themselves were so constructed. *Suite by Chance* was also the first modern dance performed to an electronic score, which was commissioned from Christian Wolff. *Symphonie pour un homme seul* (1952; later called *Collage*) was performed to Pierre Schaeffer's and Pierre Henry's composition of the same name and was the first performance in the United States of *musique concrète*, or music constructed from tape-recorded environmental sounds.

Cunningham's abstract dances vary greatly in mood but are frequently characterized by abrupt changes and contrasts in movement. Many of his works have been associated with Dadaist, Surrealist, and Existentialist motifs.



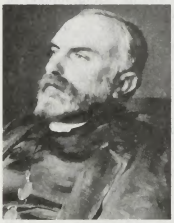
Merce Cunningham, 1970
Jack Mitchell

In 1974 Cunningham abandoned his company's repertory that had been built over a 20-year period for what he called "Events," excerpts from old or new dances, sometimes two or more simultaneously. Choreography created expressly for videotape was still another innovation, which included *Blue Studio: Five Segments* (1976). He also began working with film and created *Locale* (1979). Later dances included *Duets* (1980), *Fielding Sixes* (1980), *Channels/Inserts* (1981), and *Quartets* (1983).

BIBLIOGRAPHY. James Kosty (ed.), *Merce Cunningham* (1975, reprinted 1986), includes essays by dancers, composers, and others who worked with him.

Cunningham, William: *see* Glencairn, William Cunningham, 4th Earl of.

Cunningham, William (b. Dec. 29, 1849, Edinburgh, Scot.—d. June 10, 1919, Cambridge, Cambridgeshire, Eng.), British economist and churchman who was largely responsible for establishing economic history as a scholastic discipline in British universities. Cunningham was ordained in the Church of England in 1873 and became vicar of Great St. Mary's, Cambridge (1887), and archdeacon of Ely (1906). Meanwhile, from 1891 to 1897, he



William Cunningham, detail of a portrait by Eric Kennington, 1908; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

was professor of economics at King's College, London. His *The Growth of English Industry and Commerce* (1882; later expanded to 3 vol.), one of the first systematic economic histories of England, became a standard reference work.

Cunninghame, district, Strathclyde (*q.v.*) region, southwestern Scotland, created by the reorganization of 1975 from part of the former counties of Ayr and Bute. The district has an area of 339 square miles (878 square km) and includes the northern part of Ayr and the island of Arran, separated from the mainland by the Firth of Clyde. Arran's economy is based on livestock raising and tourism fostered by the unspoiled mountain scenery, abundant reserves of game and fish and, especially, its proximity to the Glasgow conurbation. The economy of mainland Cunninghame reflects a contrast between the cultivated coastal plain around the resorts of Ayr, Troon, Saltcoats, and Largs and the hill sheep farming of the more elevated inland areas. Ardrossan is a seaport and industrial town with an oil refinery and shipyards. Hunterston near West Kilbride is the site of a deepwater port, iron-ore terminal, and nuclear power station. The new town of Irvine (*q.v.*), the seat of the district authority, supports a wide range of new light industries. Prestwick, Scotland's main international airport, lies in the south near Ayr, the former county town. Pop. (1987 est.) 137,265.

Cuno, Wilhelm (Carl Josef) (b. July 2, 1876, Suhl, Ger.—d. Jan. 3, 1933, Aumühle), German politician and business leader, general director of the Hamburg-American Line, and chancellor of the Weimar Republic during the Franco-Belgian invasion of the Ruhr (1923).

Appointed government assessor in the German imperial treasury department (1907), Cuno subsequently served as a government adviser charged with drafting and presenting bills to the Reichstag (national parliament). During the first years of World War I, he headed the department of grain management (until July 1916), then served in the food ministry and, finally again, in the treasury department as general adviser on the war economy. Later, during the Armistice and peace negotiations, he represented his government as an economic expert. Following the suicide of shipping magnate Albert Ballin, Cuno succeeded to the direction of the Hamburg-American Line (December 1918), the largest German shipping concern, and in this position frequently acted as unofficial spokesman for German foreign political interests.

After twice refusing cabinet appointments in

governments of the Weimar Republic, Cuno was finally persuaded to accept the chancellorship (November 1922). To this office he brought the advantages of a creditable international reputation and the strong support of German business and industry. His ministry nonetheless succeeded neither in securing a much-needed readjustment of war reparations nor in halting inflation. With the Franco-Belgian invasion of the Ruhr over defaulted reparations payments (January 1923), he urged a national policy of passive resistance, which, though proving successful in certain respects, ultimately taxed beyond endurance the resilience of an already crippled economy. After a vote of no confidence by the powerful Social Democratic Party, he was finally obliged to resign (August 1923). He returned to the board of Hamburg-American and in 1926 was again elected chairman.

Cunobelinus (d. *c.* AD 42), ruler of a large area of southeastern Britain from about AD 10 to 42. He is the Cymbeline in William Shakespeare's play of the same name, although the play's fanciful plot bears no relation to the events in Cunobelinus' career.

Cunobelinus succeeded his father, Tasciovanus, as chief of the Catuvellauni, a tribe centred north of what is now London. Either shortly before or shortly after his accession, Cunobelinus conquered the territory of the Trinovantes, in modern Essex. He made Camulodunum (Colchester) his capital and the seat of his mint. His power and influence were so extensively felt in Britain that the Roman biographer Suetonius referred to him as "Britannorum rex." About AD 40 Cunobelinus banished his son Adminius, who thereupon fled to Rome and persuaded the emperor Caligula to make preparations to invade Britain. The expedition was assembled, but it never left the continent. After Cunobelinus' death, his two other sons, Caratacus and Togodumnus, displayed the hostility toward Rome that gave the emperor Claudius an excuse to impose Roman rule on the island.

Cunoniaceae, family of leathery-leaved plants, in the order Saxifragales, comprising 26 genera of shrubs and trees, native primarily to tropical areas of the Southern Hemisphere.



Cunonia capensis
A to Z Botanical Collection—EB Inc.

Several of the trees are cultivated as ornamentals, including *Geissois racemosa,* a New Zealand species with crimson flowers, and *Cunonia capensis,* a small southern African tree with clusters of small white flowers.

Cuoco, Vincenzo, Cuoco also spelled coco (b. Oct. 1, 1770, Civita Campomarano, Molise, Kingdom of Naples [Italy]—d. Dec. 14, 1823, Naples), Italian historian noted for his history of the Neapolitan Revolution of 1799.

At the age of 17, Cuoco went to Naples to study law and became a partisan of the French Jacobins when the French Revolution broke out in 1789. After taking an active part in the revolution of the Kingdom of Naples in 1799, he was forced into exile in France, where he wrote in 1800 his *Saggio storico sulla rivoluzione di Napoli,* 3 vol. (1800; "Historical Essay on the Revolution of Naples"). One of the best philosophical studies on the attempt to establish a republic in Naples, it narrates the events, acutely analyzes the movement's failure, criticizes the revolution's leaders for their lack of knowledge of Italy and its needs, and appeals for the creation of a unified national consciousness.

After the Battle of Marengo (June 14, 1800) had established French control, Cuoco returned to Milan, where he directed the newspaper *Giornale italiano.* When Joseph Bonaparte acceded to the throne of Naples after the expulsion of the Bourbons in 1806, Cuoco returned to Naples, became a member of the royal council, and later was named councillor of state. After the restoration of the Bourbon king Ferdinand I in 1815, however, he gradually became mentally ill and was insane at his death. His other major work was a philosophical novel, *Platone in Italia,* 2 vol. (1804; "Plato in Italy"), a romanticized account of pre-Roman Italy.

Cuong De (b. 1882—d. April 6, 1951, Tokyo, Japan), Vietnamese prince who was cultivated by Vietnamese nationalists at the turn of the 20th century to serve as a symbol of a free Vietnam.

As a direct descendant of the emperor Gia Long, Cuong De had a legitimate claim to the throne of Vietnam but was excluded by the French, who held a protectorate over the country. By 1904 Cuong De was associating with leaders of the Vietnamese opposition to French rule, including Phan Boi Chau. He was enrolled with other Vietnamese at Shimbu Military Academy in Tokyo, where he strengthened his relationship with Phan Boi Chau, who formed a movement to fight French rule in Vietnam. The strength of the movement increased, with Cuong De representing a link between royalty and commoner. Japan's desire for French financial assistance, together with Japanese imperial intentions, resulted in Cuong De's expulsion from Japan at French insistence in 1909. He spent the next few years traveling in Asian and European countries, vainly seeking support for his cause.

In 1915, during World War I, he returned to Japan, where he received a stipend for his support and assurance that, if France were defeated in Europe, the Japanese would guarantee Vietnam's autonomy. He remained active in the nationalist movement after the war, sending cables to the Versailles Peace Conference, to the French government, and to U.S. President Woodrow Wilson, repeating his demands for a free Vietnam. Meanwhile, the Japanese agreed to withdraw from the issue of Vietnamese independence in exchange for French assistance in controlling the rebellious Japanese colony of Korea.

Cuong De was honoured by Vietnamese nationalist politicians, but he remained in Japan and was kept under surveillance. In March 1945, when the Japanese finally removed all power from the French colonial regime in Indochina, it was thought that Cuong De might be appointed as a puppet emperor. The Japanese, however, retained the existing emperor, Bao Dai, on the throne, and Cuong De died in exile.

cup, unit of volume in the British Imperial and U.S. Customary systems of measurement. The U.S. unit for liquid measurement is different from that for dry measurement. The U.S. liquid cup, which is used much more commonly than is the dry cup, is equal to $14\frac{7}{16}$ cubic inches, or 236.64 cubic cm. The dry cup is equal to 1.164 liquid cups. In Great Britain the single cup, used for both types of measurement, is equal to 1.201 American liquid cups (284.2 cubic cm). In either system a cup is made up of two gills, and two cups make up a pint.

cup fungus, any member of the series Discomycetes, a large group of fungi (kingdom Fungi) in the class Ascomycetes and typically characterized by a disk- or cup-shaped structure (apothecium) bearing spore sacs (asci) on its surface. Some of the cup fungi are important plant pathogens, such as *Monilinia* (*Sclerotinia*), causing brown rot in peach and other stone fruits. Others are saprobes, displaying small (2–5 mm [0.08–0.2 inch]), brilliant red or orange disks found on old cow dung and decaying twigs and branches. Each ascus usually contains eight ascospores. Apothecia are usually open to the exterior; however, in the subterranean order Tuberales, to which the truffle belongs, the apothecia are completely enclosed, exposed only when the truffle is opened. Many of the cup fungi produce ballistospores, ascospores that are forcibly shot out. Sometimes, as in *Helvella* and *Peziza,* they are discharged in such numbers that they form a cloud above the fruiting body, and innumerable tiny explosions may be heard as a hissing sound.

The term morel is used for the 15 species of edible *Morchella* mushrooms. They have a convoluted or pitted head, or cap. Morels are varied in shape and occur in diverse habitats. The edible *M. esculenta* is found during early summer in woods. The bell morel (*Verpa*), an edible mushroom with a bell-shaped cap, is found in woods and in old orchards in early spring. Most species of *Gyromitra,* a genus of false morels, are poisonous. *G. brunnea* is edible, however, and is found in sandy soils or woods.

Peziza, which contains about 50 widespread species, produces in summer a cup-shaped fruiting body or mushroomlike structure on rotting wood or manure. Fire fungus is the common name for two genera (*Pyronema* and *Anthracobia*) of the order that grow on burned wood or steamed soil.

The edible snow mushroom (*Helvella gigas*) is found at the edge of melting snow in some localities. Caution is advised for all *Helvella* species. *H. infula* has a dull yellow to baybrown, saddle-shaped cap. It grows on rotten wood and rich soil from late summer to early fall and is poisonous to some people.

Sarcoscypha and *Geopyxis* (earth cup) are typically cup- or goblet-shaped.

cup lichen (genus *Cladonia*), widely distributed yellow, gray, or brown lichens usually found on the ground or on rocks in the north. The thallus varies in shape from simple and pointed to cup-shaped. One of the most com-



Cladonia coccifera
Vernon Ahmadjian









(Top to bottom) Morel (*Morchella esculenta*); snow mushroom (*Helvella gigas*); cup fungus (*Sarcoscypha coccinea*); saddle fungus (*Helvella infula*)

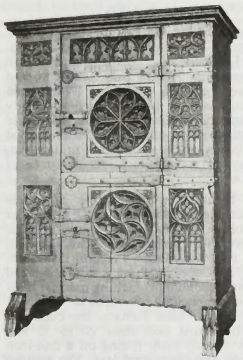
(Top to bottom) Frankiin K. Anderson—EB Inc., Larry C. Moon—Tom Stack & Associates, William Cibula, Larry C. Moon—Tom Stack & Associates

monly collected lichens, it contains a gummy or starchy material. When boiled with milk or syrup this material has been used as a remedy for whooping cough and chest ailments. The pyxie cup lichen (*C. pyxidata*) has small, funnel-shaped cups and grows about 2.5 centimetres high.

Cupar, royal burgh and market centre in North East Fife district, Fife region, eastern Scotland, situated in the fertile valley known as Howe of Fife on the banks of the River Eden.

During the 13th century Cupar emerged as the centre of the administration of justice for Fife and was created a royal burgh in 1356. It has remained the administrative centre for Fife (in spite of the development of larger coastal towns) because of its early connection with the courts of justice and its central position and accessibility as a market within the district. The town serves as a grain and livestock market, and its industries are related to agriculture: tanning, agricultural engineering, and milling. Pop. (1981) 6,636.

cupboard, type of furniture that originated in the Middle Ages as a board or table for cups. The word also may have been used for a stepped sideboard and later for open shelves, both to display plate. Since the 16th century the name has referred to a general receptacle fitted with doors.



Oak cupboard with Gothic tracery, German, 15th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Byzantine and Romanesque cupboards were of simple board construction, though they were sometimes decorated with elaborate painted designs. A fine example of about 1200, painted inside and out with pictures of saints on a gesso ground, survives in the cathedral at Halberstadt, Ger. Freestanding cupboards were made for churches long before they were in common use in domestic interiors. The latter stage was reached only when the tendency developed, in the 14th century, for furniture to be made as movable units rather than as fitments forming parts of a building. Many of the finest medieval cupboards were finely carved with Gothic designs closely following architectural motifs and forms.

Late 15th-century cupboards for food storage, such as the English livery cupboard, had ventilating holes, often taking the form of carved open tracery. Another variety was the hall, or parlour, cupboard, an enclosed version of the cupboard for display. The court cupboard, for example, was important in Tudor and Stuart times in England but lost fashion after the Restoration.

By the 17th century the cupboard was taking over the role of the chest as the principal piece of storage furniture. In certain parts of Europe, such as southern Germany, the cupboard may have developed from a chest placed on another chest, each opening at the front rather than at the top. For a long time cupboards were divided in two, horizontally, with handles sometimes attached to the sides of each section to facilitate moving.

With the increasing importance of the cupboard, decoration became more lavish, taking the form of panelling, carving, and intarsia (mosaic of wood). Italy led the way in the 16th century with some of the finest intarsia panels. Panels were rectangular and sometimes contained finely carved scenes, or motifs, accompanied by carved friezes (horizontal bands). In the 17th century the Low Countries popularized a heavy form of cupboard, in which the panels were raised and three evenly spaced twisted columns supported a heavy cornice, the whole resting on squat bun (or ball) feet. Northern Germany was particularly noted for its massive cupboards, which were the most important pieces of furniture in the house.

The press was a tall cupboard that held bed linen, curtains, and clothes. In the early 18th century a press composed of a cupboard above a chest of drawers became popular in England, and its use spread to the Continent. Until modern times no major advances in cupboard design were made after the 18th century.

cupellation, separation of gold or silver from impurities by melting the impure metal in a cupel (a flat, porous dish made of a refractory, or high-temperature-resistant, material) and then directing a blast of hot air on it in a special furnace. The impurities, including lead, copper, tin, and other unwanted metals, are oxidized and partly vaporized and partly absorbed into the pores of the cupel.

Cuphea, genus of more than 200 species of chiefly tropical American herbs or shrubs of the family Lythraceae. Four species—native to Mexico and Central America—are commonly grown indoors for their attractive flowers.

Cuphea hyssopifolia, elfin herb, is a small hairy shrub with many branches. The small



Cigar flower (*Cuphea*)

A to Z Botanical Collection—EB Inc.

stalkless leaves are crowded and narrow; the flowers are tubular and violet white. *C. llavea* grows to a height of 60 centimetres (2 feet), is covered with stiff hairs, and has nearly stalkless, oval, rough leaves. The tubular flowers are red. *C. micropetala* grows 30–120 cm tall, with oblong leaves; its tubular yellow flowers are scarlet near the base. *C. platycentra* (sometimes *C. ignea*), commonly called the

cigar flower, grows 20–37 cm tall and has lance-shaped leaves. The tubular flowers are reddish, with a dark ring near the tip and an ashy-white mouth.

Cupid, ancient Roman god of love in all its varieties, the counterpart of the Greek god Eros and the equivalent of Amor in Latin poetry. According to myth, Cupid was the son of Mercury, the winged messenger of the gods, and Venus, the goddess of love; he usually appeared as a winged infant carrying a bow and a quiver of arrows, whose wounds inspired love or passion in his every victim. He was sometimes portrayed wearing armour like that of Mars, the god of war, perhaps to suggest ironic parallels between warfare and romance or to symbolize the invincibility of love.



Cupid, classical statue; in the Museo Archeologico Nazionale, Naples
Alinari—Art Resource/EB Inc.

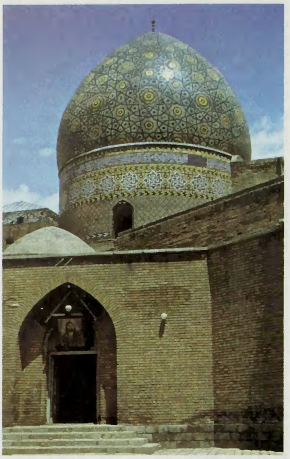
Although some literature portrayed Cupid as callous and careless, he was generally viewed as beneficent, on account of the happiness he imparted to couples both mortal and immortal. At the worst he was considered mischievous in his matchmaking, this mischief often directed by his mother, Venus. In one tale, her machinations backfired when she used Cupid in revenge on the mortal Psyche, only to have Cupid fall in love and succeed in making Psyche his immortal wife.

cupola, in architecture, small dome, often resembling an overturned cup, placed on a circular, polygonal, or square base or on small pillars or a glassed-in lantern. It is used to crown a turret, roof, or larger dome. The inner vault of a dome is also a cupola.

Cupolas, usually bulbous or pointed, first saw widespread use in Islāmic architecture in about the 8th century. They often topped minarets but were also built over the central space or on the corners of mosques as well as on domestic buildings in the Middle East and India.

From the Middle East the cupola design spread to Russia, where in the 17th and 18th centuries it gained great popularity in the form of the "onion dome," which had the advantage of being decorative while not gathering snow during severe winters. The Moors brought the design to Spain, and Islāmic influence in the 17th century may be responsible for its introduction in Vienna, where it can be seen on many Baroque structures. Throughout Austria and Bavaria, onion domes top innumerable small churches.

Cupolas of various styles were integrated into English domestic architecture during the late 17th century and became part of U.S. architectural design during the post-Revolutionary Federalist era. Cupolas cap the small but elegant City Hall in New York City and the dome of the U.S. Capitol in Washington, D.C. Cupolas were popular in 19th-century U.S. domestic architecture, perhaps because they distinguish an otherwise undistinguished house. When placed atop posts or lanterns, they may also serve as lookouts or sources of light or air.

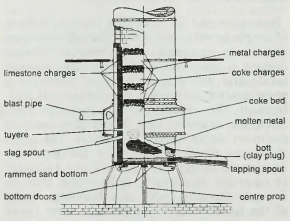


Mosque with cupola in the bazaar, Tehrān
Margot Wolf—SCALA from Art Resource/EB Inc.

cupola furnace, in steelmaking, a vertical cylindrical furnace used for melting iron either for casting or for charging in other furnaces.

René-Antoine Ferchault de Réaumur built the first cupola furnace on record, in France, about 1720. Cupola melting is still recognized as the most economical melting process; most gray iron is melted by this method.

Similar to the blast furnace, the cupola is a refractory-lined steel stack 20 to 35 feet (6 to 11 metres) high, resting on a cast-iron base plate with four steel legs. The bottom of the cupola furnace has two hinged doors supported in the closed position by a centre prop. Molding sand is rammed over the closed bottom doors to support the coke bed, molten metal, and succeeding charges. Forced air for combustion enters the cupola through the openings (tuyeres) spaced around the rim of the lower portion of the cupola.



Cupola furnace

Iron, coke, and limestone flux are placed on a bed of coke high enough to hold the iron above the tuyere openings, where the temperature is the highest. The melting is continuous, and molten metal may be allowed to flow continuously through an open tapping spout at the base of the cupola, or it may be tapped intermittently. Intermittent tapping is accomplished by piercing a clay bott, or plug, in the tapping spout with a pointed steel rod to create a passageway called the breast of the cupola. The tapping spout is stopped by plugging with a fresh clay bott. Wastes flow out in the form of slag when the slag spout is tapped. At the end of the operation, the prop is knocked from under the bottom doors and the remaining contents discharged.

Cupressaceae, the cypress family (order Coniferales), about 19 genera with over 130 species of evergreen ornamental and timber shrubs and trees, distributed throughout the world. The leaves of these plants are opposite or whorled and usually paired or in threes. Adult leaves are narrow, scalelike, and pressed against the branchlets, which themselves are often flattened. Awllike juvenile and transitional leaves are often present on mature trees. The male reproductive structures are borne at the ends of short twigs; the female structures (cones) are terminal, with opposite or whorled scales, consisting of both a fused bract (modified leaf) and a scale. The cones, usually woody, have erect ovules.

Economically important genera include alerce (*Fitzroya*), white alerce (*Pilgerodendron*), arborvitae (*Thuja*), Chilean cedar (*Austrocedrus*), cypress (*Cupressus*), cypress pine (*Callitris* and *Widdringtonia*), arartree (*Tetraclinis*), false arborvitae (*Thujopsis*), false cypress (*Chamaecyparis*), incense cedar (*Calocedrus*), oriental arborvitae (*Thuja* or *Biota*), and juniper (*Juniperus*).

Many members of the cypress family are important as timber sources or ornamentals, especially arborvitae, cypress, and juniper. They also contain useful oils, resins, and tannins.

cuprite, soft, heavy, red oxide mineral (Cu_2O) that is an important ore of copper. A secondary mineral often formed by the weathering of copper sulfide minerals, cuprite is widespread as brilliant crystals, grains, or earthy masses in the oxidized zone of copper lodes. Deposits have been found at Chessy, Fr.; several places in Cornwall, Eng.; Broken Hill, Australia; and Tsumeb, South West Africa/Namibia. It is abundant in the copper districts of the southwestern U.S., as at Bisbee, Ariz. For detailed physical properties, *see* oxide mineral (table).



Cuprite from Bisbee, Ariz.
Floyd R. Getsinger—EB Inc.

Cuprite has two unusual varieties. Chalcotrichite, or plush copper ore, is loosely matted aggregates of capillary crystals with a rich carmine colour and a silky lustre. Tile ore is a soft, earthy variety that is brick red to brownish red; it often contains admixed hematite or limonite and has been formed by the alteration of chalcopyrite.

cupronickel, any of an important group of alloys of copper and nickel; the alloy containing 25 percent nickel is used by many countries for coins. Because copper and nickel mix readily in the molten state, the useful range of alloys is not confined within any definite lim-

its. Additions of from 2 percent to 45 percent of nickel to copper provide a series of alloys that are stronger and more resistant to oxidation at high temperatures than is pure copper. That containing 30 percent nickel, the most important, is widely used for condenser tubes in steam-power plants.

Cupronickel was first utilized for coins in 1860 by Belgium; it became widely used thereafter, replacing silver in British coinage, for example, in 1947. The 75:25 ratio was adopted by the United States for the "nickel" 3-cent piece (1865–89) and the "nickel" 5-cent coin (from 1866); since 1965 it has formed the two outer layers of the 10-cent and 25-cent pieces, with a layer of copper sandwiched between. An 88:12 composition was used briefly for the U.S. cent (1857–64).

Easily worked hot or cold, cupronickel has numerous applications, with 20 percent nickel, for example, in exposed automobile parts.

Cupronickel has high electrical resistivity; constantan, an alloy of 55 percent copper and 45 percent nickel, is used in resistors, thermocouples, and rheostats. *See also* Monel.

cups and balls trick: *see* shell game.

Cuquenán Falls (Guyana-Venezuela): *see* Kukenaam Falls.

Curaçao, largest island of the Benedenwindse Eilanden (Leeward Islands) and of the Netherlands Antilles in the Caribbean Sea. Its area is 171 square miles (444 square km), and it is situated some 37 miles (60 km) north of the coast of Venezuela, near the southwestern extreme of the Lesser Antilles.

Curaçao was first visited by Europeans in 1499 and was settled by the Spanish in 1527 and then by the Dutch, who established it as a major centre of trade for their West India Company. The entire native Indian population was deported to Hispaniola in 1515. Curaçao is the home of the oldest continuously inhabited Jewish community in the Western Hemisphere, originally formed by Sephardic Jews who immigrated from Portugal in the 1500s.

The island enjoyed one special advantage for the Dutch—the finest natural harbour in the West Indies. At the southeastern end of the island, a channel, St. Anna Bay, passes through reefs to a large, deep, virtually enclosed bay called Schottegat, the site of the capital town, Willemstad. The need for salt to preserve herring initially drove the Dutch to the Caribbean. During the period 1660 to 1700, the Dutch West India Company flourished; the slave trade boomed, and the port of Curaçao was opened to all countries both to receive the incoming food supplies and to dispose of products from the plantations of South America. The island was subjected to frequent invasions from competing privateers and suffered during the wars between the English and Dutch. It has remained continuously in Dutch hands since 1816.

Curaçao elects 12 members of the legislative assembly (Staten) of the Netherlands Antilles. Local affairs are handled by the island government, consisting of an Island Council, an Executive Council, and a lieutenant governor. There is much popular agitation for independence.

In spite of having very little rainfall or fertile soil, the island developed a major sugarcane-plantation economy under Dutch colonial rule; it also produces oranges whose dried peel is the base for the famous Curaçao liqueur that is distilled there. Aloes, which had originally been imported from Africa, do not require irrigation and are still exported for pharmaceutical uses. All water is distilled from seawater.

The thriving economy of Curaçao depends heavily on oil from Venezuela; in addition to the excellent harbour, which can accommodate very large tankers, the island is located at the junction of trade routes passing through the Panama Canal. The Dutch found oil in Lake Maracaibo, Venezuela, but, because the lake was too shallow for oceangoing ships, the oil was transported in smaller vessels to Curaçao for refining and transshipment. Curaçao developed large, modern dry-docking and bunkering facilities and is among the largest ports in the world in terms of total tonnage handled.

In spite of the government's attempts to diversify the economy by encouraging light industry, there are only a few manufacturing firms, and all consumer goods and food must be imported. The decline of phosphate mining and automation in the oil industry aggravated problems of unemployment and attendant social unrest. This has been alleviated only slightly by the expanding tourist industry; immigrant labourers from other Caribbean islands have had to return to their original homes, while citizens of the Netherlands Antilles (especially mulattos of African and European stock) emigrate to The Netherlands. Pop. (1987 est.) 153,736.

curare, skeletal-muscle-relaxant drug belonging to the alkaloid family of organic compounds. Of botanical origin, it is used in modern medicine primarily as an auxiliary in general anesthesia, frequently with cyclopropane, especially in abdominal surgery. Upon injection, curare acts as a neuromuscular blocking agent to produce flaccidity in striated (striped) muscle (it competes with acetylcholine at the nerve ending, preventing nerve impulses from activating skeletal, or voluntary, muscles). It first affects the muscles of the toes, ears, and eyes, then those of the neck and limbs, and, finally, those involved in respiration. In fatal doses, death is caused by respiratory paralysis.

Crude preparations called curare have been used as arrow poisons in hunting wild game by the Indians of South America. Sources include various tropical American plants (primarily *Chondodendron* species of the family Menispermaceae and *Strychnos* species of the family Loganiaceae). Crude curare is a resinous, dark brown to black mass with a sticky to hard consistency and an aromatic, tarry odour. The name comes from Indian words (*woorari, woorali, urari*) meaning "poison." Preparations have been classified according to the containers used for them: pot curare in earthenware jars, tube curare in bamboo, and calabash curare in gourds.

Several related alkaloidal constituents are responsible for the pharmacological action of these preparations, the principal alkaloid being tubocurarine, first isolated from tube curare in 1897 and obtained in crystalline form in 1935. Tubocurarine chloride (as *d*-tubocurarine chloride), isolated from the bark and stems of a South American vine (*Chondodendron tomentosum*), is the purified form used in medicine.

Injection of curare alkaloids in anesthesia produces a profound relaxation (comparable only to that produced by spinal anesthesia) with a minimal concentration of anesthetic agent. From this there is prompt recovery and a radical reduction of the possibilities of postoperative pneumonias and other complications.

The drug is also employed as a relaxant to keep the throat open, to keep open for examination such hollow organs as the rectum and urethra, to relieve various muscular contractions and convulsions, and to allow manipulations in the lumbar and sacroiliac regions of the back. Because of its quickly reversible action, it is useful in the diagnosis of myasthenia gravis, a muscle disorder. Curare also is used for relief of spastic paralysis, as an adjunct in shock therapy to reduce the incidence of vertebral fractures, and in cases in which a state of profound muscular relaxation or even immobility is desirable.

curassow, any of numerous tropical American birds of the family Cracidae (order Galliformes). Strictly, it refers to 7–12 species in which the male is glossy black (often with white belly) and has a curled crest of feathers and a brightly coloured bill ornament; the female, lacking the ornament, is smaller and brownish. Curassows are game birds with delicious flesh. Large examples (to nearly 100 cm, or 40 inches) are the great curassow (*Crax rubra*), from Mexico to Ecuador; the helmeted curassow (*Pauxi pauxi*), of the mountains of Venezuela and Colombia; and the razor-billed curassow (*C. mitu*), of the Amazon, which is critically endangered.

The chachalacas comprise 11 species and are the smallest and least arboreal members of the family. Typical is the plain chachalaca (*Ortalis vetula*), a 50-centimetre species, ranging



Southern helmeted curassow (*Crax unicornis*)
Albert E. Gilbert

from the Texas border to Nicaragua. Weighing about 0.5 kg (1 pound), it is brownish with a long green-glossed, white-tipped tail. At dawn and sundown, flocks call together from the treetops with regular, almost metronomic beat.

Guans comprise 12 species, lighter in weight and somewhat smaller than related curassows. Strongly gregarious, they have noisy cries heard mainly at night. Sexes look alike. The crested (miscalled purple) guan (*Penelope purpurascens*), from Mexico to Ecuador and Venezuela, is an important game bird, about 65 cm long and weighing about 2 kg. It is greenish brown, with white spotting below. Several species are endangered.

curculio, any of various stout-bodied weevils of the beetle family Curculionidae (order Coleoptera). Among the best known is the



Plum curculio (*Conotrachelus nenuphar*)
Grant Heilman—EB Inc.

plum curculio (*q.v.*), which attacks plums, apples, peaches, and other fruits.

Adult curculios hibernate in trash piles; in the spring the female deposits eggs into holes that she bores in fruit. She also makes a crescent-shaped cut near each hole. After three to five weeks of feeding inside the fruit, the larva emerges and pupates in the ground for one month. Not all curculios attack fruit—*Conotrachelus juglandis,* for example, feeds on nuts.

Curel, François de (b. June 10, 1854, Metz, Fr.—d. April 26, 1928, Paris), French dramatist and novelist, one of the brightest lights of André Antoine's famous Théâtre Libre, which was founded, in reaction to the established French commercial theatre, as a forum for original dramatic art.

Curel, a member of an old noble family, studied engineering, but his career was interrupted by the surrender of his native province of Lorraine to Germany in 1871, and he turned to literature.

Curel's austere dramas show the working out of social, moral, or psychological conflicts: the destructiveness of an embittered woman in *L'Envers d'une sainte* (1892; *A False Saint*); the decadence of a noble family in *Les Fossiles* (1892; *The Fossils*); the impulses of love and revenge in *L'Invitée* (1893; "The Guest"); capital-labour relations in *Le Repas du lion* (1897; "The Lion's Meal"); and the cult of science at the expense of human value in *La*



Curel
H. Roger-Viollet

Nouvelle Idole (1895; "The New Idol"). Unlike the popular "thesis plays" of his time, which emphasized abstractions, Curel's dramas of ideas emphasized the characters' emotions and actions. After 1906, Curel abandoned writing for several years. When he resumed, his work was comic and ironic in tone. *L'Âme en folie* (1919; "The Soul Gone Mad"), his only popular success, was a comedy comparing human and animal emotions. Curel was elected to the French Academy in 1918.

Curepipe, town (township) on the island of Mauritius, in the western Indian Ocean. It lies in the western highlands region of the country, about 11 miles (18 km) south of Port Louis, the national capital. The town, named after a similar township in France, developed quickly after a malaria epidemic in 1867, which forced Port Louis residents to relocate to safer areas in the highlands. Several import companies and the Mauritius Broadcasting Company, the Carnegie Library, the Royal College secondary school, and the Mauritian Academy of Language and Literature are located in the town. A surfaced road links Curepipe with the expressway connecting Vacoas-Phoenix and the national capital. The Trou aux Cerfs, an extinct crater that is 280 feet (85 m) deep and 200 feet (60 m) wide, overlooks the town. Pop. (1990 est.) 66,704.

curia, plural CURIAE, in ancient Rome, a political division of the people. According to tradition Romulus, the city's founder, divided the people into 3 tribes and 30 curiae, each of which in turn was composed of 10 families (gentes). They were the units that made up the primitive assembly of the people, the Comitia Curiata, and were the basis of early Roman military organization. Under the early republic (5th–4th century BC), the curiae gradually lost their political and military importance and functioned mainly as religious bodies, headed by an official called a curio.

"Curia" also designated the meeting place for such a group and came to be applied to other meeting places (including the Senate building) and to other kinds of assemblies.

curia, plural CURIAE, in European medieval history, a court, or group of persons who attended a ruler at any given time for social, political, or judicial purposes. Its composition and functions varied considerably from time to time and from country to country during a period when executive, legislative, and judicial functions were not as distinct as they were later to become. In general, the curia took care of the ruler's personal needs (chamberlains, stewards, butlers), directed the affairs of government (chancellors, treasurers, secretaries, military leaders), or simply provided the ruler with companionship. The ruler and curia made policy decisions either ordinary or major (as on war, treaties, finances, church relations) and, under a powerful ruler—a king, duke, or count—often became active as a court of law. Indeed, curiae became so loaded down with judicial work that the work gradually came to be delegated to special groups of judges, such as the Court of King's Bench in England or the Parlement in France; such judicial courts in medieval times were at first considered instruments of the curia, however, not independent bodies. The curia similarly turned over the growing burden of financial affairs to such bodies as the English Exchequer and the French Curia in Compotis ("Curia of Accounts"), which too remained instruments of the curia.

The evolution of the medieval curia is well illustrated in England's Curia, also known as the Curia Regis, or Aula Regis ("King's Court"). It was introduced at the time of the Norman Conquest (1066) and lasted to about the end of the 13th century. The Curia Regis was the germ from which the higher courts of law, the Privy Council, and the Cabinet were to spring. It was, at first, the general council of the king, or the *commune concilium* (*i.e.,* the feudal assembly of the tenants-in-chief); but it assumed a more definite character during the reign of Henry I (1100–35), when its members, fewer in number, were the officials of the royal household and other friends and attendants of the king. It assisted the king in his judicial work, its authority being as undefined as his own.

About the same time, the Curia undertook financial duties and in this way was the parent of the Court of Exchequer (*curia regis ad scaccarium*). The members were called "justices," and in the king's absence the justiciar presided over the court. A further step was taken by Henry II. In 1178 he appointed five Curia members to form a special court of justice, which became known as the Court of Common Pleas. Initially, this court's justices, like the other members of the Curia, followed the king's court from place to place, but Magna Carta (1215) provided for the court's establishment in one place, and it thus became a stationary judicial body. The Court of King's (or Queen's) Bench also developed out of the Curia Regis. This court continued to move about with the monarch until the 14th century, at which time it too lost its close connections with the king and simply became one of the superior courts of common law. The Court of Chancery was also an offshoot of the Curia Regis. About the time of Edward I (reigned 1272–1307), the executive and advising duties of the Curia Regis came to be handled by a select group, the king's secret council, which later came to be called the Privy Council. From the Privy Council there later developed the Cabinet.

Curia, Roman, Latin CURIA ROMANA: *see* Roman Curia.

curia baronis (medieval English law): *see* court baron.

Curiatii: *see* Horatii and Curiatii.

Curicó, capital of Curicó *provincia,* Maule *region,* central Chile, lying in the Central Valley near the Mataquito River. Founded in 1743 as San José de Buena Vista de Curicó, it was given city status in 1830. In 1928 it was devastated by an earthquake, but the fine Plaza de Armas (central square) survived. The surrounding agricultural area is famed for its wine grapes. The city has flour mills and distilleries and is the centre for local *huasos* (cowboys). It is on the Pan-American Highway and main north-south railroad, and branches of both run westward to Licantén, near the Pacific. Pop. (1990 est.) mun., 106,092.

Curicum (Croatia): *see* Krk.

curie, in physics, unit of the quantity of radioactive substances. In 1962 the International Commission on Radiological Units recommended that this unit be defined as the activity of a quantity of a radioactive nuclide for which the number of nuclear transformations in one second is exactly 3.7×10^{10}. Other groups define the curie as the amount of radioactive material undergoing 3.7×10^{10} disintegration per second. The unit is named in honour of the French physicist Marie Curie.

Curie, Irène (physicist): *see* Joliot-Curie, Frédéric and Irène.

Curie, Marie, *née* MARIA SKŁODOWSKA (b. Nov. 7, 1867, Warsaw, Pol., Russian Empire—d. July 4, 1934, near Sallanches, Fr.), Polish-born French physicist famous for her work on radioactivity and twice a winner of the Nobel Prize. With Henri Becquerel and her husband, Pierre Curie, she was awarded the 1903 Nobel Prize for Physics. She was then sole winner of the 1911 Nobel Prize for Chemistry.

From childhood she was remarkable for her prodigious memory, and at the age of 16 she won a gold medal on completion of her secondary education at the Russian lycée. Because her father, a teacher of mathematics and physics, lost his savings through bad investment, she had to take work as a teacher and, at the same time, took part clandestinely



Marie Curie
The Granger Collection, New York City

in the nationalist "free university," reading in Polish to women workers. At the age of 18 she took a post as governess, where she suffered an unhappy love affair. From her earnings she was able to finance her sister Bronia's medical studies in Paris, on the understanding that Bronia would in turn later help her to get an education.

In 1891 Marie Skłodowska went to Paris and began to follow the lectures of Paul Appel, Gabriel Lippmann, and Edmond Bouty at the Sorbonne. There she met physicists who were already well known—Jean Perrin, Charles Maurain, and Aimé Cotton. Skłodowska worked far into the night in her students'-quarter garret and virtually lived on bread and butter and tea. She came first in the *licence* of physical sciences in 1893. She began to work in Lippmann's research laboratory and in 1894 was placed second in the *licence* of mathematical sciences. It was in the spring of this year that she met Pierre Curie.

Their marriage (July 25, 1895) marked the start of a partnership that was soon to achieve results of world significance, in particular the discovery of polonium (so called by Marie in honour of her native land) in the summer of 1898, and that of radium a few months later. Following Henri Becquerel's discovery (1896) of a new phenomenon (which she later called "radioactivity"), Marie Curie, looking for a subject for a thesis, decided to find out if the property discovered in uranium was to be found in other matter. She discovered that this was true for thorium at the same time as G.C. Schmidt did.

Turning to minerals, her attention was drawn to pitchblende, a mineral whose activity, superior to that of pure uranium, could only be explained by the presence in the ore of small quantities of an unknown substance of very high activity. Pierre Curie then joined her in the work that she had undertaken to resolve this problem and that led to the discovery of the new elements, polonium and radium. While Pierre Curie devoted himself chiefly to the physical study of the new radiations, Marie Curie struggled to obtain pure radium in the metallic state—achieved with the help of the chemist A. Debierne, one of Pierre Curie's pupils. On the results of this research Marie Curie received her doctorate of science in June 1903 and, with Pierre, was awarded the Davy Medal of the Royal Society. Also in 1903 they shared with Becquerel the Nobel Prize for Physics for the discovery of radioactivity.

The birth of her two daughters, Irène and Ève, in 1897 and 1904 did not interrupt Marie's intensive scientific work. She was appointed lecturer in physics at the École Normale Supérieure for girls in Sèvres (1900) and introduced there a method of teaching based on experimental demonstrations. In December 1904 she was appointed chief assistant in the laboratory directed by Pierre Curie.

The sudden death of Pierre Curie (April 19, 1906) was a bitter blow to Marie Curie, but it was also a decisive turning point in her career: henceforth she was to devote all her energy to completing alone the scientific work that they had undertaken. On May 13, 1906, she was appointed to the professorship that had been left vacant on her husband's death; she was the first woman to teach in the Sorbonne. In 1908 she became titular professor, and in 1910 her fundamental treatise on radioactivity was published. In 1911 she was awarded the Nobel Prize for Chemistry, for the isolation of pure radium. In 1914 she saw the completion of the building of the laboratories of the Radium Institute (Institut du Radium) at the University of Paris.

Throughout World War I, Marie Curie, with the help of her daughter Irène, devoted herself to the development of the use of X-radiography. In 1918 the Radium Institute, the staff of which Irène had joined, began to operate in earnest, and it was to become a universal centre for nuclear physics and chemistry. Marie Curie, now at the highest point of her fame, and, from 1922, a member of the Academy of Medicine, devoted her researches to the study of the chemistry of radioactive substances and the medical applications of these substances.

In 1921, accompanied by her two daughters, Marie Curie made a triumphant journey to the United States, where President Warren G. Harding presented her with a gram of radium bought as the result of a collection among American women. She gave lectures, especially in Belgium, Brazil, Spain, and Czechoslovakia. She was made a member of the International Commission on Intellectual Co-operation by the Council of the League of Nations. In addition, she had the satisfaction of seeing the Curie Foundation in Paris develop and the inauguration in 1932 in Warsaw of the Radium Institute, of which her sister Bronia became director.

One of Marie Curie's outstanding achievements was to have understood the need to accumulate intense radioactive sources, not only for the treatment of illness but also to maintain an abundant supply for research in nuclear physics; the resultant stockpile was an unrivaled instrument until the appearance after 1930 of particle accelerators. The existence in Paris at the Radium Institute of a stock of 1.5 grams of radium in which, over a period of several years, radium D and polonium had accumulated, made a decisive contribution to the success of the experiments undertaken in the years around 1930 and in particular of those performed by Irène Curie in conjunction with Frédéric Joliot, whom she had married in 1926 (*see* Joliot-Curie, Frédéric and Irène). This work prepared the way for the discovery of the neutron by Sir James Chadwick and above all the discovery in 1934 by Irène and Frédéric Joliot-Curie of artificial radioactivity. A few months after this discovery Marie Curie died as a result of leukemia caused by the action of radiation. Her contribution to physics had been immense, not only in her own work, the importance of which had been demonstrated by the award to her of two Nobel Prizes, but because of her influence on subsequent generations of nuclear physicists and chemists.

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Curie, Pierre (b. May 15, 1859, Paris, Fr.—d. April 19, 1906, Paris), French physical chemist and cowinner of the Nobel Prize for Physics in 1903. He and his wife, Marie Curie, discovered radium and polonium in their investigation of radioactivity.

Educated by his father, a doctor, Curie developed a passion for mathematics at the age of 14 and showed a particular aptitude for spatial geometry, which was later to help him in his work on crystallography. Matriculating at the age of 16 and obtaining his *licence ès sciences* at 18, he was in 1878 taken on as laboratory assistant at the Sorbonne. There Curie carried out his first work on the calculation of the wavelength of heat waves. This was followed by very important studies on crystals, in which he was helped by his elder brother Jacques. The problem of the distribution of crystalline matter according to the laws of symmetry was to become one of his major preoccupations. The Curie brothers associated the phenomenon of pyroelectricity with a change in the volume of the crystal in which it appears, and thus they arrived at the discovery of piezoelectricity. Later, Pierre was able to formulate the principle of symmetry, which states the impossibility of bringing about a specific physical process in an environment lacking a certain minimal dissymmetry characteristic of the process. Further, this dissymmetry cannot be found in the effect if it is not preexistent in the cause. He went on to define the symmetry of different physical phenomena.

Appointed supervisor (1882) at the School of Physics and Industrial Chemistry at Paris, Curie resumed his own research and, after a long study of buffered movements, managed to perfect the analytical balance by creating an aperiodic balance with direct reading of the last weights. Then he began his celebrated studies on magnetism. He undertook to write a doctoral thesis with the aim of discovering if there exist any transitions between the three types of magnetism: ferromagnetism, paramagnetism, and diamagnetism. In order to measure the magnetic coefficients, he constructed a torsion balance that measured 0.01 mg, which, in a simplified version, is still used and called the magnetic balance of Curie and Chèneveau. He discovered that the magnetic coefficients of attraction of paramagnetic bodies vary in inverse proportion to the absolute temperature—Curie's Law. He then established an analogy between paramagnetic bodies and perfect gases and, as a result of this, between ferromagnetic bodies and condensed fluids.

The totally different character of paramagnetism and diamagnetism demonstrated by Curie was later explained theoretically by Paul Langevin. In 1895 Curie defended his thesis on magnetism and obtained a doctorate of science.

In the spring of 1894 Curie met Marie Skłodowska; their marriage (July 25, 1895) marked the beginning of a world-famous scientific achievement, beginning with the discovery (1898) of polonium and then of radium. The phenomenon of radioactivity, discovered (1896) by Henri Becquerel, had attracted Marie Curie's attention, and she and Pierre determined to study a mineral, pitchblende, the specific activity of which is superior to that of pure uranium. While working with Marie to extract pure substances from ores, an undertaking that really required industrial resources but that they achieved in relatively primitive conditions, Pierre himself concentrated on the physical study (including luminous and chemical effects) of the new radiations. Through the action of magnetic fields on the rays given out by the radium, he proved the existence of particles electrically positive, negative, and neutral; these Ernest Rutherford was afterward to call alpha, beta,



Pierre Curie
The Granger Collection, New York City

and gamma rays. Pierre then studied these radiations by calorimetry and also observed the physiological effects of radium, thus opening the way to radium therapy.

Refusing a chair at the University of Geneva, in order to continue his joint work with Marie, Pierre Curie was appointed lecturer (1900) and professor (1904) at the Sorbonne. He was elected to the Academy of Sciences (1905), having in 1903 jointly with Marie received the Royal Society's Davy Medal and jointly with her and Becquerel the Nobel Prize for Physics. He was run over by a dray in the rue Dauphine in Paris in 1906 and died instantly. An exceptional physicist, he was one of the main founders of modern physics. His complete works were published in 1908.

BIBLIOGRAPHY. The basic biography is Marie Curie, *Pierre Curie* (Eng. trans. 1923). Eugénie Cotton, *Les Curie* (1963), contains recollections of the Curie family and an assessment of their scientific accomplishments by a student of Marie Curie.

Curie point, temperature at which certain magnetic materials undergo a sharp change in their magnetic properties. In the case of rocks and minerals, remanent magnetism appears below the Curie point—about 570° C (1,060° F) for the common magnetic mineral magnetite. This temperature is named for the French physicist Pierre Curie, who in 1895 discovered the laws that relate some magnetic properties to change in temperature.

Below the Curie point—for example, 750° C (1,382° F) for iron—atoms that behave as tiny magnets spontaneously align themselves in certain magnetic materials. In ferromagnetic materials, such as pure iron, the atomic magnets are oriented within each microscopic region (domain) in the same direction, so that their magnetic fields reinforce each other. In anti-ferromagnetic materials, atomic magnets alternate in opposite directions, so that their magnetic fields cancel each other. In ferrimagnetic materials, the spontaneous arrangement is a combination of both patterns, usually involving two different magnetic atoms, so that only partial reinforcement of magnetic fields occurs.

Raising the temperature to the Curie point for any of the materials in these three classes entirely disrupts the various spontaneous arrangements, and only a weak kind of more general magnetic behaviour, called paramagnetism, remains. One of the highest Curie points is 1,120° C (2,048° F) for cobalt. Temperature increases above the Curie point produce roughly similar patterns of decreasing paramagnetism in all three classes of materials. When these materials are cooled below their Curie points, magnetic atoms spontaneously realign so that the ferromagnetism, anti-ferromagnetism, or ferrimagnetism revives.

The anti-ferromagnetic Curie point is called the Néel temperature in honour of the French physicist Louis Néel, who in 1936 successfully explained anti-ferromagnetism.

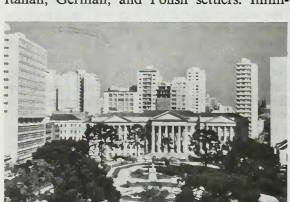
Curio, Gaius Scribonius (d. 49 BC), Roman politician, partisan of Julius Caesar against Pompey. He was the son of a statesman and orator of the same name.

Curio was elected tribune for the year 50 BC. When the Senate demanded that year that Caesar surrender his *imperium* before entering Rome, Curio advocated that Pompey do the same, adding that, if the two generals refused to comply, both ought to be declared public enemies. His proposal was carried, but the consuls ignored it and called upon Pompey to undertake the command of all the troops stationed in Italy. Fleeing to Caesar at Ravenna, Curio was commissioned to take a message to the Senate. He met with so hostile a reception that he hurried back to Caesar. In the Civil War, Curio collected troops for Caesar in Umbria and Etruria and was sent by him to Sicily as propraetor in 49. After some successes against the forces loyal to Pompey, Curio crossed over to Africa, where he was defeated and killed by Juba, king of Numidia. The first amphitheatre in Rome was erected by him (50), for the celebration of the funeral games of his father.

Curio, Gaius Scribonius (d. 53 BC), Roman statesman and orator, father of a noted politician of the same name.

He opposed Saturninus in 100 BC, was tribune in 90 BC, and served in Sulla's army in Greece against Archelaus, general of Mithradates, and as his legate in Asia, where he was commissioned to restore the kings of Bithynia and Cappadocia to their thrones. In 76 he was consul, and as governor of Macedonia (75–73) defeated the Dardanians, thereby becoming the first Roman general to penetrate as far as the Danube. On his return he was granted a triumph. In 63, during the discussion as to the punishment of the Catilinarian conspirators, he supported Cicero, but he spoke in favour of P. Clodius at the latter's trial (61). This led to a violent attack on the part of Cicero, but it does not appear to have permanently impaired their friendship.

Curitiba, city, capital of Paraná state, southeastern Brazil, located 3,000 ft (900 m) above sea level, near the Atlantic margin of the Brazilian Highlands and the headwaters of the Rio Iguaçu. It was founded in 1654 as a gold-mining camp, but the ores proved unimportant. In 1854 it became the state capital and during the next 60 years received many Italian, German, and Polish settlers. Immigration continued during the 20th century with the arrival of large numbers of Syrians and Japanese. Since 1940, Curitiba has had sustained economic and population growth. During the early 1970s the central area underwent extensive rejuvenation, which included the creation of new parks and of other recreational facilities.



The Federal University of Paraná facing the Praça Santos Andrade, a garden square in Curitiba, Braz.
Piessner International

A modern commercial centre, the city's manufactures include paper, furniture, textiles, automobiles, cement, matches, and tobacco. Curitiba is also an important processing centre for maté (tea), beer, soft drinks, lumber, and cattle. Products are exported via the Atlantic ports of Antonina and Paranaguá.

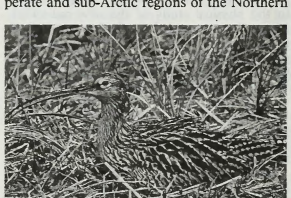
The city is an episcopal see with a cathedral (1894) inspired by that of Barcelona; it is also the seat of the Universidade Católica do Paraná (1959) and the Universidade Federal do Paraná (1912) and the site of a military air base. The Civic Centre, a monumental group of buildings, is dominated by the Palacio Iguaçu, the state government headquarters. Other interesting sites include the Paranaense Museum and an Egyptian-style temple beside Lake Bacacheri. Highways, railroads, and air routes link Curitiba with other major Brazilian cities. Pop. (1980 prelim.) 843,733.

curium (Cm), synthetic chemical element of the actinide series in Group IIIb of the periodic table, atomic number 96. Undetected in nature, curium (as the isotope curium-242) was discovered (summer 1944) at the University of Chicago by Glenn T. Seaborg, Ralph A. James, and Albert Ghiorso in a plutonium isotope, plutonium-239, that had been bombarded by helium ions (alpha particles) in the 60-inch cyclotron at the University of California, Berkeley. It was the third transuranium element to be discovered.

Curium is a silvery metal. All of its isotopes are radioactive. For chemical research curium-242 (163-day half-life) has been supplanted by curium-244 (17.6-year half-life) and the still longer lived isotopes from curium-245 to curium-248, all of which are built up from plutonium-239 by neutron irradiation. Curium exhibits its common +3 oxidation state as the very faint yellow Cm^{3+} ion in aqueous solution, as the sesquioxide Cm_2O_3, and as the trihalides; it is chemically similar to the other tripositive actinide elements and to the lanthanide elements. The +4 oxidation state appears in the black dioxide CmO_2 and as the Cm^{4+} ion complexed with the fluoride ion. The isotopes curium-242 and curium-244 are well suited for use in space because they can be used as compact, long-lived sources of electricity through conversion of their heat of radioactive decay by thermoelectric and thermionic devices.

atomic number	96
stablest isotope	247
melting point	*c.* 1,340° C (2,444° F)
specific gravity	*c.* 13.51
valence	3,4
electronic config.	2-8-18-32-25-9-2 or $(Rn)5f^{7}6d^{1}7s^{2}$

curlew, any of numerous medium-sized or large shorebirds of the genus *Numenius*, family Scolopacidae having a bill that is decurved, or sickle-shaped, curving downward at the tip. There are eight species. Curlews are streaked, gray or brown birds with long necks and fairly long legs. They breed inland in temperate and sub-Arctic regions of the Northern Hemisphere and migrate far south. During migration, they frequent dry uplands, where they feed on insects and seeds; wintering birds occupy marshes and coastal mud flats, where they probe for worms and fiddler crabs.



Eurasian curlew (*Numenius arquata*)
John Markham

The bristle-thighed curlew (*N. tahitiensis*) breeds in the mountains of Alaska and migrates some 6,000 miles (9,650 kilometres) to winter on islands in the South Pacific.

The common, or Eurasian, curlew (*N. arquata*), almost 60 centimetres (24 inches) long including the bill, is the largest European shorebird. This species breeds from Britain to central Asia.

The Eskimo curlew (*N. borealis*) is one of the world's rarest birds, a species now virtually extinct. It formerly bred in abundance in Arctic America and wintered on the pampas of South America. The population of Eskimo curlews was severely diminished during the 1800s, when the birds were killed by market gunners.

The least curlew (*N. minimus*), of eastern Asia, is only 30 cm (12 in.) long.

In the long-billed curlew (*N. americanus*), a western North American counterpart of the Eurasian curlew, the bill alone is about 20 cm (8 in.) long.

The eastern curlew (*N. madagascariensis*), the largest bird in the family, 60 cm (24 in.) long, and the slender-billed curlew (*N. tenuirostris*) are both Old World birds.

The whimbrel (*N. phaeopus*), or lesser curlew, is the most widely distributed curlew, occurring both in the Old World and in the New World (as two distinct races). Eurasian whimbrels are white rumped, but the North American race (formerly called the Hudsonian curlew) is dark rumped.

For stone curlew, *see* thickknee.

Curley, James M(ichael) (b. Nov. 20, 1874, Boston—d. Nov. 12, 1958, Boston), American politician, one of the best known and most colourful big-city Democratic bosses, who dominated Boston politics throughout the first half of the 20th century.

Reared in an Irish tenement neighbourhood, Curley never forgot the needs of new immigrants, and he owed much of his political success to serving those needs in exchange for votes. He entered politics in 1899, winning a seat on the Boston common council. In 1904 he was imprisoned briefly for impersonating a friend at a civil service examination.

Curley served in a succession of elective capacities—as a state legislator, alderman, city councilman, and U.S. representative—before winning the mayoralty in 1914, resigning his congressional seat, in fact, to assume the municipal office.

Curley centralized the powers of patronage in his own hands and distributed public-works jobs in such a way as to retain the loyalty and support of his working-class electoral base. As mayor, he nearly brought the city to bankruptcy by spending enormous sums on parks and hospitals to satisfy his various constituencies. He was a gifted orator and a resourceful political campaigner. He lost his bid for reelection in 1918, won in 1922, lost in 1926, and won again in 1930.

Unable in 1932 to win a seat in the Massachusetts delegation to the Democratic convention, Curley contrived by means he never explained to be elected a delegate from Puerto Rico. He supported the presidency of Franklin D. Roosevelt, but national party leaders looked upon the controversial Curley as something of an embarrassment. As governor of Massachusetts from 1935 to 1937, he spent New Deal funds lavishly on roads, bridges, and other public works programs.

Curley was out of elective office from 1938 to 1942, during which period he lost bids for the U.S. Senate, mayor, and governor. He won a seat in the U.S. House of Representatives in 1942, however, and was reelected two years later. He followed with another tenure as mayor of Boston (1947–50) but spent five months of his term in federal prison following a conviction for mail fraud. Pres. Harry S. Truman secured his release and later (1950) granted him a full pardon, but Curley—who had foiled an attempt by Republicans to have him replaced while he was in prison—retired from politics after losing reelection bids in 1950 and 1954. His career inspired Edwin O'Connor's popular novel *The Last Hurrah* (1956), and the next year Curley's best-selling autobiography, *I'd Do It Again*, was published.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

curling, a game similar to lawn bowls, but played on ice. Two teams of four players each slide round stones, concave on the bottom and each having a handle, across the ice of a rink toward the tee (called the button in Canada and the United States), a fixed mark in the centre of a circle (called the house) marked with concentric bands; the object of the game is for each side to get its stones closest to the centre. Each player delivers two stones alternately with his opponent. One point is awarded for each stone belonging to one side that comes to rest nearer the tee than does any rival stone. A team (also called a rink) can score from one to eight points with the 16 stones delivered in an end, or inning, unless no stone is in the house or the nearest opposing stones are equidistant, in which case there is no score. The usual number of ends in a match is 10 to 12. A distinctive part of the game is the use of a broom by the partners of the deliverers to sweep the ice in the path of the oncoming stones, which both removes stray snow or ice particles and smoothes the surface of the ice, thus assuring the stone a longer ride.



Curling players sweeping vigorously as a teammate's stone nears the house
MALAK from Miller Services Ltd.

Curling is especially associated with Scotland, where the game dates to the early 16th century. Paintings by Pieter Bruegel the Elder in the Low Countries dating from about the same time are evidence that the game was also played there, but it was Scotland that promoted the game worldwide. The Grand Caledonian Curling Club was organized at Edinburgh in 1838 (royal patronage made it the Royal Caledonian Curling Club in 1842) with the announced purpose of becoming an international body. The International Curling Federation was founded there in 1966. A Canadian branch of the Royal Caledonian Curling Club was founded in 1852, but the Royal Montreal Curling Club had been in existence since 1807. The Canadian championship was inaugurated in 1927 and became the world's biggest curling event.

In the United States the Grand National Curling Club of America, affiliated with the Royal Caledonian, was formed in 1867. The oldest U.S. club is the Orchard Lake Club near Detroit, founded in 1832. The first U.S. championship was held in Chicago in 1957, and in 1958 the United States Curling Association was organized as a federation of 125 clubs. There is also the United States Women's Curling Association (founded 1947). After World War II, women's and junior curling increased enormously. There are also curling clubs or associations in most countries in western Europe. World championships have been held since 1959, the Canadians usually dominating them.

The rink is 42 metres (46 yards) long and 4.3 m (14 feet) wide. The houses are 3.7 m (12 ft) in diameter, their centres being 34.7 m (38 yd) from each other. The stone weighs an average of 18.1 kilograms (40 pounds) and cannot exceed 19.9 kg (44 lb) with a circumference of not more than 91.4 centimetres (36 inches). The height averages about 11.4 cm (4.5 in.). *See* Sporting Record: *Curling*. *See also* Eisstockschiessen.

curly top, also called WESTERN YELLOW BLIGHT, viral disease of some 150 cultivated and weed plants in more than 70 genera in the western half of North America, including beans, beets, carrot, eggplant, spinach, tomato, vine crops, carnation, delphinium, geranium, pansy, petunia, strawflower, zinnia, and flax. The virus is transmitted in North America, Europe, and Asia by the beet leafhopper (*Circulifer tenullus*) and in South America by *Agalliana ensigera*, which overwinter on weed hosts and in the spring migrate to sugar-beet fields. Diseased plants are usually stunted or dwarfed and have thickened, yellowed, and bunched or curled leaves that frequently die early.

The disease may be avoided by planting a thick stand as early as possible or when suggested for the area to avoid spring migrations of the beet leafhopper. Susceptible weeds should be eradicated. Insecticides can be applied to winter breeding grounds of the leafhopper and to insects present or expected in fields.

Curme, George O(liver) (b. Jan. 14, 1860, Richmond, Ind., U.S.—d. April 29, 1948, White Plains, N.Y.), American grammarian and professor of German, best known for his *Grammar of the German Language* (1905, revised 1922) and for his *Syntax* (1931) and *Parts of Speech and Accidence* (1935)—the third and second volumes respectively of *A Grammar of the English Language* by Curme and Hans Kurath.

Curme received most of his education at DePauw University, Greencastle, Ind., and the University of Michigan, Ann Arbor. He also did postgraduate work at the University of Berlin. His principal teaching posts were at Cornell College, Mount Vernon, Iowa (1886–96), and Northwestern University, Evanston, Ill. (1896–1933). After his retirement from Northwestern, Curme taught from 1934 to 1939 at the University of Southern California, Los Angeles.

Curme's *Grammar of the German Language* is one of the best works in its field, among the books by non-Germans. His English grammars are very conservative but may be profitably consulted for detailed information.

curragh: *see* coracle.

Curragh, The, Irish AN CURRACH, plain, or down, County Kildare, Ireland, noted for its excellent soils. Some 8 sq mi (21 sq km) in area, the down of Kildare apparently was an ancient meeting place, and The Curragh has been just such a common since at least the 12th century. The rich pastureland is renowned for the breeding of racehorses; it is said that races were held there as early as the 1st century AD. It is the site of several noted training stables, and studs are located there. The Irish Derby is run there annually. Since 1646 The Curragh has also been a military training area.

Curran, John Philpot (b. July 24, 1750, Newmarket, County Cork, Ire.—d. Oct. 14, 1817, Brompton, Middlesex, Eng.), Irish lawyer and statesman, remembered as a great advocate and as a champion of Irish liberties.

Although handicapped by small stature and a speech impediment, he soon became celebrated for his quick wit and courage in defending apparently hopeless cases. Though not a Roman Catholic himself, he fought in the Irish House of Commons for Roman Catholic

emancipation. He undertook the defense in the treason trials of the rebel leaders of the Society of United Irishmen, Wolfe Tone, Archibald Hamilton Rowan, and Lord Edward Fitzgerald; and he was a personal friend and ally of the Irish patriot Henry Grattan. He was also an eloquent opponent of the Act of Union (1800). After the insurrection led by Robert Emmet in 1803, Curran came under suspicion because, unknown to him, his daughter Sarah was engaged to Emmet and knew of his plans. He was absolved of complicity, but his faith in radical nationalism was shaken.



Curran, portrait by an unknown artist; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Curran held a seat in the Irish privy council (1806–13). In 1814 he retired to London where he was a member of a distinguished group of wits, writers, and lawyers that included Richard Brinsley Sheridan, Lord Byron, Thomas Moore, and Thomas Erskine.

currant, shrub of the genus *Ribes* of the gooseberry family (Grossulariaceae), the piquant, juicy berries of which are used chiefly in jams and jellies. There are at least 100 species, natives of temperate climates of the Northern Hemisphere and of western South America.



Currant (*Ribes*)
Walter Chandoha

The Rocky Mountains in North America are especially rich in species.

The currant seems first to have been cultivated sometime before 1600 in the Netherlands, Denmark, and elsewhere around the Baltic Sea. Bushes were taken to settlements in America early in the 17th century; most American varieties, however, originated there. Both red and black currants are used for making tarts, pies, jams, and jellies. Black currants are used in lozenges, for flavouring, and are occasionally fermented. Currants are extremely high in vitamin C and also supply calcium, phosphorus, and iron. Great Britain grows more black currants than any other country.

Currants flourish in cool, moist, northern climates. Clay and silt soils are best. They are propagated by cuttings 200–300 millimetres (8–12 inches) long, usually taken in the autumn and set in the nursery immediately or in spring, 75 to 150 mm apart, with not more than two buds above ground. In the plantation, they are set 1.2–1.5 metres (4–5 feet) apart in rows 1.8–2.4 m distant. Under intensive cropping, currants are planted under grapes, peaches, cherries, and pears because they stand shade very well.

Currants and gooseberries are the chief agencies in the spread of the white-pine blister rust, a destructive disease of the five-leaved pines in Europe and America. The common garden black currant is the favourite host of the blister rust. Because the white pine is a very valuable timber there, the black currant has been declared a menace and is not grown in the northwestern United States; culture of currants and gooseberries has actually been prohibited in some areas.

The name currant is also applied to a seedless raisin (*q.v.*) frequently used in cooking.

currawong, also called PIPING-CROW, or CROW-SHRIKE, any of several songbirds of the Australian family Cracticidae (order Passeriformes). They are large, up to 50 centimetres (20 inches) long, with black, gray, or black-and-white plumage and yellow eyes. All have



Pied currawong (*Strepera graculina*)
John R. Brownlie—Bruce Coleman Ltd.

resounding, metallic voices. Found in woodlands and occasionally flocking into suburban areas, currawongs live on fruit, insects, small animals, and other birds' eggs and young; they may be a nuisance in orchards and hen yards. The pied currawong, or chillawong (*Strepera graculina*) makes rolling sounds; the gray currawong (*S. versicolor*), also called squeaker, or rainbird, makes clanking noises.

currency, in industrialized nations, portion of the national money supply, consisting of bank notes and government-issued paper money and coins, that does not require endorsement in serving as a medium of exchange; among less developed societies, currency encompasses a wide diversity of items (*e.g.,* livestock, stone carvings, tobacco) used as exchange media as well as signs of value or wealth. In the developed nations, where checks drawn on demand deposits are an important means of transaction, currency may actually account for only a small portion of the total money supply.

Since the abandonment of the gold standard in the 1930s, governments have not been obligated to repay the holders of currency in any form of precious metal. Consequently the volume of currency is determined by the actions of the government or central bank and not by the supply of precious metals.

current, electric: *see* electric current.

curricle, open, two-wheeled gentleman's carriage, popular in England from about 1700 to 1850. It was pulled by two matched horses yoked abreast and was therefore equipped with a pole, rather than shafts. The pole had to be very strong because it both directed the carriage and bore its weight. To draw the carriage without jolting it, the horses had to be of equal size and gait; fashion required a matched colouring.

In colonial America early curricles were called pole-chairs or double-chairs. Later ones remained popular well into the 19th century. The curricle may have become obsolete because of the danger in two spirited horses pulling a medium weight, two-wheeled vehicle.

Currie, Sir Arthur William (b. Dec. 5, 1875, Napperton, Ont., Can.—d. Nov. 30, 1933, Montreal), the first Canadian commander, from 1917, of Canada's overseas forces in World War I.

Currie taught school before going into business in Victoria, B.C. He enlisted in the militia and rose from the ranks to become lieutenant colonel of artillery. In spite of this minimum of professional training, he was given command of a battalion in the first Canadian contingent sent to assist Britain in 1914. He advanced steadily, winning distinction at the battles of Ypres and Saint-Julien in Belgium and at the battle of Vimy Ridge in France. Within three years he became lieutenant general and commander of the four divisions of the Canadian Corps, succeeding the British general Sir Julian Byng. He was knighted in 1918. After the war Currie served as inspector general of the Canadian militia and became the first general in the Canadian Army. In 1920 he accepted the position of principal and vice chancellor of McGill University, Montreal, and retained this post until his death.

Currie, Sir Donald (b. Sept. 17, 1825, Greenock, Renfrewshire, Scot.—d. April 13, 1909, Sidmouth, Devonshire, Eng.), shipowner and politician, founder of the Castle Line of steamers between England and South Africa, and later head of the amalgamated Union–Castle Line.

After a number of years with the Cunard Steamship Line, Currie established the Castle Line of sailing ships between Liverpool and Calcutta in 1862 and, in 1872, the Castle Line to South Africa. From 1876 the South African mail contract was divided between the Castle and Union lines, until, after intense rivalry, they merged in 1900.

Because of his intimate knowledge of South African conditions, Currie was entrusted by the British government with boundary negotiations in the Kimberley diamond fields and was also concerned with the restoration of the Transvaal to the Boers. Entering politics, he was returned to Parliament in 1880 as a Liberal member from Perthshire; from 1885 to 1900 he represented West Perthshire as a liberal Unionist. In 1881 he was knighted.

Currier, Nathaniel; and Ives, James Merritt (respectively, b. March 27, 1813, Roxbury, Mass., U.S.—d. Nov. 20, 1888, New York City; b. March 5, 1824, New York City—d. Jan. 3, 1895, Rye, N.Y.), lithographers whose prints were among the most popular wall hangings in 19th-century America.

After apprenticeships in Boston and Philadelphia, Currier set up business in New York



"A Midnight Race on the Mississippi," lithograph by Currier & Ives, 1860
By courtesy of the Museum of the City of New York, the Harry T. Peters Collection

City in 1834. He hired Ives as his bookkeeper in 1852 and made him a partner in 1857, creating the firm of Currier & Ives, which lasted, under the management of their sons, until 1907.

In an era before news photography, Currier met the public's demand for graphic presentation of recent events. In 1835 he printed a lithograph, "The Ruins of the Merchants' Exchange," four days after the building burned, and in 1840, three days after the event, he issued a coloured print of a steamship burning on Long Island Sound. In partnership with Ives, who had a flair for gauging popular interests, he expanded his range from depictions of disasters to political satire and other topical subjects, as well as dramatic or slightly sentimentalized scenes such as steamboat races, boxing matches, sleigh rides in the country, and fashionable soirees. Touting themselves as "Publishers of Cheap and Popular Pictures," Currier and Ives sold prints at 5 cents to $3, depending on the size. They sold retail as well as wholesale, establishing outlets in cities across the country and in London. Between 1840 and 1890 the firm published more than 7,000 titles.

While never pretending artistic greatness, Currier & Ives insisted on fine craftmanship and the best lithographic materials. Most designs were done by house staff; others were commissioned by young artists such as Louis Maurer, Thomas Worth, and Arthur Fitzwilliam Tait. As the firm was not equipped for chromolithography, prints were handcoloured by a dozen or more women in assembly-line fashion, one colour to a woman. Colours were clear and simple, drawing bold and direct. Rendered obsolete by automation and the photograph, Currier & Ives prints became valuable records of the manners of a vigorous, unsophisticated nation.

curry (from Tamil *kari:* "sauce"), in Western usage, blend of ground spices adapted by British settlers in India from the traditional spice mixtures of Indian cuisine; also, any dish characterized by such seasoning. The basic ingredients of commercial curry powder are turmeric (which imparts the characteristic yellow colour), cumin, coriander, and red, or cayenne, pepper. Other ingredients may include chilies, cloves, cinnamon, fenugreek, nutmeg, ginger, mace, mustard seed, fennel, poppyseed, allspice, anise, bay leaves, and black or white pepper, all roasted and ground fine.

In traditional Indian cookery, spice mixtures called *masala* are prepared in the home and may vary in ingredients and proportions according to the particular dish to be seasoned or the preferences of the cook. Some *masala* are blended with a liquid, such as water or vinegar, to make a paste. The primarily vegetarian curries of southern India, seasoned with *sambar podi* and other traditional blends, are the most pungent, often containing hot chilies. By contrast, classic, or Mughal, *garam masala* of northern India contains only raw cardamom seeds, cinnamon, cloves, and black pepper; variations on this mixture add coriander seeds and cumin seeds but avoid hot or pungent ingredients. Lamb and poultry are common features in the curries of the north.

Spicy, gravied dishes have been a mainstay of South Asian cookery since antiquity, perhaps deriving from sour-milk stews. Certain spices have long been known for their antiseptic and preservative properties, particularly in regions lacking natural means of refrigeration.

Curry, Haskell Brooks (b. Sept. 12, 1900, Millis, Mass., U.S.—d. Sept. 1, 1982, State College, Pa.), American mathematician and educator whose research in logic led to his theory of formal systems and processes as well as to the formulation of a logical calculus using inferential rules.

Curry graduated from Harvard University in 1920 and received postgraduate degrees from that institution (A.M., 1924) and from the University of Göttingen (Ph.D., 1929). He served on the faculties of Harvard University (1926–27) and Princeton University (1927–28) before becoming assistant professor of mathematics at Pennsylvania State University in 1929, where he remained for more than 35 years.

During World War II Curry served as a mathematician at the Frankford Arsenal and as a researcher at the applied physics laboratory at Johns Hopkins University. In 1966 he became a professor of mathematics at the University of Amsterdam. He was the author of *Combinatory Logic* (1958; with Robert Feys), dealing with a system of formal logic that he developed in the 1930s, and *Foundations of Mathematical Logic* (1963), a widely used graduate school textbook.

Curry, John Steuart (b. Nov. 14, 1897, near Dunavant, Kan., U.S.—d. Aug. 29, 1946, Madison, Wis.), American painter whose art reflects the social attitudes of the 1930s.

Curry studied at the Kansas City Art Institute and School of Design and the Art Institute of Chicago. In 1918 he started his artistic career as an illustrator of pulp magazines, particularly westerns. In 1926 he spent a year studying in Europe, and upon his return he received his first encouragement and support from Mrs. Gertrude Vanderbilt Whitney. He won prominence with often melodramatic, anecdotal portrayals of the regions where he lived and their traditions. Among his best known works are "Baptism in Kansas" (1928), "Hogs Killing a Rattlesnake" (1930), and a series of paintings on circus life that he executed after touring with the Ringling Brothers in 1932. He came to be identified, along with Thomas Hart Benton and Grant Wood, as one of the American Regionalists.

Curry executed several important murals. The one for the state capitol building in Topeka, Kan. (1938–40), has as its subject matter the turbulent events associated with the abolitionist John Brown.

He taught at Cooper Union School of Art and Architecture (New York City) and at the Art Students League of New York until 1936 and was artist in residence at the University of Wisconsin until his death.

Curry, Kid, byname of HARVEY LOGAN (b. 1865, Dodson, Mo., U.S.—d. July 7, 1903, near Parachute, Colo.?), American gunslinger who became notorious as the most quick-tempered killer of the Wild Bunch (*q.v.*), a group of Western outlaws. His brothers, Lonny and Johnny, also gained reputations as Western badmen, as did their uncle, George Sutherland ("Flat Nose") Curry.

Kid Curry, primarily a bank and train robber, was imprisoned in 1902, escaped in June 1903, robbed a train in Parachute, Colo., on July 7, and, according to Pinkerton agents, was wounded by a pursuing posse and shot himself dead. Another story has him surviving, joining Butch Cassidy in South America, and dying in Bolivia in 1909, while yet another has him escaping to Idaho and dying there sometime after 1925.

cursillo, in Roman Catholicism, a three-day period of spiritual renewal stressing the dynamic, communitarian, and personalistic aspects of the Christian faith. The *cursillo de cristianidad* (Spanish: "little course in Christianity"), founded in 1949 by Bishop Juan Hervas of Ciudad Real, Spain, brings together a group of about 40 men or women from different races, educational backgrounds, and economic and social status for spiritual exercises conducted by a team of priests and laymen. The exercises are centred on the celebration of the mass and include a series of talks (5 meditations and 5 lessons on Christian doctrine given by the priests; 10 lessons in which the lay members of the team make practical applications of the doctrine), each followed by small group discussions. A spirit of conviviality, with singing sessions and skits, is encouraged.

The *cursillo* movement spread from Spain to other parts of Europe and to Latin America. It made its first appearance in the United States among the Spanish-speaking people of the Southwest and then grew rapidly in popularity in all sections of the country.

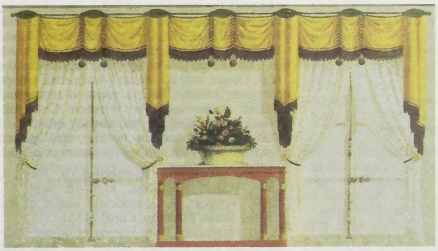
curtain, in interior design, decorative fabric commonly hung to regulate the admission of light at windows and to prevent drafts from door or window openings. Curtains, usually of a heavy material, arranged to fall straight in ornamental folds are also called draperies. Portieres are heavy curtains hung in a doorway.

From the evidence of excavations at Olynthus, Pompeii, and Herculaneum, portieres appear to have been used as room dividers in classical antiquity. Mosaics of the Early Christian period (*c.* 2nd–6th century AD) show curtains suspended from rods spanning arches.

In medieval illuminated manuscripts, curtains are shown knotted or looped up at doorways. Until the end of the Middle Ages, window openings were covered with utilitarian wooden shutters or a heavy cloth. Beds were curtained on all sides and covered with a tester, or canopy. By day, when the beds were used as couches and seats, the curtains were neatly looped up in the form of a bag.

Dutch paintings of the 17th century show simple dwellings in which windows are shaded with half- or full-length curtains, and beds are curtained with plain fabrics, some of them undoubtedly homespun and home woven, and probably of wool. In Italy beds, which were placed in alcoves, were furnished with curtains of rich velvet and damask.

In France, during the reign of Louis XIV,



Window curtaining comprising fixed silk draperies with divided muslin curtains, *c.* 1814; illustration from *Meubles et Objets de Goût,* a Paris magazine

By kind permission of the Victoria and Albert Museum, London; photograph, Philip de Bey, Fine Art Photography

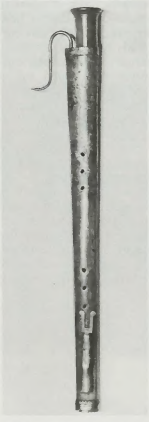
much of the ritual and pomp of court society centred around the monarch's state bedchamber, where the bed furniture included layer upon layer of curtains and valances. During the reign of Louis XV, bed and matching window curtains were designed in a wide variety of fanciful Rococo forms, laden with ribbons, cords, braid, tassels, and bows.

In the early 19th century the Directoire style and the Empire style in France and the Regency style in England drew motifs from ancient works, especially Greek and Egyptian. Growing romanticism led to other new fashions inspired by styles as geographically remote as those of India and the Orient or as remote in time as the Gothic. The tops of single windows were ornamented by carved birds or bunches of grapes that held up the drapery. The bay of several full-length windows was spanned by a stiff valance with separate curtains falling to the floor. Plain, light-coloured silks were preferred, since they could be hung to good effect in swags and loops.

In the Victorian age eclecticism and the fear of empty spaces were both carried to extremes. Doors and windows were smothered with portieres and curtains that further confined the already cluttered rooms, busy with floral and scroll patterns on the walls, carpets, and upholstery.

The major 20th-century innovation in curtain fabric has been the use of synthetics such as fibreglass. Mechanical systems for drawing and closing curtains simplified their installation and use.

curtal, also spelled CURTALL, French COURTAUT, Italian FAGOTTO, German DULZIAN, Renaissance-era musical instrument and predecessor of the bassoon, with a double-back bore cut from a single piece of wood and built in sizes from treble to double bass (sometimes



Curtal; in the Kunsthistorisches Museum, Vienna
By courtesy of the Kunsthistorisches Museum, Vienna

called the double curtal in England and the *Choristfagott* in Germany). The curtal was developed in the 16th century, probably in Italy, to be used with choirs as a bass that would be less clamorous than the brasses of the time.

Both open and stopped curtals were produced, and some had perforated lids to soften the sound. "Curtal" also referred in England *c.* 1700 to the true bassoon.

Curtea de Argeş town, Argeş *judeţ* (district), south central Romania. It is on the Argeş River, at an elevation of 1,480 ft (450 m), on the southern slopes of the Transylvanian



The cathedral, Curtea de Argeş, Romania
By courtesy of the Socialist Republic of Romania

Alps (Southern Carpathians), about 80 mi (130 km) northwest of Bucharest. Curtea de Argeş succeeded Cîmpulung as capital of feudal Walachia. Outstanding architectural monuments include the St. Nicholas church, one of the oldest churches in Walachia, built in the mid-14th century, which has several restored murals; the ruins of the prince's residence, built around 1370; the Romanian Orthodox cathedral, built in the second decade of the 16th century—probably on the foundations of an earlier metropolitan church—and renovated in the last quarter of the 19th century; and the ruins of St. Nicoară church (late 13th century). An Episcopal church was founded in Curtea de Argeş in the 16th century. According to legend, the architect of the church entombed his wife within its walls during construction. The town is a small industrial centre (woodworking, pottery, and local craft industries) and health resort. An archaeological museum is located there. Highways and a railway connection extend through Curtea de Argeş to Piteşti, the district capital. Pop. (1982 est.) 25,752.

Curteen, Sir William (merchant): *see* Courteen, Sir William.

Curtin, John (Joseph) (b. Jan. 8, 1885, Creswick, Victoria—d. July 5, 1945, Canberra, A.C.T., Australia), statesman, prime minister of Australia during most of World War II, and leader of the Australian Labor Party (1934–45).

After involving himself in trade union and anti-conscription activity in Melbourne (1911–15), Curtin became editor of a Perth newspaper, the *Westralian Worker.* In 1928 he entered the federal Parliament as a member of the Labor Party, becoming its leader in 1935. By unifying the party thereafter, Curtin prepared for its assumption of power in 1941.

Curtin served as a member of the Advisory War Council in 1940 and became prime minister and minister for defense the following year. He led a full-scale national mobilization for war, winning difficult political battles in 1942–43 for expansion of federal taxation and broader conscription. He changed Australia's traditional military dependence on Great Britain when Japanese advances to the south in 1941–42 led him to appeal principally to the U.S. for aid and to transfer Australian troops from the Middle East, a move that angered British prime minister Winston Churchill. When Curtin died, he had already established welfare-state economic policies that guided Australia's growth during the postwar period.

Curtis, Benjamin R(obbins) (b. Nov. 4, 1809, Watertown, Mass., U.S.—d. Sept. 15, 1874, Newport, R.I.), associate justice of the United States Supreme Court (1851–57).

Curtis graduated from Harvard College, studied at the Harvard Law School, and took over the practice of a country attorney in Northfield, Mass. in 1831. He quickly gained a reputation at the Boston bar for his ability. In 1846 he succeeded his teacher Joseph Story on the Harvard Corporation and in 1851 was elected to the state legislature.

An ardent Whig and supporter of Daniel Webster, Curtis was appointed to the Supreme Court in 1851 largely through his influence. He gave the opinion of the Court in *Cooley* v. *Board of Port Wardens,* which established the broad power of Congress to regulate interstate and foreign commerce, and in *Murray's Lessee* v. *Hoboken Land and Improvement Company,* which confirmed the government's power to assess and collect sums due to it by its agents without resort to law. His most famous, and last, opinion was his dissent in the Dred Scott case, in which his brother, George Ticknor Curtis (1812–94), was counsel for the slave Dred Scott, who sued unsuccessfully for his own and his family's freedom. Benjamin Curtis maintained that the court could not decide the Scott case on the merits after having ruled that Scott himself had no standing before it. In the wake of an unpleasant public correspondence with Chief Justice Roger Taney, who had echoed slavers' sentiments, Curtis resigned from the court.

Over the next 17 years he argued more than 50 cases before the Supreme Court and in 1868 was Pres. Andrew Johnson's chief defense counsel in his impeachment trial.

Curtis, Charles (b. Jan. 25, 1860, Kansas Territory, U.S.—d. Feb. 8, 1936, Washington, D.C.), 31st vice president of the United States (1929–33) in the Republican administration of Pres. Herbert Hoover.

Curtis' mother was one-quarter Kansa Indian, and he spent his early youth with the Kaw Indian tribe. After being admitted to the bar (1881), he began the practice of law



Charles Curtis
Ewing Galloway

in Topeka and served as county attorney of Shawnee County from 1884 to 1888. Entering Republican politics, he served in the U.S. House of Representatives (1893–1907) and then in the Senate (1907–13, 1915–29), where he was Republican whip in the period 1915–24 and majority leader for his last six years. Although he opposed Hoover's nomination to the presidency in 1928, Curtis won the second place on the party ticket, and both men were elected by a resounding electoral vote, 444 to 87.

Defeated for reelection in 1932, he returned to the practice of law in Washington, D.C.

Curtis, Charles Gordon (b. April 20, 1860, Boston—d. March 10, 1953, Central Islip, N.Y., U.S.), U.S. inventor who devised a steam turbine widely used in electric power plants and in marine propulsion. He was a patent lawyer for eight years.

The Curtis steam turbine was patented in 1896, and its principles are still used in large ocean liners and other naval vessels. The land rights were sold to the General Electric Company and have been used worldwide in its power installations. Curtis is also credited with invention of the first American gas turbine, patented in 1899. Curtis, an associate of

Thomas Alva Edison, also held a number of patents for diesel engine improvements and helped develop propulsion mechanisms for naval torpedoes.

Curtis, Cyrus Hermann Kotzschmar (b. June 18, 1850, Portland, Maine, U.S.—d. June 7, 1933, Wyncote, Pa.), publisher who established a journalistic empire in Philadelphia.

As early as 1863 Curtis began publishing in Portland a local weekly called *Young America*. When fire destroyed his plant, he moved to Boston, where he worked as a messenger, an advertising solicitor, and as publisher of *The People's Ledger*, a magazine. He moved to Philadelphia in 1876 and continued there the publication of the magazine. In 1879 he founded *The Tribune and Farmer*, from the women's section of which he formed a new magazine, the *Ladies' Home Journal*. In 1890 Curtis organized the Curtis Publishing Company. Later acquisitions included *The Saturday Evening Post* (1897); *The Country Gentleman* (1911); the Philadelphia *Public Ledger* (1913), which he expanded to include the *Evening Ledger* (1914); the Philadelphia *Press* and *The North American*, morning newspapers that he merged with the Curtis papers (1925); *The Evening Post* (1924); and *The Philadelphia Inquirer* (1930).

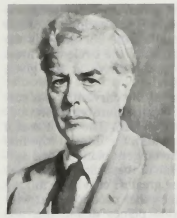
Curtis, George William (b. Feb. 24, 1824, Providence, R.I., U.S.—d. Aug. 31, 1892, Staten Island, N.Y.), U.S. author, editor, and leader in civil service reform.

Early in life Curtis spent two years at the Brook Farm community and school, subsequently remaining near Concord, Mass., for a time, to continue his association with Emerson. Later he travelled in Europe, Egypt, and Palestine. In 1850 he returned and joined the *New York Tribune*, to which he had sent some letters from Europe. As a result of his travels, he became a popular lecturer and published *Nile Notes of a Howadji* (1851) and *The Howadji in Syria* (1852). As an associate editor of *Putnam's Monthly Magazine* and author of "The Lounger" column in *Harper's Weekly* and "The Easy Chair" column in *Harper's Magazine*, he wrote prolifically. Many of his essays were collected, chiefly in *The Potiphar Papers* (1853), a satire on fashionable society, and *Prue and I* (1856).

He was active in the 1856 presidential campaign for Republican candidates. In 1863 he became political editor of *Harper's Weekly*. In succeeding years he was frequently offered nominations and appointments by the Republican Party but refused them all, until he finally accepted the chairmanship of the commission on civil service reform, offered by Pres. Ulysses S. Grant in 1871. From then until his death he led this movement; progress in reform was mainly due to his sound judgment and forceful presentation of the evils of the political patronage system. In 1884 he refused to support James G. Blaine as candidate for the presidency and left the Republican Party to become an independent. In 1890 he became chancellor of the University of New York. His life and work are detailed in *George William Curtis and the Genteel Tradition* (1956) by Gordon Milne.

Curtis, Lionel George (b. March 7, 1872, Coddington, Herefordshire, Eng.—d. Nov. 24, 1955, near Oxford), British public administrator and author, advocate of British imperial federalism and of a world state, who had considerable influence on the development of the Commonwealth of Nations.

After being educated at Haileybury College and at New College, Oxford, Curtis entered the legal profession. He fought in the South African War, became secretary to Sir Alfred Milner, British high commissioner in South Africa, whose staff of gifted young men became known as "Milner's kindergarten." Curtis also filled several posts in the Transvaal



Lionel George Curtis, detail of a portrait by Sir Oswald Birley, 1932; in the Royal Institute of International Affairs, London

By courtesy of the Royal Institute of International Affairs, London

government. In 1907 he resigned to work for the union of the four British colonies in South Africa, and he began to develop a conception of a federal world order that occupied him for the rest of his life.

In 1910 Curtis founded the quarterly *Round Table* for the propagation of Liberal imperialist thought, and in 1912 he was appointed Beit lecturer in colonial history at Oxford University. In 1920 Curtis helped found the organization that became, in 1926, the Royal Institute of International Affairs. From 1921 to 1924 he served as colonial office adviser on Ireland.

Curtis' first major book was *The Commonwealth of Nations* (1916). He was chiefly responsible for replacing the term "empire" with "commonwealth." His visits to India and China gave him material for *Dyarchy* (1920) and *The Capital Question of China* (1932). After 1932 he devoted himself to his most important work, *Civitas Dei*, 3 vol. (1934–37), in which he advocated a world federation.

Curtis Cup, golf trophy awarded since 1932 to the winner of a biennial amateur women's match played between teams from Great Britain and the United States. The cup was donated by Harriot and Margaret Curtis, both winners of the U.S. women's amateur championship in the early 1900s. Teams consist of six players, two alternates, and a captain, selected by the U.S. Golf Association and the Ladies Golf Union of Great Britain. Teams play six 18-hole foursomes (partners taking alternate strokes) and 12 18-hole single matches, a point being scored for each match won, with half points for tied matches. *See* Sporting Record: *Golf: International team matches—women.*

Curtiss, Glenn (Hammond) (b. May 21, 1878, Hammondsport, N.Y., U.S.—d. July 23, 1930, Buffalo), pioneer in the development of U.S. aviation whose aircraft were widely used during World War I.

Curtiss began his career building engines for bicycles. In 1904 he designed and built a motor for the dirigible "California Arrow." His success in building aircraft engines drew him into the Aerial Experiment Association (AEA), founded by Alexander Graham Bell. In 1908, using a plane built by the AEA, Curtiss won the *Scientific American* trophy for the first U.S. flight of one kilometre (0.6 mile).

Curtiss was the first builder of seaplanes in the U.S.; after demonstrating to the U.S. Navy the practicability of using a seaplane in conjunction with a warship, he was awarded the first contract to build U.S. Navy planes. His factories, which were greatly expanded in 1917, supplied planes to Great Britain and Russia as well as to the U.S. Probably his best known plane was the JN-4, or Jenny, a trainer widely used during World War I. It was also a popular plane among barnstormers after the war and became famous for such exploits as the first Canadian mail flights over the Rocky Mountains.

Though Curtiss and his company were deeply involved in litigation with the Wright Company for patent infringement, the question was dropped during World War I, and afterward the two companies merged into the Curtiss-Wright Corporation.

Curtius, Ernst (b. Sept. 2, 1814, Free City of Lübeck—d. July 11, 1896, Berlin), German archaeologist and historian who directed the excavation of Olympia, the most opulent and sacred religious shrine of ancient Greece and site of the original Olympic Games. In addition to revealing the layout of this vast sanctuary, the excavation also unearthed the only major surviving sculpture by Praxiteles, "Hermes Carrying the Infant Dionysus."

After travels in Greece (1836–40), Curtius was appointed professor at the University of Berlin (1844), where he published *Griechische Geschichte*, 3 vol. (1857–67; *The History of Greece*, 5 vol., 1868–73). In 1874 he concluded an agreement with the Greek government granting the German Archaeological Institute the exclusive right to excavate the site of Olympia, thus opening the age of large-scale excavation in Greece. Under his direction nearly all of Olympia was uncovered (1875–81), and model techniques of excavation and stratigraphic study were developed. Discoveries included the temple of Hera, the great altar of Zeus, and the location of the Olympic stadium. Most of the superb sculptures unearthed had been damaged and fragmented, but a few were in surprisingly fine condition. He found many coins and inscriptions, which had considerable historical value. Curtius' writings include *Olympia, die Ergebnisse der . . . Ausgrabung*, 4 vol. (1890–97; "Olympia, Excavation Results"), published jointly with his assistant, Friedrich Adler.

Curtius, Georg (b. April 16, 1820, Free City of Lübeck—d. Aug. 12, 1885, Hermsdorf, Pol., Russian Empire), German language scholar, whose writings were fundamental to the study of the Greek language. He was the brother of the archaeologist Ernst Curtius.

In 1845 Georg Curtius became a *Privatdozent* (student-paid lecturer) at Berlin and in that year published one of his first important works, *Die Sprachvergleichung in ihrem Verhältnis zur classischen Philologie* ("Comparative Philology in Its Relationship to Classical Philology"). It was followed by a work on the comparative grammar of Latin and Greek (1846). During his academic appointment at Prague (1849–54), he first published his *Griechische Schulgrammatik* (1852; "Textbook of Greek Grammar"), which went into its 23rd edition in 1902. While a professor at Kiel, (1854–61/62), he prepared his most influential work, *Grundzüge der griechischen Etymologie* (1858–62; "Fundamentals of Greek Etymology"). In the later years of his professorship at the University of Leipzig (1861/62–1885), he spent much time attacking the newly ascendant Neogrammarian school of linguistics, which one of his most noted students, Karl Brugmann, helped to establish.

Curtius, Julius (b. Feb. 7, 1877, Duisburg, Ger.—d. Nov. 10, 1948, Heidelberg), German statesman, foreign minister of the Weimar Republic (1929–31).

Following the completion of his legal studies at Berlin, Curtius became a lawyer at Duisburg in 1905 but moved to Heidelberg in 1911. After distinguishing himself in World War I, he served until 1921 as city councillor at Heidelberg, at the same time continuing his law practice, especially as an industrial counsel. As a member of the German People's Party (Deutsche Volkspartei), he sat in the Weimar Reichstag (national parliament) from 1920 to 1932 and in 1926 was named

economics minister for the republic. After the death of the foreign minister, Gustav Stresemann, in 1929, Curtius succeeded to the foreign office. As executor of the policies of his predecessor, he pressed for readjustment of war reparations and for foreign evacuation of the Rhineland; but his qualified support of the new reparations settlement—the Young Plan (1929)—won him the ill will of the German right-wing parties. His subsequent attempt to forge an Austro-German customs union elicited strong international disapproval, especially from France, and the official condemnation of this plan by the Permanent Court of International Justice was followed shortly by his resignation (October 1931).

Curtius, Marcus, a legendary hero of ancient Rome. According to legend, in 362 BC a deep chasm opened in the Roman Forum. The seers declared that the pit would never close until Rome's most valuable possession was thrown into it. Claiming that nothing was more precious than a brave citizen, Curtius leaped, fully armed and on horseback, into the chasm, which immediately closed. The spot was afterward covered by a pond, known as the Lacus Curtius, which was dry by the 1st century BC. The legend of Marcus Curtius is the most widespread of several tales invented to explain the origin of the name Lacus Curtius.

Curtiz, Michael, original name MIHÁLY KERTÉSZ (b. Dec. 24, 1888, Budapest—d. April 10, 1962, Hollywood), Hungarian-born U.S. motion-picture director, credited with discovering such stars as Errol Flynn, Danny Thomas, and Doris Day.

At age 17, Curtiz joined a travelling circus and later trained as an actor at the Royal Academy of Theatre and Art in Budapest. He acted and directed motion pictures in several European countries before moving to the United States in 1926.

Curtiz directed nearly 50 films at Warner Brothers during the 1930s. The popular adventures starring Flynn included *Captain Blood* (1935), *The Charge of the Light Brigade* (1936), *The Adventures of Robin Hood* (1938), and *The Sea Hawk* (1940). Curtiz won an Academy Award for *Casablanca* (1943), starring Ingrid Bergman and Humphrey Bogart. His later films included *Mildred Pierce* (1945), *White Christmas* (1954), and *Francis of Assisi* (1961).

curuba (plant): *see* cassabanana.

curule chair, Latin SELLA CURULIS, a style of chair reserved in ancient Rome for the use of the highest government dignitaries and usually made like a campstool with curved legs. Ordinarily made of ivory, with or without arms, it probably derived its name from the chariot (*currus*) in which a magistrate was conveyed to a place of judgment; it served early as a seat of judgment. Subsequently it became a sign of office of all higher ("curule") magistrates, or officials, including the consul, praetor, curule aedile (*see* aedile), dictator, master of the horse, interrex, censor, and, later, the emperor.

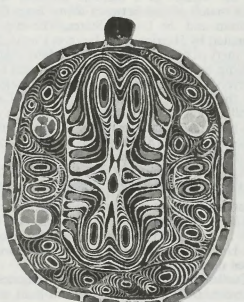
curvature, in mathematics, the rate of change of direction of a curve with respect to distance along the curve. If the curve is a section of a surface (that is, the curve formed by the intersection of a plane with the surface), then the curvature of the surface is taken to be that of the curve.

The curvature of all plane curves (and straight lines, which can be regarded as circles of infinite radius) varies from point to point; the curvature at any point is defined as the limit of the ratio of the change in direction to the length of arc as the end points of the arc approach the point given. At every point on a circle, the curvature is the reciprocal of the radius; for other curves, the curvature is the reciprocal of the radius of the circle that most closely conforms to the curve at the given point.

For determination of the curvature of a surface at a point, an infinite number of sectioning planes might be chosen. The most useful are two that both contain the normal (the line perpendicular to the tangent plane) to the surface at the point. One of these planes produces the section with the greatest curvature among all such sections; the other produces that with the least. These two planes define the two so-called principal directions on the surface at the point; these directions lie at right angles to one another. The curvatures in the principal directions are called the principal curvatures of the surface. The mean curvature of the surface at the point is either the sum of the principal curvatures or half that sum (usage varies among authorities).

curvilinear style, in visual arts, two-dimensional surface ornamentation that dominates the art of the Gulf of Papua region in southeastern Papua New Guinea. The style is characterized by a curving line used to form abstract patterns, such as spirals, circles, swirls, and S-shapes, as well as to define human facial features. The straight line and the right angle are practically nonexistent in both the abstract and the anthropomorphic types of ornamentation. In representations of human faces—which display the typical features of the Neolithic Melanid tradition, the oldest cultural strain in Oceania—the forehead, nose region, and perimeter of the face are described by an unbroken, curving line that outlines the nose, swings up over the eyes, and descends to the chin; the eyes are usually circular, and the mouth is set very near the bottom of the face.

The majority of the works from this region are low-relief carvings or paintings. Three-dimensional sculpture is much less common, and, when it appears, it seems to have been created not from the manipulation of volume and weight but from the exaggeration of surface articulation into three-dimensional form.

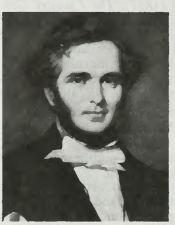


Wooden protective house shield painted with faces in the curvilinear style, from Tambanum on the middle Sepik River, Papua New Guinea; in the Museum für Völkerkunde und Schweizerisches Museum für Volkskunde Basel, Basel, Switz.
Holle Bildarchiv, Baden-Baden, W.Ger.

Among the objects produced in the Gulf of Papua region are masks, ritual oblong boards, secular shields, hourglass drums, and statues. On carved wooden figures used as fetishes in initiation ceremonies, human features are either painted or carved in low relief, and they appear on only one side of the statue. The figures are in no way meant to be three-dimensional. Oblong boards, also associated with the rites and also decorated on one side only, have a face incised at the top and an array of curving, abstract motifs below.

Although it is concentrated in the Gulf of Papua region, traces of the curvilinear style have been found throughout Melanesia; elsewhere in Papua New Guinea in the upper Sepik River area and in the Massim region; in Indonesian New Guinea, especially around the Danau Sentani–Teluk Kajo (Lake Sentani–Humboldt Bay) region, where abstract designs, particularly the double spiral, predominate; and in the Maori art of New Zealand (notably in the graceful and rhythmic neck pendants, or *hei tiki* [*q.v.*]).

Curwen, John (b. Nov. 14, 1816, Heckmondwike, Yorkshire, Eng.—d. May 26, 1880, Manchester), British music educationist and founder of the tonic sol-fa system of musical notation, which concentrates the student's attention on the relating of sounds to notation in a systematic way.



Curwen, detail of an oil painting by W. Gush; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

The son of a Congregational minister, he was himself a minister from 1838 until 1864, when he began to devote himself to propagating his new method of musical nomenclature. Curwen adapted his system from that of Sarah Ann Glover (1786–1867), whose *Manual of the Norwich Sol-fa System* (1845) used the syllables of the system of notation of Guido of Arezzo (*q.v.*), and he also adapted from the system of Aimé Paris (1798–1866) terms for the notation of rhythm. Curwen's method of teaching was founded on the attraction of notes to the tonic and, in modulation, to the principle of a shifting tonic ("the movable *do*"). In 1853 he founded the Tonic Sol-fa Association (later the English Schools Music Association), and from then on his method was widely adopted in schools and choral societies. In 1863 he established a publishing house for music (Curwen & Sons, Ltd.) and three years later became lecturer at Anderson's College, Glasgow. In 1879 the Tonic Sol-fa College (later the Curwen Memorial College) was opened. His son, John Spencer Curwen (1847–1916), succeeded him as director of the publishing firm and founded in England the competition festival movement for amateur musicians. His system, or variants of it, has remained continuously in use in music schools of Europe and the United States.

Curwood, Mount, highest point (1,980 ft [604 m]) in Michigan, U.S., in the northern Upper Peninsula. It lies in Baraga County, 12 mi (19 km) east-southeast of L'Anse, inland from the Lake Superior shore and east of Baraga State Park in a wilderness recreational region of lakes and streams. It was named for James Oliver Curwood (1878–1927), who wrote of Michigan's "great out-doors" and sought retirement in the vicinity (in Letherby Homestead). The Huron Mountains, extending for about 20 mi along the south shore of Lake Superior, are close by to the northeast.

Curzola (Croatia): *see* Korčula.

Curzon (of Kedleston), George Nathaniel Curzon, Marquess, VISCOUNT SCARSDALE, BARON RAVENSDALE, also called (1898–1911) BARON CURZON OF KEDLESTON, or (1911–21) EARL CURZON OF KEDLESTON (b. Jan. 11, 1859, Kedleston Hall, Derbyshire, Eng.—d. March 20, 1925, London), British



Lord Curzon
BBC Hulton Picture Library

statesman, viceroy of India (1898–1905), and foreign secretary (1919–24), who during his terms in office played a major role in British policy-making.

Early life. Curzon was the eldest son of the 4th Baron Scarsdale, rector of Kedleston, Derbyshire. His early development was strongly influenced by the benign neglect of his parents and the dominating character of his governess (whom he termed "a brutal and vindictive tyrant") and of his first preparatory schoolmaster (a firm believer in corporal punishment). At Eton, where he proved a wayward and emotional pupil, he clashed with his tutors but developed an extraordinary gift for assimilating the contents of books; by studying hard in private, he surprised everyone by winning more prizes (for French, Italian, and history, among other subjects) than had ever been carried off before.

Just before entering Oxford in 1878, he was struck down by a devastating pain in his back, the aftermath of a riding accident of four years previous. He refused to accept medical advice to rest and instead donned a leather harness, which he wore for the rest of his life. The back pain was to plague him from that time on, robbing him of sleep, forcing him to take drugs, and often making him querulous and unbalanced at some of the most vital moments in his career and in the affairs of the British Empire. It should be added that the pain sharpened his mind and never kept him from achieving remarkable feats of physical and mental endurance.

Curzon was elected president of the Oxford Union in 1880 and made a fellow of All Souls College in 1883. He had a gift for making friends in high places, and this was apt to be resented by his contemporaries. About this time a verse was circulated at Oxford of which he was to write later: "Never has more harm been done to one single individual than that accursed doggerel has done to me." It went as follows:

> My name is George Nathaniel Curzon,
> I am a most superior person,
> My cheek is pink, my hair is sleek,
> I dine at Blenheim once a week.

(Blenheim is the residence of the dukes of Marlborough.) Two years later he was dining even more frequently at Hatfield House, ancestral home of Lord Salisbury, Conservative leader in the House of Lords, for whom he was now doing research and drafting speeches. His reward was Salisbury's recommendation of Curzon to the Tories of Southport, Lancashire, who agreed to adopt him as their candidate at the next election. It was a safe Tory seat, and in 1886 Curzon became a member of Parliament for the first time. With Salisbury's approval he neglected his parliamentary duties to embark on a world tour and came back infatuated with Asia. From this and subsequent journeys emerged three books: *Russia in Central Asia* (1889); *Persia and the Persian Question* (1892), by far the most successful of his works; and *Problems of the Far East* (1894).

Rise to political eminence. On Nov. 10, 1891, Curzon took his first step up the political ladder by accepting Salisbury's invitation to become under secretary of state for India in the Tory government. The financial worries that beset him at the time (for he had developed extravagant tastes) were solved when he married Mary Victoria Leiter, daughter of Adolphus (Levi) Leiter, a Chicago millionaire. The marriage took place in Washington, D.C., on April 22, 1895, and the union involved marriage settlements of several millions of dollars. There was also a present from Lord Salisbury: the newly married couple returned from their honeymoon to find him waiting with an offer to Curzon of the job of under secretary of state, Salisbury having just been appointed foreign secretary. Curzon accepted on the condition that he was also to be made a privy councillor, and on June 29, 1895, he was duly sworn in by Queen Victoria at Windsor Castle. From this moment his rise to political eminence was swift.

In 1898 it was announced that he would succeed Lord Elgin as viceroy of India, and, in September of that year, he was created Baron Curzon of Kedleston. He was the youngest viceroy of India in history, and he cherished the prospect of it, for it was an office filled with the pomp and ceremony he loved. India was the most treasured jewel in Queen Victoria's crown, and, after the pageantry of his arrival in Calcutta on Jan. 3, 1899, Curzon wrote: "I suddenly saw what had come into my hands, and what prodigies of energy and inspiration would be needed on my part to guide them." He demanded obedience and a bent knee from the rajas, maharajas, and provincial governors he now ruled, but there was no doubt of his sense of mission toward the Indian people. He initiated commissions of inquiry into education, police, and civil services; he reduced taxes; he ordered immediate punishment of any Briton (including members of the army) who ill-treated Indian nationals. In external affairs he paid special attention to India's frontiers, toured the Persian Gulf, and sent a successful mission to Tibet to frustrate Russian ambitions there. On his return from what he called a "triumphal" tour of the Indian provinces, he ordered the restoration of the Tāj Mahal, which was decaying, and thereafter took a personal interest in India's artistic and cultural heritage.

At the end of his first five years in India, his successes were recognized by the government at home by a renewal of his term; but, in fact, the period of blazing glory was over and now came political tragedy. At Curzon's personal request, the job of commander in chief of the Indian army and military member of the viceroy's Cabinet had been given to England's military hero of the day, Lord Kitchener of Khartoum. Curzon believed that to have such an illustrious soldier on his staff would embellish his own image, though his friends in England warned him repeatedly that Kitchener was, in Lord Esher's words, "an uncouth and ruthless man." It was a clash of personalities, and the two were soon unscrupulously intriguing against each other. A final confrontation between the two men, which ended in Curzon's bursting into tears, brought matters to a climax. Curzon, confident that the government would take his part, cabled that either his views must be accepted or he would go. On the morning of Aug. 16, 1905, he received a cable from King Edward VII telling him that his resignation had been accepted. He delayed his return to England; and, by the time he was once again in London, the Tories were out of office, and his Indian achievements had been forgotten. He was not even given the earldom usually awarded to retiring viceroys.

In the period of political eclipse that followed, he became an excellent and enlightened chancellor of the University of Oxford and filled many other important offices. But his temporary retirement from politics was marred by the death of his beloved wife, Mary. Her death affected him deeply, but the money that now came to him enabled him to indulge in his passion for the collection of art treasures and old buildings. In 1911 he bought his first castle, Tattershall, in Lincolnshire, which he restored; and later he did the same to Bodiam Castle, Sussex, eventually presenting both of them to the nation.

His political ambitions had been damped down but never extinguished, and his hopes were stirred anew in 1911. In that year, after the coronation of King George V, Curzon received an earldom, along with the viscountcy of Scarsdale and the barony of Ravensdale. He showed his gratitude to the Tories who had elevated him by persuading his fellow peers (against his own and their feelings) to abstain from voting against the Parliament Bill, which curtailed their powers, thus avoiding a constitutional crisis the government had feared. He joined the coalition Cabinet of H.H. Asquith in the summer of 1915, and, when Lloyd George took over that December, he became leader of the House of Lords with the office of lord president. From then on Curzon was one of the members of the inner Cabinet concerned with the policies and pursuits of World War I.

There had been a time when all fashionable London imagined that Curzon would marry the flamboyant redheaded novelist Elinor Glyn, but to everyone's surprise—not least that of Glyn—he announced his engagement in December 1916 to Mrs. Alfred (Grace) Duggan, widow of a rich Argentinian rancher and daughter of J. Monroe Hinds, an American diplomat. They were married on Jan. 2, 1917. His first wife had given Curzon three daughters. He hoped that his second would produce the son to inherit his title, and for both of them the years ahead were filled with hopes and disappointments.

Last years. There were disappointments in politics, too. Curzon had decided that the one lesson he must learn from his bitter experience in India was: never to resign. But in his case, it was a poor one. In the postwar government led by Lloyd George, he was appointed foreign secretary, a position for which he was eminently fitted. But time and again he was overruled or pushed aside by his boisterous leader, and his carefully planned policies thwarted. It was a time when resignation might well have gained him the overwhelming support of the Tories (who despised the Liberal coalition leader, Lloyd George) and taken him to the top. Instead he clung to office, and it was not until Tories took over in 1922 that he came into possession of the full powers of his office. He served with distinction until 1923, painstakingly dealing with the chaotic problems of postwar Europe and the Near East. When the Tory prime minister Bonar Law, a dying man, prepared to relinquish office, Curzon had good reason to believe that his efforts would be rewarded by the premiership that he felt he so richly deserved. It was not to be. Backstairs political intrigue (and the fear that a premier in the House of Lords would be

"out of touch") resulted in the appointment of a House of Commons man, Stanley Baldwin, as prime minister.

It was a bitter blow to Curzon's hopes, but he insisted on presiding at the meeting at which Baldwin was elected to the job for which he was so much better equipped. He hung on to his job as foreign secretary until 1924, when Baldwin replaced him with Austen Chamberlain.

He had been created a marquess in 1921, and more than ever he hoped for a son to inherit his title, but in this, too, he was to be frustrated. On March 9, 1925, he was operated on for an internal condition, and he died of complications less than two weeks later. With him died his marquessate and his earldom. The viscountcy subsequently passed to his nephew and the barony of Ravensdale to his eldest daughter, Lady Irene Curzon.

(Le.M.)

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Curzon Line, demarcation line between Poland and Soviet Russia that was proposed during the Russo-Polish War of 1919–20 as a possible armistice line and became (with a few alterations) the Soviet-Polish border after World War II.

After World War I the Allied Supreme Council, which was determining the frontiers of the recently reestablished Polish state, created a temporary boundary marking the minimum eastern frontier of Poland and authorized a Polish administration to be formed on the lands west of it (Dec. 8, 1919). That line extended southward from Grodno, passed



Poland in 1921 showing the Curzon Line

through Brest-Litovsk, and then followed the Bug River to its junction with the former frontier between the Austrian Empire and Russia. Whether eastern Galicia, with Lvov, should be Polish or Ukrainian was not decided.

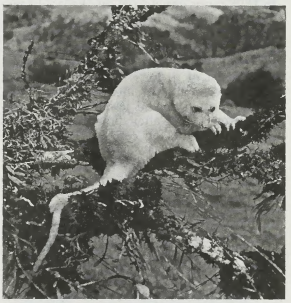
When a subsequent Polish drive eastward into the Ukraine collapsed, the Polish prime minister, Władysław Grabski, appealed to the Allies for assistance (July 1920). On July 10, 1920, the Allies proposed an armistice plan to Grabski, designating the line of Dec. 8, 1919, with a southwestward continuation to the Carpathian Mountains, keeping Przemyśl for Poland but ceding eastern Galicia; the following day the British foreign secretary, Lord Curzon, whose name was subsequently attached to the entire line, made a similar suggestion to the Soviet government. Neither the Poles nor the Soviets, however, accepted the Allied plan. The final peace treaty (concluded in March 1921), reflecting the ultimate Polish victory in the Russo-Polish War, provided Poland with almost 52,000 square miles (135,000 square kilometres) of land east of the Curzon Line.

Although the Curzon Line, which had never been proposed as a permanent boundary, lost significance after the Russo-Polish War, the Soviet Union later revived it, claiming all the territory east of the line and occupying that area (in accordance with the German-Soviet Nonaggression Pact of 1939) at the outbreak of World War II. Later, after Germany had invaded the Soviet Union, the Red Army pushed back the German troops and occupied all of the former state of Poland by the end of 1944; the United States and Great Britain then agreed to Soviet demands (Yalta Conference; Feb. 6, 1945) and recognized the Curzon Line as the Soviet-Polish border. On Aug. 16, 1945, a Soviet-Polish treaty officially designated a line almost equivalent to the Curzon Line as their mutual border; in 1951 some minor frontier adjustments were made.

Cusanus, Nicolaus: *see* Nicholas of Cusa.

Cusco (city, Peru): *see* Cuzco.

cuscus, any of the seven species of Australasian marsupial mammals of the genus *Phalanger.* These are the marsupial "monkeys." The head and body are 30 to 65 cm (12 to 25 inches) long, the tail 25 to 60 cm (10 to 24 inches). The big eyes are yellow-rimmed, and the nose is yellowish; the ears are nearly



Female spotted cuscus (*Phalanger maculatus*)
Root/Okapia

hidden in the fine dense fur. Cuscuses move slowly through the trees, capturing birds and lizards by stealth but mostly eating leaves and fruit. The female is pouched and usually has one or two young at a time.

Cuscuses range from Celebes to the Solomon islands and northern Australia. In the spotted cuscus (*P. maculatus*) of Australia and New Guinea, the male usually is brown, with large pale blotches; the female is plain-coloured. Some other cuscuses are nearly black, with faint spotting (males); still others are plain whitish.

Cush, the southern portion of the ancient region known as Nubia (*q.v.*).

Cushing, Caleb (b. Jan. 17, 1800, Salisbury, Mass., U.S.—d. Jan. 2, 1879, Newburyport, Mass.), American lawyer, Cabinet member, and diplomat around the period of the American Civil War (1861–65).

After serving in the state legislature and the U.S. Congress (1835–43), Cushing was appointed U.S. commissioner to China. There he negotiated the Treaty of Wanghia (1844) establishing the principle of extraterritoriality. In 1852 he became an associate justice of the Massachusetts Supreme Judicial Court.



Caleb Cushing
By courtesy of the Library of Congress, Washington, D.C.

President Franklin Pierce named him U.S. attorney general in 1853. Although he was chairman of the Democratic national convention at Charleston, S.C. (1860), when secession came he returned to Washington and supported President Abraham Lincoln. After the war President Ulysses S. Grant appointed him counsel for the United States at the Geneva Conference (1871–72) for the settlement of the *Alabama* claims. From 1874 to 1877 he was U.S. minister to Spain.

Cushing, Frank Hamilton (b. July 22, 1857, North East, Pa., U.S.—d. April 10, 1900, Washington, D.C.), early American ethnographer of the Zuni people.

Cushing studied the Zuni culture while making a five-year stay with the tribe, during which he was initiated into the Bow Priest Society. Many of his findings are summarized in *Zuñi Folk Tales* (1901), *Zuñi Creation Myths* (1896), and *My Adventures in Zuñi* (1941), as well as in his treatises on native technologies, such as *Zuñi Breadstuff.* He was an authority on the processes by which artifacts are made, having practiced the aboriginal arts until he mastered them.

Cushing studied natural science at Cornell University. He was employed by the Smithsonian Institution's Bureau of American Ethnography from the age of 18 until his death.

Cushing, Harvey Williams (b. April 8, 1869, Cleveland—d. Oct. 7, 1939, New Haven, Conn., U.S.), American surgeon who was the leading neurosurgeon of the early 20th century.

Cushing graduated from Harvard Medical School in 1895 and then studied for four years at Johns Hopkins Hospital, Baltimore, under William Stewart Halsted. He was a surgeon at Johns Hopkins from 1902 to 1912 and thenceforth was surgeon-in-chief at the Peter Bent Brigham Hospital in Boston and professor of surgery at the Harvard Medical School. In 1933 he joined the faculty of Yale University.

Cushing developed many of the operating procedures and techniques that are still basic to the surgery of the brain, and his work greatly



Harvey Williams Cushing, charcoal drawing by John Singer Sargent, 1924; in the Yale University Art Gallery
By courtesy of Yale University Art Gallery, gift of Mrs. Cushing

reduced the high mortality rates that had formerly been associated with brain surgery. He became the leading expert in the diagnosis and treatment of intracranial tumours. His research on the pituitary body (1912) gained him an international reputation, and he was the first to ascribe to pituitary malfunction a type of obesity of the face and trunk now known as Cushing's disease, or Cushing's syndrome. He wrote numerous scientific works and received the Pulitzer Prize in 1926 for his *Life of Sir William Osler* (1925).

Cushing, William (b. March 1, 1732, Scituate, Mass. [U.S.]—d. Sept. 13, 1810, Scituate), American jurist who was the first appointee to the U.S. Supreme Court.

Cushing graduated from Harvard in 1751, began studying law, and was admitted to the bar in 1755. After working as a county official, he succeeded his father in 1772 as judge of the superior court of Massachusetts. With the outbreak of the American Revolution, he sided with the revolutionaries, and in 1777 he became the chief justice of the supreme judicial court of Massachusetts. His most notable act during his 12 years in that post was his 1783 ruling that the "all men are born free and equal" clause in the state bill of rights implicitly abolished slavery in Massachusetts. Cushing was appointed to the U.S. Supreme Court by President George Washington shortly after that court's formation in September 1789. He declined the chief justiceship in 1796 owing to ill health, but he remained an associate justice on the court until his death in 1810.

Cushing, William Barker (b. Nov. 4, 1842, Delafield, Wis., U.S.—d. Dec. 17, 1874, Washington, D.C.), U.S. naval officer who won acclaim for his daring exploits for the Union during the American Civil War (1861–65).



William Barker Cushing

By courtesy of the Library of Congress, Washington, D.C.

Appointed to the U.S. Naval Academy at Annapolis, Md., in 1857, Cushing was obliged to resign four years later because of his irreverent attitude and practical jokes. The onset of the Civil War gave him a chance to redeem himself, however, and in four years' time he had risen to the rank of lieutenant commander. Exhibiting courage and exceptional resourcefulness, he also experienced amazing good fortune and escaped a number of hazardous incidents without harm; the more superstitious sailors regarded him as invulnerable.

Cushing performed numerous feats throughout the war, the most spectacular being the destruction of the Confederate ironclad *Albemarle* in the Roanoke River, N.C., in October 1864. This vessel, which had done much damage to Union naval forces, was at anchor when Cushing, in a steam launch, eluded the Confederate lookout and exploded against the ship a spar torpedo with such success that it sank. Cushing's own launch was destroyed and the crew compelled to take to the water; only he and one other man escaped capture or death. For this achievement he was thanked by Congress and promoted.

After the war, he continued to serve in the navy and was promoted to commander at the early age of 30.

Cushing's syndrome, metabolic disorder caused by overactivity of the adrenal cortex, usually secondary to other disease processes. If caused by a tumour of the pituitary gland, it is called Cushing's disease.

The condition is characterized by a combination of manifestations, including obesity of the trunk; muscle wasting and generalized protein breakdown; florid complexion; high blood pressure; skin atrophy resulting in excess bruisability and the appearance of abdominal streaks (striae); osteoporosis (resulting from breakdown of the protein framework of the bone rather than from decalcification); diabetes mellitus; facial obesity ("moon" face); and fat in the area between the shoulders ("buffalo hump"). Various other pathologic changes are associated with Cushing's disease, including atherosclerosis of the large arteries, calcification or atherosclerosis of the renal blood vessels, and abnormalities in other endocrine glands. The condition is named for Harvey Cushing, the American neurosurgeon who in 1932 first described the complex of symptoms in patients with pituitary tumours.

Cushing's syndrome is caused by the adrenal gland's excessive secretion of cortisol (hydrocortisone). In general, anything that increases the adrenal gland's secretion of glucocorticoid hormones will cause Cushing's syndrome, including adrenal tumours, enlargement of the outer layers of the adrenal gland, or overproduction of adrenocorticotropic hormone (ACTH), the major pituitary hormone regulating adrenal function. Excess ACTH may result from pituitary tumours (Cushing's disease), as in Cushing's first group of symptomatic patients, or from inappropriate production of the hormone by other tissues that do not ordinarily make ACTH. Treatment with corticosteroid drugs may also induce Cushingoid symptoms.

Although relatively rare in all populations, Cushing's syndrome is four times as common in women as in men and may appear during or just following pregnancy. It can occur at any age but most typically appears during the third to sixth decades of life.

Many of the manifestations of Cushing's syndrome disappear when the cause of the cortisol excesses is removed. If the cause is from ACTH or steroid treatment, remission occurs when treatment is discontinued. In the spontaneous types, partial or complete surgical removal of the overactive adrenal cortices or removal of the ACTH-producing tumour of the pituitary is followed by a remission of the symptoms and signs. Daily treatment with cortisol is essential if the adrenal cortices have been completely removed, but it may also be necessary after partial removal of these glands. Cushing's syndrome is also treated at times by irradiation of the pituitary with a proton beam, by implants of radioactive materials, or by administration of certain chemical agents that block cortisol production.

Even when Cushing's syndrome has been eradicated, however, some of the changes produced by the disorder may continue. This is true, for example, of heart, blood vessel, and kidney changes and osteoporosis.

cushion moss, also called WHITE MOSS, any of the plants of the genus *Leucobryum* (order Bryales), which form tufts resembling giant grayish white pincushions in moist woods or swampy areas. Three or more species are native to North America. Cushion moss grows in dense clumps ranging from a few centimetres to a metre (1 or 2 inches to more than a yard) in diameter and from 3 to 10 cm (1 to 4 inches) high. The clumps can absorb and retain water. They detach easily and may lie on the soil surface. New plants are formed vegetatively from female plants at the edges of each tuft; clusters of rootlike structures in the terminal phyllid (leaf) clusters fall and root, forming new cushions. Cushion mosses have lance-shaped phyllids with sharp tips and reddish brown capsules (spore cases), seldom seen, which ripen in autumn.

Cushite DYNASTY, also called NAPATA DYNASTY, or ETHIOPIAN DYNASTY, Cushite also spelled KUSHITE, 25th dynasty of Egypt (*c.* 750–656 BC), founded by Shabaka (*q.v.*) after his father, Kashta, had annexed Upper Egypt to Cush and his brother, Piye (*q.v.*), had conquered the rest of Egypt. Cush was the southern portion of the region known as Nubia (*q.v.*).

Cushitic languages, group of languages spoken in Ethiopia and adjacent areas south and east and comprising one of the five branches of the Afro-Asiatic (formerly Hamito-Semitic) language family. (The others are Egyptian, Berber, Chadic, and Semitic.) Scholars differentiate five Cushitic subgroups: (1) Beja, (2) Agau, (3) Eastern Cushitic (including Oromo and Somali), (4) West Cushitic (including Kaffa in southwest Ethiopia), and (5) Southern Cushitic (including Mbugu and Mbulunge [Burungi] in Tanzania). The most widespread languages are Oromo, Somali, and Beja. Because West Cushitic has few vocabulary items in common with the other Cushitic languages, some scholars consider it to be a separate (or sixth) branch, called Omotic, of the Afro-Asiatic language family.

Cushman, Charlotte Saunders (b. July 23, 1816, Boston, Mass., U.S.—d. Feb. 18, 1876, Boston), first native-born star on the American stage.

At age 19 Cushman made her debut in Boston as Countess Almaviva in Mozart's opera *The Marriage of Figaro* and was said to have had a fine contralto voice. Her singing voice soon failed, however, and she turned to the stage. In 1837 she first played her most popular role, Meg Merrilies, in a stage adaptation of Sir Walter Scott's *Guy Mannering*, and Nancy in *Oliver Twist* (1839), based on the Charles Dickens novel. In 1842 she became manager of the Walnut Street Theatre in Philadelphia. Starring with W.C. Macready in *Macbeth*, she played in Philadelphia and New York on alternate evenings during 1843–44. She played Bianca in 1845 opposite Edwin Forrest in Henry Milman's *Fazio* and scored a great triumph in London. That same year and again on a tour in London in 1854–55, she played Romeo to her sister Susan's Juliet. Other famous male roles included Hamlet and Cardinal Wolsey.

An extremely popular actress in Europe as well as the United States, Cushman was at her best in powerfully emotional roles, showing little talent for subtlety or comedy. She played more than 30 masculine roles in her lifetime.

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Charlotte Saunders Cushman as Meg Merrilies in *Guy Mannering*

By courtesy of the Library of Congress, Washington, D.C.

Cushman, Joseph Augustine (b. Jan. 31, 1881, Bridgewater, Mass., U.S.—d. April 16, 1949, Sharon, Mass.), U.S. paleontologist known for his work on paleoecology as shown by Foraminifera (marine protozoans).

Cushman was a member of the U.S. Geological Survey and museum director for the Boston Society of Natural History from 1913 until 1923, when he founded the Cushman Laboratory for Foraminiferal Research in Sharon. He was a faculty member of Harvard University from 1926 until 1940. He wrote *The Foraminifera: Their Classification and Economic Use* (1928). Cushman's work helped to advance the study of Foraminifera as a stratigraphic tool and a major factor in petroleum exploration.

Cusi Inca Yupanqui (Inca ruler): *see* Pachacuti Inca Yupanqui.

Cusio, Lago (Italy): *see* Orta, Lake.

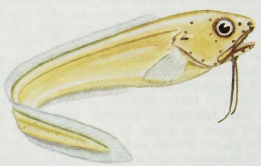
cusk, also called TORSK (*Brosme brosme*), long-bodied food fish of the cod family, Gadidae, found along the bottom in deep, offshore waters on either side of the North Atlantic.



Cusk (*Brosme brosme*)
Painting by Jean Helmer

The cusk is a small-scaled fish with a large mouth and a barbel on its chin. It has one dorsal and one anal fin, both long and both connected, though only at the base, to the rounded tail. The cusk may grow about 90 to 110 centimetres (3 to 3½ feet) long. It varies from yellowish or brownish to a slaty colour and when young may be vertically barred with yellow.

cusk eel, any of about 30 species of slim, eel-like marine fishes of the family Ophidi-



Ghost cusk eel (*Otophidium chickcharney*)
Painting by Karen Allan

idae, found worldwide in warm and temperate waters. Cusk eels are characterized by the union of their dorsal, anal, and tail fins into a single long fin, and by the position of their feeler-like pelvic fins, which are on the throat and act as sensory devices, searching out food as the fish swims along the bottom. Some cusk eels are found in shallow water, but most are deep-water fish, growing no longer than about 0.6 metre (2 feet). The kingklip (*Genypterus capensis*), a South African species prized as food, attains a length of 1.5 metres or more.

cusp, technically, the intersection of two curves; hence, in architecture, the intersections of lobed or scalloped forms, particularly in



Gothic cusped arch
From M.S. Briggs, *Everyman's Concise Encyclopaedia of Architecture*. E.P. Dutton and Co., Inc. and J.M. Dent and Sons Ltd.

arches (cusped arches) and tracery (*q.v.*). Thus the three lobes of a trefoil (cloverleaf form) are separated by three cusps. Cusped forms appear commonly in early Islāmic work, as in the Mosque of Aḥmad ibn Ṭūlūn at Cairo (*c.* 879), and were especially common in the Moorish architecture of North Africa and Spain. The cusp is found occasionally in the Romanesque work of France, as in the chapel of Saint-Michel-d'Aiguilhe, Le Puy, Fr. (probably late 11th century), where its occurrence may be due to influence from Spain. The form did not become popular in Europe until the Gothic period, during which builders used the cusp universally and frequently enriched it with representations of leaves, flowers, or even human heads at the tip.

cuspid: *see* canine tooth.

custard, mixture of eggs, milk, sugar, and flavourings which attains its consistency by the coagulation of the egg protein by heat. Baked custard contains whole eggs, which cause the dish to solidify to a gel. Flan, or *crème caramel*, is a custard baked in a dish coated with caramelized sugar that forms a sauce when the custard is unmolded. For *crème brûlée*, the baked custard is sprinkled with sugar that is caramelized under a broiler or with a hot iron called a salamander. The sugar forms a thin, crisp shell over the custard.

Boiled custard may omit the white of the egg. It is cooked slowly over hot water until it reaches the consistency of thick cream. Also called *crème anglais*, boiled custard may be used as a sauce with fruits and pastries or incorporated into desserts such as trifle or rice pudding. The richest ice creams are made with a custard base; the egg whites in this case are sometimes beaten stiffly and the custard folded into them. Bavarian creams are custards stiffened with gelatin.

Savoury custards are sometimes encountered, the most notable being quiche, a French tart with a filling of custard flavoured with cheese, onions, ham or bacon, or chopped vegetables.

custard apple, any of various *Annona* species of shrubs or small trees of the Annonaceae family, native to the New World tropics and Florida, or their fruits. The fruit of the common custard apple (*A. reticulata*), or bullock's heart of the West Indies, is dark brown in colour and marked with depressions giving it a quilted appearance; its pulp is reddish yel-



Custard apple (*Annona reticulata*)
Walter Dawn

low, sweetish, and very soft (hence the common name); the kernels of the seeds are said to be poisonous. The soursop is the fruit of *A. muricata*, native to the West Indies. The sweetsop (*q.v.*) is produced by *A. squamosa*, a native of tropical America and widely cultivated in the tropics. *A. cherimola* yields the cherimoya, a much-esteemed fruit of superior flavour. Alligator apple, or corkwood (*A. glabra*), a native of South America and the West Indies, is valued for its wood, which serves the same purposes as cork; the fruit, commonly known as the alligator apple or pond apple, is not eaten fresh but is sometimes used for making jellies.

Custer, city, seat (1875) of Custer county, southwestern South Dakota, U.S., in the southern Black Hills, on French Creek, 5,318 ft (1,621 m) above sea level. The town was laid out in 1875 after gold was discovered (1874) in French Creek by miners accompanying Gen. George A. Custer's reconnaissance expedition. Custer is the headquarters of the Black Hills National Forest. Nearby are the Custer State Park, Norbeck Wildlife Preserve, Mount Rushmore National Memorial, and Jewel Cave National Monument. Korczak Ziolkowski's Crazy Horse Memorial, an unfinished monumental statue of the Indian chief carved out of a mountain top, is 5 mi (8 km) north. Annual summer pageants depict the discovery of gold and a lynching in 1881. Custer has extensive mineral (gold, quartz, beryl, mica, gypsum) industries, lumbering, and livestock markets. Local museums display frontier and gold-mining memorabilia. Inc. 1883. Pop. (1990) 1,741.

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Custer, George Armstrong (b. Dec. 5, 1839, New Rumley, Ohio, U.S.—d. June 25, 1876, Little Bighorn River, Montana Territory), U.S. cavalry officer who distinguished himself in the U.S. Civil War (1861–65) but later led his men to death in one of the most controversial battles in U.S. history.



Custer
From the Mathew Brady Historical Collection, GAF Corp.

After graduation from the U.S. Military Academy at West Point, N.Y. (1861), Custer served in the Civil War, attached to the staff of Gen. George B. McClellan. At 23 he became brigadier general of volunteers in command of a Michigan cavalry brigade. He distinguished himself in numerous battles, and, during the closing days of the war, his relentless pursuit of the Confederate commander in chief, Gen. Robert E. Lee, helped to hasten Lee's surrender at Appomattox, Va., on April 9, 1865.

In 1866 Custer was ordered to Kansas to take part in Gen. Winfield S. Hancock's expedition designed to awe hostile Plains Indians with the military strength of the U.S. Army. Instead of waiting for supplies to be loaded at Ft. Harker, he went to Ft. Riley to visit his wife and was court-martialled in 1867 at Ft. Leavenworth and suspended for one year without pay. Increased hostility of the Plains Indians, however, led to his reinstatement, and in September 1868 he rejoined the 7th Cavalry in Kansas. In November his command surprised and destroyed the Cheyenne chief Black Kettle's village on the Washita River.

In 1874 Custer led an expedition to investigate rumours of gold deposits in the Black Hills of South Dakota. The region had been recognized by treaty as the sacred hunting ground of the Indians, primarily the Sioux and Cheyenne. The gold rush was on, however, and the U.S. government directed that all Indians move onto reservations by Jan. 31, 1876, or be deemed hostile.

In their remote and scattered winter camps, it was likely that many Indian tribes did not receive these orders and could not have reached the government agencies with their women and children if they had. When the hunting season arrived in the spring, the tribes moved out to join Sitting Bull's encampment on the Little Bighorn River in Montana.

Custer, now a lieutenant colonel in command of one column of a projected two-pronged attack under the command of Gen. Alfred Terry, arrived near the Little Bighorn on the night of June 24, 1876. Terry's column was to join him in two days. Instead of waiting for Terry, Custer decided to attack on June 25, possibly in the belief that his presence was known to the Indians. Of the more than 200 men who followed Custer into battle, not one lived to tell the story. A single horse, Comanche, survived and for many years thereafter appeared in 7th Cavalry parades, saddled but riderless. Custer was given a hero's burial at West Point.

Works on Custer include *The Custer Myth: A Source Book of Custeriana* (W.A. Graham, ed., 1953); Jay Monaghan, *Custer: The Life of General George Armstrong Custer* (1959 reprinted 1971); and T.B. Marquis, *Keep the Last Bullet for Yourself* (1976).

custom, in English law, an ancient rule of law for a particular locality, as opposed to the common law of the country. It has its origin in the Anglo-Saxon period, when local customs formed most laws affecting family rights, ownership and inheritance, contracts, and personal violence. The Norman conquerors granted the validity of customary law, adapting it to their feudal system. After the great transformations of the 13th and 14th centuries, when English law was given statutory authority under the crown, the "customs of the realm" became England's common law. Since that time, a local custom outside of common law has been considered valid if it: (1) has been practiced peaceably and continuously from time immemorial—in practice, as long as living testimony can recall; (2) is reasonable, certain, and obligatory; and (3) is confined to a specific locality. With the cultural uniformity of the modern age, custom as a force of law retains its validity, but in practice it has lost ground to common law.

customs duty (international trade): *see* tariff.

customs union, a trade agreement by which a group of countries charges a common set of tariffs to the rest of the world while allowing free trade among themselves. It is a partial form of economic integration, intermediate between free trade zones, which allow mutual free trade but lack a common tariff system, and common markets, which, in addition to the common tariffs, also allow free movement of resources such as capital and labour between members.

A brief treatment of customs unions follows. For full treatment, *see* MACROPAEDIA: International Trade.

It has long been recognized that tariff barriers generally reduce the quantity of trade between nations. Under most circumstances this reduction in trade protects certain domestic producers, but it also translates into higher costs for consumers on both sides. Many governments seem to recognize this problem by trying to strike a balance between protecting politically favoured producers and reducing consumer costs. Customs unions, along with other forms of partial economic integration, are one way to try to achieve that balance.

In free trade zones several countries agree to drop tariff barriers to each other's goods in the hope that each will capture at least as much of the gains from trading as they face in losses for some domestic producers. A serious flaw in the free trade zone approach is the absence of common external tariffs. Since the countries may differ in the tariff barriers presented to the outside world, importers will ship through low-tariff countries, even if the cost is higher for fuel, labour, etc. Such roundabout shipping methods are unnecessarily wasteful. The solution is to agree on a common set of tariffs so that shippers can concentrate on transportation costs instead of evading tariffs. A free trade zone and common tariffs is a customs union.

While the common external tariffs levied by a customs union avoid the problem of wasteful shipping patterns, they do not solve the problem of wasteful production, a problem sometimes referred to as trade diversion. For example, a country presents a given tariff to all other countries for a given good; if trade occurs at all, it will ideally be in goods produced by the lowest-cost foreign producer. The quantity of trade will not be as high as it would be if there were no tariff at all, and too much of the good may be produced domestically at a higher cost, but at least the incremental goods bought from the foreign producer will have been efficiently produced. However, by selectively lowering tariffs to partners in a free trade zone or customs union, the home country may allow a partner's producers to sell the good at a lower price, even if they have higher production costs than the outsider. The net effect is to reduce trade with the efficient, low-cost producer. The increased volume of trade from a customs union is sometimes referred to as trade creation.

Other forms of economic integration include common markets, economic unions, and federations. Common markets allow free passage of labour, capital, and other productive resources in addition to making provisions for no internal tariffs on goods and a common set of external tariffs. Economic unions closely coordinate national economic policies of members. Federations such as the United States or the Swiss Federation coordinate policy generally through the agency of the federal government. Well-known customs unions include the Zollverein (*q.v.*), formed by several German states under Prussian leadership in the 19th century, and the European Economic Community, which passed through a customs union stage on the path to fuller economic integration.

Custoza, battles of (1848 and 1866), two Italian defeats in the attempt to end Austrian control over northern Italy during the Italian Wars of Independence, both occurring at Custoza, 11 miles southwest of Verona, in Lombardy.

The first battle, on July 24, 1848, was a crushing defeat for the forces of Charles Albert, king of Sardinia-Piedmont, at the hands of the 82-year-old Austrian veteran of the Napoleonic Wars, Field Marshal Joseph Radetzky. An armistice was signed August 9.

In the second battle at Custoza, on June 24, 1866, four days after the Sardinian-dominated Kingdom of Italy declared war, the 80,000-man Austrian army, under Archduke Albert, defeated a disorganized, demoralized, and poorly led 120,000-man Italian army, under Victor Emmanuel II. In this battle, repeated Italian assaults were broken by the vigorous action of the Austrian cavalry. Italian losses were 8,000 men killed, wounded, and missing; Austrian losses were about 5,600. The defeat so unsettled the Italian high command that, despite the Italian numerical superiority, they fell back and spent a month reorganizing the army. In the same year, Austria was compelled to retire permanently from Italy by combined Prussian and French pressure.

cut-card work, technique for decorating silver objects, generally cups, bowls, or coffeepots, in which thin sheets of silver that



Gilded ewer with cut-card decoration on the body by David Willaume, 1700; in the Victoria and Albert Museum, London

By courtesy of the Board of Trustees of the Victoria and Albert Museum, London

have previously been cut into outline designs are soldered to the object, creating a relief and silhouette effect. The cards are usually cut and pierced into leaf shapes, which are often embellished with beadwork in imitation of the stems. Otherwise, they are unadorned. Besides providing decoration, cut-card work adds strength to the vessel. Sometimes a row of slats, often in the shape of spoon handles that have been soldered around the object and then finely chased or engraved, is mistakenly called cut-card work. This is not a true example of the craft, as cut-card is always finished before application.

The technique originated in France and spread to other European countries and North America largely through the movement of Huguenot craftsmen. It was popular in England from about 1660 until the early 18th century.

cut glass, glassware characterized by a series of facets on its surface produced by cutting. The prismatic surface designs greatly enhance the brilliance and reflecting power of glass and so have made cutting one of the most popularly practiced techniques of embellish-



Cut glass sweetmeat bowl, Irish, *c.* 1795; in the Corning Museum of Glass, New York

The Corning Museum of Glass, Corning, New York

ing glassware. The cutting process involves roughing out a marked pattern on an article

of glass with a revolving steel wheel that is kept coated with fine wet sand or an artificial abrasive. The wheel's edge, which may be flat, convex, or V-shaped, leaves an incision that is smoothed by a sandstone wheel and then polished by a third, wooden wheel. A final polish is usually provided by acid dipping.

The Romans introduced a rudimentary form of glass cutting akin to lapidary techniques of faceting and relief-cutting in the 1st century AD. Glass cutting, as practiced by modern glassmakers, developed in Germany during the late 17th century. Its development was promoted by the production of a heavy, colourless crystal glass that did not easily shatter under carving. Cutting was adopted by English and Irish glassmakers as a primary decorative technique during the late 1720s, and the prismatic styles characteristic of cut glass became identified with their products. Much fine cut glassware manufactured by the Irish glasshouse at Waterford was exported to the United States after 1780.

All cut patterns are variations of three basic cuts: the flat, the hollow, and the mitre. The mitre cut, in which the incision is made at approximately a 60° angle, predominates in older styles of cut glass. The diamond pattern was one of the earliest to be adopted; it prevailed in the drinking glasses, bowls, basins, and chandeliers made by English and Irish glasshouses during the early 18th century. The star, relief diamond, and scalloped fan also were common English and Irish cut patterns.

During the mid-19th century the pressed-glass process was used to manufacture glassware that closely resembled cut glass in appearance at low cost. This development led to a decline in the demand for cut glass and eventually to practices aimed at reducing the cost of producing such glassware. Today much cut glass is partially molded and then finished at the wheel, eliminating the expensive work of marking out the design and making the rough cut.

cutaneous leishmaniasis: *see* Oriental sore.

cutch (plant extract): *see* catechu.

Cutch, Rann of (mudflats, India-Pakistan): *see* Kachchh, Rann of.

Cuthah, modern TALL IBRĀHĪM, ancient city of Mesopotamia located north of the site of Kish in what is now south-central Iraq. Cuthah was devoted to the cult of Nergal, the god of the lower world, and because of its sanctity it seems to have been kept in repair by all Sumerian and Semitic rulers down to a few centuries before the Christian era.

To make the best use of the Britannica, consult the INDEX *first*

Cuthbert, SAINT (b. 634/635, probably Northumbria, Eng.—d. March 20, 687, islet of Inner Farne, or House, off Northumbria; feast day March 20), bishop of the great Benedictine abbey of Lindisfarne (or Holy Island), one of the most venerated English saints, who evangelized Northumbria and was posthumously hailed as a wonder-worker.

After a divine vision, Cuthbert, a shepherd, entered (651) the Northumbrian monastery of Melrose (Mailros) under Abbot St. Eata. In 661 Melrose was struck by the plague, afflicting Cuthbert and killing the prior, whom he succeeded. Thereafter, he aided plague victims while missioning throughout the countryside, reportedly performing miracles.

When in 663/664 at the Synod of Whitby the Northumbrians decided to adopt Roman rather than Celtic church customs, Abbot-Bishop St. Colman of Lindisfarne, one of the leaders of the Celtic party, resigned his see in opposition to Whitby. In 664 Eata and Cuthbert—who, although trained in the Celtic tradition, firmly supported the synod's decisions—were transferred to Lindisfarne, Eata as bishop and Cuthbert as prior. Thence, Cuthbert maintained reforms decreed by Whitby, instituted a severe rule, and extended his apostolate south, to Durham. A hermit by nature, Cuthbert retired in 676 to Inner Farne, where he devoted himself to prayer and where he built an oratory and cell. His fame for holiness grew. His successful efforts to protect birds (hence St. Cuthbert's [eider] duck) made him one of the earliest wildlife conservationists.

In 684 King Ecgfrith of Northumbria made him bishop of Hexham, a see that he exchanged with Eata in 685 for that of Lindisfarne. In 687 he again retired to Inner Farne. A small 14th-century chapel stands on the site of his final hermitage. He was buried at Lindisfarne, but his body was removed in 875 to protect it from Viking raids; after many moves in northeastern England, it was finally deposited (999?) in Durham Cathedral, which, until its destruction by King Henry VIII in 1538, was a great pilgrimage site. Numerous churches and monuments are dedicated to him.

Cuthred (d. 756), king of the West Saxons, or Wessex, who acceded to the throne (740) when neighbouring Mercia was at the height of its power. Cuthred was apparently a dependent of Aethelbald, king of Mercia, and throughout much of his reign of 16 years had to struggle against the Mercians as well as the Welsh. In 752 he defeated Aethelbald's forces at Burford in Oxfordshire, an epic event freeing Wessex from foreign overlordship. In 753 he decisively defeated the Welsh.

cuticle, the outer layer or part of an organism that comes in contact with the environment. In many invertebrates the dead, noncellular cuticle is secreted by the epidermis. This layer may, as in the arthropods, contain pigments and chitin; in humans the cuticle is the epidermis.

In some higher plants, the cuticle is a water-impervious protective layer covering the epidermal cells of leaves and other parts and limiting water loss. It consists of cutin, a waxy, water-repellent substance allied to suberin, which is found in the cell walls of corky tissue. Cutin is especially noticeable on many fruits—*e.g.*, apple, nectarine, and cherry, which can be buffed to a high gloss. Carnauba wax is derived from the cuticles of the leaves of *Copernicia cerifera,* a Brazilian palm.

cutis laxa, disorder, either inherited or acquired, in which the skin hangs in loose folds. The defect lies in the skin's elastic connective tissue, of which the protein elastin is the principal component. There are several forms of the disorder, which are separable into inherited and acquired varieties. In the inherited variety there may be a characteristically hooked nose, with nostrils opening outward, and a long upper lip. Included among the complications are diverticula (abnormal pouches or pockets in the walls) of the gastrointestinal tract and bladder, hernias of the diaphragm or the abdominal wall, and rectal and vaginal prolapse (falling from a normal position).

cutlass fish, any of several species of fishes in the family Trichiuridae (order Perciformes). All species are marine; representatives occur in the Atlantic, Pacific, and Indian oceans. Cutlass fishes have a distinctive appearance with a long, eellike body and a short dorsal fin that extends the length of the back. The tail is greatly reduced in size, characteristically tapering to a point. They are carnivorous, feeding primarily on other fishes, and have enlarged mouths and sharp, pointed teeth. One species (*Trichiurus lepturus*) attains a maximum length of 1.5 m (5 feet). The family consists of about 6 genera and 20 species.

Cutler, Manasseh (b. May 13, 1742, Killingly, Conn. [U.S.]—d. July 28, 1823, Ipswich Hamlet, Mass.), Congregational minister who, as a leader of the Ohio Company of Associates, was instrumental in settling what is now Ohio.

After graduating from Yale University in 1765, Cutler worked as a schoolteacher, whaling merchant, and lawyer. In 1768 he began to study divinity and in 1771 was ordained a minister at Ipswich Hamlet. Later he supplemented his ministry by practicing medicine and conducting a private boarding school.



Cutler, oil painting by N. Lakeman, 1787; in the Essex Institute, Salem, Mass.
By courtesy of the Essex Institute, Salem, Mass.

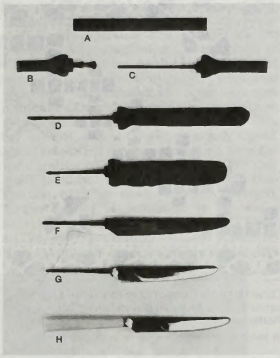
Cited for heroism as an American Revolutionary War chaplain, Cutler joined with other veterans of the war in Boston in 1786 to form the Ohio Company of Associates in order to develop the Ohio Valley. The veterans hoped to use their depreciated Continental certificates at par value for the purchase of a large tract of land.

Cutler, selected as the company's negotiating agent, obtained a contract with the Continental Congress for the purchase of 1,500,000 acres (610,000 hectares) of public land around Marietta, Ohio. The company sent out colonists from New England, and Marietta, the first permanent settlement in the present state of Ohio, was founded in 1788. It has frequently been claimed that Cutler also acted as a leading author of the Northwest Ordinance of 1787, particularly of its paragraphs prohibiting slavery and encouraging public education. Among his other achievements were his election to Congress as a Federalist (1801–05) and to various learned societies, and his investigations in astronomy, meteorology, and botany.

cutlery, cutting implements, such as knives, razors, and scissors, used for industrial, commercial, and domestic purposes.

History. Prehistoric implements used for cutting, hunting, and defense were fashioned from stone, especially flint; from obsidian, a volcanic glass; and from bones and shells. Cutting edges were formed by rubbing the implement in the hollow of a stone, a method still employed by aborigines of central Brazil, Australia, and New Guinea. By 1500 BC bronze cutting implements were being used from the British Isles to China. Scissors with blades connected by a C-shaped spring at the handle end also originated at about this time. As various metals became known, the art of forging blades developed in China, India, and Europe. Pivoted scissors of bronze or iron, connected by a rivet or screw between the handles and blades, were known in ancient Rome and in China, Japan, and Korea.

The Egyptians fashioned cutting implements from flints chipped to form serrated edges and then glued into slots in wood that had been appropriately shaped for the intended purpose. Knives served mainly for hunting and as weapons, but the wealthy used small ornamental eating knives. The Greeks produced bronze knives, and the Romans spread blade-making



Stages in the manufacture of a table knife
(A) Length of stainless steel bar for two blades; (B) bolster stamped; (C) tang drawn out; (D) blade forged out to approximate length; (E) blade cross-rolled for widening; (F) blade cropped to final shape, hardened and tempered; (G) blade ground and partly polished; (H) blade fully polished and sharpened with handle fitted
By courtesy of the Granville College of Further Education, Sheffield, Eng.

techniques throughout the Mediterranean and Europe. As in Egypt, small ornamental eating knives were used by the wealthy. Steel-bladed eating knives dating from the Roman period have been found in Italy and Britain.

As knowledge of techniques spread, cutlery production was established in areas able to offer plentiful timber to heat furnaces and provide charcoal, in addition to soft water for the hardening and tempering of steel. Medieval grindstones were sometimes hand-operated, but animal or water power was frequently employed to revolve treadmills or wheels. From about 1200 cutlery manufacture began to settle in London and Sheffield in England; in Thiers and Paris in France; in Solingen, Germany; and in many other places where craft guilds were founded. Craftsmen produced elaborately ornamented blades and fashioned handles of such fine materials as gold, silver, ivory, ebony, agate, amber, and marble.

Table cutlery was not provided by innkeepers, and the affluent possessed elegant travelling sets. Others used plain knives with handles of bone or wood and crude molded forks and spoons made by tinkers from an alloy of lead and antimony. In the homes of the wealthy it became usual to provide knives for guests, though most men still carried their own. Serving knives made in pairs, sometimes called *présentoirs,* were used only for passing food. Sets known as "wedding knives," consisting of a pair of knives in a sheath, were common gifts from bridegrooms to their brides. Table knives of the 18th century frequently had pistol-shaped handles and curved blades like those of scimitars.

By the 18th century Sheffield, England, had become an international centre of the industry. In the early 1700s Sheffield cutlers and silversmiths were making knives with hollow silver handles that were stamped in two halves, soldered together, and filled with pitch into which the tang, the projecting portion of the knife blade, was inserted. Large-scale production of pivoted scissors and shears began in 1761, when Robert Hinchliffe of Sheffield first used crucible cast steel for their manufacture. By the 19th century scissors with elaborately designed hand-filed and polished bows and shanks were made in Europe.

Steel razors were made with ornamental handles, and blades were individually hollow-ground, producing a concave surface behind the cutting edge. The forerunner of the modern safety razor, with a guard along one edge, was introduced in 1828. In 1880 a hoe-shaped safety razor was manufactured in the United States, and early in the 20th century King C. Gillette began to manufacture a model with double-edged replaceable blades.

Cutlery manufacture. Cutlery steel consists of iron to which from 0.35 to 1 percent carbon has been added. Early methods involved hammering charcoal into red-hot iron bars. In the 18th century Benjamin Huntsman built new types of furnaces in Sheffield for making highly refined steel in clay vessels called crucibles. His process greatly increased both the availability and quality of steel during the first part of the Industrial Revolution.

In the 20th century much cutlery is manufactured from stainless steel (*q.v.*). Martensitic stainless steels, widely used for both table knives and trade knives, contain from 12 to 18 percent chromium, imparting corrosion resistance, and from 0.12 to 1 percent carbon, permitting a great degree of hardening by heat treatment. Edge retention increases with higher carbon content; corrosion resistance is increased by higher chromium content but reduced with additional carbon. By 1928 the manufacture of carbon-steel blades was limited to commercial knives and some carving, hunting, and pocket knives.

The many kinds of cutlery all have distinctive uses, the blade being the major determining factor. Retention of sharpness depends on the type of steel employed and the skill with which it is processed. Cost is determined by the quality of the blade steel, workmanship, material used for the handle, and ornamentation.

Processes in the production of table cutlery include: (1) forging the steel into the desired blade shape; (2) hardening and tempering it correctly; (3) grinding the blade to a cutting edge and removing all traces of forging and heat treatment; (4) polishing the blade; and (5) making, fitting, and polishing the handle, a process known as cutling.

High-quality knife blades are forged by mechanical hammers from bars of steel. After heating, a bar is placed between forging dies that rapidly hammer out the rough blade shape desired. The final blade shape is obtained by trimming the forgings. Some knives are made as complete forgings of blade and handle by one stroke of a large drop-forging hammer; others are cut from sheet steel so that a short flat tang without a forged bolster (the part of the knife blade that abuts upon the handle) is left. After forging, the blades are hardened by heating and then quenching in a cooling liquid or between metal plates cooled by an internally circulating liquid. The blades are then tempered by reheating to the correct temperature to give them flexibility and toughness.

Grinding consists of applying the blades to the rapidly revolving periphery of an abrasive wheel, removing the steel until the desired tapers from the back to the cutting edge and from bolster to point are attained. The blades are kept cool with water or a "cutting fluid" to maintain their temper.

After either machine or hand grinding, the surface of a blade is given a finer finish in successive operations known as glazing and buffing, followed, if desired, by mirror polishing, or "satin" finishing. The bolsters are also ground, glazed, and polished to fit the desired handle. The maker's name is then applied by acid or electricarc etching.

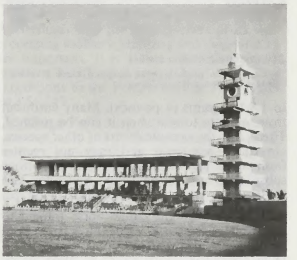
Natural materials used for handles include animal horns and tusks, various woods, mother-of-pearl, and bone; manufactured handles range from gold, silver, and porcelain to stainless steel, silver plate, nickel alloys, compressed wood, and plastics. Some of these materials are processed mechanically and others by the cutler. Cellulose adhesives, cements, or resin mixtures are used to fix the tangs securely in the handles, except for hollow metal handles, which are secured by hard soldering or welding.

Blanks (unfinished pieces) for scissors are made by high-speed forging of red-hot steel bars between the dies of drop hammers. For ordinary scissors, steel containing 0.55 percent carbon is mainly used; for the finest scissors and shears for trade use, such as tailors' shears and trimmers, a harder steel containing 0.75 percent carbon is preferred. For cutting man-made fibres, harder and more blunting than natural fibres, the blades of tailors' shears are sometimes made of a composite material consisting of an even harder steel on the cutting side (1.03 percent carbon), backed by tough iron. Many scissors, including surgical varieties, are made of stainless steel, and some specialized scissors and shears are made of nonferrous alloys that will not produce a spark or interfere with magnetism (*e.g.,* for cutting cordite and magnetic tape). Low-cost scissors are made from relatively soft steel wire that is pressed cold and is not hardened.

If scissors are to cut well, the blades must touch in two places only—at the joint and at a single spot along the blades wherever the cutting takes place. The blades are made to twist or curve toward one another, and, when completely closed, their points should touch. Both blades must be accurately tempered to equal hardness. In the finest scissors and shears, the two blanks and the screw, as well as the nut in large shears, are coded with an identification mark early in manufacturing to ensure that the pieces are treated as a set.

Cutpurse, Moll: *see* Moll Cutpurse.

Cuttack, town, administrative headquarters of Cuttack district, eastern Orissa state, eastern India. Lying at the apex of the Mahānadi River Delta, the city was the state capital until succeeded by Bhubaneswar in 1948. It remains the district's headquarters and the largest town in Orissa.



Barabati Stadium in Cuttack, Orissa, India
Vidyavrata

Cuttack was founded in the 13th century by King Anaṅgabhīma Deva III, but it fell to the Muslims in 1266, to the Marāṭhās in 1751, and to the British in 1803. An important river port and trade centre, it has good rail and road connections to the rest of Orissa and to Calcutta and other Indian cities. Cuttack's industries include manufacturing, handicrafts, and milling of agricultural products. The Central Rice Research Institute, the Orissa School of Engineering, and several colleges are located in Cuttack. The town has a famous ruined fort and numerous temples, monuments, and churches.

Cuttack district, 4,329 sq mi (11,211 sq km) in area, is located on the Bay of Bengal. It comprises a narrow, marshy strip along the

coast and, inland, an irrigated, rice-growing alluvial plain and a hilly section. Drained by the Mahānadi and Brāhmani rivers, the district produces jute and pulses, with fishing also important. Glass, steel tubes, paper, and textiles are among the manufactures. Jājpur is a famous pilgrimage centre, and the Assia hill range contains several centres of Buddhist art. Pop. (1981) town, 269,950; metropolitan area, 327,412; district, 4,628,800.

cutter, small, speedy sailing vessel similar to a sloop. It has a single mast rigged fore and aft, carrying a mainsail and at least two headsails. Its traditional hull design, deep and narrow, features a raking transom stern, a vertical stem, and a long bowsprit. In U.S. Coast Guard usage, the term cutter refers to a Coast Guard vessel more than 83 feet (25 metres) long and not classed as an auxiliary vessel.

In naval usage, a cutter is a transom-sterned utility boat, usually propelled by oars or motor and capable of being taken aboard a ship.

cutter, lightweight, open, horse-drawn sleigh, introduced in the United States in about 1800. It usually had a single seat that held two people, but some contained a second one, which could be removed or jumped out of the way when not in use, for two additional passengers, and some had a child's seat that folded out when needed. They have been made in many different styles, but most have gracefully curved runners and decoratively coloured bodies. Cutters are still used occasionally in winter as a form of recreational transport, most often in the northeastern United States.

cutthroat trout (*Salmo clarki*), black-spotted game fish, family Salmonidae, of western North America named for the bright-red streaks of colour beneath the lower jaws. It strikes at flies, baits, and lures and is considered a good table fish. Size is usually up



Cutthroat trout (*Salmo clarki*)
Tom Dolan—EB Inc., painted under the supervision of Loren P. Woods, Field Museum of Natural History, Chicago

to 1.8 kilograms (4 pounds). Many cutthroat trout migrate to sea when it can be reached. These, like the oceanic forms of other species, are called sea trout and may not reenter fresh water for several years. The numerous subspecies, such as the Tahoe, yellowfin, and Yellowstone trout, are also marked with red.

cutting horse, light saddle horse trained to cut (isolate) livestock, especially cattle, from herds. Most are quarter horses, with the intelligence, speed, and ability to make quick starts, stops, and turns. A well-disposed and trained cutting horse can manoeuvre an animal away from a herd and into a corner with little direction from a rider, or, in some contests, without a rider.

cuttlefish, any of several marine cephalopods of the order Sepioidea, related to the octopus and squid and characterized by a thick, internal, calcified shell called the cuttlebone. The approximately 100 species of cuttlefish range between 2.5 and 90 centimetres (1 to 35 inches) and have somewhat flattened bodies bordered by a pair of narrow fins. All species have eight arms and two longer tentacles that are used in capturing prey and can be withdrawn into two pouches. Suction disks are located on the arms and on expanded pads at the tips of the tentacles.

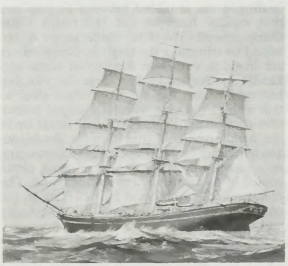
Cuttlefish inhabit shallow tropical or temperate coastal waters, usually migrating to deeper water in winter. The common cuttlefish breeds during spring and summer, producing about 100 to 300 eggs. *Sepia* species feed mainly on crustaceans, small fishes, and each other. Their main enemies are large aquatic animals. Cuttlefish are used by man as food, as a source of ink, and for the cuttlebone, a dietary supplement providing calcium for cage birds.



Cuttlefish (*Sepia officinalis*)
Douglas P. Wilson

The modern cuttlefish appeared in the Miocene Epoch (about 21,000,000 years ago) and derived from a belemnite-like ancestor.

Cutty Sark, three-masted British clipper ship, launched at Dumbarton, Dunbarton, Scot., in 1869. It was 212 feet 5 inches (64.7 metres) long, 36 feet (11 metres) wide, and had a net tonnage of 921; the name (meaning "short shirt") came from the garment worn by the witch Nannie in Robert Burns's poem *Tam o'Shanter.* The vessel served in the English–Chinese tea trade through the 1870s, later in the Australian wool trade, and finally as a training ship. In 1957, fully restored, she

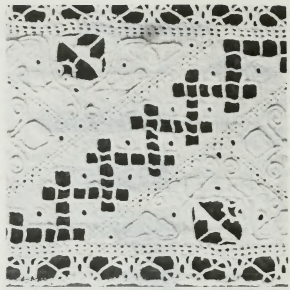


"Cutty Sark," oil on canvas by Frank Vining Smith; in the Mariners' Museum, Newport News, Va.
By courtesy of the Mariners' Museum of Newport News, Va.

was installed in a concrete dry berth near the Thames at Greenwich, London, and was opened to the public by Queen Elizabeth II as a maritime relic and sailing museum.

Cuttyhunk (island, Massachusetts, U.S.): *see* Elizabeth Islands.

cutwork, Italian PUNTO TAGLIATO, in fabric, designs obtained by cutting out pieces of a length of material and either filling the spaces thus created with stitches or joining the pieces themselves together by connecting bars of thread. In Europe the technique of filling the spaces with stitches originated in the 14th, 15th, and 16th centuries in Italy and preceded needle lace; it continued as an embroidery



Cutwork (*punto tagliato*) from Italy, 16th–17th century; in the Museum Boymans-van Beuningen, Rotterdam
By courtesy of the Museum Boymans-van Beuningen, Rotterdam

technique. In Elizabethan times, ruffs were often decorated in cutwork.

Cuu Long, *tỉnh* (province) on the Mekong delta, southern Vietnam. It was created in 1976 from the former provinces of Vinh Long and Vinh Binh and has an area of 1,488 sq mi (3,854 sq km). It is bounded on the north by the Song (river) Tien Giang, on the northeast by Song Co Chien, and on the southwest by the Song Hau Giang (Bassac River), all branches of the Mekong. The Tien Giang, the main branch of the Mekong, further divides into the three main streams of the delta proper at Vinh Long, the provincial seat. To the southeast the province is bounded by the South China Sea.

The flat, alluvial lowland, subject to the summer monsoonal flooding of the Mekong, has rice paddies except along the coastal mangrove swamps. Near the coast fishing and fish farming are important economic activities; the yield annually supplies fish to other provinces. Vung Liem, 20 mi (32 km) southeast of Vinh Long, is a rice centre. Other activities include coconut raising, sawmilling, and distilling. Besides the extensive network of canals and arroyos, there are two large river ports, Cua Cung Hau and Cua Song Hau. Cuu Long was formerly a district of Cambodia, but in 1731 the area passed to the Vietnamese. The population includes Vietnamese and Khmer. Pop. (1979) 1,504,215.

Cuvette, *région* of northern Congo, west central Africa, bordering Gabon (west) and Zaire (east). It covers an area of 26,600 sq mi (69,000 sq km) and includes nine districts: Owando, Makoua, Kellé, Mbomo, Ewo, Okoya, Boundji, Mossaka, and Loukoléla. The capital is Owando (formerly called Fort-Rousset).

Cuvette (French: "basin") lies in the basin of the Congo River and a number of its slow, meandering tributaries. Much of the *région* is either permanent swamp and marsh or low land subject to frequent flooding. Cassava is the main traditional crop. Cash crops include coffee, rice in the southwest, cacao in the north, and palms near the palm oil processing towns of Owando, Etoumbi, and Ewo. Fish are caught, smoked, and dried at Mossaka on the Congo River. Cuvette has unexploited timber and gold resources in the northwest. It has some roads and seasonally navigable rivers, and there are airfields at Owando, Makoua, Boundji, and Kellé. Pop. (1980 est.) 121,470.

Cuvier, Georges, Baron, in full GEORGES-LÉOPOLD-CHRÉTIEN-FRÉDÉRIC-DAGOBERT, BARON CUVIER (b. Aug. 23, 1769, Montbéliard, Fr.—d. May 13, 1832, Paris), French zoologist and statesman, who established the sciences of comparative anatomy and paleontology.

In 1784–88 Cuvier attended the Académie Caroline (Karlsschule) in Stuttgart, Ger., where he studied comparative anatomy and learned to dissect. After graduation Cuvier served in 1788–95 as a tutor, during which time he wrote original studies of marine invertebrates, particularly the mollusks. His notes were sent to Étienne Geoffroy Saint-Hilaire, a professor of zoology at the Museum of Natural History in Paris, and at Geoffroy's urging Cuvier joined the staff of the museum. For a time the two scientists collaborated, and in 1795 they jointly published a study of mammalian classification, but their views eventually diverged.

Cuvier refused an invitation to become a naturalist on Napoleon's expedition to Egypt in 1798–1801, preferring to remain at the museum to continue his research in comparative



Cuvier, detail of a portrait by Van Brae, 1798
By courtesy of the Musee National d'Histoire Naturelle, Paris

anatomy. His first result, in 1797, was *Tableau élémentaire de l'histoire naturelle des animaux* ("Elementary Survey of the Natural History of Animals"), a popular work based on his lectures. In 1800–05, he published his *Leçons d'anatomie comparée* ("Lessons on Comparative Anatomy"). In this work, based also on his lectures at the museum, he put forward his principle of the "correlation of parts," according to which the anatomical structure of every organ is functionally related to all other organs in the body of an animal, and the functional and structural characteristics of organs result from their interaction with their environment. Moreover, according to Cuvier, the functions and habits of an animal determine its anatomical form, in contrast to Geoffroy, who held the reverse theory—that anatomical structure preceded and made necessary a particular mode of life.

Cuvier also argued that the anatomical characteristics distinguishing groups of animals are evidence that species had not changed since the Creation. Each species is so well coordinated, functionally and structurally, that it could not survive significant change. He further maintained that each species was created for its own special purpose and each organ for its special function. In denying evolution, Cuvier disagreed with the views of his colleague Jean-Baptiste Lamarck, who published his theory of evolution in 1809, and eventually also with Geoffroy, who in 1825 published evidence concerning the evolution of crocodiles.

Cuvier advanced rapidly. While continuing his zoological work at the museum, he brought about major reforms in education. He served as imperial inspector of public instruction and assisted in the establishment of French provincial universities. For these services he was granted the title "chevalier" in 1811. He also wrote the *Rapport historique sur les progrès des sciences naturelles depuis 1789, et sur leur état actuel* ("Historical Report on the Progress of the Sciences"), published in 1810. These publications are lucid expositions of the European science of his time.

Meanwhile, Cuvier also applied his views on the correlation of parts to a systematic study of fossils that he had excavated. He reconstructed complete skeletons of unknown fossil quadrupeds. These constituted astonishing new evidence that whole species of animals had become extinct. Furthermore, he discerned a remarkable sequence in the creatures he exhumed. The deeper, more remote strata contained animal remains—giant salamanders, flying reptiles, and extinct elephants—that were far less similar to animals now living than those found in the more recent strata. He summarized his conclusions, first in 1812 in his *Recherches sur les ossements fossiles de quadrupèdes* ("Researches on the Bones of Fossil Vertebrates"), which included the essay "Discours préliminaire" ("Preliminary Discourse"), as well as in the expansion of this essay in book form in 1825, *Discours sur les révolutions de la surface du globe* ("Discourse on the Revolutions of the Globe"). Cuvier assumed a relatively short time span for the Earth but was impressed by the vast changes that undoubtedly had occurred in its geologic past. His work gave new prestige to the old concept of catastrophism according to which a series of "revolutions," or catastrophes—sudden land upheavals and floods—had destroyed entire species of organisms and carved out the present features of the Earth. He believed that the area laid waste by these spectacular paroxysms, of which Noah's flood was the most recent and dramatic, was sometimes repopulated by migration of animals from an area that had been spared. Catastrophism remained a major geologic doctrine until it was shown that slow changes over long periods of time could explain the features of the Earth.

Just before Napoleon abdicated, in 1814, Cuvier was elected to the Council of State, and in 1817 he became a vice president of the Ministry of the Interior. In 1817 he also published *Le Règne animal distribué d'après son organisation* ("The Animal Kingdom, Distributed According to Its Organization"), which, with its many subsequent editions, was a significant advance over the systems of classification established by Linnaeus.

Cuvier showed that animals possessed so many diverse anatomical traits that they could not be arranged in a single linear system. Instead, he arranged animals into four large groups of animals (vertebrates, mollusks, articulates, and radiates), each of which had a special type of anatomical organization. All animals within the same group were classified together, as he believed they were all modifications of one particular anatomical type. Although his classification is no longer used, Cuvier broke away from the 18th-century idea that all living things were arranged in a continuous series from the simplest up to man.

The increasing theoretical differences between Geoffroy and Cuvier culminated in 1830 in a public debate in the Academy of Sciences over the degree to which the animal kingdom shared a uniform type of anatomical organization, in particular, whether vertebrates and mollusks belonged to the same type. Geoffroy thought they did and that all animals, in fact, were representatives of only one type, whereas Cuvier insisted that his four types were completely distinct. At issue in their controversy was how to explain similarity and diversity in animals. Darwin's doctrine of evolution eventually clarified this question by showing that similar animals were descended from common ancestors and that diversity meant that hereditary changes had occurred.

Cuvier's lifework may be considered as marking a transition between the 18th-century view of nature and the view that emerged in the last half of the 19th century as a result of the doctrine of evolution. By rejecting the 18th-century method of arranging animals in a continuous series in favour of classifying them in four separate groups, he raised the key question of why animals were anatomically different. Although Cuvier's doctrine of catastrophism did not last, he did set the science of palaeontology on a firm, empirical foundation. He did this by introducing fossils into zoological classification, showing the progressive relation between rock strata and their fossil remains, and by demonstrating, in his comparative anatomy and his reconstructions of fossil skeletons, the importance of functional and anatomical relationships.

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Cuvilliés, François de, THE ELDER (b. Oct. 23, 1695, Soignies, Hainaut—d. April 14, 1768, Munich), chief architect and decorator in the Bavarian Rococo style.

He was trained in Paris before his appointment (1725) as court architect to Duke Maximilian II Emanuel of Bavaria. Among his works in Munich and its environs are the Amalienburg hunting lodge, Nymphenburg (1734–39); the Residenztheater (1750–53); and the facade of St. Cajetan's Church (Theatinerkirche; 1765–68). His son François de Cuvilliés the Younger (1731–77) also was an architect in the Rococo idiom.

Cuxhaven, city, Lower Saxony *Land* (state), northwestern Germany, port at the mouth of the Elbe (estuary). Conquered by Hamburg in 1394, it remained the foreport of that city (83 mi [134 km] east-southeast) until it passed to Hanover province in 1937. It was chartered in 1907. Frequently bombed in World War II, it was captured by the Allies in May 1945. Historic buildings include the 14th-century Ritzebüttel Castle containing a regional museum, and a 14th-century lighthouse, the oldest on the German coast, on the island of Neuwerk.

Cuxhaven is one of the largest fishing ports of Germany and the headquarters of its fish-processing industry; shipping and shipbuilding are important. It is also a North Sea beach resort, a health spa, and a base for sailing expeditions to the Frisian Islands. Pop. (1989 est.) 55,249.

Cuyahoga Falls, city, Summit county, northeastern Ohio, U.S., just northeast of Akron, on the Cuyahoga River. Settlers came to the site in 1800 and harnessed the falls of the river by a series of dams (the falls have since been eliminated by a modern dam). Cuyahoga, possibly meaning "crooked water," was the name given by the Iroquois Indians to the river. Although now mainly a residential suburb, Cuyahoga Falls has some light industry, including the manufacture of rubber goods, steel and wire machinery, tools and dies, medical supplies, and chemicals. Kendall State Park is 8 mi (13 km) north; nearby is Blossom Music Center, the summer home of the Cleveland Orchestra. Inc. village, 1868; city, 1920. Pop. (1990) 48,950.

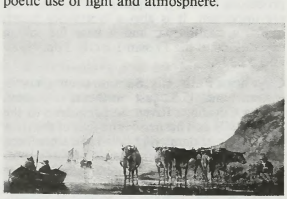
Cuyahoga River, river in northeastern Ohio, U.S., rising 15 mi (24 km) south of Lake Erie and 35 mi east of Cleveland. It flows southwestward to the city of Cuyahoga Falls (where its falls were eliminated by a series of dams) on the northern edge of Akron; there it drops into a large, deep valley and turns sharply northward. Upon reaching the lake plain about 6 mi from its mouth, it continues as a sharply meandering stream, entrenched to a depth of 60–125 ft (18–38 m), before

emptying into Lake Erie at Cleveland, where its mouth forms part of Cleveland's harbour. Some meanders have been widened so that it is navigable for lake freighters to about 5 mi upstream; its total length is about 80 mi. During the 20th century the lower reaches of the Cuyahoga became one of the most severely polluted rivers in the U.S.; by the late 1970s, however, antipollution measures had substantially improved the condition of the river. The Cuyahoga receives the Little Cuyahoga River near Akron. Its name is Iroquoian, possibly meaning "crooked water." The Cuyahoga Valley National Recreation Area, established in 1975, covers about 32,000 acres (12,950 hectares) of river valley between the urban areas of Akron and Cleveland.

Cuyo, historical region, western Argentina, roughly comprising the modern provinces of Mendoza, San Juan, and San Luis in the Andean piedmont. Its first European visitor was the Spanish adventurer Francisco de Villagrá in 1551; and the Cuyo later became the first area of permanent interior settlement in what now is Argentina. It is partially separated from the Pampa to the southeast by the Sierra de Córdoba, a low range of mountains extending along a north–south axis west of the city of Córdoba.

Mendoza is the largest city in the Cuyo; founded in the 16th century, it was destroyed by earthquake in its third centennial year (1861) and was rebuilt with extraordinarily wide streets and solid buildings as a precaution against further disaster. The small city of San Juan also suffered from major earthquakes in 1944 and 1977. While the area is known for violent natural phenomena, it has a flourishing economy based on the irrigated cultivation of grapes, fruits, and vegetables in San Juan and Mendoza provinces and the exploitation of petroleum, copper, lead, and uranium.

Cuyp, Aelbert Jacobsz(oon), Cuyp also spelled CUIJP (baptized Oct. 20, 1620, Dordrecht, Neth.—d. November 1691, Dordrecht), Dutch painter of the Baroque period who is known for his peaceful landscapes of the Dutch countryside, distinguished for their poetic use of light and atmosphere.



"Herdsmen with Cows by a River," panel painting by Aelbert Jacobsz. Cuyp; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London, photograph, J.R. Freeman & Co. Ltd.

After the death of his father, portraitist Jacob Gerritszoon Cuyp, soon after 1651, and of his mother in 1654, Aelbert came into a considerable property and was a leading citizen of Dordrecht. In 1658 he married Cornelia Boschman, a well-connected widow with three children, who in the following year bore him his only child, a daughter. He sold his father's house on the Nieubrugge in 1659 and, in 1663, moved into the house in the Wijnstraat, which he occupied, together with a property at Dordwijck, until shortly before his death. Apart from records of his name in the archives of Dordrecht, where he held a variety of civic offices, the known facts of his life are extremely sparse.

It is reasonable to suppose that he first studied under his father, whose influence is visible in both the style and the subject matter of his early works. Whether he also studied under Jan van Goyen, with whom his early style has much in common, remains a subject of speculation. He does not appear ever to have travelled far from Dordrecht, but his pictures suggest that he knew the country around Nijmegen and that he journeyed farther up the Rhine or Meuse, where the banks are hillier—*e.g.*, "Hilly Landscape with Cows and Shepherds" (*c.* 1665; Metropolitan Museum of Art, New York City). The theory that he worked in Utrecht would explain the Italianate elements in his mature style, the feeling for simple and noble form, and the warm, rich rendering of atmosphere. More than any other artistic centre in Holland, Utrecht looked to Italy for its stylistic nourishment. There, Cuyp would have known the work of Jan Both, a direct link to the works of the great French landscapist Claude Lorrain. Lorrain's indirect influence can be discerned in the "River Landscape" of the Boymans-Van Beuningen Museum in Rotterdam.

Cuyp painted some pictures of animals and birds and an occasional portrait or historical piece, but by far the most numerous and important branch of his art is the landscapes. Cuyp signed many but dated few of his paintings, and it is difficult to establish a chronology of his stylistic development. It is clear that up to the early 1640s he painted usually on a small scale, landscapes with cattle and figures, executed with a firm but flowing touch. To the later 1640s and 1650s belong most of his best known works, the serene views of the banks of the Maas and Waal near Dordrecht, with shipping on calm waters—*e.g.*, "The Maas at Dordrecht" (National Gallery of Art, Washington, D.C.)—or resting cattle silhouetted against an evening sky—*e.g.*, "Cattle" (Museum of Fine Arts, Budapest)—and the bolder Rhenish landscapes, with groups of horsemen or peasants—*e.g.*, "Evening Landscape With Horsemen and Shepherds" (Buckingham Palace, London). Whether the composition is simple or expansive, he bathes these subjects in a subtle glow of light, creating a poetic environment. Some larger and more artificial compositions, in which the spirit of delight in simple nature becomes diluted, probably belong to the later years of his activity in the 1660s. During the last 20 years of his life he painted little.

Cuyp, Jacob Gerritsz(oon), Cuyp also spelled CUIJP (b. December 1594, Dordrecht, Neth.—d. after 1651, Dordrecht), Dutch Baroque painter, best known for his portraits. He broke with the family tradition of glass painting and painted historical pictures, portraits, and animal subjects.

A man of substance in Dordrecht, he held various offices in the painters' guild there. He probably studied under Abraham Bloemaert of Utrecht, a painter of portraits and histories. Little else is known of his life.

Cuyp's portraits are soundly painted, sure in draftsmanship, and firm in modelling. Though they lack the vitality of a Hals or the insight into character of a Rembrandt, they are imbued with that honesty and integrity that, allied to technical competence, are characteristic of the best tradition of Dutch 17th-century portraiture. Besides many simple bust or half-length portraits on a monochrome background, he painted some full-lengths, including several pleasing portraits of children, and some more ambitiously designed group portraits, with interior or landscape backgrounds. As a painter of animal subjects and landscapes, Jacob exerted a powerful influence on his more famous son, Aelbert, for there is a degree of atmosphere and luminosity in his work unusual among the painters of his generation. He also influenced the landscapes and genre paintings of his nephew and student, Benjamin Gerritszoon Cuyp (1612–1652).

Cuyuni River, river in northern Guyana and eastern Venezuela, rising in the Guiana Highlands of Venezuela. It descends northward to El Dorado, Venezuela, where it turns eastward and meanders through the tropical rain forests of Guyana, forming the international boundary for approximately 60 mi (100 km). It turns southeastward, flowing to its confluence with the Mazaruni just above Bartica. Although the river is approximately 350 mi (560 km) long, rapids impede navigation. Its economic significance is less as a transportation artery than as a source of alluvial gold and diamonds.

Cuza, Alexandru Ion (b. March 20, 1820, Huşi, Moldavia—d. May 15, 1873, Heidelberg, Ger.), first prince of united Romania, architect of national rural reform and peasant emancipation.

The scion of an old boyar family, Cuza studied in Paris, Pavia, and Bologna, participated in revolutionary agitation against Russo-Turkish rule in his native Moldavia (1848), obtained the rank of colonel, and subsequently achieved prominence as a delegate to the Moldavian assembly (*divan ad hoc*) in 1857. Two years later, despite the Great Powers' determination that the Romanian principalities should enjoy separate autonomy, he was successively elected prince of Moldavia (January 1859) and of Walachia (February 1859), thus effecting a personal union that presaged the formal proclamation of Romanian unity in 1861. He attempted to rule in the plebiscitary manner of the French emperor Napoleon III and openly courted the peasantry as "the state's active force." In 1863 he expropriated the vast lands owned by the monasteries of Moldavia and Walachia, and the following year he enacted a large-scale land-redistribution program (August 1864), which not only provided the peasants with ownership of their own plots but also emancipated them from all manorial services and tithes; the program, however, was only partly successful. In addition, the Prince, intending to provide universal free and obligatory educational services, built more schools at all levels and introduced a program to award scholarships to poor students. He also introduced reform in the electoral laws as well as the judicial system and revised the state structure to enhance his own authority. Nevertheless, his policies provoked the opposition of the great landowners and some middle-class elements; in 1866 a group of officers, who had formed a conspiracy, forced Cuza to abdicate and go into exile.

Cuzco, also spelled CUSCO, department (formed 1822) of southern Peru, occupying an area of 29,431 sq mi (76,225 sq km). Sparsely populated tropical rain forests in the north contrast sharply with the towering, snow-capped peaks that overlook the high plateaus



Farmlands in central Cuzco department, Peru

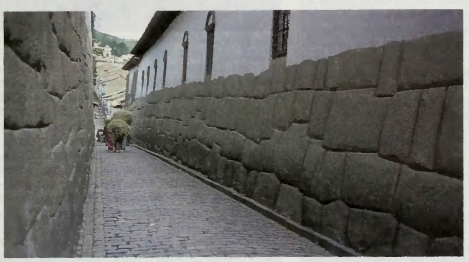
Reflejo—EB Inc

and deep canyons etched by the Apurímac and Urubamba rivers in the south. In the heart of the former Inca Empire, the department is dotted with archaeological ruins, most

notably the spectacular Machu Picchu. Lead and zinc mining and the generation of hydroelectric power are of some importance to present-day Cuzco, but most people are subsistence farmers or herders. Settlements are concentrated in the Andean highlands, especially in the Urubamba River valley, where the departmental capital, Cuzco, is located. Pop. (1990 est.) 1,041,800.

Cuzco, also spelled CUSCO, city, capital of Cuzco *provincia* and *departamento,* south-central Peru. It stands high in the Andes at an elevation of 11,152 feet (3,399 m) at the west end of Cuzco Valley, a basin extending 20 miles (30 km) east to Huambutio. It is watered by the Huatanay River, a tributary of the Vilcanota. The air is dry, and frost is rare even during the coldest months, June and July.

As capital of the Inca empire, dating from the 11th century, Cuzco (whose name derives from the Quechua Indian word meaning "navel") was the political centre of an empire extending southward from Quito to the Maule River in present-day Chile. The population of the empire at the time of the Spanish conquest may have numbered 10,000,000. Cuzco and the surrounding area contain extensive pre-Inca and Inca ruins that reflect unusual skill in engineering, stonework, and architecture. The architecture of the Incas comprised fortresses, religious sanctuaries, and dwellings. Construction resembling the configuration of the Andes and the pyramidal shape were characteristic of the architectural style.



Walls of Inca stonework form the foundations of Spanish structures lining a street in Cuzco, Peru

D. Donne Bryant Stock Photography Agency

Francisco Pizarro's forces occupied Cuzco in November 1533 and sacked the city. Pizarro formally established the municipal government of Cuzco in March 1534 in the name of the emperor Charles V. The series of earthquakes that occurred in 1650, causing the almost total destruction of the buildings then standing in Cuzco, mark the beginning of the Cuzco Baroque period. During the colonial era, under the influence of a strong religious spirit, Cuzco was the centre of a notable and prolific artistic production, mainly in painting, sculpture, jewelry, and ornamental woodworking.

Significant religious and public buildings of colonial origin include the cathedral, completed in 1654 upon the site of the Inca palace of Huiracocha; the National University of San Antonio Abad del Cuzco, founded in 1692; and a number of churches, convents, and monasteries. Evidence of the pre-Inca and Inca civilizations is prevalent throughout the city in the form of foundations of the Spanish structures, walls of fine stonework, and the remains of the Temple of the Sun. The cyclopean fortress of Sacsahuamán, visible from the city, is said to have been constructed over a period of 80 years with the labour of 20,000 Indians. Other ruins nearby include the Inca bath, or Tambomachay; the Kenco amphitheatre; and the Inca throne. In May 1950 Cuzco was badly shaken by an earthquake that damaged all the churches and almost 90 percent of the dwellings.

In the region of Cuzco, potatoes and grains are cultivated for local consumption, and sheep, alpaca, and llama are grazed. Important local industries are the production of cloth, rugs, tapestries, fine metalwork, and beer for both the local and tourist markets. The population is chiefly Indian and mestizo. The ancient citadel of Machu Picchu is accessible by rail from the city. Cuzco is reached from the port of Mollendo by railway and is connected with Lima by road and by airline. Pop. (1990 est.) 275,500.

Cuzzoni, Francesca (b. *c.* 1698, Parma, duchy of Parma [Italy]—d. 1770, Bologna, Papal States), Italian soprano, one of the first great prima donnas.

Cuzzoni studied with Francesco Lanzi and appeared first in Parma in 1716. She made her debut in Venice in 1718 as Dalinda in Carlo Francesco Pollarolo's *Ariodante* and in London in 1723 as Teofane in George Frideric Handel's *Ottone,* performed by his opera company. There she subsequently achieved prominence and was at her best in the many Handel roles written for her, as Cleopatra, Asteria, Rodelinda, and Antigona.

The enthusiasm of Cuzzoni's devotees in London led to public disputes, however, first with followers of Francesco Senesino and later with those of Faustina Bordoni. The notoriety of her rivalry with Bordoni obscured her considerable accomplishments, but she performed in many more operas in Italy between 1730 and 1738, including Johann Adolf Hasse's *Ezio* and *Euristeo,* Nicola Antonio Porpora's *Arianna in Nasso,* Leonardo Leo's *Olimpiade,* and Antonio Caldara's *Ormisda.* In 1750 she returned to London to give a benefit concert and the next year, beset by debts, made a final appearance there. Her fortunes continued to decline, and she died in poverty.

C.V.O., commander of the Royal Victorian Order, member of the third highest class of a British order of knighthood, although this rank does not confer knighthood. *See* Royal Victorian Order.

Ćwiklińska, Mieczysława, pseudonym of MIECZYSLAWA TRAPSZO (b. Jan. 1, 1880, Lublin, Pol.—d. July 28, 1972, Warsaw), outstanding comic actress renowned for her roles in both operettas and the classics.

Ćwiklińska, who came from a Polish theatrical family, made her debut in Warsaw in 1900. She toured Russia in 1906 and in 1910 went to Paris to study voice. In 1918, after appearing in various European cities, such as Dresden and Berlin, she returned to Warsaw and worked with several companies until she was invited to join the National Theatre in 1927, a position she held until 1939. In 1933 she made her film debut, and she eventually appeared in 40 films.

In addition to operettas, Ćwiklińska gradually added to her repertoire comic roles in plays by such Polish playwrights as Aleksander Fredro, Michał Balucki, and Józef Bliziński, as well as such foreigners as George Bernard Shaw and Armand Salacrou. On April 25, 1950, she celebrated the golden jubilee of her career in the theatre and was awarded highest honours by the Polish government.

Cwmbrân, new town, Iorfaen district, Gwent county, Wales, in the valley of the Afon Lywd. It is the administrative seat of Gwent. One of 32 new towns established in the United Kingdom after World War II to relieve congestion and encourage development, Cwmbrân was designated a new town in 1949 in an area of small and decaying industrial villages. It attracted a number of new industries producing automobile components; nearby are factories producing biscuits (cookies) and nylon yarn, supplementing some tinplate manufacture that dates from the 19th century. Pop. (1981) 44,316.

cyanide, any compound containing the monovalent combining group CN. In inorganic cyanides, such as sodium cyanide, NaCN, this group is present as the negatively charged cyanide ion; these compounds, which are regarded as salts of hydrocyanic acid, are highly toxic. Organic cyanides are usually called nitriles; in these, the CN group is linked by a covalent bond to a carbon-containing group, such as methyl (CH_3) in methyl cyanide (acetonitrile).

Hydrocyanic acid, also known as hydrogen cyanide, or HCN, is a highly volatile liquid used to prepare acrylonitrile, which is used in the production of acrylic fibres, synthetic rubber, and plastics. Cyanides are employed in a number of chemical processes, including fumigation, case hardening of iron and steel, electroplating, and the concentration of ores. In nature, substances yielding cyanide are present in certain seeds, such as the pit of the wild cherry.

Cyanide poisoning results from inhaling hydrogen cyanide or ingesting the salts of hydrogen cyanide. Hydrogen cyanide is highly toxic because it inhibits the oxidative processes of the cells. Acute poisoning from hydrogen cyanide or the cyanides is manifested by dizziness, nausea, staggering, and loss of consciousness. Death may occur rapidly after swallowing as little as 300 milligrams of the salts or inhaling as little as 100 milligrams of hydrogen cyanide. Exposure to concentrations of 200–500 parts of hydrogen cyanide per 1,000,000 parts of air for 30 minutes is also usually fatal. In sublethal doses, the cyanide is rapidly detoxified by the human body through combination with sulfur to form nontoxic sulfocyanides, and recovery is usually complete within a few hours, with no permanent aftereffects.

Because the poison acts with extreme rapidity, recovery from poisoning depends upon the promptness with which antidotes are administered. Fatalities may be prevented by the administration of such antidotes as amyl nitrite, sodium nitrite, and 25 percent sodium thiosulfate solution.

cyanite (mineral): *see* kyanite.

cyanobacterium: *see* blue-green algae.

cyanocobalamin: *see* vitamin B_{12}.

cyanogen halide, any of a group of colourless, volatile, chemically reactive, lacrimatory (tear-producing), highly poisonous compounds, the molecules of which contain the cyano group (—CN) linked to one of the halogen elements (fluorine, chlorine, bromine, or iodine).

Cyanogen fluoride, prepared by heating cyanuric fluoride, is a gas. Cyanogen chloride, made by the reaction of chlorine with hydrocyanic acid or its salts, is a liquid that has been suggested for use as a military poison gas. Cyanogen bromide is formed by the reaction of bromine with salts of hydrocyanic acid; it is a solid that has been used as a fumigant against insects and rodents and as a reagent for the study of the structure of proteins. Cyanogen iodide is made by treating a cyanide with iodine; at atmospheric pressure the solid vaporizes without melting at about 45° C (113° F); it has been used in taxidermy as a preservative.

cyanuramide (chemical compound): *see* melamine.

Cyathocrinites, extinct genus of crinoids, or sea lilies, found as fossils in Silurian to Permian marine rocks (between 438 million and 245 million years old). The genus is especially well represented in the Early Carboniferous



Cyathocrinites, in limestone

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

Epoch (360 to 320 million years ago), a time that saw an abundance of many crinoids. More than 100 species of *Cyathocrinites* have been described.

Cyaxares (d. 585 BC), king of Media (located in what is now northwestern Iran), who reigned from 625 to 585 BC. According to the 5th-century-BC Greek historian Herodotus, Cyaxares renewed the war with the Assyrians after his father, Phraortes, had been slain in battle. While besieging Nineveh, he was attacked and defeated by a great army of Scythians, who then ruled Media (653–625) until their chiefs were slain by Cyaxares at a banquet. It was probably Cyaxares, not his father, as is maintained by Herodotus, who united the tribes of ancient Iran. He also reorganized the Median army, dividing it into spearmen, bowmen, and cavalry and instituting changes in clothing and weapons.

Cyaxares once more renewed the war with Assyria; in 614 the Medes took Ashur, and in 612 they occupied and sacked Nineveh. About the same time they seem to have conquered the kingdom of Mannai in modern Iranian Azerbaijan and in 609 invaded and afterward subjected Urartu in the Armenian highlands. The Median army took part in the final defeat of the Assyrians in northern Mesopotamia (612–609); and, when the territory of Assyria was divided between Media and Babylonia, Media took Assyria with Harran. Five years of war between Media and Lydia in Anatolia (590–585) ended when the two countries accepted the Halys River as their boundary. Cyaxares died shortly afterward.

Cybele, also called CYBEBE: *see* Great Mother of the Gods.

cybernetics, control theory as it is applied to complex systems. More generally, cybernetics is associated with models of systems in which a monitor (human or electronic/mechanical) compares what is happening at time t, x_t, with some standard of what should be happening at time t, φ_t. The difference or error, $\varepsilon_t = x_t - \varphi_t$, is fed to a controller for action, y, which can be taken only at a later time, $t + k$. Thus, the equation

$$y_{t+k} = f(\varepsilon_t) = f(x_t - \varphi_t)$$

expresses the elements of the control model but does not describe the control procedures. Only when the function $f(\varepsilon_t)$ is explained will the control system be fully understood.

The controller can be the human brain receiving signals from the eyes regarding the distance between a reaching hand and an object to be picked up. Understanding the control rules, $f(\varepsilon_t)$, by which human action takes place, in order to construct artificial limbs that could be tied in with the brain to operate them, was part of the earliest work in cybernetics.

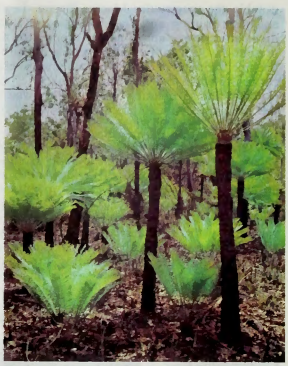
The information that the monitor sends to the controller about the difference ε_t is called feedback. The household thermostat performs this feedback function by means of a bimetallic strip that turns on the heating unit when the room temperature falls below a given value, and turns off the heating unit when the room is sufficiently warm. Thus, ε_t continuously measures the difference between room temperature and the standard set for it, while $f(\varepsilon_t)$ is the instruction to the heating unit of when to turn on and off.

Delays or lags in responding to the monitor's communications can produce undesirable results. If the delay is too long, the hand can overshoot the target object or the heating unit can raise room temperatures too much. The monitor can provide continuous or intermittent data. If the interval between samples is too short, the controller may overreact. An airplane will follow an erratic zig-zag path if corrections are continuously made for every deviation from the intended course. Thus the sizes of both t and k in y_{t+k} are critical determinants of how the system will behave. The effects of sampling intervals and lags must be considered in designing adequate control systems. They are a vital part of cybernetic theory, especially when applied to complex problems such as an organization's behaviour.

The sources of lags are various. For example, in matching production of an item to the demand for it, the monitors may be delayed in determining demand and in reporting it to both production control and advertising control. Also, upon receiving the necessary information, one or both controllers may delay while deciding the appropriate action to take and then in taking it. Finally, either production or demand may not respond immediately to the actions taken by the controllers. In this example, we see two controllers acting on the system, and each can experience delays that affect the other. A cybernetic model of an organization must take account of many interacting controllers and their responses to a variety of changes. Their success depends upon the excellence and timing of communications. For this reason cybernetics is often called the study of control and communications.

The American engineer Claude Shannon helped develop an important part of cybernetics, referred to as information theory. In Shannon's methodology a sequence of error terms, $\varepsilon_t, \varepsilon_{t+1}, \ldots$, is analyzed to reveal their inherent variety, which can then be matched by the designed variety of the control system. The measure of variety is called entropy (H), a concept similar in construction to the thermodynamic measure of entropy.

cycad (order Cycadales), any of a group of palmlike, woody plants of four families—Cycadaceae, Zamiaceae, Stangeriaceae, and Boweniaceae. Some authorities use the term



Cycad (*Cycas*)

Douglass Baglin

cycad to refer to all members of the division Cycadophyta. Plants of this group are known to have existed in the Mesozoic Era, about 245 to 66.4 million years ago. Only the order Cycadales contains living species.

Cycads are distinguished by crowns of large, pinnately compound leaves and by cones borne at the ends of the branches. Some cycads have tall, unbranched trunks with an armourlike appearance; others have partially buried stems with swollen (tuberous) trunks. The stem has a large pith surrounded by a narrow zone of soft, woody tissue. Male cones produce pollen that is carried by wind to female cones (borne on separate plants), where fertilization occurs.

Slow-growing cycads are used as ornamental conservatory plants, but some survive outdoors in temperate regions. Starch from the stems of some cycads is edible after an alkaloid is removed by thorough cooking. The young leaves and seeds of other species also are edible.

Cycadeoidales, also called BENNETTITALES, an extinct order of plants with certain features in common with cycads (order Cycadales), and grouped with them and the seed ferns (order Pteridospermales) in the class (sometimes division) Cycadophyta. Both the cycadeoids and the cycads dominated the vegetation in middle Mesozoic times (about 150 million years ago)—called the "Age of Cycads"—and both are presumed to have originated from a seed-fern ancestor. The evolution of cycadeoids seems to have paralleled the rise and fall of the dinosaurs. Unlike the cycads, in which a few large strobili (conelike reproductive bodies) are borne at the stem tip, the cycadeoids produced many smaller strobili in rosettes among the leaf bases.

Two important families were represented: Williamsoniaceae and Cycadeoidaceae (Bennettitaceae). *Williamsonia,* best known of its family, had a columnar trunk with frondlike leaves at branch tips; its fossil cones are not well defined. *Williamsoniella,* a related genus, was shrubby; fossil leaves placed in the genus *Nilssoniopteris* are believed to belong here. *Cycadeoidea* (*Bennettites*) had a barrel-shaped trunk, like a large pineapple, with a crown of leaves; its cones are reconstructed in detail from fossils. *Monanthesia* is the genus name reserved for fossil cycadeoid trunks with cones in the leaf axils.

Cycas, a genus of 10 or more species of palmlike tropical and subtropical ornamental cycads (family Cycadaceae), among them trees 12 m (40 feet) or more in height. Their leaves are dark green and circinate (unfold-



Cycas revoluta
By courtesy of Knut Norstog

ing as fern leaves do), differing from those of other members of the family in having a midrib but no lateral veins. The seeds are borne along the margins of modified leaves, which are arranged in a whorl at the top of the trunk, rather than in compact cones. The leaves of *C. revoluta,* sometimes called the sago palm, are widely used as ceremonial "palms" and in floriculture; the pithy stems of this and other species are a source of sago, a food starch. Several species, among them the Australian nut palm (*C. media*) and *C. circinalis,* a fern palm of the Malaysian area, bear edible seeds.

Cyclades, Modern Greek KIKLÁDHES, some 30 islands making up the *nomós* (department) of Cyclades, Greece, off Attica (Attikí) in the Aegean Sea. Ermoúpolis, the capital, is on the island of Syros (Síros).

The islands, which have a total land area of 974 square miles (2,523 square km), are peaks of the submerged mountain ranges of Greece. In antiquity they were the centre of a Bronze Age culture, the Cycladic, noted for its white marble idols. The name Cyclades means "encircling islands," and they are so named because they form a rough circle around the sacred island of Delos (Dhílos), the legendary birthplace of Artemis and her brother Apollo. Virtually all of the islands have some archaeological interest.

The earliest inhabitants of the Cyclades are believed to have been Carians (from the ancient district of southwestern Anatolia [now Turkey]). According to the Greek historian Thucydides (fl. 450 BC), the Carians were expelled from the islands by King Minos. The Greek historian Herodotus says the Carians were subjects of Minos and that they were expelled from the islands much later, by the Dorians and the Ionians. The rich material culture of the Bronze Age is much in evidence throughout the islands, and on many of the islands are found remarkable and characteristic (mostly female) figurines. The islands were colonized by Ionians in the 10th and 9th centuries BC, were overrun by the Persians in 490 BC, and over time were under of the rule of virtually every power in the region, including the Crusaders, who in 1204 gave the Cyclades to Venice. The islands were ransacked for antiquities in the 17th century, an activity halted by the Greek Civil War. They enjoyed relative stability for a century until the Russo-Turkish wars, but they also suffered damages and occupation during World Wars I and II.

Náxos (*q.v.*), the largest and most fertile island, and the highest, produces fruits, nuts, and wheat and exports emery. Kéa and Íos furnish valonia (from the valonia oak, *Quercus aegilops*) for tanning; Syros has tanning, shipbuilding, and weaving. Kímolos produces fuller's earth and flint, and marble is quarried on Tínos. Iron ore is exported from Sérifos, manganese and sulfur from Melos (Mílos), pumice for cement from Thera, and manganese from Mykonos as well. The islands also export wines, brandy, tobacco, hides, pottery, and handicrafts. The islands were being rapidly depopulated until the development of tourism. Pop. (1981) *nomós,* 88,458.

cyclamate, odourless white crystalline powder having a very sweet taste, with about 30 times the sweetening power of sucrose. The name usually denotes either calcium cyclamate or sodium cyclamate, both of which are salts of cyclohexylsulfamic acid ($C_6H_{11}NHSO_3H$).

Cyclamates were developed in 1937 and during the 1960s were widely used in the United States as nonnutritive sweeteners in dietetic foods. They were temporarily banned when tests showed them to be potentially harmful. Further investigations did not substantiate the original conclusions.

Cyclamen, genus of about 15 species of flowering perennial herbs, of the primrose family (Primulaceae), native to the Middle East and southern and central Europe. The florist's cyclamen (*Cyclamen persicum*), the best-known species, is notable as an indoor plant cultivated for its attractive white to pink to deep red flowers.



Cyclamen (*Cyclamen indicum*)
Sven Samelius

The plants grow from a tuber (a short underground stem) and have no stem above ground. Long-stalked, roundish, or kidney-shaped leaves, often variously marked, grow from the base. Solitary flowers grow on stalks less than 30 cm (12 inches) tall.

Cyclanthales, the Panama hat palm order of monocotyledonous flowering plants comprising the family Cyclanthaceae, with 11 genera of mostly stemless, perennial, palmlike herbs, woody herbaceous shrubs, and climbing vines, distributed in Central America and tropical South America.

The plants are characterized by parallel-veined, sometimes fan-shaped, often deeply forked and lobed leaves and small, separately sexed flowers that are densely crowded along the axis of a rodlike structure called a spadix. Each spadix is surrounded by several conspicuous sheathing spathes (leaflike or petal-like structures) that usually fall as the flowers mature. The flowers are characteristically arranged either in spiraling groups of one female surrounded by four male flowers or in alternating whorls of male and female flowers.

The chief genera are *Asplundia* (82 species), *Dicranopygium* (44 species), *Sphaeradenia* (38 species), *Carludovica* (3 species), and *Cyclanthus* (one species). *Cyclanthus* differs from the other genera in having a screwlike spadix structure. The order is considered to have originated, with the palm order (Arecales), from an ancestor of the lily order (Liliales).

In Ecuador and perhaps elsewhere in Latin America, the young leaves of *Carludovica palmata* are collected, cut into narrow strips, and bleached, to be woven into Panama hats.

cycle, in literature, a group of prose or poetic narratives, usually of different authorship, centring on a legendary hero and his associates. The term cyclic poems was first used in late classical times to refer to the independent poems that appeared after Homer to supplement his account of the Trojan War and the heroes' homecomings. Another classical Greek cycle is the "Theban" group, dealing with Oedipus and his descendants. It is best known through Sophocles' tragedies *Oedipus Rex, Antigone,* and *Oedipus at Colonus,* and Aeschylus' *Seven Against Thebes.*

Medieval romance is classified into three major cycles: the "matter of Rome the great," the "matter of France," and the "matter of Britain" ("matter" here is a literal translation of the French *matière,* referring to subject matter, theme, topic, etc.). The matter of Rome, a misnomer, refers to all tales derived from Latin classics. The matter of France includes the stories of Charlemagne and his Twelve Noble Peers. The matter of Britain refers to stories of King Arthur and his knights, the Tristan stories, and independent tales having an English background, such as *Guy of Warwick.*

The word cycle is also used for a series of poems, plays, or novels that are linked in theme, such as Zola's *Rougon-Macquart* cycle of 20 novels (1871–93), tracing the history of a single family.

cyclic form, in music, any compositional form characterized by the repetition, in a later movement or part of the piece, of motives, themes, or whole sections from an earlier movement in order to unify structure. The need for such a device arose during the 19th century, when the traditional classical restraint of Wolfgang Amadeus Mozart and Joseph Haydn yielded to ever greater extremes, emotionally as well as formally—when, in fact, the romantic novel superseded classical drama as the basic model for instrumental music.

There are early examples of a type of cyclic technique in Mozart's *Horn Concerto No. 3* (1784–87?). But the frequent use of recurrent material in large-scale works begins with Beethoven's *Fifth Symphony* (1808), in which movements are bound together by a recurring motive as well as by literal repetition of a sizable section of music.

Cyclic technique permeates many works of the generation following Beethoven—*e.g.,* the *Wanderer Fantasy* of Franz Schubert and the *Symphony No. 4* of Robert Schumann, in which the cyclic material is extensively melodic rather than motivic (using brief melodic-rhythmic fragments). This tendency culminated in the *idée fixe* (literally, "fixed idea"), or recurrent theme, of the French composer Hector Berlioz. In his *Harold en Italie* the theme returns each time in much the same form, but in the *Symphonie fantastique* it takes on a different character in each movement.

The latter method of thematic transformation appealed especially to Franz Liszt, who based whole works on this principle of using a single theme in vastly different guises, for example in his *Piano Concerto No. 2* and *Sonata in B Minor.*

A kind of cyclic school arose for a time among Liszt's disciples, especially the Franco-Belgian composer César Franck, whose techniques were well publicized by his pupil Vincent d'Indy. Subsequent composers, however, used the cyclic technique as only one, and often not the most important, means of unifying a piece of music.

cycling, sport, form of recreation, and means of transportation that developed as a result

of improvements to the bicycle (*q.v.*), a two-wheeled foot-pedaled machine. (Historically, cycling has also involved, especially in recreation, three-wheeled machines [tricycles] and tandems [bicycles with separate seats and pedals for two or more riders].) The classic professional races in the sport are held mainly in Europe, where recreational and transport uses are also greatest. Use of the bicycle as a mode of transportation is particularly important in the flatter countries, and some countries have systems of bicycle paths that rival motorways. The sport is, however, nearly worldwide, being most popular in Europe, England, the Commonwealth countries (Canada, Australia, and New Zealand), the United States, Japan, and the West Indies.

Early history. Cycling as a sport officially began with a 1,200-metre (1,312-yard) race in Saint-Cloud Park near Paris on May 31, 1868. The first English race was held the next day at Hendon, Middlesex. In 1869 an English cyclist, James Moore, who had won the first race in 1868, won the first town-to-town race, of 133.57 km (83 miles), from Rouen to Paris. Road racing predominated in Europe, but in England the deteriorated condition of the roads made them unsuitable for racing, and, with the rise of professional racing from 1871, racing on tracks became more common. The National Cyclists Union (NCU; from 1959 the British Cycling Federation), which was founded in 1878, led a movement to form the International Cyclist Association (ICA; 1892), the founding members of which were England, Belgium, Denmark, Germany, France, The Netherlands, the United States, and Canada. The Union Cycliste Internationale (UCI) was founded in 1900 because of a feeling that there was undue British influence in the ICA. Great Britain joined the UCI a few years later.

Racing in the United States began in 1878, and by the 1880s both road and track racing were common. The League of American Wheelmen (LAW; founded 1880) was the first governing body for amateur racing as well as for promoting recreational use. The National Cycling Association (founded 1898) arose from conflicts within the LAW over amateur–professional criteria. Later the LAW restricted itself to touring, and the United States Cycling Federation (founded 1921 as the Amateur Bicycle League of America) took over as governing body of amateur racing. A characteristic of early American racing was the use of pacers—originally single riders, then tandem, and finally up to six riders on one bicycle—who rode ahead of the contestants at as fast a pace as the contestants desired before dropping away. In 1891 Madison Square Garden in New York City, with its board track, became the site of the first six-day bicycle race to be held in the United States (such a race had been held in England in 1878); the event remained popular through the 1930s and sporadically after that through 1961. Six-day races were held in many cities across the United States. Originally an individual sport, from 1899 it was a two-man team race. Six-day racing was reintroduced to Europe in the 20th century, gaining popularity in Germany, Belgium, France, England, and The Netherlands and spreading to Canada and Australia, well after such racing had died out in the United States. (*See also* six-day race.)

After the turn of the century, British and American racing declined somewhat in interest as the automobile became more popular, and thereafter the two countries were long separated from European racing. The NCU banned road racing, which was dominant in continental Europe. British racing was predominantly amateur; European racing was both professional and amateur.

Cycling as recreation became organized shortly after racing did. In England the Cyclists Touring Club (from 1883; founded 1878 as the Bicycle Touring Club) had nearly 60,000 members early in the 20th century and about 25,000 in the 1980s. In its early days, cycling brought the sexes together for the first time in an unchaperoned way, particularly after the development in the 1880s of the Rover safety bicycle. Public cries of alarm at the prospect of moral chaos arose from this and from the evolution of women's cycling attire, which grew progressively more masculine.

Modern sport racing. The development of racing as a popular summer spectator sport in much of Europe began in the 1890s with the now-classic Bordeaux–Paris, Paris–Ronbaix, and Liège–Bastogne–Liège races held annually except in wartime. In 1903 the first Tour de France, the premier classic road race, was held; it continued annually thereafter, except in wartime. In England a ban on road racing created a special kind of racing, the time trial (*q.v.*), intended to circumvent the law, in which racers started one at a time, raced over a fixed distance, and tried to achieve the fastest time. The Roads Record Association, which had been founded in 1888, persisted, being renamed the Road Time Trials Council in 1937. The first mass-started road race was not held in Great Britain until 1942. The Tour of Britain began in 1951 and from 1958 was run annually as the Milk Race. Professional cycling began in 1965.

European road racing was under the sponsorship of bicycle manufacturers until World War II. Thereafter, as the industry declined, companies selling motor fuels, liquor, and tobacco took over sponsorship. The professional season begins in the spring in the Mediterranean region and continues, working its way north, through national and regional races, ending in the north in the autumn. The amateur season is similar.

Amateur cycling (for men only) has been part of the Olympic Games since the first modern games in 1896 (road race; track since 1900). (*See* Olympic Games.) There are both professional and amateur world championships, the latter informally before the ICA was formed in 1892 and formally since 1893. Until after World War I the British were dominant, being challenged only by France, Germany, and the United States. After World War II, competition was roughly even throughout Europe. Professional championships began in the 1920s. In 1965, because professional–amateur separation had become so difficult that the International Olympic Committee threatened to remove cycling from the games, two new constituent organizations of the UCI were formed: the Fédération Internationale du Cyclisme Professionnel (10 national members, all in Europe) and the Fédération Internationale Amateur de Cyclisme (more than 100 national members worldwide). The UCI continued to organize world championships for amateurs and Olympic competition. National championships were organized by national groups and other races by private promoters. (*See* Sporting Record: *Cycling.*)

Competition. Races are held for both men and women amateurs (except in the Olympics) in local, regional, and national races by age group, ranging upward from youngsters, or benjamins (12–13 years), adolescents (14–15), younger juniors (16–17), juniors (18–20), and seniors. In addition to the time trial, which is an individual event, there are two major types of road races that are team events. The first, called a criterium, is run over a relatively short (4–5-kilometre [2.5–3-mile]) closed course; racers ride a predetermined number of laps, the winner being the first to complete that number. The second type consists of races held on open roads and includes point-to-point, circuit, and stage events. Point-to-point and circuit races are generally one-day races, varying in distance from 240 to 280 km (roughly 150 to 175 miles) for professionals and 180 to 220 km (roughly 110 to 140 miles) for amateurs. Stage races (such as the Tour de France) are essentially a series of point-to-point races run on several successive days, although the distance ridden per day is usually less than a single-day event; the winner is the rider with the lowest aggregate time for all stages.

Track racing events for amateurs are different from those for professionals, and those for men from those for women. Events include the sprint, the pursuit, the time trial, the points race, and the keirin, or motor-paced race (*q.v.*). Cyclo-cross (*q.v.*), or cross-country racing, established by the mid-1920s, covers rough terrain that may require racers to dismount and walk or run with their cycles.

The use of stimulant and antifatigue drugs was widespread in cycling, both amateur and professional, before the problem surfaced in other sports. A list of prohibited drugs was established, and blood tests were instituted. The fatal accident of the British cyclist Tom Simpson in the Tour de France of 1967 was attributed to drug abuse.

Recreation. Bicycle and touring clubs abound in Europe, especially in France, Belgium, Italy, and England. Tours are frequently international. Touring by bicycle also increased in the United States, encouraged from the 1950s by medical opinion that cycling is a healthful exercise. About 50,000,000 persons cycle regularly. The annual sales of bicycles rose from 200,000 in 1932 to more than 10,000,000 in the 1980s. Bicycle paths were created on the streets of many cities and in national as well as municipal parks.

cyclo-cross, cross-country bicycle racing in open and usually quite rough country with riders often forced to dismount and carry their bicycles.



Cyclo-cross competitors carrying their cycles during a race in England
Oli Tennent—Allsport

The sport originated early in the 20th century in France, but it eventually became popular throughout western Europe and in the United States. World championships were initiated in 1925; by 1950 these were recognized by the Union Cycliste Internationale (UCI; International Cyclists' Union). After 1967 amateur and professional classes were officially separated in competition.

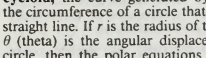
The 16–24-kilometre (10–15-mile) cyclo-cross course, often involving laps, is usually completed in 60–75 minutes. A course typically includes obstacles such as ditches, mud, fallen trees, streams, flights of stairs, fences,

and gates; artificial hurdles are added to insufficiently challenging natural courses. Cyclo-cross races are usually held from September to March, adding winter weather hazards to the challenge.

There is a massed start with the field assembling not more than two abreast. Helpers are often stationed around the course with spare bicycles in case the original machine encounters mechanical difficulties or becomes too weighted down by mud picked up on the course. *Compare* moto-cross.

cyclohexanehexol (biochemistry): *see* inositol.

cycloid, the curve generated by a point on the circumference of a circle that rolls along a straight line. If r is the radius of the circle and θ (theta) is the angular displacement of the circle, then the polar equations of the curve are $x = r(\theta - \sin\theta)$ and $y = r(1 - \cos\theta)$.



Cycloid

The points of the curve that touch the straight line are separated along the line by a distance equal to $2\pi r$, which is the circumference of the circle, indicating one complete revolution of the circle. The curve is periodic, which means that it repeats in an identical pattern for each cycle, or length of the line, that is equal to $2\pi r$.

One variant of the simple cycloid is the curtate cycloid, for which the curve falls below the line at the cusps, making retrograde loops in which the curve moves in the direction opposite to that of the rolling circle.

The prolate cycloid is similar to the simple cycloid except that the curve has no cusps and does not intersect the line. The prolate is formed by a point on a radius less than that of the rolling circle, such as a point on the spoke of a wheel.

For the case of a circle rolled along outside the circumference of another circle, an epicycloid is formed. For a circle rolled along inside the circumference of another circle, a hypocycloid is formed. *See also* brachistochrone.

cyclone, any large system of winds that rotates about a centre of low atmospheric pressure in a counterclockwise direction north of the Equator and in a clockwise direction to the south. Cyclonic winds move across nearly all regions of the Earth except the equatorial belt and are generally associated with rain or snow. Also occurring in much the same areas are anticyclones, wind systems that rotate about a high-pressure centre. Anticyclones are so called because they have a flow opposite to that of cyclones—*i.e.*, an outward-spiralling motion, with the winds rotating clockwise in the Northern Hemisphere and counterclockwise in the Southern. These winds are usually not as strong as the cyclonic variety and bring no precipitation.

A brief treatment of cyclones follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

Cyclones occur chiefly in the midlatitude belts of both hemispheres. In the Southern Hemisphere, where most of the terrestrial surface is covered by the oceans, cyclones are distributed in a relatively uniform manner through various longitudes. Characteristically, they form in latitudes 30° to 40° S and move in a generally southeasterly direction, reaching maturity in latitudes around 60°. The situation is quite different in the Northern Hemisphere. There, continental landmasses extend from the Equator to the Arctic, and large mountain belts interfere with the midlatitude air currents, giving rise to significant variations in the occurrence of cyclones (and anticyclones). Certain tracks are favoured by the wind systems. The principal cyclone tracks lie over the oceans, the ocean surface being smoother than that of the land and thus offering less resistance to the strong winds around low-pressure centres.

Cyclones that form closer to the Equator (*i.e.*, in latitude 10° to 15° north and south over the oceans) differ somewhat in character from the extratropical variety. Such wind systems, known as tropical cyclones, are much smaller in diameter. Whereas extratropical cyclones range from nearly 1,000 to 4,000 kilometres (620 to 2,500 miles) across, tropical cyclones measure only about 100 to 500 kilometres in diameter. They also tend to be more violent than those occurring in the midlatitudes and can cause considerable damage. Their wind velocities may reach up to 60 metres per second (nearly 200 feet per second), as opposed to about 30 metres per second for extratropical cyclones. In the Atlantic and Caribbean regions, tropical cyclones are commonly called hurricanes, while in the western Pacific and China Sea the term typhoon is applied.

cyclonite (explosive): *see* RDX.

Cyclopaedia, two-volume, alphabetically arranged encyclopaedia compiled and edited by the English encyclopaedist Ephraim Chambers and first published in 1728. The work treated the arts and sciences; names of persons or places were not included. Seven editions had been published in London by 1751–52. The materials for seven additional volumes were published in two folio volumes in 1753 as a *Supplement* after having been reworked first by John Lewis Scott and then by John Hill after the death of Chambers.

Although Chambers declined an invitation in 1739 to publish a French edition of his *Cyclopaedia,* a projected French translation of the work became the starting point for *L'Encyclopédie,* the great 18th-century French encyclopaedia edited by the French philosopher and translator Denis Diderot and the French mathematician Jean d'Alembert.

cyclopean masonry, wall constructed without mortar, using enormous blocks of uncut stone. This technique was employed in fortifications where use of large stones reduced the number of joints and thus reduced the walls' potential weakness. Such walls are found on Crete, and in Italy and Greece. Ancient fable attributed them to a Thracian race of giants, the Cyclopes, named after their one-eyed king, Cyclops. Similar walls, though not called cyclopean, are found at Machu Picchu, Peru, and at several other pre-Columbian sites in the New World.

The citadel of Tiryns (*c.* 1300 BC) on Crete features such walls. They range in thickness from approximately 24 feet (7 metres) to as much as 57 feet (17 metres) where chambers are incorporated within them. Though formed without mortar, clay may have been used for bedding.

Cyclopean concrete derives its name from this ancient method. It is a form of massed concrete in which stones are placed as the concrete is poured. These are called plums or pudding stones and are 100 pounds or more in weight. They are generally set at least six inches apart and no closer than eight inches from any surfaces.

cyclopropane, also called TRIMETHYLENE, explosive, colourless gas used in medicine since 1934 as a general anesthetic. Cyclopropane is nonirritating to mucous membranes and does not depress respiration. Induction of and emergence from cyclopropane anesthesia are usually rapid and smooth. A mixture of about 5 to 20 percent cyclopropane in oxygen is administered by inhalation. Because of the flammability and expense of cyclopropane, it is usually used in a closed (rebreathing) system, in which an absorbent chemical, such as soda lime, removes exhaled carbon dioxide, and the anesthetic is recirculated. The chemical formula is C_3H_6.

Cyclops (Greek: Round Eye), in Greek legend and literature, any of several one-eyed giants to whom were ascribed a variety of histories and deeds. In Homer the Cyclopes were cannibals, living a rude pastoral life in a distant land (traditionally Sicily), and the *Odyssey* contains a well-known episode in which Odysseus escapes death by blinding Cyclops. In Hesiod the Cyclopes were three sons of Uranus and Gaea—Arges, Brontes, and Steropes (Bright, Thunderer, Lightener)—who forged the thunderbolts of Zeus. Later authors made them the workmen of Hephaestus and said that Apollo killed them for making the thunderbolt that slew Asclepius.

The walls of several ancient cities (*e.g.*, Tiryns) of Mycenaean architecture were sometimes said to have been built by Cyclopes. Hence in modern archaeology the term cyclopean is applied to walling of which the stones are not squared.

cyclorama, in theatre, background device employed to cover the back and sometimes the sides of the stage and used with special lighting to create the illusion of sky, open space, or great distance at the rear of the stage setting. Introduced early in the 20th century, a cyclorama usually forms a smoothly curving, concave wall at the rear of the stage. Some, called dome horizons, also curve at the top, heightening the illusion of open space. Although some theatres have a curved back wall that serves as a permanent cyclorama, it most commonly consists of a drop curtain that can be raised or lowered according to need.

The cyclorama has a rough surface of plaster or canvas for diffuse light reflection and is painted white or light blue. The surface can then be illuminated with varying colours and intensities of light sky to simulate various times of day, seasons, and weather conditions. Slides or filmstrips can also be projected onto the cyclorama surface to produce such effects as clouds or stars.

cyclosilicate, compound with a structure in which silicate tetrahedrons (a central silicon atom surrounded by four oxygen atoms at the corners of a tetrahedron) are arranged in rings. Each tetrahedron shares two of its oxygen atoms with other tetrahedrons; the rings formed may have three (*e.g.*, benitoite), four (*e.g.*, axinite), or six members (*e.g.*, beryl). The cyclosilicates have chemical formulas that contain multiples of SiO_3.

cyclosis (biology): *see* cytoplasmic streaming.

cyclostome, any member of the order Cyclo-stomata (class Agnatha), which contains the lamprey and the hagfish (*qq.v.*). These fish are characterized by a long slender body without scales and fins, a sucking mouth with horny teeth, a cartilaginous skull, and a notochord.

cyclostrophic wind, wind circulation that results from a balance between atmospheric pressure gradients and the centripetal force, called the Coriolis force, which arises by virtue of the rotation of the Earth upon its axis and is of considerable importance in large cyclonic systems but of negligible import for small-scale systems.

In small-scale cyclonic systems, such as tornadoes, dust devils, waterspouts, and the central regions of hurricanes, the radius of curvature of the airflow is relatively small. Cyclostrophic wind flow in these small systems may exist only around cyclonic, or low pressure, regions; and the sense of rotation may be either clockwise or counterclockwise, a condition in contrast to larger scale cyclonic systems, which

always rotate in a counterclockwise manner in the Northern Hemisphere and clockwise in the Southern Hemisphere.

cyclothem, complex, repetitive stratigraphic succession of marine and nonmarine strata that are indicative of cyclic depositional regimes. Ideal cyclothem successions are rare, and reconstructions of generalized sequences result from the study of examples in which typical beds of limestone, clastic sediments, or coal seams may be missing.

Different sedimentary rocks are often stacked on top of one another in recognizable patterns that suggest an orderliness in formation. In particular, coal-bearing sequences not only show a repetition of coal seams, through sometimes hundreds of metres, but also other rocks in a more or less regular order. The coal seam is underlain by a seat-earth (underclay). Above the coal, a limestone or a claystone (shale or mudstone) with marine shells is often found. The marine shells disappear in the succeeding shales, to be replaced occasionally by nonmarine bivalves. Before another seat-earth and coal appears, a siltstone or a sandstone or both may be present.

In Great Britain this type of cycle was described in the 1830s, and some Carboniferous sequences (those about 360 to 286 million years old) may be conveniently described as composed of repetitions of the cycle limestone–shale–siltstone–sandstone–seat-earth–coal, in which the coal is taken to define the point at which the sequence is repeated. A similar sequence was recognized in the United States in which an erosional break below the sandstone was identified and the sandstone was recognized as the significant repeated feature initiating the new cycle.

In both cases the cycle is defined in terms of recurring rock types. The rocks and fossils suggest alternating open-sea (the limestone and shales with marine shells) and terrestrial conditions (the coal). Processes forming the sediments were oscillatory or cyclic. Furthermore, this oscillation took place through time. In many discussions of the subject the term cycle was used indiscriminately for the processes, the time involved (such as the periodicity of oscillations), and the sediments. The potential confusion in this loose nomenclature led American geologist J.M. Weller to coin the term cyclothem to describe a series of beds deposited during a single sedimentary cycle, such as the deposits of layers during the Pennsylvanian period (or Late Carboniferous epoch, roughly 320 to 286 million years ago). Cyclothem refers to the rocks themselves; the term cycle might then be reserved for the processes or the time involved in forming a cyclothem, or both.

Weller had in mind the type of sequence described above. It therefore seems valid to use the term cyclothem to refer to similar sequences in the Carboniferous period in Europe and elsewhere. North American and European cyclothems are acknowledged as representing successive phases of delta outbuilding interspersed with marine incursions. This being so, the term cyclothem may now be extended to any sequence of sedimentary rocks that is repeated in vertical sequence. For example, Devonian rocks in Great Britain are often composed of the repeated sequence conglomerate-sandstone-siltstone-muddy siltstone with nodular carbonate. These are interpreted as having been formed by a river meandering across its floodplain. Each sequence has been called a cyclothem, as has a very different sequence of shale or marl and limestones in the Jurassic period (208 to 144 million years ago) of Europe.

During the first half of the 20th century the identification of the repetitive sequence was largely a matter of subjective judgment. Since the 1960s statistical treatment of the data has led to greater precision in defining the probability that any one rock unit will occur in its place in the sequence.

Pennsylvanian cyclothems vary considerably in thickness but tend to be about 10 m (32 feet) thick. The term, when applied to thinner, simple alterations of shale-limestone or sandstone-siltstone, has been referred to as minor. On the other hand, thicker sequences have been called megacyclothems. Sometimes this simply denotes a cyclothem of an order of size thicker than normal. Some authors use the term to describe a group of cyclothems that show some distinctive character followed by another group that have some other characteristics—*i.e.,* one group of cyclothems with many limestone bands may be followed by another with few limestones. Together these constitute a cycle of cyclothems, or a megacyclothem. Groups of megacyclothems with some distinctive features have been called a hypercyclothem. Rock units, measuring several kilometres in thickness and spanning entire geologic systems, have been referred to as magnacycles. These larger units are of doubtful validity and restricted utility.

The main problem with regard to Pennsylvanian and Carboniferous cyclothems is to explain sea extensions (transgressions) over a delta plain in an area that is undergoing progressive subsidence. One tectonic mechanism invokes jerky subsidence of the basin of sedimentation. Marine incursions would take place after sudden sinkings. A rise in sea level and incursion could also be caused by the growth of oceanic ridges. Equally, transgressions of the sea might be due to climatic changes, which, for example, might cause the periodic melting of polar icecaps; or delta out-building might be active during climatic periods of rapid debris supply to the basin, followed by marine transgressions during dry periods with little sediment supply. The mechanisms that have received most recent support are sedimentological. In these, delta outbuilding is thought to be ended by a switch in the locus of deposition when the river finds a shorter route to the sea. The starved delta-lobe, still subject to continuous regional subsidence, is then flooded by the sea to begin a new cyclothem. Later, the locus of deposition switches back to the former area, sedimentation returns, and a cyclothem is completed by renewed out-building.

cyclotrimethylenetrinitramine (explosive): *see* RDX.

cyclotron, any of a class of devices that accelerates charged atomic or subatomic particles in a constant magnetic field. The first particle accelerator of this type was developed in the early 1930s by the American physicists Ernest O. Lawrence and M. Stanley Livingston. A cyclotron consists of two hollow semicircular electrodes, called dees, mounted back to back, separated by a narrow gap, in an evacuated chamber between the poles of a magnet. An electric field, alternating in polarity, is created in the gap by a radio-frequency oscillator.

The particles to be accelerated are formed near the centre of the device in the gap, where the electric field propels them into one of the dees. There the magnetic field guides them in a semicircular path. By the time they return to the gap, the electric field has reversed, so they are accelerated into the other dee. Although the speed of the particles and the radius of their orbit increase each time they cross the gap, as long as the mass of the particles and the strength of the magnetic field remain constant, these crossings occur at a fixed frequency, to which the oscillator can be adjusted.

A cyclotron operating in this manner can accelerate protons to energies no greater than 25 million electron volts. This limitation is imposed by the relativistic increase in the mass of any particle as its speed approaches that of light. As the mass increases, the orbital frequency decreases, and the particles cross the gap at times when the electric field decelerates them.

To overcome this limitation, the frequency of the alternating voltage impressed on the dees can be varied to match that of the orbiting particles. A device with this feature is called a synchrocyclotron, and energies close to one billion electron volts have been achieved with it. Another technique is to strengthen the magnetic field near the periphery of the dees and to effect focusing by azimuthal variation of the magnetic field. Accelerators operated in this way are called isochronous, or azimuthally-varying-field (AVF) cyclotrons.

Cydones, Demetrius, also spelled DEMETRIOS KYDONES (b. *c.* 1324, Thessalonica, Byzantine Empire [now in Greece]—d. *c.* 1398, Crete), Byzantine humanist scholar, statesman, and theologian who introduced the study of the Greek language and culture to the Italian Renaissance.

Cydones was a student of the Greek classical scholar and philosopher Nilus Cabasilas. In 1354 he went to Italy, where he studied the writings of the leading medieval philosophical theologians. Attracted to Latin Scholasticism, he made Greek translations of the major works of Western writers, including tracts by Augustine of Hippo (5th century) and Thomas Aquinas' *Summa theologiae* ("Compendium of Theology"). By 1365 he had made a profession of faith in the Latin church.

Returning to Constantinople, Cydones was named prime minister by Emperor John V Palaeologus (1369). With the weakening of Byzantine resistance to the Arabs, he retired to private life about 1383. In 1390 Cydones returned to Italy and opened an academy of Greek culture in Venice. Attracting Venetian and Florentine students, he effected a cultural exchange that diffused Greek language and thought throughout Italy and served as a stimulus for the Italian Renaissance. He formed, moreover, the nucleus of a group of Byzantine intellectuals that strove for Christian unity between East and West. Recalled to Constantinople in 1391 by his former pupil Emperor Manuel II Palaeologus, Cydones resumed his ministerial post, resigning in 1396, when hostility to his Latin Catholicism ultimately compelled him to retire permanently to the island of Crete.

With the support of his brother Prochorus, Demetrius opposed Hesychasm, the belief in a life of contemplation and uninterrupted prayer taught by the Eastern Orthodox monks of Mount Athos and articulated by the 14th-century ascetic-theologian Gregory Palamas. Applying Aristotelian logic to the Neoplatonic character of Hesychasm, the Cydones brothers accused Palamas of pantheism, only to be condemned themselves by the Orthodox Synod of 1368 that canonized Palamas.

Considered the most brilliant Byzantine writer of the 14th century, Cydones is the author of the moral philosophical essay *De contemnenda morte* ("On Despising Death"), an apology for his conversion to Latin Catholicism, and a voluminous collection of 447 letters, valuable for the history of Byzantine relations with the West. The principal documentary sources for Byzantium's gradual submission to the Turks are his *Symbouleutikoi* ("Exhortations"), vainly urging the Byzantine people to unite with the Latins in order to resist the Turkish onslaught; these fervent appeals give a clear picture of the hopeless position of the Byzantine Empire in about the year 1370.

Cydones, Prochorus, also spelled PROCHOROS KYDONES (b. *c.* 1330, Thessalonica, Byzantine Empire—d. *c.* 1369, Mount Athos), Eastern Orthodox monk, theologian, and lin-

guist who, by his advocacy of Western Aristotelian thought and his translation of Latin Scholastic writings, based his opposition movement against the leading school of Byzantine mystical theology.

A priest-monk of the Lavra (monastery) on Mount Athos, Prochorus Cydones collaborated with his brother Demetrius in translating Thomas Aquinas' monumental *Summa theologiae* ("Compendium of Theology"). Prochorus also made Greek versions of the works of the 5th-century Latin Church Father Augustine of Hippo (North Africa) and of the 6th-century philosopher Boethius, notably his *De consolatione philosophiae* ("On the Consolation of Philosophy").

Prochorus' own treatise, *De essentia et operatione Dei* ("On the Essence and Activity of God"), vigorously disputed the mystical theology of another Athonite monk, Gregory Palamas. Cited before the Synod of Constantinople in 1368 by the Palamite patriarch Philotheus Coccinus, the brothers Cydones were charged with heresy; Prochorus was expelled from the priesthood and Palamism received canonical status. It is probable that Prochorus followed Demetrius in making a profession of faith in the Latin church. The chief source for Prochorus' life is a pair of polemical addresses by Demetrius, eulogizing his brother and denouncing Patriarch Philotheus.

Cygnaeus, Uno (b. Oct. 12, 1810, Hameenlina, Fin.—d. Jan. 2, 1888, Helsinki), educator known as "the father of the primary school in Finland."

Graduating from the gymnasium (secondary school) at Tavastehus in 1827, Cygnaeus attended the University of Helsingfors, becoming *Filosofie Magister* there in 1836. He then spent two years as assistant pastor and prison chaplain at Viborg, simultaneously teaching in a private school. In 1840 Cygnaeus became chaplain to a trading colony at New Archangel, Russian America (now Sitka, Alaska, U.S.), where he was profoundly impressed by the contrast between the educated people of the trading post and the native peoples who came there with furs and other items to barter.

Cygnaeus returned to Europe in 1845 and spent the next 12 years as superintendent of a Finnish school in St. Petersburg, Russia. This experience, along with his study of the educational philosophers Johann Heinrich Pestalozzi and Friedrich Froebel, helped develop his own educational ideas. In 1856, when Tsar Alexander II promised a complete reorganization of Finland's primary schools, Cygnaeus finally had an opportunity to put his ideas into practice. Exercising the right of Finnish citizens to make suggestions "for the public good," Cygnaeus offered his ideas for reform, which he later embodied in his brief *Strodda Tankar* (Eng. trans. *Stray Thoughts on the Intended Primary Schools in Finland*).

Cygnaeus centred his curriculum on handwork, drawing from Froebel's idea of introducing such activities as paper folding, weaving, needlework, and work with sand, clay, and colour in the kindergarten; but he extended the concept to include farm work, gardening, metal- and wood-work, and basket weaving—collectively known as *veisto*, or sloyd, from Swedish *slöjd* (for "handiwork," or manual training). As a consequence of Cygnaeus' efforts, the Finnish government in 1866 made the sloyd system compulsory for boys in all rural schools and for male teachers in training institutions. In 1872 the government extended the system to city schools and established a sloyd school at Nääs to train teachers. A second school—called a Sloyd Seminarium—was started in 1875.

The manual-training idea spread first to Sweden, then to France, Germany, England, and the United States, where it persists—along with home economics—as part of the curriculum in many schools.

In 1863 Cygnaeus became director of a new Finnish seminary at Jyvaskyla, a post he held until his death.

Cygnus A, most powerful cosmic source of radio waves known, lying in the northern constellation Cygnus about 500,000,000 light-years (4.8×10^{21} km) from Earth. It has the appearance of a double galaxy. For a time it was thought to be two galaxies in collision, but the energy output is too large to be accounted for in that way. Radio energy is emitted from Cygnus A at an estimated 10^{45} ergs per second, more than 10^{11} times the rate at which energy of all kinds is emitted by the Sun. The source of the energy of Cygnus A remains undetermined.

Cygnus Loop, group of bright nebulae (Lacework Nebula, Veil Nebula, and the nebulae NGC 6960, 6979, 6992, and 6995) in the constellation Cygnus, thought to be remnants of a supernova—*i.e.,* of the explosion of a star probably 60,000 years ago. The Loop, a strong source of radio waves and X rays, is still expanding at about 100 kilometres (60 miles) per second. It lies several thousand light-years from the Earth.

cylinder, in mechanical engineering, chamber of an engine in which a piston moves. *See* piston and cylinder.

cylinder function: *see* Bessel function.

cylinder recording, earliest form of phonograph record, invented by Thomas A. Edison in 1877. The sound to be recorded was focused by a horn onto a diaphragm, causing it to vibrate; the vibrations were transmitted to a stylus and modulated its motion as it followed a helical path along the surface of a yielding material (such as wax) that coated a cylinder rotating under the stylus. *See also* phonograph.

cylinder seal, small stone cylinder engraved in intaglio on its surface to leave impressions when rolled on wet clay. Cylinder seals are characteristic artifacts of ancient Mesopotamian civilization and are considered some of its finest artistic achievements. The seals first appear during the Protoliterate Period (*c.* 3400–2900 BC), and, although the earliest examples used primarily geometric, magical, or animal patterns, later seals incorporated the owner's name and depicted a variety of motifs. Sometimes the elements were arranged in symmetrical, decorative patterns; often, however, an action was represented.

Cylinder seals were employed in marking personal property and in making documents legally binding. Their fashioning and use were adopted by surrounding civilizations, such as those of Egypt and the Indus valley.



Impression from a cylinder seal from Babylonia, 8th century BC; in the Pierpont Morgan Library, New York City

By courtesy of the Pierpont Morgan Library, New York City

Where the same name may denote a person, place, or thing, the articles will be found in that order

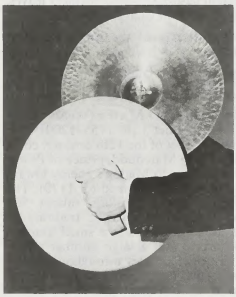
cymbal, percussion instrument consisting of a circular flat or concave metal plate that is struck with a drumstick or is used in pairs struck glancingly together. They were



Egyptian cymbal from Thebes, copper, Greco-Roman period; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, Rogers Fund, 1908

used, often ritually, in Assyria, Israel (from *c.* 1100 BC), Egypt, and other ancient civilizations and reached the Far East in medieval times and Europe before the 13th century. Most Asian cymbals are either broad-rimmed, with or without a dome (boss), held horizontally, and clashed loudly, or small-rimmed (or rimless), held vertically, and played softly. Western orchestral cymbals derive from those used in the Turkish military bands in vogue



Pair of modern hand-held symphonic orchestral cymbals

By courtesy of Avedis Zildjian Company

in 18th-century Europe, and cymbals were introduced in work by Joseph Haydn (notably his *Military Symphony,* 1794), W.A. Mozart, and Ludwig van Beethoven. In Romantic music—*e.g.,* Richard Wagner's *Tannhäuser*—they are frequently used to mark a dramatic

climax. Traditionally the best cymbals came from Turkey—their manufacture and coppertin alloy a guarded family secret.

Of indefinite pitch, modern cymbals are about 14–18 inches (36–46 cm) in diameter, domed at the centre (where the holding strap is attached), and slightly tapered to secure contact at the edges only. They are capable of a wide dynamic range. Though usually clashed or brushed together, they may also be operated with a foot pedal, or a single cymbal may be struck with a brush or a hard- or soft-ended drumstick. Other techniques are also used in jazz and dance bands.

The "ancient cymbals," or crotals (used, for example, by Claude Debussy), are small, castanet-like finger cymbals sounding high notes of definite pitch; they have been used in the Middle East since ancient times, primarily as dancers' instruments.

cymbidium (genus *Cymbidium*), any of about 70 species of tropical and subtropical Asian orchids, family Orchidaceae, containing several thousand man-made hybrids. The flowers range from white and pale yellow to green, maroon, and dark bronze.



Cymbidium
Derek Fell

Cymbidium species grow in soil or on other plants and are popular as florists' plants and ornamentals. Most have short pseudobulbs (bulblike stem bases), straplike, leathery leaves, and many flowers on each flower stalk.

cymophane, variety of the gemstone chrysoberyl (*q.v.*).

Cymraeg: *see* Welsh language.

Cymru: *see* Wales.

Cynddelw BRYDYDD MAWR (Welsh: "Cynddelw the Great Poet") (fl. 1155–1200), outstanding Welsh poet of the 12th century, court bard to Madog ap Maredudd, prince of Powys (d. 1160), and then to Madog's enemy Owain Gwynedd, prince of Gwynedd (d. 1170). The extant poems ascribed to him (about 50), composed in the Welsh bardic tradition of deliberate archaism, include a small amount of religious verse and a large number of eulogies to the chief princes throughout Wales. Cynddelw seems, therefore, to have been the chief bard of all of Wales.

Cynegils (d. 643), king of the West Saxons, or Wessex (611–643), in England and the first to be converted to Christianity.

With his son Cwichelm (d. 636), Cynegils defeated the advancing Britons at Bampton in Oxfordshire in 614, and Cwichelm sought to arrest the growing power of the Northumbrian king Eadwine by procuring his assassination. The attempt, however, failed, and in 626 the West Saxons were defeated in battle and forced to own Eadwine's supremacy.

Cynegils' next struggle was with Penda of Mercia at Cirencester in 628. There again he was defeated in battle, and he was quite probably compelled to surrender a portion of his kingdom to Mercia. Cynegils was converted to Christianity and was baptized in 635 at Dorchester in Oxfordshire, where he founded a bishopric. He was succeeded as king by his son Cenwalh.

Cynewulf (d. 786), king of the West Saxons, or Wessex (757–786), in England who succeeded to the throne following the deposition of Sigebert. Cynewulf was constantly at war with the Welsh. In 779 Offa of Mercia defeated him and took Bensington. In 785 he was surprised and killed, with all his thanes present, at Marten, in modern Wiltshire (Merantune), by Cyneheard, the brother of the deposed Sigebert.

Cynewulf, also spelled CYNWULF, or KYNEWULF (fl. 8th or 9th century AD, Northumbria or Mercia [now in England]), author of four Old English poems preserved in late 10th-century manuscripts. *Elene* and *The Fates of the Apostles* are in the Vercelli Book, and *The Ascension* (which forms the second part of a trilogy, *Christ,* and is also called *Christ II*) and *Juliana* are in the Exeter Book. An epilogue to each poem, asking for prayers for the author, contains runic characters representing the letters *c, y, n, (e), w, u, l, f,* which are thought to spell his name. A rhymed passage in the *Elene* proves that the author was from Northumbria or Mercia. Nothing is known of him outside his poems, as there is no reason to identify him with any of the recorded persons bearing this common name. He may have been a learned cleric since all of the poems are based on Latin sources.

Elene, a poem of 1,321 lines, is an account of the finding of the True Cross by St. Helena.

The Fates of the Apostles, 122 lines, is a versified martyrology describing the mission and death of each of the Twelve Apostles.

Christ II (*The Ascension*) is a lyrical version of a homily on the Ascension written by Pope Gregory I the Great. It is part of a trilogy on Christ by different authors.

Juliana, a poem of 731 lines, is a retelling of a Latin prose life of St. Juliana, a maiden who rejected the suit of a Roman prefect, Eleusius, because of her faith and consequently was made to suffer numerous torments.

Although the poems do not have great power or originality, they are more than mere paraphrases. Imagery from everyday Old English life and from the Germanic epic tradition enlivens descriptions of battles and sea voyages. At the same time, the poet, a careful and skillful craftsman, consciously applies the principles of Latin rhetoric to achieve a clarity and orderly narrative progress that is quite unlike the confusion and circumlocution of the native English style.

cynghanedd (Welsh: "harmony"), Welsh poetic device, a complicated system of accentuation, alliteration, and internal rhyme, obligatory in the 24 strict metres of Welsh bardic verse. *Cynghanedd* had developed by the 13th century from the prosodic devices of the early bards and was formally codified at the Caerwys Eisteddfod (Assembly of Bards) of 1524. The device became an obligatory adornment of poems in the strict (classical bardic) metres. In its simplest form *cynghanedd* involves an internal rhyme of a syllable in the first part of a line with the penultimate accented syllable of the line. There are four fundamental types of *cynghanedd,* but within these there are a number of refinements and variations. When skillfully used, *cynghanedd* is capable of conveying an almost unlimited variety of subtle effects.

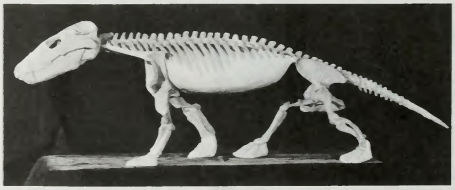
Cynic, any member of a Greek philosophical sect that flourished from the 4th century BC to well into Christian times and was distinguished more for its unconventional way of life than for any system of thought. Antisthenes, a disciple of Socrates, is considered to be the founder of the movement, but Diogenes (*q.v.*) of Sinope was its paradigm. He strove to destroy social conventions (including family life) as a way of returning to a "natural" life. Toward this end he lived as a vagabond pauper, slept in public buildings, and begged his food. He also advocated shamelessness (performing actions that were harmful to no one but unconventional in certain circumstances), outspokenness (to further his cause), and training in austerity.

cynodont (suborder or infraorder Cynodontia), mammallike reptiles of the order Therapsida (*see* therapsid) that existed from the Late Permian to the Early Jurassic Epoch (258 to 187 million years ago). Cynodont fossils have been found in China, South Africa, South America, and North America. (Examples in North America were not reported until 1989, from sites in Virginia, U.S.)

The cynodont skull has many features anticipating that of a mammal. Notably, it has a secondary palate, as in a mammal, allowing it to simultaneously chew food and breathe, making for quicker digestion. (Most reptiles do not chew food but swallow it in large pieces, digesting slowly.) Thus cynodonts probably had a metabolic rate and large food requirement similar to mammals. They also had differentiated teeth, jaw bones, and jaw muscles suitable for chewing. Though the brain remained small, the braincase had an almost mammalian appearance, presaging the enlargement of the brain in mammalian descendants. Otherwise, the skeleton remained largely reptilian (the front and back limbs were appended on the sides, not underneath the body), signifying a sprawling posture and gait.

The suborder Cynodontia contains, according to some classifications, five families—Procynosuchidae, Galesauridae, Tritylodontidae, Chiniquodontidae, and Trithelodontidae. The first mammals probably derived from small carnivorous chiniquodontids or trithelodonts sometime in the Middle Triassic Epoch (240 to 230 million years ago).

Cynognathus, genus of extinct advanced mammallike reptiles found as fossils in Lower



Restored skeleton of *Cynognathus*
By courtesy of the American Museum of Natural History, New York

and Middle Triassic deposits in South Africa (those from 245 to 230 million years old). *Cynognathus* is representative of the Theriodontia, a group of therapsid (mammallike) reptiles that through time gave rise to the earliest mammals.

Cynognathus was approximately as large as a modern wolf and, like the wolf, was an active predator. The body of *Cynognathus* was not massively constructed. The limbs were tucked well under and close to the body, providing the potential for rapid and efficient locomotion. The tail was long and well developed. The animal's skull was long and had openings for the attachment of strong muscles used in opening and closing the jaws. The lower jaw was dominated by the dentary bone; the other lower-jaw elements that are characteristic of reptiles were reduced and insignificant. The teeth were advanced in character; regional specialization of the dentition is evident, a mammalian feature. Incisors were present and adapted to nipping. These were followed by strongly developed canines, important features in predatory animals. Separated from the canines by a gap, or diastema, was a series of cheek teeth that sliced the animal's food into smaller, more easily swallowed particles. A well-developed secondary palate separated food passages from breathing passages. The vertebral column was well differentiated.

Cynon Valley, district, Mid Glamorgan county, southern Wales. It was created in 1974 and encompasses the entire Cynon River valley from the town of Abercynon in the south to the southern reaches of Brecon Beacons National Park in the north. Cynon Valley district borders the districts of Brecknock to the north, Merthyr Tydfil to the east, Taff-Ely to the south, and Rhondda to the east. Archaeological evidence of Iron Age settlement was discovered in northern Cynon Valley when a natural lake near Hirwaun was converted to a reservoir in 1911. The town of Aberdare, the administrative seat of the district, dates from the Middle Ages; its Church of St. John was built in about 1189 and is one of the oldest churches in Glamorgan. Significant industrial growth took place in Cynon Valley during the 18th and 19th centuries when the rich deposits of coal and iron ore in South Wales were discovered and exploited. Mining towns such as Aberdare, Mountain Ash, and Hirwaun prospered until the market for steam coal slumped after 1918 and the resulting industrial decline brought serious and persistent unemployment to the region.

Industry in the district has been diversified to include the manufacture of cables and smokeless fuel at Aberdare, carpet making and linen mills in Mountain Ash, and light engineering and electrical-products manufacturing in Hirwaun. Recreational areas that are protected from mining and industry include Brecon Beacons National Park in northern Cynon Valley, and the Dare Valley Country Park. A huge pavilion, which was constructed in Mountain Ash in 1906 for the National *Eisteddfod* (Welsh cultural festival), is the site of regional music festivals and other gatherings. Area 68 square miles (176 square km). Pop. (1991 prelim.) 63,600.

Cynoscephalae (Greek: "Dogs' Heads"), ancient range of hills in Thessaly, Greece, 7 miles (11 km) west of modern Vólos. It was the site of the victory (197 BC) that ended the Second Macedonian War when the Romans under Titus Quinctius Flamininus defeated Philip V of Macedon. The combat engaged about 26,000 men on each side. The outcome hung in the balance, each side prevailing on its own right wing, until a detachment led by an unknown Roman tribune cut through the flank and rear of the Macedonian right. Philip fled, leaving 8,000 dead and 5,000 captured. An earlier, less-celebrated battle that was fought there resulted in the triumph of the Theban general Pelopidas over Alexander, tyrant of Pherae, in 364 BC.

Cynric (d. 560), king of the West Saxons, or Wessex (from 534). By some accounts he also reigned jointly (519–534) with his grandfather (or father?), Cerdic, founder of Wessex. The period was apparently one of consolidating gains climaxed by the Battle of Mount Badon (520) rather than a period of further expansion, though Cynric is said to have routed Britons in battle at least once, at a place called Searobyrg (552). He was succeeded by his son Ceawlin.



(Top to bottom) Sedge (*Carex vesicaria*); umbrella plant (*Cyperus alternifolius*); bulrush (*Scirpus palustris*); cotton grass (*Eriophorum*)

(Top to bottom) A.J. Jermy, Walter Chandoha, Ingmar Holmasen, Russ Kinne—Photo Researchers

Cynthius: *see* Giraldi, Giambattista.

Cynwulf (Old English poet): *see* Cynewulf.

Cyperaceae, the sedge family of monocotyledonous flowering plants, with some 5,000 species of grasslike herbs of wet regions throughout the world. It is one of the 10 largest families of flowering plants.

A brief treatment of Cyperaceae follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The plants are characterized by the presence of solid stems that are often triangular in cross section; of leaves, when present, with a sheath clasping the stem and the two margins of the sheath coalescent; and of minute flowers in a small spike not enclosed by a leaflike structure (bract). Each flower consists of a single pistil (female part) and two or three stamens (male parts) set in the axil (upper angle) of a small bract. The stems range in height from a few centimetres to 4 m (about 13 feet) or more. Nearly all species are wind-pollinated.

Often confused with grasses (family Poaceae), sedges are distinguished by the aforementioned characteristics. Grasses, for example, have round, hollow stems, leaves with noncoalescent sheaths, flowers enclosed by two bracts, and the whole flowering cluster (spikelet) enclosed by two more bracts. Although the Cyperaceae are similar in appearance to grasses and are placed in the same order (Cyperales), there is a growing body of evidence that suggests that the closest relatives of Cyperaceae are the rushes (family Juncaceae, order Juncales).

The largest genera include the sedges (*Carex,* with about 2,000 species); the galingales (*Cyperus,* nearly 650 species); the beak rushes (*Rhynchospora,* about 250 species); and *Fimbristylis, Eleocharis,* and *Scleria* (each with about 200 species). Other large genera include *Bulbostylis* and *Schoenus* (each with about 100 species) and *Mapania* (about 80 species).

Although the group as a whole is of little economic importance, several species are notable. Among them is the papyrus (*Cyperus papyrus*), the pith of which was used by the ancient Egyptians for making paper. The papyrus is now often grown ornamentally. Other cultivated genera include *Carex, Eleocharis* (the spike rushes), *Scirpus* (bulrushes or club rushes), and *Eriophorum.* The umbrella plant (*Cyperus alternifolius*) is a popular potted plant growing to 1.2 m, each stem producing an umbrella-shaped cluster of leaves at its top. The yellow nut sedge (*C. esculentus*) is considered a grassy weed in many north temperate locations. Its tubers, and those of related *Cyperus* species, are edible, especially so in *C. esculentus sativus,* a variety known as chufa, or earth almond, which is rich in stored starch, sugar, and fat. The Chinese water chestnut (*Eleocharis dulcis*) is one of the edible water chestnuts. Two ornamental bulrushes are frequently grown in bog or water gardens, *Scirpus cernuus* and *S. tabernaemontani.* The cotton grasses (*Eriophorum* species) are also bog-garden favourites.

Cyperales, order of flowering plants belonging to the class Liliopsida (monocotyledons). The Cyperales are generally annual or perennial herbs; a few are woody. They have reduced, mostly wind-pollinated or self-pollinated flowers. The flowers have a unilocular ovary with two to three carpels and a single ovule; the ovary ripens into an indehiscent fruit. The flowers form simple or complex spikes or spikelets that represent reduced in-

florescences. The perianth is lacking or is represented by a set of bristles or tiny scales. The leaves generally have a well-defined sheath and a parallel-veined, usually narrow and elongated blade; often there is a small adaxial appendage, called a ligule, at the junction of the sheath and blade.

The order contains two families: the Cyperaceae, or sedges, with about 5,000 species; and the Poaceae (*q.v.*; also called Gramineae), or grasses, with some 8,000 to 10,000 species. The Poaceae are one of the most important families of plants; grasses form the dominant vegetation over large portions of the Earth. Some authorities have classified the Cyperaceae and Poaceae as separate, unifamilial orders: Cyperales and Poales (or Graminales).

cypress, any of about 20 species of ornamental and timber evergreen conifers constituting the genus *Cupressus* of the family Cupressaceae, distributed throughout warm-temperate and subtropical regions of Asia, Europe,



Italian cypress (*Cupressus sempervirens*)
W.H. Hodge

and North America. Many resinous, aromatic evergreen trees called cypress belong to other genera of the same family, especially species of false cypress and cypress pine (*qq.v.*). The name "cypress" is occasionally used for some species of fustic and for bald cypress (*qq.v.*); in eastern Canada it often denotes jack pine.

Cypress trees are often 25 m (80 feet) tall and are pyramidal in shape, especially when young. Some species develop flattened, spreading heads at maturity, and others are shrubs less than 6 m tall. Their bark is sometimes smooth, but in most species it separates into thin plates or strips that may be shed from the tree. The leaves are spreading and awl-shaped on young shoots but are characteristically small, scalelike, and appressed to the branch on older branchlets. They are usually aromatic, with glandular pits on the outer surface, and cover the stem in opposite pairs, giving the branchlet a four-sided appearance.

Tiny male and female reproductive structures (cones) are borne on the same tree, generally at the tips of different branches. The cones are small, usually spherical, with three to six pairs of woody or leathery scales that are attached to the cone axis by the back of the scale, and have a small projection on the outer surface. Fertile scales bear from 6 to more than 100 winged seeds each, depending on the species; the seeds ripen at the end of the second season after fertilization, but they may be retained for several more years until the cone breaks open.

Cypresses are of limited importance as timber trees; the most useful wood is obtained from the Bhutan, Italian, and Monterey cypresses (*C. torulosa, C. sempervirens,* and *C. macrocarpa,* respectively). Their wood is light, moderately hard, and very durable in contact with the soil but is usually knotty and has an odour sometimes considered offensive. These three trees, together with the Arizona (*C. arizonica* and *C. glabra*), Gowen (*C. goveniana*), Kashmir (*C. cashmeriana*), Mexican (*C. lusitanica*), mourning (*C. funebris*), and Sargent (*C. sargentii*) cypresses, are cultivated as ornamentals for their foliage and graceful habit, especially when young. Mourning and Italian cypresses have been used by some cultures as symbols of death and immortality. The hybrid or Leyland cypress (*Cupressocyparis leylandii*) is an ornamental windbreak developed by crossing the Monterey cypress with the yellow cypress (*Chamaecyparis nootkatensis*).

Cypresses do not withstand severe frost. They have few insect pests but are susceptible to crown gall, stem canker, and root rot.

Cypress Hills, isolated range in southeastern Alberta and southwestern Saskatchewan, Canada, extending for 100 miles (160 km) in an east-west direction, north of the Montana, U.S., border. Rising to 4,816 feet (1,468 m—the highest point in Saskatchewan), the hills are the most prominent relief in the southern prairies. Heavily wooded, they serve primarily as a recreation area with two provincial parks (51,200 acres [20,720 hectares] in Alberta, 44,800 acres in Saskatchewan), although coal has been mined in their eastern foothills near Shaunavon, Sask. Incorrectly named "cypress" (by Captain John Palliser, a British government surveyor, on a map he drew in 1857), for the jack pine trees that covered their slopes, the hills contain pre-Ice Age fossils, flowers, and rocks of subtropical variety found nowhere else in Canada.

cypress pine, any of the ornamental and timber shrubs and trees of two closely related genera (*Callitris* and *Widdringtonia*) of the family Cupressaceae.

About 16 species constitute the genus *Callitris;* they are native to Australasia and grow best in arid localities. The mature leaves of the trees are borne in whorls of three; their tips are often thickened and curve inward. *Callitris* wood is often attractively marked and is resistant to termite attack. Tannin, resin, and fragrant oils are extracted from the trees. The most important timber trees of the genus are the Murray River pine, or white cypress pine (*C. columellaris*), found throughout Australia; the black cypress pine (*C. endlicheri*) of eastern Australia, also locally called black pine, red pine, and scrub pine; the Port Macquarie pine, or stringybark (*C. macleayana*), of southeastern Australia; and the common cypress pine (*C. preissii*) of southern Australia, a tree often shrubby near the seacoast, with one subspecies called slender pine and another known as turpentine pine. Most of these timber trees are about 25 m (about 80 feet) tall, but the Port Macquarie pine, also planted as an ornamental, may reach 45 m. Timber from the Oyster Bay pine (*C. rhomboidea*), a coastal tree of eastern and southern Australia, usually 9 to 15 m tall, is used for local construction.

The South African genus *Widdringtonia* includes five species of evergreen shrubs, or tall trees, sometimes called African cypresses. Some species produce fragrant, durable, yellowish or brownish wood of local importance, such as Clanwilliam cedar, or Cape cedar (*W. juniperoides*), a tree 6 to 18 m tall, with widespreading branches, found in the Cedarburg Mountains. Willowmore cedar (*W. schwarzii*), a tree from Cape Province, is usually gnarled and about 15 m tall under unfavourable growing conditions but may reach 30 m and have a graceful shape in better habitats. The Berg cypress, or sapree-wood (*W. cupressoides*), usually is a shrub 2 to 4 m high. The Mlanje cedar (*W. whytei*), up to 45 m tall, is the most valuable timber tree of the genus.

cypress vine (*Ipomoea quamoclit*), tropical American twining climber naturalized in southern North America. It has star-shaped scarlet, pink, or white blooms amid deep green, deeply lobed leaves. It is a member



Cypress vine (*Ipomoea quamoclit*)
Derek Fell

of the morning glory family (Convolvulaceae) and is an annual. The closely related star ipomoea (*I. coccinea*), with crimson flowers and heart-shaped leaves, which grows wild over much the same area, is also an annual.

Cyprian, SAINT, Latin in full THASCIUS CAECILIUS CYPRIANUS (b. *c.* AD 200, Carthage—d. Sept. 14, 258, Carthage; Western and Eastern feast day September 16; Anglican feast day September 26), early Christian theologian and bishop of Carthage who led the Christians of North Africa during a period of persecution from Rome. Upon his execution he became the first bishop-martyr of Africa.

Bishop during the Decian persecution. Cyprian was born of wealthy pagan parents and was educated in law. He practiced as a lawyer in Carthage before he was converted to



St. Cyprian, detail of a polyptych by Girolamo di Giovanni da Camerino, 1473; in the Church of Santa Maria del Pozzo, Monte San Martino, Italy
By courtesy of the Gabinetto Fotografico Nazionale, Rome

Christianity about 246. In baptism he found complete release from the sinful and useless life he believed he had led hitherto. Within two years he was elected bishop of Carthage and a few months later, early in 250, was con-

fronted by the Decian persecution. He went into hiding. Bereft of his leadership, thousands of Christians apostatized (rejected their faith) or obtained *libelli* (certificates), by which they declared that they had sacrificed to the pagan gods. When the persecution began to diminish, the confessors—*i.e.*, those who had stood firm for their faith—reconciled the lapsed on easy terms, claiming that as "friends of Christ" they had the right of granting pardon, even more than did priests and bishops. Cyprian returned to Carthage (early 251) and at a council of bishops in May 251 was able to regain his authority. The decision of the council was that, though no one should be totally excluded from penance, those who truly had sacrificed (the *sacrificati*) should be readmitted only on their deathbeds, and those who had merely accepted certificates (the *libellatici*) were to be readmitted after varying periods of penance. Three important principles of church discipline were thus established. First, the right and power to remit deadly sins, even that of apostasy, lay in the hands of the church; second, the final authority in disciplinary matters rested with the bishops in council as repositories of the Holy Spirit; and, third, unworthy members among the laity must be accepted in the New Israel of Christianity just as in the Old Israel of Judaism.

In 252 a renewed threat of persecution by the emperor Gallus encouraged a more speedy reintegration of the lapsed, because many now wanted to prove themselves as martyrs. In the same year, the steadfastness of the Christian clergy in face of a plague won for the church further popular support, and Cyprian defeated internal enemies who had set up a rival bishop in Carthage.

Relations with Rome. In the summer of 254 his position was tested again by a dispute with Stephen, bishop of Rome (254–257). Until then relations between the churches of Carthage and Rome had been cordial. In 251 Cyprian had supported Bishop Cornelius against his rival, Novatian, and had written on his behalf the treatise *On the Unity of the Catholic Church,* which stressed the centrality of the see of Peter (Rome) as the source of the episcopacy. Though Cyprian may have written two drafts of an important passage concerning the primacy of the chair of Peter, he implied no acceptance of Roman jurisdictional prerogatives. When in 254 two Spanish congregations (Mérida and León) appealed to him against a decision by Stephen to restore bishops who had lapsed during the persecution, he summoned a council to consider the case. The council decided that the congregations not only had a right but a duty to separate themselves from a cleric who had committed a deadly sin such as apostasy. Cyprian wrote (Letter 67) that the Holy Spirit was no longer in such a priest and that his sacraments would lead to perdition and not salvation. The church as the "pure Bride of Christ" might be obliged to absorb a sinful laity, but a sinful priest making offerings on behalf of the people was unthinkable.

Within months there was an even more serious dispute with Rome. For a few years the supporters of Novatian had been active in Africa, asserting against Cyprian that no forgiveness for lapsed Christians was possible. With the recovery of Cyprian's prestige, however, their threat began to fade. Many of those whom they had baptized clamoured to be admitted to the church. Was their baptism valid or not? In Rome, Stephen, confronted by the same problem, decided that all baptism in the name of the Trinity was valid. The Africans at first were of two minds. Cyprian held three councils between the autumn of 255 and September 256. The last, at which 87 bishops were present, decided unanimously that there could be no baptism outside the church, just as there could not be faith, hope, or salvation for those outside it. A minister could not dispense what he himself did not possess, namely, the Holy Spirit. Those who had received baptism from Novatianists must be baptized anew. Behind this clash over rites lay the more fundamental question concerning the nature of the church. Though Rome emphasized the church's universal and inevitably mixed character on earth, the North Africans stressed its integrity under all circumstances. Baptism entailed total renunciation of the world and the reception of the Spirit.

Persecution under Valerian. A complete breach between Rome and Carthage was averted by Stephen's death on Aug. 2, 257, and his successor, Sixtus II, was more conciliatory. Meanwhile, persecution had been renewed by the emperor Valerian (253–260). On Aug. 30, 257, Cyprian was summoned before the proconsul, Aspasius Paternus, and assigned an enforced residence at Curubis (Kurba) on the Gulf of Hammamet. Following a more severe edict the next year, he was brought back to Carthage, tried, and condemned to death.

During the previous seven years his character had matured. Though not the "man of moderation" eulogized by his biographer, he had shown himself a brave and resourceful leader of the church in Africa. His theology was based on the central idea of the unity and uniqueness of the church: "He no longer has God for his Father, who does not have the Church for his mother" (*On the Unity of the Catholic Church*). Unity was expressed through the consensus of bishops, all equally possessing the Holy Spirit and sovereign in their own sees. There was no "bishop of bishops." The church consisted of the people united to their bishop. Schism and rebellion against the priesthood were viewed as the worst of sins. These views—associated with an uncompromising insistence on the integrity and exclusive character of the church, which are believed to have been derived from the North African theologian Tertullian—received divine sanction for most North African Christians through his martyrdom.

(W.H.C.F.)

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Cyprian, SAINT, Russian KIPRIAN (b. *c.* 1336, Bulgaria—d. Sept. 16, 1406, Moscow, Russia; canonized 15th century; feast day September 16), metropolitan of Moscow in 1381–82 and 1390–1406.

Educated in Greece, Cyprian was appointed by Constantinople to be metropolitan of Kiev and Lithuania in 1375 and then of Moscow in 1381. In 1382 Cyprian was forced into exile by the prince of Moscow, Dmitry, who rejected all appointments made by Constantinople. Eight years later, following the succession of Dmitry's son, Vasily I, Cyprian resumed his position.

Cyprian introduced Byzantine liturgical reforms into the Russian Orthodox church: he replaced the old Russian format of prayer and chanting in the church, called the Rule of the Studion, with a new format, the Rule of Jerusalem, or of St. Savvas. He also introduced into Russia new versions of liturgical books that were then being used in Constantinople.

Cypriot syllabary, system of writing used on the island of Cyprus, chiefly from the 6th to the 3rd century BC. The syllabary consists of 56 signs, each of which represents a different syllable. Most inscriptions written with this syllabary are in the Greek language, although the syllabary was originally designed for writing the earlier non-Greek language of Cyprus. The classical Cypriot syllabary is apparently a late development of the still undeciphered Cypro-Minoan script (containing 63 syllabic symbols), which was found on a number of clay tablets from Cyprus and Syria and dates from about 1500 to about 1100 BC. The Cypro-Minoan script in turn is thought to be a distant offshoot of the early Cretan scripts (Linear A and Linear B).

Cyprus, Greek KÍPROS, Turkish KIBRIS, island located in the northeastern Mediterranean Sea; it is the third largest island in the Mediterranean, covering an area of 3,572 square miles (9,251 square km). It is bounded by latitudes 35°45′ and 34°30′ N (extending about 60 miles [97 km] north and south) and



Cyprus

by longitudes 32°15′ and 34°30′ E (extending about 140 miles [225 km] east and west). The island lies about 40 miles (64 km) south of Turkey, 60 miles (97 km) west of Syria, and 250 miles (402 km) north of Egypt's Nile Delta. Its coastline is 486 miles (782 km) in length.

Administratively, the island consists of the Republic of Cyprus (Greek: *Kipriakí Dimokratía,* Turkish: *Kıbrıs Cumhuriyeti*) with a Greek-speaking majority and a Turkish-speaking minority; the capital is Nicosia. In 1974, however, aided by an invasion of troops from the Turkish mainland, the Turkish Cypriots established a separate state on the northern third of the island. Known as the Turkish Republic of Northern Cyprus (*Kuzey Kıbrıs Türk Cumhuriyeti*) following a unilateral declaration of independence in 1983, it is not recognized internationally. Its capital is also Nicosia, in the part of the city (Lefkoşa) that is within the Turkish sector. Pop. (1993) whole Island of Cyprus, 764,000.

A brief treatment of Cyprus follows. For full treatment, *see* MACROPAEDIA: Cyprus.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The island of Cyprus may be divided, from north to south, into four distinct physiographic regions. The Kyrenia Mountain region, running for 100 miles (160 km) along the northern coast and the Karpas Peninsula, is a narrow limestone range, generally no higher than 3,000 feet (900 m). The Troodos Massif occupies the southwestern half of Cyprus, including Mount Olympus (also called Mount Troodos), the country's highest peak at 6,401 feet (1,951 m). It is separated from the Kyrenian range by the fertile heartland of the island, the Mesaorian Plain, some 80 miles (129 km) long and 15 to 30 miles (24 to 48 km) wide. The southeastern portion of the island is composed of a high plateau that merges into the country's fertile coastal plains.

The climate is Mediterranean. Average precipitation is about 20 inches (500 mm) per year; every river on the island is dry at least part of the year. More than half of Cyprus' precipitation occurs in winter and less than a tenth in summer. At Nicosia in the Mesaorian Plain the average annual temperature is about 67° F (19° C). All the major rivers orig-

inate in the Troodos highlands; the Pedieos (the largest) flows eastward toward Famagusta Bay, the Karyoti westward to Morphou Bay, and the Kouris southward to Episkopi Bay.

One-sixth of the island's land area is arable, most of it in the Mesaoria Plain, which has deep alluvial soils. The Mesaoria Plain lies mostly in the Turkish sector of the island. Agricultural productivity, however, is limited by inadequate water supplies; much cropland is irrigated, and the undependability of rainfall guarantees periodic droughts. Almost one-seventh of the land is forested, mainly in the mountains and the Paphos region. Many animal species have been overhunted; the *agrino* (related to the Mediterranean mouflon, or wild sheep) is considered endangered. Cyprus has nearly exhausted its copper deposits but has reserves of chromite, gypsum, iron pyrites, and asbestos.

The people. The people of Cyprus represent two main ethnic groups, Greek and Turkish. The Greek-speaking population has inhabited the island the longest. The Turkish-speaking Cypriots are largely the descendants of the Ottoman Turks who occupied the island from 1571 until 1878. The Greek Cypriots are Eastern Orthodox Christians, and the Turkish Cypriots are Sunnite Muslims. English is widely spoken and understood as a second language.

Of the island's total population, four-fifths are Greek-speaking people living in the Greek sector, and the rest are Turkish-speaking people living in the Turkish sector. About one-fourth of the population in the Republic of Cyprus is less than 15 years of age.

Limited economic opportunity at home has long stimulated Cypriots to emigrate, mostly to the United Kingdom. There was, in fact, a marked increase in emigration immediately after Cyprus attained independence from Great Britain in 1960. The Turkish invasion of northern Cyprus in 1974 brought a prolonged resettlement of Greek and Turkish Cypriots to their respective sectors.

The Cypriots are now largely urbanized, although there are only six major towns. Nicosia is now split between the Greek and Turkish sectors. Famagusta, once the island's principal port, and Kyrenia are in the Turkish sector. Limassol, the southern port, Larnaca, and Paphos are in the Greek sector.

The economy. The Republic of Cyprus has a free-enterprise economy based mainly upon trade and manufacturing. The gross national product (GNP) is growing more rapidly than the population; the GNP per capita is similar to that of other eastern Mediterranean countries. The Turkish sector's GNP per capita is significantly lower than that of the Republic of Cyprus. The gross domestic product (GDP) in the Greek sector originates principally from and is almost equally divided among trade, manufacturing, and finance. The Turkish sector's GDP is derived mostly from trade, public administration, finance, and agriculture.

Of the arable land on the island of Cyprus, about one-fourth is irrigated, mainly in the cereal-growing Mesaoria Plain and around Paphos, where citrus fruits have been introduced. The principal crops in the Greek sector are potatoes, grapes, citrus fruits (mainly oranges and grapefruits), and cereals (barley and wheat). Citrus fruits, wheat, barley, potatoes, and carob, are important in the Turkish sector. Pastures occupy about one-tenth of the island's total land area, and the principal livestock include sheep, goats, and pigs.

The mineral industry in the Greek sector is well developed, producing limestone, marl, gypsum, marble, bentonite clay, iron pyrites, and chrome ore.

Manufacturing in the Republic of Cyprus has recovered dramatically from the disruption of 1974, when most industrial plants fell under Turkish control. The principal products are refined petroleum, cement, mosaic tile, wine, beer, footwear, cigarettes, clothing, and bricks. All the electricity in the Greek sector is produced by thermal power plants. The Greek sector supplies electricity to the Turkish sector in return for water.

The construction industry in the Greek sector since 1974 has concentrated upon housing, tourist facilities, industrial plants, a new airport at Paphos, and new ports on the southern coast.

Tourism, an important source of foreign exchange, has increased far beyond the pre-1974 levels in the Greek sector. In the Turkish sector most of the visitors come from Turkey.

Greek Cypriot budgetary revenue originates primarily from taxes. About two-thirds of the Turkish sector's revenue is from taxes, the rest from loans and aid from the government of Turkey. Greek Cypriot expenditures include those for public debt, subsidies, education, police, and health. Turkish-sector expenditures are mostly for health and social services, water, housing, communications, and economic development.

About half the roads on the island of Cyprus are paved. The Greek Cypriot government has built ports at Larnaca and Limassol to replace ports lost to the Turks in 1974. Larnaca and Paphos in the Republic of Cyprus have international airports, and there is an airport at Geçitiikale (Greek: Lefkoniko) with service to Turkey.

The value of Greek Cypriot exports is only about one-third that of imports. Clothing, potatoes, footwear, and citrus fruit are the principal exports. The principal importers of Cypriot products are the United Kingdom, Lebanon, and Greece. The principal imports are consumer goods, capital goods, transport equipment, and mineral fuels. Principal import sources are the United States, Italy, and Germany.

Turkish Cypriot exports, at about one-seventh the value of imports, are mainly citrus fruits, potatoes, carob, and tobacco. The United Kingdom receives about half the exports, followed by Turkey. Imports, such as machinery and transport equipment, and food are mostly from Turkey and the United Kingdom.

Government and social conditions. In 1974 Turkish forces invaded northern Cyprus, and in 1975 the northern sector became the Turkish Federated State of Cyprus with its own constitution. In 1983 the Turkish sector declared itself an independent state as the Turkish Republic of Northern Cyprus, and in 1985 it approved a new constitution. The government functions with an elected president and legislative assembly, all serving five-year terms of office; the president appoints a prime minister from among the assembly members. The sector's highest judicial authority is the Supreme Court.

The government of the Greek sector derives its authority from the 1960 constitution of the Republic of Cyprus, which provides for a democratically elected president and House of Representatives, with 70 percent of its members elected by the Greek community and 30 percent by the Turkish community. Since the Turkish occupation of northern Cyprus, however, all seats in the House of Representatives have been held by Greek Cypriots. Highest judicial authority is vested in a Supreme Court.

Both communities have devoted major resources to the health and housing of thousands of war refugees. Despite problems, such as a shortage of medical personnel, health conditions are relatively good on the island. Life expectancy in the Greek sector is 75 years for men and 79 years for women.

Literacy in the Republic of Cyprus is more than 95 percent. Primary education is free and compulsory for children for six years, beginning at age five. The first three years of secondary education are also free and compulsory. In the Turkish sector, education is divided into formal (primary, secondary, and higher) and adult education. Eastern Mediterranean University (1979) in the Turkish sector and the University of Cyprus (1989) in the Greek sector are the main institutions of higher education. The Greek sector also has colleges of art, forestry, engineering, and business management.

Cultural life. Folk arts have had a rich tradition in Cyprus, especially music, dance, and handicrafts. The Folk Art Museum in Nicosia exhibits many fine examples of traditional handicrafts.

History. Cyprus was inhabited by the early Neolithic Age (9th–10th millennia BC) and by the late Bronze Age (*c.* 1600 BC–*c.* 1050 BC) had become a trading centre, visited and settled by Mycenaeans and Achaeans, who introduced Greek culture and language. By 800 BC, Phoenicians had begun to settle there. By the 7th century BC, 11 known Cypriot kingdoms had achieved great wealth and influence under the sway of Assyria.

After the death of Alexander the Great (323 BC), Cyprus passed to the Ptolemies of Egypt. It was annexed by the Romans in 58 BC, and Christianity reputedly reached the island as early as AD 45. The apostle Paul's assistant Barnabas was a native Cypriot, and Paul himself is believed to have preached there. Jewish refugees arrived from Jerusalem in the late 1st century. In 116 a Jewish revolt was suppressed by the Roman emperor Hadrian, who expelled the Jews from the island.

After the division of the Roman Empire in 395, Cyprus remained subject to the Byzantine emperors, with brief interruptions, for more than 700 years. Muslim Arab attacks began in the 7th century, and for the next 300 years the island was treated as mutual territory of the Byzantine Empire and the Caliphate. Richard I of England, on a crusade to the Holy Land, conquered the island in 1191 and bestowed it on Guy de Lusignan, the dispossessed king of Jerusalem, who founded a feudal monarchy there that lasted through the Middle Ages. Merchants from Genoa and Venice gained increasing control of the island's trade until, in the 15th century, it became part of the Venetian empire.

The Ottoman Turks wrested away control of Cyprus in 1573. They restored the Orthodox archbishopric, but early enlightenment in their rule gave way later to oppression and neglect of the island. Serious uprisings began in the 18th and continued well into the 19th century. In 1878 the British assumed control of Cyprus in agreement with the Turkish sultan, who remained sovereign, but in World War I the British annexed Cyprus, later offering it to Greece (1915); the offer lapsed and Cyprus became a crown colony in 1924.

A Greek Cypriot movement for *énosis* (union) with Greece accelerated after World War II, punctuated by acts of terrorism against Cypriot and British opponents. The Turkish minority agitated for partition. A compromise joint government with majority Greek representation was approved in 1959, and Cyprus became an independent republic in 1960, but violence and *énosis* agitation continued. In 1974 the Cyprus National Guard, under Greek officers, staged a coup. Turkish forces then invaded Cyprus and at a cease-fire a month later had control of the northern third of the country. The Turkish Cypriots established a functioning government but obtained recognition as a sovereign country only from Turkey. Reunification talks remained deadlocked in the late 20th century.

Cyprus, Church of, also called ORTHODOX CHURCH OF CYPRUS, one of the oldest autocephalous, or ecclesiastically independent, churches of the Eastern Orthodox commu-

nion. Its independence, first recognized by the third ecumenical Council of Ephesus (431), was reaffirmed by the Council in Trullo (692) and was never lost, not even during the occupation of the island by the crusaders. Under the feudal French dynasty of the Lusignans (1191–1489) and the Venetians (1489–1571), the efforts of the Latin bishops to submit the Orthodox Church of Cyprus to the pope's authority were unsuccessful. Until the Turkish conquest of the island in 1571, the Greek bishops were often submitted to the authority fo the Latin archbishop and forced to serve as auxiliaries of their Latin colleagues.

The highest ecclesiastical authority lay with the synod, composed of the archbishop of Nicosia and the three other bishops of the island—Paphos, Citium, and Kyrenia—who were, and still are, elected by both clergy and laity, each of the four bishoprics being divided into several parishes.

The bishops became the natural leaders of national resistance: during the Greek War of Independence (1821–32), all the bishops on the island, as well as several abbots, were hanged by the Turks, while in the years of British control (1878–1958), the bishops took an active lead in the Greek Cypriot movement for union with Greece (*énosis*). In 1956 the Archbishop Makarios and the Bishop of Kyrenia were exiled by the British. When the new Cypriot republic became independent in 1960, the church was assured of its position as an autocephalous and independent Greek Orthodox Church on the basis of its old titles, and Archbishop Makarios was elected the first president of the new republic.

Monastic life has developed greatly since the beginning of the republic. There are several monasteries, the most important being the monastery of Kykkou. Parish clergy are educated in an undergraduate seminary; higher theological education is obtained at the University of Athens. The church keeps several educational and philanthropic institutions and publishes *Apostolos Barnabas*, a monthly ecclesiastical–theological review.

Cyrano de Bergerac, Savinien (b. March 6, 1619, Paris—d. July 28, 1655, Paris), French satirist and dramatist whose works combining political satire and science-fantasy inspired a number of later writers. He has been the basis of many romantic but unhistorical legends, of



Cyrano de Bergerac, engraving after a painting
H. Roger-Viollet

which the best known is Edmond Rostand's play *Cyrano de Bergerac* (1897), in which he is portrayed as a gallant and brilliant but shy and ugly lover, possessed (as in fact he was) of a remarkably large nose.

As a young man, Cyrano joined the company of guards and was wounded at the Siege of Arras in 1640. But he gave up his military career in the following year to study under the philosopher and mathematician Pierre Gassendi. Under the influence of Gassendi's scientific theories and libertine philosophy, Cyrano wrote his two best known works, *Histoire comique des états et empires de la lune* and *Histoire comique des états et empires du soleil* (Eng. trans. *A Voyage to the moon: with some account of the Solar World*, 1754). These stories of imaginary journeys to the Moon and Sun, published posthumously in 1656 and 1662, satirize 17th-century religious and astronomical beliefs, which saw man and the world as the centre of creation.

Cyrano's use of science helped to popularize new theories; but his principal aim was to ridicule authority, particularly in religion, and to encourage freethinking materialism. He "predicted" a number of later discoveries such as the phonograph and the atomic structure of matter; but they were merely offshoots from an inquiring and poetic mind, not attempts to demonstrate theories in practical terms.

Cyrano's plays include a tragedy, *La Mort d'Agrippine* (published 1654, "The Death of Agrippine"), which was suspected of blasphemy, and a comedy, *Le Pédant joué* (published 1654; "The Pedant Imitated"). As long as classicism was the established taste, *Le Pédant joué*, a colossal piece of fooling, was despised; but its liveliness appeals to modern readers as it did to Molière, who based two scenes of *Les Fourberies de Scapin* on it. *La Mort d'Agrippine* is intellectually impressive because of its daring ideas, and the direct and impassioned character of the tragic dialogue makes it interesting theatrically.

As a political writer, Cyrano was the author of a violent pamphlet against the men of the Fronde, in which he defended Mazarin in the name of political realism as exemplified in the tradition of Machiavelli. Cyrano's *Lettres* show him as a master of baroque prose, marked by bold and original metaphors. His contemporaries regarded them as absurdly farfetched, but they came to be esteemed in the 20th century as examples of the baroque style.

Cyrenaic, adherent of a Greek school of moral philosophy, active around the turn of the 3rd century BC, which held that the pleasure of the moment is the criterion of goodness and that the good life consists in rationally manipulating situations with a view to their hedonistic (or pleasure-producing) utility.

The school was called Cyrenaic because Cyrene in North Africa was the centre of its activity and the birthplace of several of its members. Although the elder Aristippus, a pupil of Socrates, was generally recognized as its founder, its flourishing occurred at a later date, probably at the end of the 4th century BC.

According to the Cyrenaics, a man knows that things external to himself exist because they have an effect upon him, but he can know nothing about their nature. All that he can perceive is the way in which he himself is affected by them; how other men are affected is unknown. The fact that two men give the same name to their experiences is no guarantee of identity. Thus, the only admissible objective of action is to ensure that one's own affections are pleasant. The three possible conditions of the human constitution are violent change, gentle change, and stability. The first is accompanied by pain, the second by pleasure, the last by neither. Man must avoid the first and seek the second; it is a mistake to suppose that the third is pleasant or desirable. Moreover, the pleasure to be sought is that of the moment; only present experience can give present pleasure. Happiness, the sum of pleasures, is to be valued because it includes momentary pleasures, which are like in kind, their relative value depending only on their intensity. Bodily pleasures (and pains) are more intense than those of the mind. Nevertheless, the latter were recognized and even held to include some that have an altruistic aspect; *e.g.*, joy in the prosperity of one's country. To be stronger than pleasure is a true Socratic ideal and distinguishes the Cyrenaic from the wastrel.

Three Cyrenaics made innovations important enough to give their names to followers. Theodorus denied that pleasures and pains are good or bad. His aim was mental cheerfulness and the gift of wisdom, which he considered sufficient for happiness. Hegesias, like Theodorus, doubted the power of reason to procure pleasures and so advised avoidance of pain; much pain of mind could be avoided by regarding such things as poverty and riches, slavery and freedom, death and life as matters of indifference. Finally, Anniceris revived the original doctrines with some additions.

The ethical doctrines of the later Cyrenaics were, in due time, incorporated bodily into the teachings of Epicurus, founder of a later school of ethical philosophy.

Cyrenaica, also spelled CIRENAICA, Arabic BARQAH, historic region of North Africa and until 1963 a province of the United Kingdom of Libya. As early as *c.* 631 BC Greek colonists settled the northern half of ancient Cyrenaica, known then as Pentapolis for the five major cities they established: Euhesperides (Banghāzi), Barce (al-Marj), Cyrene (Shaḥḥāt), Apollonia (Marsa Sūsah), and Tenchira (Tūkrah). In later times Ptolemais (Ṭulmaythah) and Daims-Zarine (Darnah) also rose to prominence.

Under the Ptolemies of Egypt (ruled 323–30 BC), the inland cities of Barce and Cyrene declined and commercial competition with Egypt and Carthage intensified. Cyrenaica itself became a Roman province in combination with Crete in 67 BC. After Arab armies under the leadership of 'Amr ibn al-'Āṣ had conquered the country in 642, inland Cyrenaica regained importance, lying as it did on the direct route between Alexandria and al-Qayrawān, and Barce became its chief centre. Ruled by a succession of Egyptian-based dynasties in the later Middle Ages, Cyrenaica came under the nominal suzerainty of the Ottoman Empire after the 15th century; in the mid-19th century the region became the centre of the Sanūsīyah religious brotherhood and dynasty.

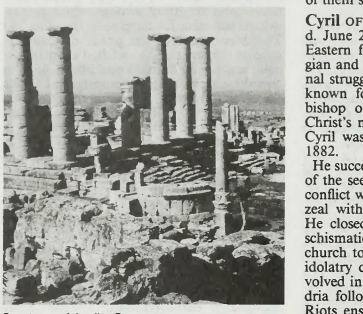
As a result of the Italo-Turkish War (1911–12), Cyrenaica, with Tripolitania, was ceded to Italy in 1912, and by 1940 about 50,000 Italian peasant colonists were converting northern Cyrenaica into the semblance of an Italian province, cultivating cereals, vines, and fruit trees. In 1939, along with Fezzan and Tripolitania, Cyrenaica was incorporated into the kingdom of Italy.

Cyrenaica became a major theatre of operations during World War II. When the British finally occupied the area after the victory at el-Alamein in Egypt (al-'Alamayn; October 1942), the Italian colonists were evacuated, and the population was once again 98 percent Muslim and Arabic-speaking.

After World War II the inability of the great powers to agree on the future of the former Italian colonies protracted the British military administration, and a united kingdom of Libya comprising the three provinces was not proclaimed until 1951. In 1963 the provinces were abolished and the country became a unitary state.

Cyrene, in Greek mythology, a nymph, daughter of Hypseus (king of the Lapiths) and Chlidanope (a Naiad). One day Cyrene wrestled a lion that had attacked her father's flocks. Apollo, who was watching, fell in love with her and carried her off from Mt. Pelion, in Thessaly, to Libya. There he founded the city of Cyrene and made her its queen. Cyrene was the mother by Apollo of Aristaeus (*q.v.*) and Idmon the seer and by Ares of Diomedes of Thrace.

Cyrene, ancient Greek colony in Libya, founded *c.* 631 BC by a group of emigrants from the island of Thera in the Aegean. Their leader, Battus, became the first king, founding the dynasty of the Battiads, whose members,



Sanctuary of Apollo, Cyrene
Josephine Powell, Rome

named alternately Battus and Arcesilaus, ruled Cyrene for eight generations (until *c.* 440 BC). Under their rule, the city prospered economically and expanded, establishing its port of Apollonia (Marsa Sūsah) and the towns of Barce (al-Marj) and Euhesperides, or Berenice (Banghāzī).

After a further influx of Greek colonists *c.* 570 BC, Greek–Libyan relations broke down; the new constitution granted under Battus III failed to allay dissension among the rival domestic factions, and *c.* 525 Cyrene was subjected to a short-lived Persian invasion.

The republic that followed was politically undistinguished. Then, under the aegis of Ptolemaic Egypt (from 323 BC), Cyrene became one of the great intellectual centres of the classical world, boasting a medical school and such scholars as the geographer Eratosthenes and the philosopher Aristippus, founder of the Cyrenaics. In 96 BC Cyrenaica came under Roman rule and in 67 BC was united with Crete to form a senatorial province, with Cyrene as local capital. The two centuries of relative prosperity under the Romans—broken by a revolt of the Cyrenian Jews (AD 115)—were followed by steady decline. With the Arab conquest (AD 642), the city ceased to exist.

The site of ancient Cyrene is partly occupied by the modern village of Shaḥḥāt in al-Jabal al-Akhḍar, eight miles southwest of Marsa Sūsah. Three main areas of the city have been excavated: the fountain and sanctuary of Apollo, where the Venus of Cyrene and a colossal statue of Apollo were found; the upper city, site of a forum and basilica modelled on the Kaisareion of Alexandria, and a large 2nd-century house with fine mosaics; and the centre of the Roman town, in which stands a huge Doric column marking the site of the temple of Zeus, a gigantic Doric building of the late 6th century BC.

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Cyriacus OF ANCONA, byname of CIRIACO DE' PIZZICOLLI (b. 1391, Ancona, Papal States—d. 1452, Cremona, Duchy of Milan), Italian merchant and Humanist whose writings, based on topographical observations and antiquarian findings relating to ancient Greek civilization, proved useful for later archaeological surveys and classical scholarship. Travelling extensively in southern Italy, Greece, Egypt, and the Near East, he copied hundreds of inscriptions, made drawings of monuments, and collected medallions, statuettes, and manuscripts. Though his collection of copies of the inscriptions, contained in six volumes of *Commentaries,* was destroyed by fire in 1514, some of his notebooks and copies of them survive.

Cyril OF ALEXANDRIA, SAINT (b. *c.* 375—d. June 27, 444; Western feast day June 27; Eastern feast day June 9), Christian theologian and bishop active in the complex doctrinal struggles of the 5th century. He is chiefly known for his campaign against Nestorius, bishop of Constantinople, whose views on Christ's nature were to be declared heretical. Cyril was named a doctor of the church in 1882.

He succeeded his uncle Theophilus as bishop of the see of Alexandria in 412 and came in conflict with the civil administration over the zeal with which he championed orthodoxy. He closed the churches of the Novatians, a schismatic sect that denied the power of the church to absolve those who had lapsed into idolatry during persecution. He also was involved in the expulsion of Jews from Alexandria following their attacks upon Christians. Riots ensued, and Cyril, who if not directly responsible at least had done nothing to prevent them, was forced to acknowledge the authority of the civil government.

Cyril remained a chief citizen of Egypt, and in his struggle with Nestorius he was in some ways a political as well as a religious leader. The conflict concerned not only doctrinal matters; it also reflected the Egyptians' fear that Constantinople might come to dominate them. The religious argument involved the relation of the divine and human within Jesus Christ. Cyril emphasized the unity of the two in one Person, while Nestorius so emphasized their distinctness that he seemed to be splitting Christ into two Persons acting in concert. The conflict came to the fore over Cyril's insistence that the Virgin Mary be called Theotokos (Greek: God-bearer) to describe the intimate union of the two natures in the Incarnation. Nestorius refused to accept such terminology, and their dispute was referred to a general council at Ephesus in 431.

Armed with a commission to represent Pope Celestine I as well as himself, Cyril convened the council and condemned Nestorius. He had not waited, however, for the arrival of certain bishops from the East, particularly from the see of Antioch, where Nestorius had lived before he became bishop of Constantinople. When they did reach Ephesus, they reconvened the council and condemned Cyril. Papal recognition of Cyril's council was eventually obtained, however, and Nestorius was banished as a heretic. Even so, the dispute continued, and peace in the church was only restored in 433, when Cyril accepted a statement, representing a compromise with Antioch, that emphasized the distinctness of the two natures within the one Person of Christ.

In addition to commentaries on selected passages of the first five books of the Old Testament, on Isaiah, and on the Gospels of John and Luke, Cyril's writings included a reply to *Against the Galileans* by Julian the Apostate, Roman emperor from 361 to 363, who had been brought up as a Christian but announced his conversion to paganism on his accession. This reply, the latest of ancient Christian apologetic works against paganism, also preserves significant extracts from Julian's works.

Cyril OF JERUSALEM, SAINT (b. *c.* 315, Jerusalem—d. 386?, Jerusalem; feast day March 18), bishop of Jerusalem and doctor of the church who fostered the development of the "holy city" as a pilgrimage centre for all Christendom.

A senior presbyter when he succeeded Maximus as bishop (*c.* 350), Cyril was exiled about 357 and at two later times from his see by the Arians (*see* Arius). Many years later at the Council of Constantinople (381) there was evidence that he might have been suspected by the strictly orthodox for his associations with the Homoiousians (moderate Arians), who had reinstated him as bishop at the Council of Seleucia (359). He retained his bishopric during the reign of Emperor Julian the Apostate (361–363).

Cyril's primary surviving work is a collection of 23 catechetical lectures (*Catecheses*) delivered to candidates for Baptism. The first 18, based on the Jerusalem baptismal creed, were given during Lent, and the concluding 5 instructed the newly baptized during the week after Easter. Cyril's eucharistic theology is an advance on that of earlier writers: he interprets the Lord's presence in the terms of the later dogma of transubstantiation (*q.v.*) and describes the rite in pronounced sacrificial language. Cyril was declared a doctor of the church in 1883.

Cyril and Methodius, SAINTS (respectively b. *c.* 827, Thessalonica, Macedonia—d. Feb. 14, 869, Rome; b. *c.* 825, Thessalonica—d. April 6, 884, Moravia; feast day for both, Western Church February 14; Eastern Church May 11), brothers who for christianizing the Danubian Slavs and for influencing the religious and cultural development of all Slavic peoples received the title "the apostles of the Slavs." Both were outstanding scholars, theologians, and linguists.

In 860, Cyril (originally named Constantine), who had gone on a mission to the Arabs and been professor of philosophy at the patriarchal school in Constantinople, worked with Methodius, the abbot of a Greek monastery, for the conversion of the Khazars northeast of the Black Sea. In 862, when Prince Rostislav of Great Moravia asked Constantinople for missionaries, the emperor Michael III and the patriarch Photius named Cyril and Methodius. In 863, they started their work among the Slavs, using Slavonic in the liturgy. They translated the Holy Scriptures into the language later known as Old Church Slavonic (or Old Bulgarian) and invented a Slavic alphabet based on Greek characters that in its final Cyrillic form is still in use as the alphabet for modern Russian and a number of other Slavic languages.

The brothers accepted Pope St. Nicholas I's invitation to Rome (867) to explain their conflict with the German archbishop of Salzburg and bishop of Passau, who claimed control of the same Slavic territory and who wanted to enforce the exclusive use of the Latin liturgy. Cyril and Methodius arrived in Rome (868), where the new pope, Adrian II, took their side, formally authorizing the use of the Slavic liturgy. When Cyril died, Adrian sent Methodius back to the Slavs as his legate and archbishop of Sirmium.

Methodius' ecclesiastical province included all of Moravia. When Rostislav's nephew and successor, Svatopluk, failed to support Methodius, he was tried in 870 by the German clergy, brutally treated, and jailed until liberated by the intervention of Pope John VIII. In 880 Methodius was again summoned to Rome about the Slavic liturgy, obtaining once more papal approval of his use of the vernacular.

When Methodius' suffragan bishop, Wiching, continued to make trouble, Methodius tried to strengthen his position in the Eastern Church by visiting Constantinople in 882. After Methodius' death, Pope Stephen V forbade the use of the Slavic liturgy; and Wiching, as successor, forced the disciples of Cyril and Methodius into exile. The posthumous influence of Cyril and Methodius reached distant Kiev in Russia and left traces among the Slavs of Croatia, Bohemia, and Poland. Soon

canonized by the Eastern Church, they were celebrated by the Roman Catholic Church in 1880.

Cyrillic alphabet, writing system developed in the 9th century AD for Slavic-speaking peoples of the Eastern Orthodox faith; it is the alphabet currently used for Russian and other languages of the republics that once formed the U.S.S.R. and for Bulgarian and Serbian. Based on the Greek uncial script of the 9th century, the Cyrillic alphabet was probably invented by two Greek brothers, the "apostles to the Slavs," St. Cyril (or Constantine), for whom it was named, and St. Methodius. As the Slavic languages were rich in sounds, 43 letters were originally provided to represent them; these were derived from Greek letters or combinations of Greek letters, or (in the case of the Cyrillic letters for *ts, sh, ch,* and *shch*) they were based on Hebrew. The earliest literature written in Cyrillic was the translation of the Bible and various church texts by St. Cyril and St. Methodius in the 9th century.

The modern Cyrillic alphabets—Russian, Ukrainian, Bulgarian, and Serbian—have been modified somewhat from the original, generally by the loss of some superfluous letters. Modern Russian has 32 letters, Bulgarian 30, Serbian 30, and Ukrainian 33. Modern Russian has also been adapted to many non-Slavic languages, sometimes with the addition of special letters.

Cyrus, Old Persian KURASH, name of Achaemenid kings, grouped below chronologically and indicated by the symbol •.

• **Cyrus I** (fl. late 7th century BC), Achaemenid king, the son of Teispes and grandfather of Cyrus II the Great; he had control over Anshan (northeast of Susa in Elam) and possibly also over Parsumash to the east during the second half of the 7th century. Although he sent aid to Shamash-shum-ukin of Babylon (651), who was in revolt against Assyria, Cyrus was forced to accept Assyrian overlordship about 639, after the conquest of Elam by Ashurbanipal; and he sent his eldest son, Arukku, with tribute to Nineveh.

• **Cyrus II,** byname CYRUS THE GREAT (b. 590–580 BC, Media, or Persis—*d. c.* 529, Asia), conqueror who founded the Achaemenid empire, centred on Persia and comprising the Near East from the Aegean Sea to the Indus River. He is also remembered in the Cyrus legend—first recorded by Xenophon, Greek soldier and author, in his *Cyropaedia*—as a tolerant and ideal monarch who was called father of his people by the ancient Persians and in the Bible as the liberator of the Jews captive in Babylonia.

Life and legend. Cyrus was born between 590 and 580 BC, either in Media or, more probably, in Persis, the modern Fārs province of Iran. The meaning of his name is in dispute, for it is not known whether it was a personal name or a throne name given to him when he became a ruler. It is noteworthy that after the Achaemenid empire the name does not appear again in sources relating to Iran, which may indicate some special sense of the name.

Most scholars agree, however, that Cyrus the Great was at least the second of the name to rule in Persia. One cuneiform text in Akkadian—the language of Mesopotamia (present-day Iraq) in the pre-Christian era—asserts he was the

> son of Cambyses, great king, king of Anshan, grandson of Cyrus, great king, king of Anshan, descendant of Teispes, great king, king of Anshan, of a family [which] always [exercised] kingship.

In any case, it is clear that Cyrus came from a long line of ruling chiefs.

The most important source for his life is the Greek historian Herodotus. The idealized biography by Xenophon is a work for the edification of the Greeks concerning the ideal ruler, rather than a historical treatise. It does, however, indicate the high esteem in which Cyrus was held, not only by his own people, the Persians, but by the Greeks and others. Herodotus says that the Persians called Cyrus their father, while later Achaemenid rulers were not so well regarded. The story of the childhood of Cyrus, as told by Herodotus with echoes in Xenophon and the Greek historian Ctesias, may be called a Cyrus legend since it obviously follows a pattern of folk beliefs about the almost superhuman qualities of the founder of a dynasty. Similar beliefs also exist about the founders of later dynasties throughout the history of Iran. According to the legend, Astyages, the king of the Medes and overlord of the Persians, gave his daughter in marriage to his vassal in Persis, a prince called Cambyses. From this marriage Cyrus was born. Astyages, having had a dream that the baby would grow up to overthrow him, ordered Cyrus slain. His chief adviser, however, instead gave the baby to a shepherd to raise. When he was 10 years old, Cyrus, because of his outstanding qualities, was discovered by Astyages, who, in spite of the dream, was persuaded to allow the boy to live. Cyrus, when he reached manhood in Persis, revolted against his maternal grandfather and overlord. Astyages marched against the rebel, but his army deserted him and surrendered to Cyrus in 550 BC.

Cyrus' conquests. After inheriting the empire of the Medes, Cyrus first had to consolidate his power over Iranian tribes on the Iranian plateau before expanding to the west. Croesus, king of Lydia in Asia Minor, had enlarged his domains at the expense of the Medes when he heard of the fall of Astyages, and Cyrus, as successor of the Median king, marched against Lydia. Sardis, the Lydian capital, was captured in 547 or 546, and Croesus was either killed or burned himself to death, though according to other sources he was taken prisoner by Cyrus and well treated. The Ionian Greek cities on the Aegean Sea coast, as vassals of the Lydian king, now became subject to Cyrus, and most of them submitted peacefully. Several revolts of the Greek cities were later suppressed with severity. Next Cyrus turned to Babylonia, where dissatisfaction of the people with the ruler Nabonidus gave him a pretext for invading the lowlands. The conquest was quick, for even the priests of Marduk, the national deity of the great metropolis of Babylon, had become estranged from Nabonidus. In October 539 BC, the greatest city of the ancient world fell to the Persians.

In the Bible (*e.g.,* Ezra 1:1–4), Cyrus is famous for freeing the Jewish captives in Babylonia and allowing them to return to their homeland. Cyrus was also tolerant toward the Babylonians and others. He honoured Marduk and conciliated the local population by supporting local customs and even sacrificing to local deities. The capture of Babylon delivered not only Mesopotamia into the hands of Cyrus but also Syria and Palestine, which had been conquered previously by the Babylonians. The ruler of Cilicia in Asia Minor had become an ally of Cyrus when the latter marched against Croesus, and Cilicia retained a special status in Cyrus' empire. Thus it was by diplomacy as well as force of arms that he established the largest empire known until his time.

Cyrus seems to have had several capitals. One was the city of Ecbatana, modern Hamadan, former capital of the Medes, and another was a new capital of the empire, Pasargadae, in Persis, said to be on the site where Cyrus had won the battle against Astyages. The ruins today, though few, arouse admiration in the visitor. Cyrus also kept Babylon as a winter capital.

No Persian chauvinist, Cyrus was quick to learn from the conquered peoples. He not only conciliated the Medes but joined them with the Persians in a kind of dual monarchy of the Medes and Persians. Cyrus had to borrow the traditions of kingship from the Medes, who had ruled an empire when the Persians were merely their vassals. It is probable that a Mede was traditionally made an adviser to the Achaemenid king, as a sort of chief minister; on later reliefs at Persepolis, a capital of the Achaemenid kings from the time of Darius, a Mede is frequently depicted together with the great king. The Elamites, indigenous inhabitants of Persis, were also the teachers of the Persians in many ways, as can be seen, for example, in the Elamite dress worn by Persians and by Elamite objects carried by them on the stone reliefs at Persepolis. There also seems to have been little innovation in government and rule, but rather a willingness to borrow, combined with an ability to adapt what was borrowed to the new empire. Cyrus was undoubtedly the guiding genius in the creation not only of a great empire but in the formation of Achaemenid culture and civilization.

Little is known of the family life of Cyrus. He had two sons, one of whom, Cambyses, succeeded him; the other, Bardiya (Smerdis of the Greeks), was probably secretly put to death by Cambyses after he became ruler. Cyrus had at least one daughter, Atossa (who married her brother Cambyses), and possibly two others, but they played no role in history.

When Cyrus defeated Astyages he also inherited Median possessions in eastern Iran, but he had to engage in much warfare to consolidate his rule in this region. After his conquest of Babylonia, he again turned to the east, and Herodotus tells of his campaign against nomads living east of the Caspian Sea. According to the Greek historian, Cyrus was at first successful in defeating the ruler of the nomads—called the Massagetai—who was a woman, and captured her son. On the son's committing suicide in captivity, his mother swore revenge and defeated and killed Cyrus. Herodotus' story may be apocryphal, but Cyrus' conquests in Central Asia were probably genuine, since a city in farthest Sogdiana was called Cyreschata, or Cyropolis, by the Greeks, which seems to prove the extent of his Eastern conquests.

The legacy of Cyrus. It is a testimony to the capability of the founder of the Achaemenid empire that it continued to expand after his death and lasted for more than two centuries. But Cyrus was not only a great conqueror and administrator; he held a place in the minds of the Persian people similar to that of Romulus and Remus in Rome or Moses for the Israelites. His saga follows in many details the stories of hero and conquerors from elsewhere in the ancient world. The manner in which the baby Cyrus was given to a shepherd to raise is reminiscent of Moses in the bulrushes in Egypt, and the overthrow of his tyrannical grandfather has echoes in other myths and legends. There is no doubt that the Cyrus saga arose early among the Persians and was known to the Greeks. The sentiments of esteem or even awe in which Persians held him were transmitted to the Greeks, and it was no accident that Xenophon chose Cyrus to be the model of a ruler for the lessons he wished to impart to his fellow Greeks.

In short, the figure of Cyrus has survived throughout history as more than a great man who founded an empire. He became the epitome of the great qualities expected of a ruler in antiquity, and he assumed heroic features as a conqueror who was tolerant and magnanimous as well as brave and daring. His personality as seen by the Greeks influenced them and Alexander the Great, and, as the tradition was transmitted by the Romans, may be con-

sidered to influence our thinking even now. In the year 1971, Iran celebrated the 2,500th anniversary of the founding of the monarchy by Cyrus. (R.N.F.)

Cyrus THE YOUNGER (b. after 423 BC—d. 401, Cunaxa, Babylonia [now in Iraq]), younger son of the Achaemenian king Darius II and his wife, Parysatis.

Cyrus was the favourite of his mother, who hoped to secure the succession for him instead of her eldest son, Arsaces. When Darius decided to continue the war against Athens and give support to the Spartans, Parysatis persuaded him to appoint the young Cyrus as satrap (governor) of Lydia, Phrygia, and Cappadocia and commander in chief of the Achaemenian forces in Asia Minor (407). Cyrus' friendly alliance with Lysander, the commander of the Spartan fleet, assured Sparta of victory.

In 405 Cyrus was called to his father's deathbed, and in 404, when Arsaces became king as Artaxerxes II, Cyrus was accused by Tissaphernes, satrap of Caria, of plotting his brother's murder. On the intercession of Parysatis, however, Cyrus was pardoned and sent back to his satrapy. On his return, Cyrus began preparations to seize the throne. He used a quarrel with Tissaphernes over the Ionian cities as a pretext for gathering a large army and also pretended to prepare an expedition to Pisidia, in the Taurus Mountains. In the spring of 401 Cyrus started out with about 20,000 men, many of whom were Greek mercenaries. When he reached the Euphrates River at Thapsacus, he announced that he was marching against Artaxerxes. He advanced unopposed into Babylonia; but Artaxerxes, warned at the last moment by Tissaphernes, was hastily gathering an army. The two forces met at the Battle of Cunaxa, north of Babylon, where Cyrus was slain. The Greek troops of Cyrus, after their commanders had been treacherously seized by Tissaphernes, forced their way to the Black Sea.

The courage and ability of Cyrus were highly praised by the Greeks, especially by the historian Xenophon (one of the Greek mercenaries), who in his *Anabasis* wrote the history of the Greek retreat; but from the standpoint of the Achaemenians Cyrus was a traitor who, to gain his own ends, used hostile Greeks to attack the empire.

cyst, in biology, enclosed sac within body tissues, having a distinct membrane and generally containing a liquid material. In the life cycle of certain parasitic worms, a cyst develops around the larval form within the muscle tissue of the host animal.

Although the majority of cysts are benign, several varieties may be malignant or precancerous. Benign cysts often require removal because they interfere with surrounding organs. Cysts form from a proliferation of epithelium, the tissue making up the skin and the linings of the blood vessels and body cavities, and may become detached from surrounding structures so that they move freely. The material inside can consist of natural body secretions, abnormal products from the breakdown of natural secretions and structural proteins, or, in case of infection, bacteria, larval parasites, and microbial products.

Several organs, including the kidney, liver, and breast, are particularly susceptible to cyst formation and may become filled with numerous cysts of various sizes. In some cases, these cystic diseases are themselves dangerous, or they may obscure more serious, underlying diseases.

cystic fibrosis (CF), also called MUCOVISCIDOSIS, formerly CYSTIC FIBROSIS OF THE PANCREAS, an inherited metabolic disorder, the chief symptom of which is the production of a thick, sticky mucus that clogs the respiratory tract and the gastrointestinal tract.

Cystic fibrosis is the most common inherited disorder affecting people of European ancestry. It is estimated to occur in 1 per 2,000 live births in these populations and is particularly concentrated in people of northwestern European descent. It is much less common among people of African ancestry (about 1 per 17,000 live births) and is very rare in Asiatics. The disorder was long known to be recessive—*i.e.,* only persons inheriting a defective gene from both parents will manifest the disease. The disease has no manifestations in heterozygotes—*i.e.,* those individuals who have one normal copy and one defective copy of the particular gene involved. When both parents are heterozygous, however, they may expect that, on the basis of chance, one out of four of their offspring will have the disease. In 1989 the defective gene responsible for cystic fibrosis was isolated; the gene lies in the middle of chromosome 7. This discovery raised the possibility of a screening test to identify those people (heterozygotes) who unknowingly carry the defective gene and may pass it on to their offspring.

Cystic fibrosis affects the functioning of the body's exocrine glands—*e.g.,* the mucus-secreting and sweat glands. In persons affected with the disease, the normal mucous secretions in the respiratory and digestive systems become abnormally thick, sticky, and concentrated. The defect (or mutation) found in the gene on chromosome 7 of persons with cystic fibrosis causes the production of a protein that lacks the amino acid phenylalanine. This flawed protein somehow distorts the movement of salt and water across the membranes that line the lungs and gut, resulting in dehydration of the mucus that normally coats these surfaces. The thick, sticky mucus accumulates in the lungs, plugging the bronchi and making breathing difficult. This results in chronic respiratory infections, often with *Staphylococcus aureus* or *Pseudomonas aeruginosa*. Chronic cough, recurrent pneumonia, and the progressive loss of lung function are the major manifestations of lung disease, which is the most common cause of death of persons with cystic fibrosis.

In the digestive system, the abnormally thick mucous secretions interfere with the passage of digestive enzymes and thus block the body's absorption of essential nutrients. The resulting maldigestion and malabsorption of food can cause affected individuals to become malnourished despite an adequate diet. Bulky, greasy, foul-smelling stools are often the first signs of cystic fibrosis. About 10 percent of infants with cystic fibrosis have intestinal obstruction at birth due to very thick secretions.

Cystic fibrosis causes the sweat glands to produce sweat that has an abnormally high salt content. The high salt content in perspiration is the basis for the "sweat test," which is the definitive diagnostic test for the presence of cystic fibrosis.

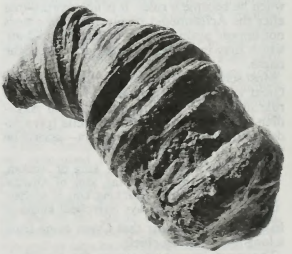
The treatment of cystic fibrosis includes the intake of pancreatic enzyme supplements and a diet high in calories, protein, and fat. Vigorous physical therapy on a daily basis is used to loosen and drain the mucous secretions that accumulate in the lungs. Antibiotics are regularly ingested in order to fight the accompanying lung infections; the enzyme deoxyribonuclease also is administered to clear mucus and reduce infection. Cystic fibrosis was not recognized as a separate disease until 1938 and was then classified as a childhood disease because mortality among afflicted infants and children was high; by the mid-1980s, however, more than half of all victims of cystic fibrosis survived into adulthood owing to the aggressive therapeutic measures described above. Adult males who have cystic fibrosis usually are sterile.

cystine, a crystalline, sulfur-containing amino acid that is formed from two molecules of the amino acid cysteine. Cystine can be converted to cysteine by reduction (in this case, the addition of hydrogen). Discovered in 1810, cystine was not recognized as a component of proteins until 1899, when it was isolated from animal horn. Cystine is particularly abundant in skeletal and connective tissues and in hair, horn, and wool.

cystinosis, inborn error of metabolism resulting in the deposition of crystals of the amino acid cystine in various body tissues. Tissues that are particularly affected include the bone marrow, liver, cornea (where the crystals can be seen), and kidney. When they are about six to nine months old, infants with cystinosis refuse to eat, grow poorly, and urinate excessively; these symptoms are related to more severe aspects of the disorder, which include rickets, enlargement of the liver, stunted growth, and kidney malfunction. The crystal deposits in the kidney tubules lead eventually to a full-blown manifestation of Fanconi syndrome (*see* de Toni-Fanconi syndrome), characterized by a generalized defect in the reabsorption of all amino acids, sugar, salts, and water. The specific genetic defect responsible for cystinosis is not known.

cystinuria, hereditary error of metabolism characterized by the excessive excretion into the urine of four amino acids: cystine, lysine, arginine, and ornithine. The main clinical problem of cystinuria is the possibility of cystine stone formation in the kidney; unlike lysine, arginine, and ornithine, which are freely soluble, cystine is only slightly soluble in urine, and when urine volume decreases, particularly at night, this amino acid may form stones. These may be reduced or eliminated by forcing fluids, alkalization, or, in severe cases, dietary restriction of foods containing methionine and cystine. Cystinuria is believed to be caused by a genetic defect in the transport system of the kidney tubule, which normally reabsorbs the four amino acids into the body circulation. In some forms of cystinuria, intestinal transport may be similarly affected. It is estimated that approximately one in 600 persons excretes abnormally large quantities of cystine, which can be detected by a simple test. Cystinuria is transmitted by an autosomal recessive gene: unaffected carriers of the trait who mate may expect, on the basis of chance, to have one affected offspring out of four.

Cystiphyllum, extinct genus of solitary corals found as fossils in Silurian and Devonian marine rocks (the Silurian Period preceded the Devonian Period and ended 408 million years ago). *Cystiphyllum* was one of the horn corals, so named for their hornlike shape. Like other corals, it had specialized requirements, and thus its fossils are important environmental indicators.



Cystiphyllum americanum, collected from Erie County, N.Y.
By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

cystitis, acute or chronic inflammation of the urinary bladder. The bladder, the storage sac for urine, is lined with a mucous membrane and is highly resistant to infection. Occasionally, however, infections arise from such neighbouring organs as the kidneys and (in females) the vagina and urethra and (in males) the urethra and the prostate. Other conditions such as obstructions, tumour growths, physical injuries, and bladder stones can disrupt the bladder and leave it more vulnerable to infections. Infective agents that cause inflammation are bacteria, viruses, fungi, and parasites.

The most common symptoms of cystitis are a burning pain during and immediately after urination, unusually urgent or frequent urinations, and lower back pain. Women are more susceptible to cystitis than men, chiefly because bacteria find easier access through the shorter female urethra than through the longer male urethra. The most common causative organism of cystitis in women is *Escherichia coli*, a bacterium that normally inhabits the intestines and is spread from the rectum to the urethra.

Acute cystitis is usually caused by bacteria. The mucous membrane becomes swollen and red and bleeds. Small ulcers can develop, the surface layer can shred, and small, clear cysts (sacs with liquid, gas, or semisolid contents) frequently form. Abscesses may form.

Chronic cystitis can result from a recurrent or persistent infection or from inflammation elsewhere in the body. Chronic infections, when there is no bladder obstruction, cause the walls of the bladder to become thickened and thus diminish the size of the cavity. If there is an obstruction as well as inflammation, the walls first become thickened and stretched and eventually tend to atrophy.

A diagnosis of cystitis is made by microscopically examining the patient's urine and determining the presence in it of infective bacteria. In more severe cases, a physical examination is made of the bladder's interior using a special viewing instrument called a cystoscope. The treatment of cystitis may consist of surgical procedures or the administration of antimicrobial or other drugs.

Cythera, Modern Greek KÍTHIRA, island, southernmost and easternmost of the Ionian Islands, off the southern Peloponnesus (Pelopónnisos). It is an *eparkhía* ("eparchy") of Attiki *nomós* (department), Greece. A continuation of the Taiyetos Range, the island has a mountainous interior, rising to 1,663 feet (507 m). The capital, Kíthira (or Khóra), is on the southern coast.

Exportation of murex, a purple dye obtained from a species of mollusk, was responsible for the island's ancient name, Porphyrusa (Greek *porphyra*, "purple"); but a lack of natural harbours precluded the island from gaining political importance. Cythera was also noted in ancient times for its local cult of Aphrodite. As a Spartan outpost the island was subdued (424 BC) by Athens during the Peloponnesian War. After the Fourth Crusade (1204) it was subjected to frequent incursions; in 1537 the island's inhabitants were sold into slavery. In 1717 Venice took over the island, renaming it Cerigo. Thereafter its history is largely that of the Ionian Islands (*q.v.*). The island produces small amounts of wheat, barley, grapes, olives, and olive oil. There are daily flights to Athens from the island. Pop. (1981) capital, 268; island, 3,469.

cytochrome, any of a group of hemoprotein cell components that, by readily undergoing reduction and oxidation (gain and loss of electrons) with the aid of enzymes, serve a vital function in the transfer of energy within cells. Hemoproteins are proteins linked to a nonprotein, iron-bearing component. It is the iron (heme) group attached to the protein that can undergo reversible oxidation and reduction reactions, thereby functioning as electron carriers within the mitochondria (the organelles that produce energy for the cell through cellular respiration).

Cytochromes are subdivided into three classes (*a, b, c*) depending on their light-absorption spectra. At least 30 different cytochromes have been identified; they are designated by letters or combinations of letters and numbers, such as cytochrome a_3, cytochrome *c*, and cytochrome B562. Cytochrome *c* is the most stable and abundant member of the class, and it has been the most thoroughly studied. *See also* cellular respiration.

cytokinin, any of a number of plant growth substances that are usually derived from adenine. Synthesized in roots, cytokinins move upward in the xylem (woody tissue) and pass into the leaves and fruits, where they are required for normal growth, for cell differentiation, and, in conjunction with auxin (another plant hormone), to promote cell division.

cytology, the study of cells as fundamental units of living things. The earliest phase of cytology began with the English scientist Robert Hooke's microscopic investigations of cork in 1665. He observed dead cork cells and introduced the term "cell" to describe them. In the 19th century two Germans, the botanist Matthias Schleiden (in 1838) and the biologist Theodor Schwann (in 1839), were among the first to clearly state that cells are the fundamental particles of both plants and animals. This pronouncement—the cell theory—was amply confirmed and elaborated by a series of discoveries and interpretations. In 1892 the German embryologist and anatomist Oscar Hertwig suggested that organismic processes are reflections of cellular processes; he thus established cytology as a separate branch of biology. Research into the activities of chromosomes led to the founding of cytogenetics, in 1902–04, when the American geneticist Walter Sutton and the German zoologist Theodor Boveri demonstrated the connection between cell division and heredity. Modern cytologists have adapted many methods of physics and chemistry to investigate cellular events. *See also* cell.

cytomegalovirus (CMV), any of several viruses in the herpes family (Herpesviridae), frequently involved in human infection. The virus is so named for the enlarged cells produced by active infections; these cells are characterized by the inclusion of foreign matter, especially in the nucleus. Cytomegalovirus, which is transmitted by sexual contact or exposure to infected body fluids, is not highly contagious and rarely causes serious illness in otherwise healthy adults, occasionally producing mononucleosis-like symptoms. In infants and immune-compromised adults, however, it has serious, permanent consequences. Its distribution is worldwide, but it is especially prevalent in crowded communities with low standards of living.

Cytomegalovirus is the most common congenital infection of newborn infants, who acquire the virus either in the uterus or during birth. Symptomatic infections in 10 percent of congenital cases cause jaundice, fever, and enlargement of the spleen and liver. Whether symptomatic or not, CMV infections are a major cause of congenital deafness and have other long-range neurological consequences, including retardation and blindness. Infections in adults with compromised immune systems can cause an opportunistic, severe pneumonia and inflammation of the retina leading to blindness; because these individuals have no natural defenses against the spread of the virus, such infections may be life-threatening. At present there is no effective treatment for CMV infection. In otherwise healthy adults, CMV infections are self-limiting and require no treatment.

cytoplasm, the protoplasm of a cell external to the nuclear membrane. In eukaryotes (*i.e.*, cells having a nucleus), the cytoplasm contains all of the organelles except for the nucleus itself. Among such organelles are the mitochondria, which are the sites of energy production through ATP (adenosine triphosphate) synthesis; the endoplasmic reticulum, the site of lipid and protein synthesis; the Golgi apparatus, which packages macromolecules into vesicles for transport; lysosomes and peroxisomes, sacs of digestive enzymes that carry out the intracellular digestion of macromolecules such as lipids and proteins; the cytoskeleton, a network of protein fibres that give shape and support to the cell; and cytosol, the fluid mass that surrounds the various organelles.

cytoplasmic streaming, also called PROTOPLASMIC STREAMING, the movement of the living substance (cytoplasm) within a plant or animal cell. The motion transports nutrients, enzymes, and, in plants, large virus particles within cells. In unicellular organisms such as amoeba, it provides the mechanism for cell locomotion. First discovered in the 1830s, the presence of cytoplasmic streaming helped convince biologists that cells were the fundamental units of life.

Although the mechanism of cytoplasmic streaming is not completely understood, it is thought to be driven by actin filaments, long protein fibres aligned in rows parallel to the streaming just inside the cell membrane. Myosin molecules attached to cellular organelles may move along the actin fibres, towing the organelles and sweeping other cytoplasmic contents in the same direction.

cytosine, a nitrogenous base derived from pyrimidine that occurs in nucleic acids, the heredity-controlling components of all living cells, and in some coenzymes, substances that act in conjunction with enzymes in chemical reactions in the body.

Cytosine is one of several types of bases that are incorporated into the nucleic acid molecule. Nucleic acids are composed of a five-carbon sugar bound to a phosphoric acid, along with a nitrogenous base. Deoxyribonucleic acid (DNA), the hereditary material of most living organisms, consists of the five-carbon sugar deoxyribose with a phosphate linkage, to which is attached cytosine or any of three other bases, which together form two complementary pairs. Cytosine's complementary base in the DNA molecule is guanine.

Cytidine is a structural subunit of ribonucleic acid that consists of cytosine and the sugar ribose. Cytidine triphosphate (CTP), an ester of cytidine and triphosphoric acid, is the substance utilized in the cells to introduce cytidylic acid units into ribonucleic acids. CTP also reacts with nitrogen-containing alcohols to form coenzymes that participate in the formation of phospholipids.

cytoskeleton, a system of tiny filaments or fibres that is present in the cytoplasm of eukaryotic cells (cells containing a nucleus). The cytoskeleton organizes other constituents of the cell, maintains the cell's shape, and is responsible for the locomotion of the cell itself and the movement of the various organelles within it. The filaments that comprise the cytoskeleton are so small that their existence was only discovered because of the greater resolving power of the electron microscope.

Three major types of filaments make up the cytoskeleton: actin filaments, microtubules, and intermediate filaments. Actin filaments occur in a cell in the form of bundles of parallel fibres; they help determine the shape of the cell and also help it adhere to the substrate. The constantly changing arrays of actin filaments help move the cell and mediate specific

activities within it, such as cell cleavage during mitosis. Microtubules are longer filaments that are constantly assembling and disassembling; they play a crucial role in moving the split chromosomes to the newly forming daughter cells during mitosis, and bundles of microtubules form the cilia and flagellae found in protozoans and in the organs of some multicellular animals. Intermediate filaments, in contrast to actin filaments and microtubules, are very stable structures that form the true skeleton of the cell. They anchor the nucleus and position it within the cell, and they give the cell its elastic properties and its ability to withstand tension.

cytotoxic drug, any drug poisonous to cells. Such drugs may disturb fundamental mechanisms involving cell growth, differentiation, and function and the activity of the chromosomes (bodies containing the genes) at some stage preceding their duplication. There is a great difference in the susceptibility of various types of cells and in the lethal capacities of the drugs used. The cells that are most susceptible to inhibition and damage by cytotoxic drugs appear to be rapidly proliferating ones, such as those in the blood and lymph-forming system, the reproductive and other epithelial tissue (*e.g.,* intestinal mucosa), and neoplastic (cancerous) tissue. The immune response is also suppressed by various cytotoxic drugs. Cytotoxic drugs such as cyclophosphamide, methotrexate, and mercaptopurine (6-purinethiol) are useful in the management of certain cancers (especially in leukemias), in the suppression of immune responses following tissue or organ transplants, and in treating certain allergic disorders.

cywydd, Welsh verse form, a kind of short ode in rhyming couplets in which one rhyme is accented and the other unaccented; each line is composed of seven syllables and contains some form of *cynghanedd* (a complex system of alliteration and internal rhyme). Developed in the 14th century in south Wales by Dafydd ap Gwilym, the cywydd shows affinities with forms used by the earlier *bardd teulu* ("bard of the [king's] war band"), the second grade in the Welsh bardic system, and with those of the French trouvères and jongleurs. It was the leading Welsh verse form from the 14th to the early 17th century; its golden age was from the mid-14th to the mid-15th century, and its silver age, when excessive concern with stylistic rules hampered free poetic expression, from 1450 to 1650. It was revived, with other bardic forms, by the classical school of Welsh poets in the mid-18th century, and again in the 19th century. It remains in use by those modern Welsh poets who prefer strict (*i.e.,* classical) forms to the free metres that are derived from Welsh folk song and from English verse.

Cyzicus, ancient Greek town, located on the southern coast of the Sea of Marmara in what is now Balikhisar, Tur. It was probably founded as a colony of Miletus in 756 BC, and its advantageous position soon gave it commercial importance.

With the collapse of Lydia (*c.* 544), Cyzicus came under Persian rule, but it joined the Delian League after the defeat of Xerxes and remained loyal to Athens until 411 BC. In Hellenistic times the town was at first closely connected with Pergamum and later allied itself with Rome. Cyzicus was partly destroyed by the Arabs in AD 675 and probably further damaged by a series of earthquakes. Among its ruins are the substructures of the Temple of Hadrian, sometimes ranked among the Seven Wonders of the World.

czar, feminine CZARINA, or CZARITSA: *see* tsar.

czardas, also spelled CSARDAS, Hungarian CSÁRDÁS, national dance of Hungary. A courting dance for couples, it begins with a slow section (*lassu*), followed by an exhilarating fast section (*friss*). The individual dancers carry themselves proudly and improvise on a simple fundamental step, their feet snapping inward and outward, the couples whirling. The music, often played by a Gypsy orchestra, is in $\frac{2}{4}$ or $\frac{4}{4}$ time with compelling, syncopated rhythms. The czardas developed in the 19th century from an earlier folk dance, the *magyar kör.* A ballroom dance adapted from the czardas is popular in eastern Europe. A theatrical czardas with complicated Slavic and Hungarian folk-dance steps appears in ballet, as in Léo Delibes's *Coppélia.* Franz Liszt, in his *Hungarian Rhapsodies,* wrote music reminiscent of the czardas.

Czartoryski, Adam Jerzy, Prince (Książę) (b. Jan. 14, 1770, Warsaw, Pol.—d. July 15, 1861, Montfermeil, Fr.), Polish statesman who worked unceasingly for the restoration of Poland when Russia, Prussia, and Austria had partitioned his country's former lands among themselves.



Prince Adam Jerzy Czartoryski, detail of a painting by Ary Scheffer, 1850; in the Bibliothèque Polonaise, Paris
By courtesy of the Bibliotheque Polonaise, Paris

Czartoryski was the most renowned member of a princely family, descended from the Lithuanian royal house, which wielded great power in Poland in the 18th century. He received a thorough education in his native country and traveled widely in western Europe. On returning to Poland in 1791, he played a distinguished part in the anti-Russian 1792 campaign that precipitated the second partition of Poland (1793). Although neither he nor his father took an active part in the 1794 insurrection that resulted in the third partition of Poland (1795), their palace at Puławy was destroyed and the family estates confiscated.

Seeking the recovery of his property, Czartoryski went in 1795 to St. Petersburg, where he joined the Russian government service and became friendly with the grand duke Alexander. When Alexander became tsar, he called upon Czartoryski, who had become one of his close advisers, to work on plans for the reform of the government, naming him deputy minister of foreign affairs in 1802 and minister in 1804. Czartoryski's hostility to Russia's alliance with Prussia and the Russian military defeat in the 1805 campaign against Napoleon (undertaken against his advice), caused his dismissal in 1806; but he remained in Russian service as curator (from 1803) of the educational region of Wilno (Vilnius), which embraced the eastern provinces of the former Polish state.

After Napoleon's downfall, Czartoryski resumed his efforts to restore Poland. With Alexander's consent, he was Poland's spokesman at the Congress of Vienna in 1815, obtaining as much as was possible—the creation of a new Kingdom of Poland with Alexander as king. He helped to prepare a liberal constitution for the kingdom and became a senator and member of the executive council, but in 1816, disillusioned with Alexander, he largely withdrew from public life.

Czartoryski did not want a Polish rebellion against Russia and knew success would depend more on Western diplomatic intervention than on fighting by the Poles, but he found himself at the head of the Poles' November Insurrection that broke out on Nov. 29, 1830. On the collapse of the rebellion, sentenced to death by the Russians and deprived of his estates, he went into exile on Aug. 15, 1831. His Paris residence, the Hôtel Lambert, became the centre of the political activity of the Polish exiles. He was unofficially acknowledged as "Polish king in exile" and maintained unofficial representatives in Constantinople, Rome, and other European capitals. A leader in preparing the Polish insurrection of 1863, he did not live to see it.

Czartoryski, Adam Kazimierz, Prince (Książę) (b. Dec. 1, 1734, Gdańsk, Pol.—d. March 19, 1823, Sieniawa [Poland]), a leading member of the princely family of Czartoryskis; offered the Polish crown (1763), he refused it, becoming instead a patron of the arts.

The son of Aleksander August Czartoryski, governor of Ruthenia, who gathered a great estate and founded prosperous workshops, Adam Kazimierz was educated in England and prepared to take over the Polish throne. But in the period when Poland was left without an elected king, Adam Kazimierz refused the crown (1763), which was accepted by his first cousin Stanisław August Poniatowski.

The interests of Adam Kazimierz were mainly literary and pedagogical. He founded periodicals and schools and became the first minister of education in a European country. By his efforts and those of his ambitious wife, Izabella Elzbieta, *née* Countess Flemming (1746–1835), their palace at Puławy became an important centre of culture competing with royal patronage in the support of Neoclassical architecture and Polish literature; this provided an excellent school for their sons and those of the local gentry. The economist P.-S. du Pont de Nemours taught there. After the downfall of Poland in 1795, Puławy, ruined in 1792–94 and rebuilt, became the shrine of the country's past, mainly through Princess Izabella's efforts.

Czartoryski, Michał Fryderyk, Prince (Książę) (b. April 26, 1696—d. Aug. 13, 1775, Warsaw, Pol.), Polish statesman who made his family party of Czartoryskis, the so-called Familia, the leading party in Poland.

Educated at Paris, Florence, and Rome, Czartoryski attached himself to the Saxon court and obtained the vice chancellorship of Lithuania. He was one of the nobles who, on the illness of King Augustus II of Poland in 1727, signed the secret guarantee of the Polish succession to that king's son; but he supported Stanisław Leszczyński when the latter was placed upon the throne by the influence of France in 1733. When Stanisław abdicated in 1735, Czartoryski voted for Augustus III, who employed him and his family against a rival family, the Potockis. Under him and his brother August, the Familia became the leading party, and promising young men were educated by them at the family palace at Puławy. Czartoryski concerned himself with internal political reform rather than diplomatic schemes. He aimed at the restoration of the royal prerogative and the abolition of the liberum veto.

Czartoryski reached the height of his power in 1752, when he was entrusted with the great seal of Lithuania; but, when his rival, Jerzy Mniszek, began to prevail at Dresden, he sought a reconciliation with his opponents at home and foreign support in England and Russia. His attempt to secure reforms with the help of Russia failed. After 1767 he retired to his estates, whence he saw the first partition of Poland; but he left a legacy of his ideas

to his nephew King Stanisław II Poniatowski and to his other nephew Adam Kasimierz Czartoryski, who became the father of Adam Jerzy Czartoryski (*q.v.*).

Czech language, formerly BOHEMIAN, Czech ČEŠTINA, West Slavic language closely related to Slovak, Polish, and the Sorbian languages of eastern Germany. It is spoken in the historical regions of Bohemia, Moravia, and southwestern Silesia in the Czech Republic, where it is the official language. Czech is written in the Roman (Latin) alphabet. The oldest records in the language are single words that are intermixed in Old Church Slavonic texts of the 11th century; Czech glosses appear in Latin and German texts of the 12th century. There was no standardized Czech language during the Old Czech period (11th–14th century), although the literary language became increasingly uniform during the Middle Czech period (15th–16th century), especially because of the innovations made in Czech orthography by the religious reformer Jan Hus. Toward the end of this period (in 1593), the Czech Bible translation became the standard of usage.

Some characteristics of Czech are that it (like Slovak) retains a distinction between long and short vowels; it places the stress on the first syllable of a word or prepositional phrase; and it has replaced the original Slavic nasalized vowel sounds with pure vowels. The modern language has seven noun cases, two numbers, three persons in the verb, three tenses (present, past, and future), two voices, and three moods (indicative, imperative, and conditional or subjunctive), and it marks verbs for perfective (completed action) and imperfective (action in process or uncompleted action) aspects. Several dialects exist, including those of Moravia and Silesia, but differences among them are slight; the central dialect, that of Prague, is the basis for standard written Czech. *See also* Slovak language.

Czech literature, the body of writing in the Czech language. Before 1918 there was no independent nation of Czechoslovakia, and Bohemia and Moravia, the Czech-speaking regions that now constitute the Czech Republic, were for a long time provinces of the Habsburg Holy Roman and Austrian empires. Because of this, the evolution of the Czechs' literary language became historically linked to their efforts to maintain their ethnic identity.

The earliest origins of literature in Czech are connected with Old Church Slavonic, which was devised by Saints Cyril and Methodius in the 9th century to counter Frankish (German) influence. Latin was established as the liturgical language of the Bohemian state in 1097, however, and its script was adopted for what would become the Czech language. The earliest preserved texts in the Czech language, mainly hymns, were written in the late 13th century at the courts of the Přemyslid kings of Bohemia.

The 14th century brought a continuous stream of Czech literary works, mostly consisting of biographies of saints (hagiography), legends, epics and chronicles, and adaptations of chivalrous romances, all in verse. The earliest secular work in the language was the epic *Alexandreis,* a life of Alexander the Great based on a Latin poem by the French writer Gautier de Châtillon. From about 1350, prose genres began to be cultivated, initially descriptions of the lives of saints and chronicles and then versions of popular medieval tales. From the last part of the century dated a group of verse satires and didactic poems as well as the political allegory *Nová rada* ("The New Council"), written by Smil Flaška to defend the rights of the Bohemian nobility against the crown.

Religious reforms begun by Jan Hus in the early 15th century set in motion the Hussite movement, which for two centuries pitted Czech reformers or Protestants against the Roman Catholic rulers of the Holy Roman Empire. The religious controversies and civil strife of this period fostered the use of Czech writing for practical and polemical purposes. Hus himself composed strong sermons in Czech and wrote a treatise reforming Czech orthography under the title *De orthographia Bohemica.* Petr Chelčický, one of his successors, wrote treatises containing radical social ideas from which sprang the Unitas Fratrum, or Bohemian Brethren, a sect and prototype of the Moravian church that became an important source of Czech literature for the next two centuries.

Czech literature in the 16th century was predominantly didactic and scholarly, reflecting the humanism of the European Renaissance. The Moravian bishop Jan Blahoslav completed an early translation of the New Testament, and the lexicographer Daniel Adam z Veleslavína further enriched the vocabulary of humanist Czech, but the most significant landmark of the period was the Unitas Fratrum scholars' translation of the Bible into Czech, known as the Kralice Bible (1579–93). The language of this version became the model for classical Czech.

The Austrian Habsburgs defeated the Protestants of Bohemia in 1620, after which Protestantism was eradicated and Bohemia was brought under direct rule within the Austrian Habsburg domain. The (largely Protestant) Bohemian nobility was crushed and replaced by newcomers with little knowledge of Czech. Under the Habsburgs, the literary traditions of the past two centuries were proscribed, and it was only among political exiles that Czech literature survived at all. Among these exiles Jan Amos Komenský (John Amos Comenius) was preeminent. His Latin works on education and theological problems and his works in Czech revealed him as a writer and thinker of European stature. His *Labyrint světa a ráj srdce* (1631; "Labyrinth of the World and Paradise of the Heart") stands as one of Czech literature's great achievements in prose. By the 18th century, however, Czech had practically ceased to be used for higher literary purposes.

The historicism and antiquarianism of the late 18th century led many Czech scholars to investigate their country's earlier literature and history. Moreover, Bohemian patriotism revived in reaction against the centralizing tendencies of the Habsburg government under the empress Maria Theresa. These two phenomena combined with currents of the Romantic movement to inaugurate a Czech national literary revival in the first half of the 19th century. At the same time, social and economic developments were helping create a new middle-class audience for Czech literature.

Czech Romanticism drew impetus from the efforts of both scholars and literary artists. The scholar Josef Dobrovský studied and codified a revived Czech literary language. Josef Jungmann set out to extend and modernize the Czech vocabulary through his translations (including John Milton's *Paradise Lost,* 1811) and his monumental Czech-German dictionary (1835–39). The revival was also furthered by the Moravian historian František Palacký and the Slovak archaeologist Pavel Josef Šafařík. The Slovak Jan Kollár, who wrote in Czech, produced the first significant work in the revived language with his allegorical sonnet cycle *Slávy dcera* ("The Daughter of Slava"). Interest in early Czech literature was further stimulated by several brilliant hoax manuscripts, purported to be from the early Middle Ages but actually written by Václav Hanka, which have held their own as examples of Romantic poetry.

The greatest poet of Czech Romanticism, and perhaps of all Czech poets, was Karel Hynek Mácha. His lyrics, prose fragments, and a lyrical epic, *Máj* (1836; *May*), showed the influence of Lord Byron, Sir Walter Scott, and the Polish Romantics but transcended these influences by its intensity of poetic vision and perfection of language. In the 1840s there was a reaction against the Romantic vision. The political journalist Karel Havlíček-Borovský and the novelist Božena Němcová were both concerned with practical issues and did much to emancipate Czech prose from the older classical manner, bringing it nearer to everyday speech. Němcová became best known for *Babička* ("The Grandmother"), an idealized portrayal of country life in sketches whose precise, realistic descriptions and firmly individual language were new in Czech prose.

The Máj group, named in honour of Mácha's great lyrical epic, was a school of writers in the second half of the 19th century who sought to create a Czech literature imbued with their own liberal and pragmatic nationalist aims. Prominent in their ranks was the poet and short-story writer Jan Neruda, known for his sardonic sketches in *Povídky malostranské* (1878; "Tales of the Little Quarter"). Other notable figures of the Máj group were the novelist Karolina Světlá and the poet Vítězslav Hálek.

By the 1870s Czech literature had fully established itself in poetry and the novel but not yet in the drama. Literary life crystallized around two groups associated with the periodicals *Lumír* and *Ruch* ("Stir"). The former stressed the need to Europeanize Czech literature, while the latter looked to the strength of native traditions and themes. The leading representative of the cosmopolitan tendency was Jaroslav Vrchlický (pseudonym of Emil Frída), who was probably the most prolific of all Czech writers. His lyrics show an amazing mastery of language, while a vast cycle of historical epics probably contain his best work. But perhaps his greatest influence was exercised by his many translations of major European writers. Cosmopolitanism also found expression in Julius Zeyer's novels and short stories. The principal figure in the nativist trend was Svatopluk Čech, who composed historical epics, idyllic pictures of Czech country life, and prose satires aimed at the philistinism of the Czech middle classes.

The Czech novel of the late 19th century exhibited a trend toward realistic description in the works of the historical novelists Alois Jirásek and Zikmund Winter. Both men presented romanticized versions of Czech history, but their historical details were based on scholarly research. Jirásek's novels presented an entire history of the Czechs up to his own time, concentrating in particular on the Hussite period and the national revival of 1780 onward. In the last decade of the century new trends in poetry began to appear in the works of Otakar Březina (pseudonym of Václav Jebavý) and Petr Bezruč (pseudonym of Vladimir Vasek). Březina expressed a personal religion in a language of great subtlety and originality, and his metrical structures (including free rhythms) had great influence on later poets. Bezruč was a regional poet, obsessed by the national and social oppression of the Czechs of Germanruled Silesia.

With the establishment of an independent Czechoslovak state in 1918, Czech literature flourished. Czech drama came into its own in the idealistic and satirical plays of Karel Čapek and František Langer. Čapek's best plays exposed the problems of a centralized, mechanized society of the 20th century: *R.U.R.* (1920), which introduced the word robot into English, and *Ze života hmyzu (1921; The Insect Play).* Narrative prose reached a new peak with such writers as Čapek, Jaroslav Hašek, and Vladislav Vončura. Shortly after World War I ended Hašek began his sequence of novels called *Osudy dobrého vojáka Švejka za světové války* (1921–23; *The Good Soldier*

Schweik). These works set in the collapsing Austro-Hungarian Empire remain widely read to the present day. Čapek's fiction included Wellsian fantasies, subtle psychological studies, and short stories.

In the period between 1918 and 1945, the lyric poetry of Josef Hora, František Halas, Vitězslav Nezval, and Jaroslav Seifert exhibited great vitality and variety, with work of the highest quality being produced. After World War II, however, the newly established communist regime suppressed free literary activity and permitted only works conforming to the drab and restrictive tenets of Socialist Realism. Czech writing consequently underwent a marked decline. When strict political controls were relaxed in the early 1960s, the novels of Josef Škvorecký and Milan Kundera, the short stories of Bohumil Hrabal and Arnošt Lustig, the poetry of Miroslav Holub, and the plays of Václav Havel began attracting international attention. In the wake of the Soviet-led invasion in 1968, many of these writers were suppressed in Czechoslovakia, though their reputations continued to grow abroad. Of the writers who emigrated to the Western nations, Kundera and Škvorecký soon attained prominence in their adopted countries. During that same period, belated interest was shown abroad in the achievements of Czech lyric poetry in the interwar period, and Seifert, its chief surviving representative, was awarded the Nobel Prize for Literature in 1984. After the democratic revolution of 1989, freer literature flourished, and the playwright Václav Havel, who had been a dissident, became president of Czechoslovakia and, later, of the Czech Republic.

Czech Republic, Czech ČESKÁ REPUBLIKA, landlocked country in central Europe. It is bordered by its former federal partner, Slovakia, to the east, and by Austria to the south, Germany to the southwest and northwest, and Poland to the north. The Czech Republic comprises the historic lands of Bohemia and Moravia (commonly called the Czech Lands) and the southwestern portion of Silesia. Bohemia, Moravia, and Slovakia were united in the independent nation of Czechoslovakia from 1918 to 1992. A separate, independent Czech Republic came into being on Jan. 1, 1993, when the federal union with Slovakia was peacefully dissolved. The nation's capital is Prague. Area 30,450 square miles (78,864 square km). Pop. (1993 est.) 10,339,000.

A brief treatment of the Czech Republic follows. For full treatment, *see* MACROPAEDIA: Czech and Slovak Republics.

For current history and for statistics on society and economy, *see* BRITANNICA BOOK OF THE YEAR.

The land. The Czech landscape is dominated by the Bohemian Massif, which rises to heights of 3,000 feet (900 m) above sea level. This ring of mountains encircles a large elevated basin, the Bohemian Plateau. A significant river valley, the Moravian Corridor, containing the Morava River, separates the Bohemian Massif on the west from the Carpathian Mountains of Slovakia on the east.

The Czech Republic is located on the European divide between the Black Sea to the southeast and the North and Baltic seas to the north. The Elbe-Vltava (Labe-Moldau) river system flows northwestward through the Bohemian Plateau, draining the western two-thirds of the country toward the North Sea. The Oder (Odra) River, flowing northward, drains the northeastern districts toward the Baltic Sea. Most of the rest of the country is drained by the Morava River southeastward into the Danube and on to the Black Sea.

The Czech Republic's climate is complex, but generally a moderate oceanic climate prevails, with harsher continental influences increasing toward the east. With the exception of some highland areas, which receive more than 60 inches (1,500 mm) of precipitation a year, annual averages are between 20 and 30 inches (500 and 760 mm) throughout most of the country. Winter temperatures are mild, with January in Prague averaging about 27° F (−3° C). Summer temperatures are warm, with July and August averaging about 65° F (18° C).



Czech Republic

Although large areas of original forest have been cleared for cultivation and for timber, woodlands remain a characteristic feature of the Czech landscape. Oak, beech, and spruce dominate the forest zones in ascending order of altitude. The timberline runs about 4,500 feet (1,400 m) above sea level. The country's varied wildlife is represented in the Krkonoše National Park, which shelters deer and wild sheep but is also extensively developed as a ski resort.

Despite centuries of exploitation, the Czech Republic still has minable metal reserves, including antimony, iron ore, copper, lead, zinc, mercury, gold, and tin. It also has reserves of uranium and low-quality coal.

The people. The western region of the country has traditionally been the westernmost settlement area of the Slavic peoples in central Europe. Czechs make up more than nine-tenths of the population, although the Moravians consider themselves a distinct group within this majority. Slovaks constitute the largest minority. Other groups include Poles in northeastern Moravia, Germans in northwestern Bohemia, and the relatively mobile Rom, or Gypsies.

The official language, Czech, belongs to the group of Slavic languages that uses the Roman rather than the Cyrillic alphabet. Roman Catholics are estimated to make up about 40 percent of the population. There are also various Protestant sects, including the Czech Brethren Reformed, and Orthodox congregations. As a legacy of the period of official atheism, a significant number of people profess no religious affiliation. About one-fifth of the population is under 15 years of age, whereas one-sixth of the population is 60 years old or older. The birth and death rates produce a relatively low natural rate of growth. Internal migration toward the cities has increased; more than three-fourths of the population is urban.

The economy. The Czech economy was in a state of transition in the early 1990s. Between 1948 and 1989 the communist government owned all major enterprises, allowing free enterprise only in small craft industries. State collectives or cooperatives dominated most of the agricultural land. Production and development were regulated through centralized five-year plans that set quotas for all economic sectors. The gross national product (GNP) came primarily from mining and manufacturing, trade, and construction. Following the collapse of communism in eastern Europe in 1989, the federal government inaugurated a program of privatization. By the time of partition in 1993, the Czech economy (based on an independent Czech currency) was largely market-oriented. The same sectors as before tended to dominate in the GNP, but new service-oriented industries and merchandising were increasingly important.

Czech agriculture is among the most advanced in the former Soviet bloc. The removal of agriculture from central government planning rendered it potentially more responsive to consumer demand and business productivity. The principal crops include sugar beets, wheat, barley, potatoes, corn (maize), and various fruits and vegetables. Northern Bohemia is noted for its hops, used in brewing beer, and there are extensive vineyards along the Vltava River around Melnik and in the Podluzi area of southeastern Moravia. Pigs, cattle (both dairy and beef), sheep, and poultry are the dominant livestock. Forestry is important mainly in the southern mountains, the hills southwest of Prague, and the northeastern districts.

The country is poor in energy resources; some black coal is mined, but the use of lignite (brown coal) predominates in thermal power stations, in home heating, and in the chemical industry. Natural gas and petroleum are produced in limited quantities, leaving the country heavily dependent on Russia for both. Important minerals produced include iron ore, magnesite, copper, manganese, lead, zinc, uranium, and various clays and building stone.

Czech manufacturing is highly diversified and is based on domestic and imported raw materials. Major products include iron, steel, and aluminum; refined-petroleum products; fertilizers; cement; cotton, wool, and synthetic fabrics and clothing; audio and electronic equipment; and road vehicles and railway locomotives. The Czech Republic is noted for precision instruments and for its engineering industry, specializing in factory, powerplant, and transportation-system design and construction. Traditional crafts include glass, porcelain, lace, and wood carving, important for tourism and export.

Tourist activities in the Czech Republic include winter and summer sports, fishing, hunting, and touring in the scenic mountains, numerous historical sites, and traditional regions. Visitors' expenditures are an important source of foreign exchange.

The railway network is well developed. Most freight moves along main-line routes, but shorter routes between the larger towns accommodate considerable passenger traffic. Virtually all of the road network is paved. A superhighway connecting Prague and Brno with Bratislava in Slovakia opened in 1980. The Elbe, Vltava, and Morava are the principal navigable rivers. Prague, Ostrava, Plzen, and other regional centres have domestic air service. The capital city is also a terminus for continental and transoceanic flights.

The country is highly dependent on foreign trade, which since 1989 has increasingly involved Western European partners. Principal exports include industrial machinery, road vehicles and parts, iron and steel, mineral fuels and lubricants, and textile yarns, fabrics, and clothing. Imports, mainly from the countries exported to, include crude and refined petroleum, industrial machinery, agricultural and construction machinery, chemicals, and food.

Government and social conditions. The Czech Constitution of 1992, adopted in anticipation of independence, vests central authority in a bicameral parliament consisting of a Chamber of Deputies and a Senate. At the time of independence, the House of Represen-

tatives consisted of the former Czech National Council, and new general elections for the Senate had yet to be scheduled. The parliament elects a president who, in turn, appoints a prime minister and cabinet to administer the government. The judicial system comprises the 15-member Constitutional Court, the newly created Supreme Administrative Court, and the chief, regional, and district courts. Apportionment of the troops, materiel, and facilities of the former federal army was a formidable task in the partition process. Military protection of the Czech-Slovak border is prohibited.

A comprehensive system of social welfare provides Czech citizens with sickness, work-injury, and maternity benefits, old-age and disability pensions, and family allowances. Health care and medicine are readily available. Good health and sanitary conditions prevail. The Czech Republic has both a relatively low infant mortality rate and a low incidence of serious contagious diseases. Life expectancy at birth is about 71 years.

All education in the Czech Republic is provided by the state and is free of charge. School is compulsory for children between the ages of 6 and 16. Most students graduate from basic school to either secondary grammar school or vocational school. The country's many distinguished institutions of higher learning include one of Europe's oldest, Prague's Charles University, founded in 1348.

Cultural life. Czech culture has made sizable contributions to European literature and music. The plays of Karel Čapek, František Langer, and Václav Havel are well known in the West, as are the novels of Jaroslav Hašek. The Czech poet Jaroslav Seifert was awarded the Nobel Prize for Literature in 1984. Besides Antonín Dvořák, notable Czech composers have included Bedřich Smetana, Leoš Janáček, and Bohuslav Martinů.

History. Until its federation with Slovakia in 1918, the history of what is now the Czech Republic was largely that of Bohemia (*q.v.*). The earliest known inhabitants of that region were the Boii, a Celtic people from whom the name Bohemia is derived. They were followed or displaced by the Germanic Marcomanni about the beginning of the Christian era. Between the 5th and 7th centuries, the Slavs swept over the area. Among them were the Czechs, who by the 9th century had become dominant throughout central Bohemia. Moravia was also settled by successive waves of Celts, Germanic tribes, and Avars before the arrival of Slavic peoples. Slavs who settled in the vicinity of the Morava River took the name Moravians. After long disputes among its neighbours, Moravia was incorporated into Bohemia.

The first Bohemian kingdom developed under the Přemysl rulers of Prague and lasted from 895 until 1306. The Přemysl dynasty by 1085 had built up a patrimony substantial enough to be considered a kingdom by the Holy Roman emperor. In 1114 the Bohemian king became one of the electors of the empire. The Přemysl family died out in 1306, and the Bohemian throne passed to the Luxembourgs. Charles I became king in 1346 and Holy Roman emperor in 1355. He moved the imperial administration to Prague and ushered in a golden age for Bohemia.

A religious reform movement led by the Czech priest and scholar Jan Hus overtook Bohemia in the 15th century. His appeal to the Czech-speaking masses and his alienation of German-speaking Roman Catholics gave his religious movement nationalist overtones, and his Hussite followers fought for political and religious rights within the empire for the next century. The Austrian Habsburgs, who were Roman Catholics, gained the Bohemian crown in 1526, and the Bohemian Protestants' revolt against them (1618) precipitated the Thirty Years' War. The Bohemians were defeated, and in 1627 the Holy Roman emperor Ferdinand II instituted severe reprisals against non-Catholics and direct rule by the Habsburgs. Bohemia was reduced to the status of a province within the Austrian Habsburg domain and remained as such within the Austro-Hungarian Empire after 1867. Nevertheless, Czech nationalism increased in Bohemia, and political parties began to develop. When the Austro-Hungarian Empire collapsed at the end of World War I, the independent republic of Czechoslovakia was born (1918) through the union of Bohemia and Moravia with Slovakia. Bohemia and Moravia together composed the western three-fifths of the new state and held two-thirds of its population.

The history of the Czechs throughout the next 70 years was that of Czechoslovakia (*q.v.*). Czechoslovakia came under the domination of the Soviet Union after World War II, and from 1948 it was ruled by a Communist government. After Communist rule collapsed in 1989–90, separatist sentiments emerged among the Slovaks, and in 1992 the Czechs and Slovaks agreed to break up their federated state. On Jan. 1, 1993, the Czechoslovakian republic was dissolved and replaced by two new countries, the Czech Republic and Slovakia, with the region of Moravia remaining in the former.

Czechoslovak Hussite Church, formerly CZECHOSLOVAK CHURCH, church established in Czechoslovakia in 1920 by a group of dissident Roman Catholic priests. Its forerunner was the Jednota (Union of the Catholic Czechoslovak Clergy), founded in 1890 to promote such reforms as use of the vernacular in the liturgy and voluntary clerical celibacy. The new church, formed when these demands were rejected by the Vatican in 1919, adopted a rationalistic doctrine and a form of organization modeled on Presbyterianism. In 1972 its name was changed to emphasize its incorporation of Hussite reforms. After an initial period of enthusiasm, its membership dwindled; in the late 20th century it claimed about 650,000 adherents.

Czechoslovakia, Czech and Slovak ČESKOSLOVENSKO, former nation in central Europe encompassing the historic lands of Bohemia, Moravia, and Slovakia. Czechoslovakia was formed from several provinces of the collapsing Austro-Hungarian Empire in 1918, at the end of World War I. In the interwar period it became the most prosperous and politically stable state in eastern Europe. It was occupied by Nazi Germany in 1938–45 and was under Soviet domination from 1948 to 1989. In 1993 Czechoslovakia separated peacefully into two new nations, the Czech Republic and Slovakia.

A brief treatment of the history of Czechoslovakia follows. For full treatment, *see* MACROPAEDIA: Czech and Slovak Republics.

The political union of Czechs and Slovaks after World War I was feasible because the two ethnic groups are closely related in language, religion, and general culture. An independent Czechoslovak state was declared by Tomáš Masaryk, Eduard Beneš, and other leaders on Oct. 28, 1918, and was quickly recognized by France and other Allied opponents of Austria. Bohemia, populated by Czechs, constituted its western portion, while Moravia lay at the centre and Slovakia occupied the eastern portion. Bohemians and the closely related Moravians together accounted for two-thirds of the new nation's population.

Under the leadership of Masaryk, who served as president from 1918 to 1935, Czechoslovakia became a stable parliamentary democracy and the most industrially advanced nation in eastern Europe. But after the rise to power of Adolf Hitler in Germany in 1933, the significant German minority in the Sudetenland of western Czechoslovakia began to lean toward Hitler's National Socialism. With the acquiescence of Britain and France, Hitler annexed the German-speaking Sudeten areas of Czechoslovakia in 1938 and had occupied all of Bohemia and Moravia by 1939 and turned these two regions into a German protectorate. Slovakia received nominal autonomy though it was dominated by Germany.

The liberation of Czechoslovakia by Soviet troops in 1944, during World War II, helped bolster the Czech Communist Party while hindering the numerous other parties that emerged. The Communists became the largest party but still a minority. Clever maneuvering and unfailing support from the Soviet Union enabled the Communists to stage a virtual coup d'état in 1948, and a people's republic was formed. Gradually, with Soviet supervision, internal opposition was crushed while the country's industry was nationalized and its agriculture was collectivized. But in the 1960s a progressively deteriorating economy discredited the government and led to grudgingly granted, and limited, reforms. When these failed, the Communist Party's leadership passed to the Slovak first secretary, Alexander Dubček, in January 1968. He instituted a more openly reformist program, "socialism with a human face," that encouraged non-Communists to participate in government and restored a number of civil liberties. In August 1968, however, Warsaw Pact troops invaded the country and returned it to conformity with Soviet-bloc norms.

The country's new Communist leaders concentrated on making the state-run economy more productive while also stifling internal political dissent. Czechoslovakia in the 1970s and '80s was thus one of the more prosperous but also one of the more repressive countries in eastern Europe. In late 1989, however, a wave of democratization swept through eastern Europe with the encouragement of the leader of the Soviet Union, Mikhail Gorbachev. Czechoslovakia's Communist leadership found itself confronted by mass demonstrations in Prague opposed to its policies, and the party soon gave in to the demands for reform. In December the Communists formed a coalition government with non-Communist opposition groups. A multiparty political system was written into law, the writer and former dissident Václav Havel became the country's new president, and free elections to the Federal Assembly were held in June 1990, with non-Communists winning resounding majorities.

With the end of Communist rule and the reemergence of true multiparty democracy (the so-called Velvet Revolution), sentiment in favour of an independent Slovakia began emerging among the Slovak population. Disagreements also emerged over the pace of economic change, with Slovaks resisting the Czechs' preference for rapid privatization of the country's state-run industries. The results of parliamentary elections in June 1992 highlighted these differences, and talks between Czech and Slovak leaders later that year resulted in the peaceful dissolution of the Czechoslovak federation and the creation of two new nations, the Czech Republic and Slovakia, on Jan. 1, 1993.

Czechowicz, Józef (b. March 15, 1903, Lublin, Pol., Russian Empire [now in Poland]—d. Sept. 9, 1939, Lublin, Pol.), Polish poet.

The son of a poor family, Czechowicz was educated at a teachers' college. His poetry is characterized by sensitivity to both urban and rural landscapes and by his love of folk culture. His style is ostentatiously modern and remarkable for its verbal economy, but his poems remain expressive because of their extensive use of metaphor. His first collection of poems, *Kamień* (1927; "Stone"), was followed

by *Dzień jak codzień* (1930; "A Day Like Every Day"), *Ballada z tamtej strony* (1932; "A Ballad from Beyond"), *W błyskawicy* (1934; "In Lightning"), *Nic więcej* (1936; "Nothing More"), and *Nuta człowiecza* (1939; "A Human Note").

His work is also imbued with "catastrophism," the pervasive presentiments of a general conflagration and of his own death. Czechowicz, who had lived in Warsaw from 1930, was evacuated immediately after the German invasion of 1939 to his native Lublin but was killed there in a Luftwaffe bombardment.

Czernin, Ottokar, Count (Graf), in full OTTOKAR, COUNT CZERNIN VON UND ZU CHUDENITZ (b. Sept. 26, 1872, Dimokur, Bohemia, Austria-Hungary [now Dymokury, Czech Republic]—d. April 4, 1932, Vienna, Austria), foreign minister of Austria-Hungary (1916–18), whose efforts to disengage his country from its participation in World War I failed to prevent the dissolution of the Habsburg monarchy in 1918.

Czernin, born into the Czech aristocracy, entered the Austro-Hungarian diplomatic service in the Paris embassy (1895) and was later chargé d'affaires at The Hague (1899). In 1903 he entered the Bohemian Landtag (provincial assembly), where he became an exponent of conservative causes. A close adviser of Archduke Francis Ferdinand, he opposed the introduction of universal suffrage to Austria (1907) and worked to restore political power to the aristocracy. Accorded lifetime membership in the Austrian Empire's upper chamber (1912), he was recalled to the diplomatic service in 1913 as minister to Romania, where he served for three years.

With the accession of the new emperor Charles I (1916), Czernin was appointed foreign minister for Austria-Hungary (December 1916). His plans for extricating Austria swiftly from World War I were wrecked by Germany's opposition and the military and economic entanglements of the Central powers. His standing as foreign minister was severely shaken by the territorial concessions to the newly independent Ukraine at the Brest-Litovsk peace negotiations (February 1918), and he fell from office over the Sixtus Affair (April 1918), an Austrian-Allied secret negotiation of which his emperor had not kept him fully informed. He was a member of the national assembly (1920–23) during the early years of the Austrian republic.

Czernowitz (Ukraine): *see* Chernovtsy.

Czerny, Carl (b. Feb. 20, 1791, Vienna, Austria—d. July 15, 1857, Vienna), Austrian pianist, teacher, and composer known for his pedagogical works for the piano.

He studied piano, first with his father, Wenzel Czerny, and later with Ludwig van Beethoven and knew and was influenced by Muzio Clementi and Johann Nepomuk Hummel. He began teaching in Vienna at the age of 15; among his pupils were Franz Liszt and Beethoven's nephew, as well as other celebrated pianists. His published compositions number nearly 1,000 and include ingenious arrangements for eight pianos, four hands each, of two overtures of Gioacchino Rossini.

Czerny's lasting influence, however, was in his piano studies, which were greatly esteemed by teachers for generations to come. These include the *School of Velocity*, the *School of Virtuosity*, and the *School of the Left Hand*. These exacting sets of graded exercises were still widely used in the 20th century. Czerny also left a valuable essay on performing the piano sonatas of Beethoven.

Częstochowa, *województwo* (province), south-central Poland, established 1975. It is bordered on the north by Sieradz and Piotrków provinces, on the east by Kielce province, on the south by Katowice province, on the west by Opole province, and at its northwestern corner by Kalisz province. Częstochowa is a mostly industrialized area producing electrical machinery, paper, and textiles. Iron-ore deposits, among the largest in Europe, extend across the entire south-central part of the province. Forestry and agriculture (wheat, rye, and potatoes) are also important. Numerous railroad lines and highways cross the entire province, connecting Częstochowa (*q.v.*) city, the provincial capital and a well-known pilgrimage centre for Roman Catholics, with all major markets in the country. The Warta is the largest river in the province; other rivers include the Pilica, Mała Panew, Kocinka, and Wiercica. Area 2,387 square miles (6,182 square km). Pop. (1991 est.) 776,700.

Częstochowa, city, capital (since 1975) of Częstochowa *województwo* (province), south-central Poland. The city originally consisted of two settlements, Old Częstochowa, founded in the 13th century, and Jasna Góra (Polish: "Shining Mountain"), founded in the 14th; the two were merged in 1826. Roman Catholic pilgrimages are made to the Jasna Góra monastery (1382), which contains valuable frescoes and the famous painting of "Our Lady of Częstochowa" (also known as "The Black Madonna"). The monastery was fortified and became a stronghold for Polish forces during the Swedish invasions of 1655 and 1705. Częstochowa is now an important industrial city with textile mills, chemical processing, glass and paper manufacturing, and food processing and is the site of an iron and steel plant. Pop. (1991 est.) 258,300.

Consult the INDEX *first*

Czetwertyński FAMILY, also called ŚWIETOPEŁK-CZETWERTYŃSKI, Polish princely family descended from the Kievan grand prince Svyatopolk II Izyaslavich (d. 1113), of the house of Rurik. Among its prominent members was Antoni Czetwertyński (1748–94), the castellan of Przemyśl and last leader of the pro-Russian Confederation of Targowica that opposed the Polish constitution of 1791; he was finally hanged as a traitor to Poland during Tadeusz Kościuszko's insurrection. Other family members included the philanthropist Włodzimierz (1837–1918) and his son Seweryn Franciszek Kalikst (1873–1945), who was a delegate to the Russian Duma (lower house of the imperial legislature) of 1906 and the Polish Sejm (parliament) from 1922 to 1928.

D-Day (in World War II), first day of the Allied landing in Normandy, France. *See* Normandy Invasion.

D-lines, in spectroscopy, a pair of lines, characteristic of sodium, in the yellow region of the spectrum. Their separation is too small to be detected with a spectroscope of low resolving power. The line is the fourth prominent absorption line in the Sun's spectrum, starting from the red end, and accordingly is designated by the letter D. It has been resolved into two components, D_1 and D_2, corresponding to wavelengths 5895.924 and 5889.950 Å (angstrom = 10^{-10} metre), respectively. An emission line appearing in the chromosphere, D_3, of wavelength 5875.62 Å, has been discovered. This line is caused by helium.

d-lysergic acid diethylamide: *see* LSD.

D region, lowest ionospheric region, at altitudes of about 70 to 90 km (40 to 55 miles). The D region differs from the other ionospheric regions (denoted E and F) in that its free electrons almost totally disappear during the night because they recombine with oxygen ions to form oxygen molecules. Hence, radio waves cannot then be reflected from it but pass through to the strongly reflecting E and F layers above. During the day, some reflection can be obtained from the D region, but the strength of radio waves is reduced; this is the cause of the marked reduction in the range of radio transmissions in daytime. At its upper boundary, the D region merges with the E region.

da (in proper names): *see under* substantive word (*e.g.*, Gama, Vasco da), except as below.

Da, Song (river, China-Vietnam): *see* Black River.

da Costa, Uriel, original name GABRIEL DA COSTA: *see* Acosta, Uriel.

Da Lat, municipality, southern Vietnam, northeast of Ho Chi Minh City (formerly Saigon). On a lake on the Lam Vien Plateau at 4,920 feet (1,500 m) above sea level, it sits among pine-covered hills with picturesque waterfalls nearby. Founded in the 19th century and named for the Da (now Cam Ly) River, which traverses the town, and the Lat population, it was developed by the French as a hill station (resort), summer capital, and centre of big-game hunting. Its temperate climate is frostless yet cool year-round; the bulk of the 70 inches (1,750 mm) of annual rainfall comes during the southwest monsoon from July to October.

Since the mid-20th century Da Lat has served as a centre for the growing of temperate-zone vegetables for sale in Ho Chi Minh City. The rich red soil supports rubber, tea, and coffee plantations as well. Da Lat has a college. There is a commercial airport at Lien Hiep (Lien Khang) to the south. Da Lat is linked by highway to Ho Chi Minh City and other sites on the main highway. Phan Rang, a port on the South China Sea, is 57 miles (92 km) to the southeast. Pop. (1989) 102,583.



A tea plantation near Da Lat, Vietnam
P. Schmid—Shostal

Da Nang, French TOURANE, city, central Vietnam. Lying at the southern end of a horseshoe-shaped bay, it is one of the largest cities in Vietnam and the chief port of the central lowlands. Although partially enclosed on the northeast by the Annamese Cordillera (French: Chaîne Annamitique; Vietnamese: Nui Truong Son), which there reaches an elevation of 4,636 feet (1,413 m), its excellent harbour is still somewhat exposed to the northeastern winter monsoon. On the east it is enclosed by the large Tien Sa Peninsula and Cape Da Nang, which rises to 2,274 feet, on the South China Sea.

First ceded to France in 1787 together with the Son Islands, it was occupied briefly in 1858 by the French. The port subsequently functioned as a French concession beyond the jurisdiction of the protectorate. In the 20th century Da Nang increased in importance after the partition of Vietnam in 1954, which left the city of Hue, to the north, close to the North Vietnamese border.

To its older primitive textile and silk-spinning industry a modern textile mill was added in the 1960s, and machinery and beverage plants were built in the 1970s. The port facilities were greatly expanded by the United States after 1965, when a major air base was built. By the early 1980s Da Nang had one of the most modern and largest ports in Vietnam. Other facilities include a hospital and a polytechnic college founded in 1976. The centre is linked to Ho Chi Minh City (formerly Saigon) and Hanoi by the major national highway and by railway.

Among Da Nang's attractions are the Cham Museum, with many Cham artifacts from the area, and Buddhist shrines in limestone caves around the city; the five peaks of the Ngu Hahn (Marble) Mountains are just southeast of the city and are flanked by China Beach. Pop. (1989) 369,734.

Da Ponte, Lorenzo, original name EMANUELE CONEGLIANO (b. March 10, 1749, Céneda, near Treviso, Veneto [Italy]—d. Aug. 17, 1838, New York, N.Y., U.S.), Italian poet and librettist.

Though Jewish by birth, Da Ponte was baptized in 1763 and later became a priest; his youthful libertinism and freethinking, however, eventually led, in 1779, to his expulsion from the Venetian state. Taking up residence in Vienna, he became official poet to the court of Emperor Joseph II and in that capacity wrote successful libretti for numerous musicians. It was there in 1783 that Da Ponte made the acquaintance of Wolfgang Amadeus Mozart and entered upon the finest period of his literary career. Three masterpieces appeared in rapid succession—*Le nozze di Figaro* (1786), *Don Giovanni* (1787), and *Così fan tutte* (1790). Da Ponte's enduring merit derived from his ability to infuse borrowed themes with new life and to interweave tragic and comic elements. His version of the Don Juan legend, in particular, exercised a lasting literary influence.

On Joseph II's death Da Ponte resumed his wanderings. After a period in London (1792–1805), he emigrated to the United States, settling finally in New York, where he devoted himself to teaching Italian language and literature at Columbia College and promoting Italian cultural activities. His four-volume *Memorie* (1823–27; *Memoirs of Lorenzo Da Ponte*), although mainly concerned with portraying the author as a victim of fate and enemies, is valuable for its portrait of early 19th-century America.

Da Yu (Chinese mythology): *see* Ta Yü.

Da Yunhe (China): *see* Grand Canal.

dab, any of the flatfishes of the genus *Limanda,* family Pleuronectidae, found in the North Atlantic and North Pacific. Dabs are right-eyed flatfish—*i.e.,* the eyes are usually on the right side of the head. The dab of European waters is *L. limanda,* an abundant and valuable food fish. It is small, usually under 25 cm (10 inches) long, and light brown, with or without dark spots.

Other species include the yellowtail flounder, or rusty dab (*L. ferruginea*), a reddish brown western Atlantic fish with rust-coloured spots and a yellow tail; the yellowfin sole, or Alaska dab (*L. aspera*), a brownish northern Pacific flatfish; and the longhead dab (*L. proboscidea*), a light-spotted, brownish northern Pacific fish with yellow on the edges of its body.

The name dab is also used for such other flatfishes as the sanddab (*q.v.*) and the American plaice, or rough dab (*see* plaice).

Dabā al-Ḥiṣn (United Arab Emirates and Oman): *see* Dibā al-Ḥiṣn.

Daba Shan (China): *see* Ta-pa Mountains.

dabbling duck, also called DIPPING, SURFACE-FEEDING, POND, RIVER, or FRESHWATER DUCK, any of about 38 species of *Anas* and about 5 species in other genera, constituting the tribe Anatini, subfamily Anatinae, family Anatidae (*q.v.*; order Anseriformes). They feed



Common, or northern, pintail (*Anas acuta*)
© Lawrence E. Naylor, The National Audubon Society Collection/Photo Researchers

mainly on water plants, which they obtain by tipping-up in shallows—uncommonly by diving (with opened wings); they often forage near the shore for seeds and insects. The bill is flat and broad, the hindtoe unlobed. Dabbling ducks float high in the water and are swift fliers, leaping upward on noisy wings before attaining level flight, usually in compact flocks.

Occurring worldwide, chiefly on inland waters, dabbling ducks are most common in temperate regions of the Northern Hemisphere and are strongly migratory. Males typically have bold plumage patterns except during the postbreeding flightless period, when they resemble the drab females. Hens tend to be slightly smaller than drakes and usually are more vocal—quacking frequently and loudly. The nest, a grass-lined hollow in thick cover by the waterside, usually is blanketed with down from the hen's breast. She may lay in more than one nest—of her own kind or of another species. The hen takes charge of incubating the single clutch of 6–12 eggs for 20–25 days, and she alone rears and protects the downy ducklings. Young birds can fly in about two weeks, and they mature in their first year.

The tribe includes some of the world's finest game birds: the black duck (*Anas rubripes*), much sought after by hunters; the mallard (*q.v.*); the gadwall (*Anas strepera*); the garganey (*A. querquedula*); the pintail (*A. acuta*),

perhaps the world's most abundant waterfowl; the shoveler (*Anas,* or *Spatula, clypeata*), the "spoonbill" of hunters; the teals, races of *Anas crecca* and other species; the wigeons, *Anas,* or *Mareca, americana* and *A.,* or *M., penelope.*

Dabie Shan (China): *see* Ta-pieh Mountains.

daboia (snake): *see* Russell's viper.

Dabola, town, central Guinea, western Africa, situated at the eastern edge of the Fouta Djallon plateau near the Bouka branch of the Tinkisso River. Dabola lies on the Conakry–Kankan railway near the intersection of roads from Mamou, Kouroussa, and Faranah. Dabola is a chief trading centre for rice, peanuts (groundnuts), millet, and cattle and also has a peanut-oil-processing plant. The region surrounding the town is mostly savanna and has an average elevation of about 1,000 feet (300 m). It is inhabited by the predominantly Muslim Fulani (Fulbe, or Peul) and by the Malinke (Mandingo) peoples. The major export item of the region is peanuts. Pop. (1983 prelim.) 18,428.

Dąbrowa Górnicza, city, Katowice *województwo* (province), southwestern Poland, on the Czarna Przemsza River just northeast of Katowice city. The town flourished when coal mining began there in 1796. During the 19th century it served as a mining and metallurgical research centre and had the first Polish mining school (1889). It became a town in 1916. Dąbrowa Górnicza is situated in the Górny Śląsk (Upper Silesia) industrial area and on the Katowice–Warsaw rail line. It is located over one of the thickest coal deposits in the world, measuring up to nearly 80 feet (24 m) in thickness. Part of the coal seam in the General Zawadzki mine is now a national geological reserve. Pop. (1990 est.) 136,000.

Dąbrowska, Maria, *née* MARJA SZUMSKA, DĄBROWSKA also spelled DOMBROWSKA (b. Oct. 6, 1889, Russów, near Kalisz, Pol.—d. May 19, 1965, Warsaw), Polish author and literary critic who is especially known for the modern Polish epic narrative *Noce i dnie,* 4 vol. (1932–34; "Nights and Days"), popularly and critically considered to be one of the best works of Polish prose.

Educated in Poland and Belgium and at the University of Lausanne in Switzerland, Dąbrowska lived in France and Britain before World War II. In 1909 she began to write articles for Polish newspapers on political and economic reform and on the cooperative movement, subjects that continued to engage her throughout her life. Her first short story, "Janek," was published in 1914. She published three collections of short stories during the 1920s, including *Ludzie stamtąd: Cykl opowieści* (1926; "Folks from Over Yonder: A Cycle of Tales"), inspired by her lifelong sympathy with the peasantry. A later volume of stories, *Gwiazda zaranna* (1955; "The Morning Star"), which contained the much-anthologized story "Na wsi wesele" ("A Village Wedding"), was published in English as *A Village Wedding, and Other Stories* in 1957.

During the 1930s Dąbrowska's early, journalistic interest in cooperatives took a new form with the publication of the first volume of her classic four-part novel *Noce i dnie.* Often compared to other acclaimed family sagas (such as Thomas Mann's *Buddenbrooks* and John Galsworthy's *Forsyte Saga*), *Noce i dnie* relates the story of Bogumił and Barbara (both of whom were born of landowning families whose fortunes are declining) from courtship through their marriage and the birth of their children to old age and Bogumił's death (the years 1863–1914). Each of the major characters is forced to redefine personal values within a changing society. Dąbrowska's theme of the human potential for development within uncertain circumstances is subtly and profoundly wrought.

In addition to her masterwork and her short stories, Dąbrowska wrote two historical plays. She also wrote a number of essays, including a series of critical essays on the Polish-born English author Joseph Conrad, *Szkice o Konradzie* (1959; "Essays on Conrad"), and she translated many foreign-language works, notably the diary of the 17th-century Englishman Samuel Pepys, into Polish.

She continued to be active in political and social issues throughout her life; in 1964, with 33 other Polish writers and scholars, she signed a letter of protest against Communist censorship. Dąbrowska was, despite her political stance, a writer respected by the government as well as the Polish people; after her death she was given a state funeral. *Przygody człowieka myślącego* ("Adventures of a Thinker"), a novel she left unfinished at her death, was published in 1970.

Dąbrowski, Jan Henryk, Dąbrowski also spelled DOMBROWSKI (b. Aug. 29, 1755, Pierzchowice, near Kraków, Pol.—d. June 6, 1818, Winnogóra), general, regarded as a Polish national hero for his part in Tadeusz Kościuszko's rebellion against Russia (1794); he later organized and commanded the Polish legions in Napoleon's army.



Dąbrowski, detail from a portrait by an unknown Polish artist; in the National Museum, Warsaw

By courtesy of the National Museum, Warsaw

After service in the Saxon Army (1772–92), Dąbrowski joined the Poles to serve against the Russians in 1792. In 1794 he took part in Kościuszko's uprising, distinguished himself in the defense of Warsaw, and then led a separate raid against the Prussians in the province of Poznań. After the Third Partition of Poland (1795) he went to Paris and obtained from the Directory (1796) permission to form a Polish legion in Italy. In command of that legion he played an important part in the war in Italy (1797–1801), entering Rome on May 3, 1798, and distinguishing himself at the Trebbia (June 17–19, 1799), where his legions suffered major losses against the Russians. After the Treaty of Amiens (1802), he passed, as general of division, into the service of the Italian Republic until he was summoned by Napoleon in 1806 to promote a rising in Poland. Arriving in Poznań on November 6, he had, by the end of 1806, organized seven Polish units, which he led in defense of the Napoleonic Duchy of Warsaw, distinguishing himself in the Battles of Danzig (Gdańsk) and Friedland in 1807. In 1809 he served in the Polish campaign against Austria in Galicia, and in 1812 he commanded one of the Polish divisions in the invasion of Russia, where he was wounded while covering the passage of the Berezina River. He fought in the Battle of Leipzig in 1813, and in 1814 he returned to Poland, where he was one of the generals entrusted by the Russian tsar with the reorganization of the Polish Army. In 1815 he was appointed general of cavalry and senator of the new Kingdom of Poland.

Dacca (Bangladesh): *see* Dhākā.

dace, any of a number of small, slim, active freshwater fishes of the carp family, Cyprinidae. In England and Europe, the dace is *Leuciscus leuciscus,* a relative of the chub.



European dace (*Leuciscus leuciscus*)

Jane Burton—Bruce Coleman Ltd

Usually found in moderately swift streams and rivers, the European dace is a rather small-headed, silvery fish attaining a usual length and weight of 25–30 cm (10–12 inches) and 0.5–0.7 kg (1–1½ pounds). It lives in schools and eats both plant and animal material. The European dace is a good bait fish. Though it is not highly valued as food, the dace is sought by sport fishermen because it is a shy, somewhat difficult fish to capture.

In North America, the name dace is applied to various small cyprinids. The redbelly daces (*Phoxinus*) are well-known, with a southern (*P. erythrogaster*) and northern (*P. eos*) species. The southern redbelly dace, found in clear creeks from Alabama to Pennsylvania and the Great Lakes region, is an attractive fish sometimes kept in home aquariums. It is 5–7.5 cm (2–3 inches) long and is marked with two longitudinal black stripes. The northern redbelly dace, similar to the southern, is found in creeks and bogs in the eastern and central United States. These and other daces are noted for the rosy to bright-red colouring assumed by the male during the spring breeding season.

Other North American daces include: the redside and rosyside daces (*Clinostomus*), which are black-banded fishes about 12 cm (4¾ inches) long found in the eastern and central United States; and several species of the genus *Rhinichthys,* among them the black-nosed dace (*R. atratulus*), a fine-scaled, black-banded, 7.5-centimetre-long fish found from New England to Minnesota, and the long-nosed dace (*R. cataractae*), a widely distributed species with a comparatively long snout. The creek chub is often known also as the horned dace, because of the hornlike projections that develop on the head of the male during breeding season.

Dach, Simon (b. July 29, 1605, Memel, East Prussia [now in Lithuania]—d. April 15, 1659, Königsberg [now Kaliningrad, Russia]), Prussian poet who was best known as the leader of the 17th-century Königsberg circle of middle-class poets, impor-



Dach, engraving

Bavaria-Verlag

tant in the early Baroque movement in literature, which reflects the stress and turmoil of the period of the Thirty Years' War.

After earning his living for many years as a private tutor for wealthy families, he became a professor of poetry at the University of Königsberg in 1639. His occasional poetry, which commemorated the births, deaths, and marriages of the Königsberg bourgeoisie, is characterized by a sweet simplicity and musicality. He went beyond this conventional manner, however, in poems with elements from folk songs and in religious poetry; these verses can be seen to anticipate the hymns of Paul Gerhardt, generally considered the greatest of the German hymnists.

Dachau, city, Bavaria *Land* (state), southern Germany, on the Amper River, just northwest of Munich. First mentioned in 805, it remained a small market town until the 20th century, attaining civic status in 1934.

Dachau is situated on a hill, on the summit of which are the castle of the Wittelsbachs and a parish church (1625). The city's picturesque natural setting has long attracted landscape painters. Industries include the production of paper, cardboard, electrical equipment, textiles, and ceramics.

In 1933 the first concentration camp set up by the Nazi SS (Schutzstaffel) was opened on the site of a former ammunition factory on the outskirts of Dachau. A museum and memorial chapels were opened in the 1960s. *See* Dachau (concentration camp). Pop. (1989 est.) 34,183.

Dachau, the first Nazi concentration camp in Germany, established on March 10, 1933, slightly more than five weeks after Adolf Hitler became chancellor. Built on the outskirts of the town of Dachau, about 12 miles (16 kilometres) north of Munich, it became the model and training centre for all other SS-organized camps. During World War II the main camp was supplemented by about 150 branches scattered throughout southern Germany and Austria, all of which collectively were called Dachau. (This southern system complemented the camps for central and northern Germany, at Buchenwald and Sachsenhausen.) In the course of Dachau's history, at least 160,000 prisoners passed through the main camp and 90,000 through the branches. Incomplete records indicate that at least 32,000 of the inmates died there, through the "natural diminution" of disease, malnutrition, and physical oppression; but numberless more were transshipped to the extermination camps in Poland.

Dachau was the first and most important camp at which German doctors and scientists set up laboratories to perform medical experiments on involuntary inmates, using them as guinea pigs for such experiments as (1) determining the human effects of sudden increases and decreases in atmospheric pressure, (2) studying the effects of freezing on warm-blooded creatures, (3) infecting prisoners with malaria and treating them with various drugs of unknown effects, (4) testing for the effects of drinking seawater or going without food or water. Continued throughout World War II, such experiments and the harsh living conditions made Dachau one of the most notorious of camps. After the war, the scientists and doctors from this and other camps were tried at Nürnberg in the "Doctors' Trial"; seven were sentenced to death.

Dachlan, Kijai Hadji Ahmad (b. 1868, Jogjakarta, Java—d. Feb. 23, 1923), founder of Muhammadiyah, an Islāmic reform movement with great impact on the practice of Islām in Indonesia and strong influence on many nationalist leaders.

Dachlan was a wealthy merchant who made the pilgrimage to Mecca shortly after 1900. On his return, he became active in religious reform activities, first in formalistic issues of ritual and subsequently on broader substantive issues then being raised by reformers in Egypt. In essence, the reformers sought to abandon the four different schools of interpretation of Islāmic law and return to the precepts of the Qur'ān, hoping thus to generate a body of Islāmic thought suited to a modernizing society. Muhammadiyah, founded in May 1912, followed Western organizational models, and Dachlan won legal recognition for it from the government of the Dutch East Indies. Muhammadiyah's practical program stressed education and social work, including the founding and operation of schools, hospitals, and related activities; it modelled itself on the programs of Christian missionary societies, whose influence Muhammadiyah hoped to reduce. The movement avoided political activity, but Dachlan maintained close connections between his organization and the openly political Sarekat Islām (Islāmic Association).

In 1915 Muhammadiyah's schools were granted a government subsidy and began to attract children of ambitious Indonesians seeking to improve their children's opportunities through education but wishing to do so in a Muslim rather than a Christian context. After 1920, Muhammadiyah spread from its Jogjakarta base to the rest of Java and the outer islands and became one of the most powerful influences on the emerging Indonesian middle class.

dachshund (German: "badger dog"), dog breed of hound and terrier ancestry developed in Germany to pursue badgers into their burrows. The dachshund is a long-bodied, characteristically lively dog with a deep chest, short legs, tapering muzzle, and long ears.

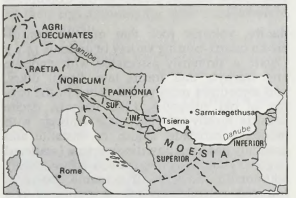


Dachshund
Sally Anne Thompson—EB Inc

Usually reddish brown or black-and-tan, it is bred in two sizes—standard and miniature—and in three coat types—smooth, long, and wiry. The standard dachshund stands about 7 to 10 inches (18 to 25 centimetres) and weighs 12 to 22 pounds (5.5 to 10 kilograms); the miniature is shorter and weighs less than 9 pounds (4 kilograms).

Dachstein, mountain massif of the northern Alps, Austria, on the borders of the *Bundesländer* (federal provinces) Oberösterreich, Salzburg, and Steiermark, reaching its maximum elevation at Hoher Dachstein (9,826 ft [2,995 m]). Among the massif's higher reaches are the easternmost and northernmost glaciers of the Alps, the largest of which is the Hallstättergletscher, 2 sq mi (5.3 sq km) in area. The Alpine scenery of the massif attracts skiers and mountain climbers, and the ice and limestone caves of the Dachsteineishöhle and Koppenbrüllerhöhle provide further attractions. Some 240 other caves have been identified on the massif.

Dacia, in antiquity, the area of the Carpathian Mountains and Transylvania, in present north-central and western Romania. The Dacian people had earlier occupied lands south of the Danube and north of the mountains, and the Roman province eventually included wider territories both to the north and east. The Dacians were agricultural and also worked their rich mines of silver, iron, and gold. They first appeared in the Athenian slave market in the 4th century BC; subsequently they traded with the Greeks (importing especially wine) and used Greek coins. They spoke a Thracian dialect but were influenced culturally by



Roman Dacia
Adapted from R. Treharne and H. Fullard (eds.), *Muir's Historical Atlas: Ancient, Medieval and Modern*, 9th ed. (1965); George Philip & Son Ltd., London

the neighbouring Scythians and by the Celtic invaders of the 4th century BC. The Dacians engaged Roman troops in 112, 109, and 75 BC. In about 60–50 BC King Burebista unified and extended the kingdom, which, however, split into four parts after his death.

During the reign of the Roman emperor Augustus (ruled 27 BC–AD 14) and again in AD 69 the Dacians raided the Roman province of Moesia but were beaten back. The Dacian Wars (AD 85–89) under the emperor Domitian resulted in their recognition of Roman overlordship. The Romans under Trajan reopened hostilities in AD 101 and by 106 subdued the whole country. A large part of the population was either exterminated or driven northward. The Romans seized an enormous amount of wealth (the Dacian Wars were commemorated on Trajan's Column in Rome) and immediately exploited the Dacian mines. Roman influence was broadened by the construction of important roads, and Sarmizegethusa and Tsierna (Orsova) were made colonies. The new province was divided under Hadrian: Dacia Superior corresponded roughly to Transylvania and Dacia Inferior to the region of Walachia.

In AD 159 Antoninus Pius redivided the region into three provinces, the Tres Daciae (Dacia Porolissensis, Dacia Apulensis, and Dacia Malvensis), all subordinate to one governor of consular rank. Marcus Aurelius made the provinces a single military region in about AD 168. The limits of Roman territory were probably never clearly defined, but the Romans benefitted both militarily and materially from the occupation.

Dacier, Anne, *née* LEFÈBVRE (b. 1654, Preuilly-sur-Claise, Fr.—d. Aug. 17, 1720, Paris), classical commentator, translator, and editor, famous throughout Europe for her translations of the *Iliad* and the *Odyssey,* for her part in the French literary controversy between the "ancients and moderns," and for her work, with her husband, André Dacier, on the famous Delphin series of editions of Latin classics.

Anne Dacier was the daughter of a French Humanist, Tanneguy Lefèbvre, who educated her and launched her in the field of classical studies. In 1683 she married one of her father's students, André Dacier (also engaged in classical studies and translations), whose work was far inferior to hers. Prior to her marriage, Mme Dacier had already produced notable translations, and her translations in prose of the *Iliad* (1699) and the *Odyssey* (1708) brought her renown throughout Europe, par-

ticularly among French men of letters. It was partly through these translations that a literary dispute known since as the *querelle des anciens et des modernes* arose as a contest of the merits of classical as opposed to contemporary authors (*see* ancients and moderns, the quarrel of). One of her important works on the subject was *Des Causes de la corruption de goût* (1714; "Of the Causes of the Corruption of Taste").

dacite, volcanic rock that may be considered a quartz-bearing variety of andesite (*q.v.*). Dacite is primarily associated with andesite and trachyte and forms lava flows, dikes, and sometimes massive intrusions in the centres of old volcanoes. Like andesite, dacite consists mostly of plagioclase feldspar with biotite, hornblende, augite, or enstatite and generally has a porphyritic structure (scattered larger crystals in a fine-grained groundmass); additionally, however, it contains quartz as rounded, corroded crystals or grains, or as a constituent of the groundmass. The feldspar content of dacite ranges from oligoclase to andesine and labradorite; sanidine occurs also in some dacites and when abundant gives rise to rocks transitional to the rhyolites. Many of the hornblende- and biotite-dacites are gray or pale-brown and yellow rocks with white crystals of feldspar and black crystals of biotite and hornblende; others, especially augite- and enstatite-dacites, are darker. Rocks of this group occur in Romania, Spain, Strathclyde region and other parts of Scotland, New Zealand, the Andes, Nevada and other parts of western North America, Greece, and elsewhere.

Dacke War, also called DACKE REBELLION (1542–43), a Swedish peasant revolt against the autocratic Reformation policies of Gustav I Vasa (ruled 1523–60). Although unsuccessful, the revolt proved a challenge to the King's centralizing efforts and caused Gustav to moderate his regime.

Led by Nils Dacke, an outlaw, the peasants of the province of Småland took up arms against the King in the spring of 1542 in protest against the royal suppression of Catholicism; furthermore, the ruthless collection procedures of nobles and state bailiffs exacerbated the peasants' discontent. After murdering any state agents unlucky enough to fall into their hands, the Smålanders gathered a large force under Dacke and offered their support for the throne to Svante Sture, whose family had supplied Sweden with three regents. Sture, however, refused the call to civil war.

The rebels' victory over a royal army in the autumn of 1542 was followed by a truce with the King in November. The King then urged Sweden's peasants to cooperate with his regime in the interest of national unity, at the same time promising to restrain his provincial agents. He was determined, however, to make an example of the Smålanders, and, reinforcing his armies in the area, he crushed the rebels early in 1543. Dacke is believed to have been killed in battle; the other leaders were executed; and the Smålanders were heavily fined. Although the rebellion had failed, it prompted Gustav to temper his harsh rule during the balance of his reign.

Dacko, David (b. March 24, 1930, Bouchia, Oubangui-Chari, French Equatorial Africa), president of the Central African Republic, 1960–65 and 1979–81. A former teacher, Dacko held ministerial posts under Pres. Barthélemy Boganda and, claiming a family relationship, succeeded to the presidency after Boganda's death. He ruled the republic as a one-party state until overthrown by Jean-Bédel Bokassa, on the night of Dec. 31, 1965/Jan. 1, 1966.

On Sept. 21, 1979, after 13 years of Bokassa's brutal rule (which included proclaiming himself emperor of a "Central African Empire"), Dacko in turn overthrew him, announcing that the country would revert to a republic with himself as president. He was removed from office in September 1981, when Gen. André Kolingba seized power.

Dacorum, district, county of Hertfordshire, England. With an area of 81 sq mi (210 sq km), the district includes a part of the range of chalk hills, the Chilterns, which borders the London Basin on the north. It embraces a number of the outer suburban communities of London, including the new town of Hemel Hempstead (*q.v.*), 25 mi (40 km) from the centre of the capital. The name Dacorum dates from as early as the 12th century, when it applied to one of the "hundreds," or early administrative divisions of the English county. It seems likely that the name commemorates the presence in this area of Daci, or Danish, settlers. The old name was adopted for the administrative district when it was created in 1974. The headquarters are at Hemel Hempstead. Pop. (1982 est.) 131,100.

dacryocystitis, inflammation and infection of the lachrymal sac. Tears leave the eye through small openings in the inner corner of the eye and flow into the lachrymal, or tear, sac, from which they drain through a duct—the nasolachrymal duct—into the nasal cavity. Thus infection can reach the lachrymal sac from the nose by way of the nasolachrymal duct. Inflammation of the sac causes a painful swelling at the inner corner of the eye. Chronic inflammation of the sac may result from any obstruction of the duct that prevents the passage of tears.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

dactyl, metrical foot consisting of one long (classical verse) or stressed (English verse) syllable followed by two short, or unstressed, syllables. Probably the oldest and most common metre in classical verse is the dactylic hexameter, the metre of Homer's *Iliad* and *Odyssey* and of other ancient epics. Dactylic metres are fairly rare in English verse, one difficulty being that the prolonged use of the dactyl tends to distort normal word accent, giving the lines a jerky movement. They appeared with regularity only after poets like Robert Browning and Algernon Charles Swinburne successfully used the form in the 19th century. Dactylic rhythm produces a lilting movement as in the following example from Byron's *Bride of Abydos:*

– ◡ ◡ | – ◡ ◡ | – ◡ ◡ | – ◡

Know ye the | land where the | cypress and | myrtle.

This line contains the common variation of omitting an unstressed syllable at the end of a line.

Dactylella, a genus of 15 species in the Fungi Imperfecti (form-class Deuteromycetes; *q.v.*). They capture and kill nematodes (roundworms) by penetrating their bodies. A penetration tube grows out of a hypha (one of the filaments that make up the body of a typical fungus) after contact with the prey, enters it, and begins to grow and branch, forming haustoria (special absorbing structures). Enzymes secreted by the fungus kill the nematode.

Dactylorhiza, genus of orchids, family Orchidaceae, containing about 30 species of plants with palmately lobed root tubers. They grow in meadows and damp places throughout Eurasia and in parts of North Africa, Alaska, and some Atlantic islands.

All species were formerly included in the genus *Dactylorchis.* The marsh orchid (*Dactylorhiza incarnata*), elder-flowered orchid (*D. sambucina*), and spotted orchid (*D. fuchsii*) are common European species.



Spotted orchid (*Dactylorhiza fuchsii*)
A.J. Huxley

Dada (French: "hobby-horse"), nihilistic movement in the arts that flourished primarily in Zürich, New York City, Berlin, Cologne, Paris, and Hannover, Ger. in the early 20th century. Several explanations have been given by various members of the movement as to how it received its name. According to the most widely accepted account, the name was adopted at Hugo Ball's Cabaret (Café) Voltaire, in Zürich, during one of the meetings held in 1916 by a group of young artists and war resisters that included Jean Arp, Richard Hülsenbeck, Tristan Tzara, Marcel Janco, and Emmy Hennings; when a paper knife inserted into a French–German dictionary pointed to the word *dada,* this word was seized upon by the group as appropriate for their anti-aesthetic creations and protest activities, which were engendered by disgust for bourgeois values and despair over World War I. A precursor of what was to be called the Dada movement, and ultimately its leading member, was Marcel Duchamp, who in 1913 created his first ready-made (now lost), the "Bicycle Wheel," consisting of a wheel mounted on the seat of a stool.

The movement in the United States was centred at "291," the New York City gallery of Alfred Stieglitz, and the studio of the Walter Arensbergs, both wealthy patrons of the arts. There Dada-like activities, arising independently but paralleling those in Zürich, were engaged in by such artists as Man Ray, Morton Schamberg, and Francis Picabia. Both through their art and through such publications as *The Blind Man, Rongwrong,* and *New York Dada* the artists attempted to demolish current aesthetic standards. Travelling between the United States and Europe, Picabia became a link between the Dada groups in New York City, Zürich, and Paris; his Dada periodical, *291,* was published in Barcelona, New York City, Zürich, and Paris from 1917 through 1924.

In 1917 Hülsenbeck, one of the founders of the Zürich group, transmitted the Dada movement to Berlin, where it took on a more political character. Among the German artists involved were Raoul Hausmann, Hannah Höch, George Grosz, Johannes Baader, Hülsenbeck, Otto Schmalhausen, and Wieland Herzfelde and his brother John Heartfield (formerly Helmut Herzfelde, but Anglicized as a protest against German patriotism). One of the chief means of expression used by these artists was



First International Dada Fair, held in Berlin, June 1920
By courtesy of Hannah Hoch

the photomontage, which consists of fragments of pasted photographs combined with printed messages; the technique was most effectively employed by Heartfield, particularly in his later, anti-Nazi works (*e.g.*, "Kaiser Adolph"). Like the groups in New York City and Zürich, the Berlin artists staged public meetings, shocking and enraging the audience with their antics. They, too, issued Dada publications: *Club Dada, Der Dada, Jedermann sein eigner Fussball* ("Everyman His Own Football"), and *Dada Almanach*. The First International Dada Fair was held in Berlin in June 1920.

Dada activities were also carried on in other German cities. In Cologne in 1919 and 1920, the chief participants were Max Ernst and Johannes Baargeld. Also affiliated with Dada was Kurt Schwitters of Hannover, who gave the name *Merz* to his collages, constructions, and literary productions. Although Schwitters used Dadaistic material—bits of rubbish—to create his works, he achieved a refined, aesthetic effect that was uncharacteristic of Dada antiart.

In Paris Dada took on a literary emphasis under one of its founders, the poet Tristan Tzara. Most notable among the numerous Dada pamphlets and reviews was *Littérature* (published 1919–24), which contained writings by André Breton, Louis Aragon, Philippe Soupault, Paul Éluard, and Georges Ribemont-Dessaignes. After 1922, however, Dada began to lose its force, and the energies of its participants turned toward Surrealism (*q.v.*).

Dada had far-reaching effects on the art of the 20th century. Its nihilistic, antirationalistic critiques of society and its unrestrained attacks on all formal artistic conventions found no immediate inheritors, but its preoccupation with the bizarre, the irrational, and the fantastic bore fruit in the Surrealist movement. Dada artists' techniques of creation involving accident and chance were later employed by the Surrealists and Abstract Expressionists. Conceptual art also is rooted in Dada, for it was Duchamp who first asserted that the mental activity ("intellectual expression") of the artist was of greater significance than the object created.

Daddah, Moktar Ould (b. Dec. 25, 1924, Boutilimit, Mauritania, French West Africa), statesman who was independent Mauritania's first president (1961–78). He was noted for his progress in unifying his biracial (Moor and Negro), dispersed, and partly nomadic people under his authoritarian but enlightened rule.

Of aristocratic background, Moktar Ould Daddah was the first Mauritanian to graduate from a university and to become a lawyer. When he returned from Paris in the mid-1950s, he joined the more moderate of two rival parties, the Progressive Mauritanian Union, and in 1957 was elected to the territorial assembly. By 1958 he was president of the Executive Council and the natural choice for prime minister in 1959 and president in 1961 after Mauritania attained independence. Meanwhile, in 1958 he had established a new unity party, the Mauritanian Regrouping Party, which in 1960 incorporated the chief remaining opposition party.

Moktar Ould Daddah's first aim was national unity, a delicate problem in a country divided between a minority agricultural south and a largely nomadic Moorish centre and north. At first he tried to balance regional notables and impatient young modernizers in a basically parliamentary regime; but in 1964 he shifted to an authoritarian one-party system (Mauritanian People's Party, of which he was secretary-general). In July 1978 dissatisfaction with the costly attempt by Mauritania to annex part of former Spanish Sahara resulted in his ouster by a military coup d'état led by Lieutenant Colonel Mustafa Ould Salek.

Daddi, Bernardo (b. *c.* 1290, Florence?—d. *c.* 1355, Florence?), early Italian Renaissance painter who was a pupil of Giotto and was influenced by Lorenzetti. Daddi's efforts to fuse the plastic qualities of Giotto's art with some aspects of Sienese art came to represent the dominant style of painting directly after Giotto. Daddi's work, from the period 1328–48, ranges from Madonna images in large church altarpieces to small panels for citizens' prayers. Though known for his technique of building up his figures with the softened weight expected of a Giotto pupil, Daddi added grace by emphasizing a curving line. His figures have a sharp, bright presence as they turn before tapestried thrones.

A triptych Daddi completed in 1328 for the Church of Ognissanti (now in the Uffizi, Florence) is typical of his best work. Numerous easel paintings by the artist are to be found in museums in Europe and North America.

daddy long legs (insect): *see* crane fly.

daddy longlegs, also called HARVESTMAN, any of the 3,400 species of the arachnid order Opiliones (sometimes named Phalangida). A daddy longlegs differs from all true spiders (order Araneae) by the extreme length and thinness of its legs and by the small size and spherical or oval shape of its body, which is not divided into two regions by a constriction. The body is 1 to 22 mm (0.04 to 0.9 inch) long; the slender legs, which easily break off, may be 20 times the body length. The two eyes are on a median knob. The adults have a pair of glands, one on each side of the carapace, that secrete an evil-smelling fluid.

Daddy longlegs are very widely distributed, being abundant in temperate countries of both hemispheres and common in the tropics. Typical daddy longlegs of Europe and North America belong to the family Phalangiidae; the United States and Canada have about 150 species. Daddy longlegs are most common in late summer and often are sighted in fields; this and the scythelike or rakelike appearance of their legs accounts for their popular name of harvestman.

Daddy longlegs are predacious, feeding upon small insects, mites, spiders, fresh carrion, and vegetable matter. The males are smaller than the females and often differ markedly from them. The male has a long protrusible penis. After a pair mates in the autumn, the female uses her long, protrusible ovipositor to lay her



Harvestman
E S Ross

eggs in some cleft in the soil. Shortly after breeding, the parents die. The eggs hatch with the warmth of spring.

Dadié, Bernard Binlin (b. 1916, Assini, Côte d'Ivoire), Ivoirean poet, dramatist, novelist, and administrator whose works have been inspired both by traditional themes from Africa's past and by a need to assert the modern African's desire for equality, dignity, and freedom.

Dadié received his higher education in Senegal, where his involvement in a folklore and drama movement first encouraged him to write plays. This interest continued when he returned to Côte d'Ivoire in 1947 (after acquiring a diploma in administration and working 11 years at the Institut Français d'Afrique Noire); it led to his work as teacher, writer, founder of a National Drama Studio, and eventually director of arts and research and minister of culture for Côte d'Ivoire.

His first published work was a collection of poems, *Afrique debout* (1950; "Africa Upright"), followed by the autobiographical novel *Climbié* (1953), which recreates the social milieu of Côte d'Ivoire when it was still a French colony, and *Un Nègre à Paris* (1959), an examination of Parisian society from a unique viewpoint, presented in epistolary form. His love of Africa's oral traditions caused him to collect and publish several volumes of legends, fables, folktales, and proverbs, which he felt provided the moral backbone of African society. Two later novels, *Patron de New York* (1964) and *La Ville où nul ne meurt* (1968; "The Town Where Nothing Dies"), satirize American and Roman life and society. Between 1967 and 1970 he published another verse collection and several plays, including *Monsieur Thôgô-Gnini* (1970). The novel *Commandant Taurcault et ses nègres* ("Commander Taurcault and His Negroes") appeared in 1980.

dado, in Classical architecture, the plain portion between the base and cornice of the pedestal of a column and, in later architecture, the paneled, painted, or otherwise decorated lower part of a wall, up to 2 or 3 feet (60 to 90 cm) above the floor. Internal walls were so

treated between the 16th and the 18th century, though toward the close of that period the dado was left plain and merely defined by a rail along the wall.

Dādra and Nagar Haveli, union territory, located between Gujarāt and Mahārāshtra states, western India, 80 miles (130 km) north of Bombay. The capital is Silvassa.

A brief treatment of Dādra and Nagar Haveli follows. For full treatment, *see* MACROPAEDIA: India.

The union territory consists of two sections: Dādra, with 3 villages, and Nagar Haveli, with the town of Silvassa and 68 villages. It is administered by the central Indian government. Forests cover some 40 percent of the area, the rest being devoted to the cultivation of rice and other cereals and to the grazing of livestock. Industrial development is limited.

Dādra and Nagar Haveli came under Portuguese control between 1783 and 1785, and in 1954 indigenous freedom movements forced the Portuguese to abandon it to India. It became a union territory in 1961. The population is predominantly Hindu, and nearly 80 percent are agricultural Ādivāsi tribal peoples. Silvassa is the commercial centre for the territory. Area 190 square miles (491 square km). Pop. (1991 prelim.) 138,401.

Dādū (b. 1544, Ahmadābād, India—d. *c.* 1603, Naraina, India), Hindu saint who founded the Dādūpanthī sect.

A cotton carder by profession, Dādū became a religious wanderer and finally settled at Naraina, near Jaipur (Rājasthān state), which remains the centre of his following. Dādū rejected the authority of the Vedas (earliest Hindu scriptures), caste distinctions, and all divisive, external forms of worship, such as visits to temples and pilgrimages. Instead he concentrated on *japa* (repetition of the name of God). Dādū also insisted on vegetarianism and abstention from alcohol. Both Hindus and Muslims were admitted as his disciples. Dādū's teachings and devotional hymns were collected in a 5,000-verse anthology, *Bāṇī* ("Poetic Utterances"), which is held in high reverence by the Dādūpanthī sect.

Dādu, town, Sindh province, southern Pakistan. The town lies just west of the Indus River. A distribution centre, it is connected by road and rail with Hyderābād (100 miles [160 km] south-southeast), Karāchi, and Quetta. Dādu has men's and women's government colleges that are affiliated with the University of Sindh. The area in which Dādu is situated is a fertile, alluvial tract irrigated by the Dādu Canal system, which is supplied via the Sukkur Barrage on the Indus River. Wheat, gram (chick-pea), rice, and sorghum are the chief crops. Pop. (1981) town, 39,298.

DAE: *see* Dictionary of American English on Historical Principles, A.

Daedala, ancient festival of Hera, consort of the supreme god Zeus. The Daedala was celebrated on Mount Cithaeron in Greece. In the festival, a wooden image dressed as a bride was carried in procession, then burnt with sacrificed animals and a wooden sacrificial altar. A myth existed that Zeus had won back the estranged Hera by arousing her jealousy with such an image. The Daedala involved a new "marriage" of the pair following reconciliation. This myth, and the fact that burning of wood was common to many spring and midsummer pagan observances throughout Europe, suggests that the Daedala was essentially a vegetation fertility rite.

Daedalic sculpture, type of sculpture attributed to a legendary Greek artist, Daedalus, who is connected in legend both to Bronze Age Crete and to the earliest period of Archaic sculpture in post-Bronze Age Greece. The legends about Daedalus recognize him both as a man and as a mythical embodiment. The writer Pausanias thought that wooden images were referred to as *daidala* even before



Kneeling youth from Samos, Greece, ivory decorative finial for a cithara in the Daedalic style, *c.* 625 BC; in the Archaeological Museum, Samos, Greece

By courtesy of the Deutsches Archaeologisches Institut, Athens

Daedalus' time. Daedalic sculpture reveals Eastern influences, known as Orientalizing in Greek art. Orientalizing is particularly noticeable in the head seen from the front; it resembles an Eastern head, with wiglike hair, but is more angular, having a triangular face, large eyes, and a prominent nose. The female body is rather flatly geometric, with high waist and formless drapery. Early sculpture exhibiting these attributes is known as Daedalic; it was used for figurines, on clay plaques, and in relief decorations on vases. It seems to have had a marked influence in the Peloponnese, Dorian Crete, and Rhodes.

Daedalus (Greek: "Cunningly Wrought"), mythical Greek architect and sculptor, who was said to have built, among other things, the paradigmatic Labyrinth for King Minos of



Daedalus and Icarus, antique bas-relief; in the Villa Albani, Rome

Alinari—Art Resource

Crete. Daedalus fell out of favour with Minos and was imprisoned; he fashioned wings of wax and feathers for himself and for his son Icarus and escaped to Sicily. Icarus, however, flew too near the Sun, and his wings melted; he fell into the sea and drowned. The island on which his body was washed ashore was later named Icaria.

The Greeks of the historic age attributed to Daedalus buildings and statues the origins of which were lost in the past. Later critics ascribed to him such innovations as representing humans in statues with their feet apart and their eyes open. A phase of early Greek art, Daedalic sculpture, is named for him.

Daegu (South Korea): *see* Taegu.

Daejeon (South Korea): *see* Taejŏn.

daemon: *see* demon.

Daendels, Herman Willem (b. Oct. 21, 1762, Hattem, Gelderland, Neth.—d. May 2, 1818, Elmina, Gold Coast [now Ghana]), soldier who fought with distinction in the army of the Batavian Republic (the Dutch Republic established by Revolutionary France) and later ably administered Dutch East Indian possessions.

Daendels was a lawyer in his native town; he led the Patriot Movement there against William V of Orange, stadtholder of the United Provinces (Netherlands). In 1787 he helped defend Amsterdam against King Frederick William II of Prussia, who had intervened on behalf of the Orangists. Exiled in France after the defeat of the Patriots, he joined the French Revolutionary army and, in 1793, took part in the French invasion of Holland.

At the beginning of the Batavian Republic period, Daendels twice helped to overthrow the government of the United Provinces by force (January and June 1798). In 1799 Daendels, who had attained the rank of lieutenant general, successfully commanded a Dutch army at Alkmaar, Neth., against an Anglo-Russian force that was attempting to detach the Netherlands from Revolutionary France.

He was made governor-general of the Asian colonies and possessions in 1807 by Louis Bonaparte, then king of Holland. Daendels' administration ended the financial abuses of the former Dutch East India Company and built the main highway through Java. From 1815 he governed, on behalf of the new kingdom of The Netherlands, the Dutch possessions on the west coast of Africa.

Dafana, Tall ad- (Egypt): *see* Daphnae.

daffodil, also called COMMON DAFFODIL, or TRUMPET NARCISSUS (species *Narcissus pseudonarcissus*), bulb-forming flowering plant of the genus *Narcissus* (*q.v.*), native to northern Europe and widely cultivated there and in North America. The daffodil grows to about 16 inches (41 cm) in height and has five or six leaves that grow from the bulb and are about 12 inches (30 cm) long. The stem bears one large yellow blossom with a corolla deeply cleft into six lobes and a central bell-shaped crown, or corona, that is frilled at its edges. This "trumpet" shape contains the stamens and is the flower's most conspicuous feature. The daffodil's popularity has resulted in the production of many varieties differing from the yellow parent form mainly in colour; the trumpet and petals may themselves be of contrasting yellow, white, pink, or orange.

Dafla, also called BANGNI, tribal people of eastern Bhutan and Arunachal Pradesh (formerly North East Frontier Agency), a mountainous state in northeastern India. They speak a Tibeto-Burman language of the Sino-Tibetan family.

The Dafla support themselves with a slash-and-burn agriculture and with hunting and fishing. They live at elevations of 3,000 to

6,000 feet (900 to 1,800 m) in houses built on pilings. Descent is traced along paternal lines; a single lineage, which may number as many as 60 or 70 persons, lives together in a longhouse without partitions but with a separate fireplace for each conjugal family. Aside from this patrilineal household there is no formal social organization or village government. Their religion involves belief in spirits associated with nature.

Dafydd AP EDMWND (fl. *c.* 1450–80), poet who authoritatively classified and defined the 24 Welsh bardic metres (announced at the Carmarthen eisteddfod, or poets' assembly, in 1451). A master of bardic forms, he wrote elegant and technically perfect love lyrics, eulogies, and elegies. His works are collected in *Gwaith Dafydd ab Edmwnd* (ed. by Thomas Roberts, 1914).

Dafydd AP GWILYM (b. *c.* 1320, probably at Brogynin, Cardiganshire, Wales—d. *c.* 1380, Strata Florida, Cardiganshire), poet generally considered one of the greatest figures in Welsh literature. He introduced into a formalistic poetic tradition an authenticity, freshness, and naturalness hitherto unknown.

Little is known of his life, except that he was a member of an aristocratic family from South Wales, that he visited Anglesey and Caernarvonshire, and that he knew many prominent families in Cardiganshire. His *awdlau* (odes) and *cywyddau* (rhymed couplets) show that he was trained in the Welsh bardic art and connect him historically with the native "poets of the princes." His use of certain poetic conventions as well as of looser poetic constructions and vocabulary probably reflect the influence of the troubadours and wandering scholars.

His outstanding poems are elaborate descriptions of the beauties of nature and of love. The freedom and lightheartedness that Dafydd ap Gwilym introduced into bardic poetry influenced succeeding generations of Welsh poets.

Dafydd NANMOR (b. before 1440, Nanmor, Merioneth, Wales—d. *c.* 1480, Whitland, Carmarthenshire?), Welsh poet, master of the cywydd form (characterized by rhyming couplets), whose poems express his belief in tradition and aristocracy. Many of his poems reflect his support of the political aspirations of the Tudors; others are simple and sincere love poems. "Llio's Hair" and "Maiden's Elegy" are considered to be his finest cywyddau. *The Poetical Works of Dafydd Nanmor,* edited by Thomas Roberts and Ifor Williams, appeared in 1923.

dagala (volcanic formation): *see* steptoe.

Dagan, also spelled DAGON, West Semitic god of crop fertility, worshiped extensively throughout the ancient Middle East. *Dagan* was the Hebrew and Ugaritic common noun for "grain," and the god Dagan was the legendary inventor of the plow. His cult is attested as early as about 2500 BC, and, according to texts found at Ras Shamra (ancient Ugarit), he was the father of the god Baal. Dagan had an important temple at Ras Shamra, and in Palestine, where he was particularly known as a god of the Philistines, he had several sanctuaries, including those at Beth-dagon in Asher (Joshua 19:27), Gaza (Judges 16:23), and Ashdod (I Samuel 5:2–7). At Ras Shamra, Dagan was apparently second in importance only to El, the supreme god, although his functions as a god of vegetation seem to have been transferred to Baal by about 1500 BC.

Dagbamba (people): *see* Dagomba.

Dagda (Celtic: "Good God"), also called EOCHAID OLLATHAIR ("Eochaid the All-Father"), or IN RUAD RO-FHESSA ("Red [or Mighty] One of Great Wisdom"), in Celtic religion, one of the leaders of a mythological Irish people, the Tuatha Dé Danann ("People of the Goddess Danu"). The Dagda was credited with many powers and possessed a caldron that was never empty, fruit trees that were never barren, and two pigs—one live and the other perpetually roasting. He also had a huge club that had the power both to kill men and to restore them to life. With his harp, which played by itself, he summoned the seasons. The Dagda mated with the sinister war goddess Morrigan.

Dagens Nyheter (Swedish: "Daily News"), morning daily newspaper published in Stockholm. It is one of the largest and most influential newspapers in Sweden. It was founded in 1864 by Rudolf Wall. *Dagens Nyheter* has long been noted for its thorough coverage of the arts, foreign news, and domestic political news. The paper has generally followed a liberal policy politically. For a time in the 1960s, its circulation was greater than that of any other Swedish daily, but it was later overtaken by its sister paper, the afternoon daily tabloid *Expressen* (*Nyheter* is of standard size). The two papers have separate editorial staffs. In the early 1990s the circulation of *Dagens Nyheter* exceeded 400,000.

Dagestan, republic in southern European Russia. Dagestan lies on the eastern end of the northern flank of the Great Caucasus Range, along the western shore of the Caspian Sea. The capital is Makhachkala.

Dagestan can be divided into five physical regions. The first, occupying most of the southern half of the republic, consists of the Caucasus Mountains, there at their widest. The southern boundary of Dagestan runs along the main crest ridge, which rises to 11,968 feet (3,648 m) in Mount Guton and 14,652 feet (4,466 m) in Mount Bazar Duzu. North of the main range the Andysky-Salatau and Gimrinsky ranges enclose a huge triangle of extremely rugged mountains known as the Dagestan Interior Highland. These mountains are cut up by the deep valleys and canyons of many rapid rivers flowing down to the Caspian Sea, notably the Sulak, the Samur, and the Kurakh. Rainfall is very scarce in the mountains, and wide areas are devoid of vegetation.

The second region, north of this forbidding complex of mountains, is the zone of foreland hills, about 12 to 25 miles (19 to 40 km) wide and rising to 2,000–3,000 feet (600–900 m). There rainfall averages 20–30 inches (510–760 mm) annually. This allows a dense forest cover of oak, beech, hornbeam, maple, poplar, and black alder. The lower slopes in this region have good chestnut soils and even patches of black earths, with a grass steppe vegetation.

The third region, the narrow coastal plain between the mountains and the Caspian Sea, is 2–20 miles (3–32 km) wide and crossed by the rivers debouching from their gorges. This plain is covered by marine sediments, and petroleum and natural gas occur there.

The fourth area continues the coastal plain northward, at the narrower "waist" of the republic, and consists of the low, swampy plain in the lower course of the Terek River and its delta. Saline swamp soils are common. Just off the Terek's delta is the long, sandy Agrakhan Peninsula.

Finally, north of the Terek, Dagestan broadens out again to include most of the rolling, sandy plain of the Nogay steppe, as far as the Kuma River, which forms the republic's northern boundary. The climate in this area is hot and dry, with only 8–10 inches (200–250 mm) of rain a year. Vegetation is of a semidesert character and is dominated by sagebrush. As a whole, the republic's climate is warm and dry. The average January temperature in the lowland is 25.5° F (−3.6° C), while the average July temperature is about 74.3° F (23.5° C).

Dagestan, which means "mountain country," was penetrated by Russians as early as the 15th century. Following an agreement between Russia and Iran, the region was annexed by Russia in 1813; control over the area was completed in 1877, and in 1921, following the Russian Civil War, it became an autonomous republic.

Dagestan has great ethnic diversity, with about 30 ethnic groups and 81 nationalities, most of which speak either Caucasian, Turkic, or Iranian languages. Largest among these ethnic groups are the Avar, Russian, Dargin, Kumyk, and Lezgin, who together constitute about 80 percent of the population. The republic's chief cities are Makhachkala, Derbent (*qq.v.*), Kislyar, Izberbash, and Buynaksk.

Dagestan is rich in oil and natural gas. There are also deposits of coal, iron ore, and nonferrous and rare metals, but the rugged terrain has prevented full development of the republic's mineral and hydroelectric-power resources. Industrial activity centres on the petroleum and natural-gas resources of the coastal plain near Makhachkala and Izberbash. Other industries include machine building, power engineering, the production of building materials, timber working, glassmaking, wine making, and food processing. Ironworking and rug making are traditional handicrafts. Hydroelectric power is supplied by stations on the Karakoysu River at Gergebil, on the Terek at Kargalinskaya, and on the Sulak at Chirkey, Chiryurt, and Kizilyurt.

The bulk of the population derives its living from agriculture, chiefly stock raising, since only 15 percent of the land is cultivable. Sheep, in particular, are kept in large numbers. Hillsides are often terraced, while the Terek River delta region and the coastal plain are irrigated for the cultivation of vegetables and such fruits as cherries, apricots, apples, pears, and melons. The major cereal crops are wheat, corn (maize), and rice (in the Terek delta). Fishing is also important along the Caspian Sea. Railways link Dagestan with Moscow, Baku, Astrakhan, and Gudermes. Sea routes cross the Caspian to Makhachkala, which is the chief port, and motor roads connect all railway stations of the republic. Area 19,400 square miles (50,300 square km). Pop. (1991 est.) 1,854,200.

Dagestan rug, usually small floor covering handwoven in the republic of Dagestan in the eastern Caucasus (Russia).



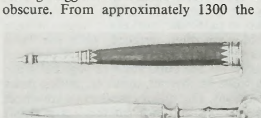
Dagestan prayer rug from the Caucasus, 1894; in a private collection in New York state

In a New York state private collection; photograph, Otto E. Nelson

Dagestan rugs are relatively finely woven, with short pile in wool, the warp being of wool and the weft frequently of cotton. Their designs are highly geometric and fragmented, producing the effect of brightly coloured mosaics. There is a wide diversity of patterns, including honeycombs, palmettes or rayed diamonds in diagonal rows, garden plans, and the so-called castle pattern. Specific designs are classified as Baku, Chichi, Lezgian, and Derbent, with a host of new names recently added. Prayer rugs, with a simple five-sided arch, usually have a honeycomb grid with a stylized flower in each cell. The line between Dagestan and Shirvan rugs has never been drawn conclusively.

Dagestanian languages, also called EAST CAUCASIAN LANGUAGES, group of languages spoken in the northeastern part of the Caucasus and including the Avar-Andi-Dido, the Lak-Dargin (Lak-Dargwa), and the Lezgian groups. One of the distinctive characteristics of a majority of these languages is the contrast of strong and weak voiceless consonants. The Dagestanian languages are often classified together with the Nakh languages (*q.v.*) as the Nakho-Dagestanian, or Northeast Caucasian, language group. *See also* Avar-Andi-Dido languages; Lak-Dargin languages.

dagger, short stabbing knife, ostensibly the diminutive of the sword, though in ancient and medieval times the distinction between a long dagger and a short sword was often obscure. From approximately 1300 the European dagger was consistently differentiated from the sword; in the 16th century a school of fencing developed in which a specially designed dagger with a large guard was held in the left hand and used for parrying.



Italian dagger, 1475–1500
By courtesy of the Metropolitan Museum of Art, New York, Rogers Fund, 1904

Its convenient size made the dagger inconspicuous to wear and easy to draw, giving it advantages over the sword in many situations. The types include the wavy-bladed Malayan *kris,* the short, curved *kukri* used by the Gurkhas, the Hindu *katar* with its flat triangular blade, as well as innumerable others.

Daghur, also spelled DAGHOR, or DAGUR, Manchu DAHUR, Russian DAUR, Chinese (Wade-Giles) TA-WO-ERH, or (Pinyin) DAWOER, or DAUR, Mongol people living mainly in the northeastern portion of Inner Mongolia autonomous region and western Heilungkiang province of China and estimated to number about 121,000. Their language, once thought to be Tungusic or a mixture of Mongolian and Tungus, is now known to be an archaic Mongolian dialect preserving features found in 13th-century documents. Their own name for themselves is Daghur; the Russian form Daur occurs in the name of the Daur mountain range.

Russian settlers in the 17th century found the Daghur well established in eastern Transbaikalia and the Amur region, and the Orthodox church sent missionaries to them in 1682. The Chinese government, not wishing the Daghur to fall under Russian sway, resettled them. By the early 20th century many Daghur lived in Heilungkiang, around the city of Hailar, and in the Nen River valley near the city of Tsitsihar. Their chief occupations are agriculture, logging, hunting, stock raising, and horse breeding. The clan system prevails. Their religion is shamanistic, although some are adherents of Tibetan Buddhism.

Dagly, Gerhard (b. *c.* 1653, Spa, Belg.—d. after 1714?, possibly Rhineland [Germany]), royal *Kammerkünstler,* or chamber artist, who, as one of the greatest craftsmen in European lacquer, was an important force behind the Baroque style.

After importers brought goods from the Orient, lacquer work won such enormous popularity that European artisans began imitating the medium. In the town of Spa, craftsmen specialized in creating small lacquered boxes called *bois de Spa.* Dagly worked there for a time, but little else is known of his early life.

At Berlin in 1687 he was appointed *Kammerkünstler* to Frederick William, the Great Elector of Brandenburg, who was succeeded in 1688 by Frederick III (later Frederick I, king of Prussia). During his reign Frederick gathered at his court many important artists and architects. Dagly was proclaimed *directeur des ornements;* in this capacity he decorated rooms and furniture. Copying Oriental prototypes, Dagly embellished Frederick's palace with richly lacquered walls. His art helped make Berlin a centre of experimentation that later influenced European craftsmen. He enhanced his furniture with East Asian scenes, both in the traditional black and gold and in more individual colour schemes of greens, blues, and reds on milky backgrounds. His work helped make chinoiserie (European art done in an Oriental style) extremely popular in 18th-century France.

In 1713, on the succession of Frederick William I to the Prussian crown, Dagly's world collapsed, for the new king severely stripped the court, considering art unnecessary and artists dispensable. Dagly then retired, being last heard from in the Rhineland (1714).

His brother Jacques, who worked with him from 1689 to about 1713, emigrated to Paris, carrying the secrets of Gerhard's art that led to the innovations of the Martin brothers, who became royal decorators for Versailles.

Dagö (Estonia): *see* Hiiumaa.

Dagobert, name of Merovingian rulers grouped below chronologically and indicated by the symbol •.

• **Dagobert I** (b. 605—d. Jan. 19, 639, Saint-Denis, France), the last Frankish king of the Merovingian dynasty to rule a realm united in more than name only.

The son of Chlotar II, Dagobert became king of Austrasia in 623 and of the entire Frankish realm in 629. Dagobert secured his realm by making a friendship treaty with the Byzantine emperor Heraclius, defeating the Gascons and Bretons, and campaigning against the Slavs on his eastern frontier. In 631 he sent an army to Spain to help the Visigothic usurper Swinthila (Svintila). He moved his capital from Austrasia to Paris, a central location from which the kingdom could be governed more effectively. He then appeased the Austrasians by making his three-year-old son Sigebert their king in 634. Famed for his love of justice, Dagobert was nevertheless greedy and dissolute. He was succeeded by Sigebert III and another son, Clovis II.

The prosperity of Dagobert's reign, and the revival of the arts during this period, can be judged from the rich contents of the tombs of the period and from the goldsmiths' work for the churches. Dagobert revised Frankish law, encouraged learning, patronized the arts, and founded the first great abbey of Saint-Denis, to which he made many gifts.

• **Dagobert II,** also called SAINT DAGOBERT (b. *c.* 650—d. Dec. 23, 679, near Stenay, Lorraine [now in France]; feast day December 23), Merovingian Frankish king of Austrasia. The son of Sigebert III, Dagobert was packed off to an Irish monastery following the death of his father in 656, and the Austrasian throne was taken by Childebert the Adopted, son of Grimoald, the Austrasian mayor of the palace. After the downfall of Grimoald and Childebert, Dagobert's cousin Chlotar III, king of Neustria, secured the Austrasian throne (662) for Childeric II. On Childeric's assassination in 675, Dagobert was traced, with effective assistance from Wilfrid, bishop of York, and restored to the throne in 676. His murder three years after he took the throne led to the nominal unity of all the Frankish lands under Theodoric III.

• **Dagobert III** (b. 699—d. 715/716), Merovingian Frankish king who succeeded his father, Childebert III, in 711. For most of his reign the boy was dominated by Pepin II of Herstal, the Austrasian mayor of the palace.

Dagobert (leader of First Crusade): *see* Daimbert.

Dagomba, also called DAGBAMBA, the inhabitants of the chiefdom of Dagbon in the northern region of Ghana; they speak Dagbane (Dagbani), a language of the Gur branch of the Niger-Congo family of African languages. The Dagomba chieftainship also includes a number of subject tribes and parts of tribes, among them the Konkomba and Chakossi.

According to tradition, the Dagomba kingdom was founded by northern invaders in the 14th century. Formerly it extended south to the Black Volta River, but the kingdom was reduced in size by the conquests of the Gonja in the mid-17th century. At the end of that century the Dagomba were subjugated by the Ashanti, who forced them to pay an annual tribute of slaves until 1874, when the Ashanti were defeated by British forces.

The Dagomba are farmers, their chief crops being sorghum, millet, corn (maize), yams, and peanuts (groundnuts). Most farm work is done by men; women often assist in harvesting. Dwarf shorthorn cattle, sheep, goats, chickens, and guinea fowl are kept; hunting and fishing are also practiced.

The Dagomba occupy compact walled villages, each household consisting of related men and their wives, children, and other dependents. The Dagomba population is divided into commoners and chiefly families. The patrilineage is the basis of social organization among the commoners. Matrilineal descent is recognized but mainly for its contribution of spiritual attributes. The patrilineages are divided into hierarchically arranged segments; lineage heads, as custodians of ancestral shrines, exercise moral authority. The ancestral cult and an earth cult are the major features of Dagomba religion.

For the chiefly class, the important kinship unit is a descent group known as the *dang,* composed of all descendants of a single grandfather or great-grandfather. In the centralized Dagomba state, only the sons of a previous paramount chief, the *ya-na,* may rise to that office, which is filled in rotation by one of three divisional chiefs.

Dagon (god): *see* Dagan.

Daguerre, Louis-Jacques-Mandé (b. Nov. 18, 1787, Cormeilles, near Paris, France—d. July 10, 1851, Bry-sur-Marne), French painter and physicist who invented the daguerreotype (*q.v.*), the first practical process of photography. Though the first permanent photograph from nature was made in 1826/27 by Joseph-Nicéphore Niepce of France, it was of poor quality and required about eight hours' exposure time. The process that Daguerre developed required only 20 to 30 minutes.

Daguerre was at first an inland revenue officer and then a scene painter for the opera. In 1822 at Paris he opened the Diorama, an exhibition of pictorial views, with various effects

induced by changes in the lighting. A similar establishment that he opened in Regent's Park, London, was destroyed by fire in 1839. Niepce, who since 1814 had been attempting to obtain permanent pictures by the action of sunlight, learned in 1826 of Daguerre's efforts in the same field. The two became partners in the development of Niepce's heliographic process from 1829 until the death of Niepce in 1833. Daguerre continued his experiments, and it was he who discovered that exposing an iodized silver plate in a camera would result in a lasting image if the latent image on the plate was developed by exposure to fumes of



Daguerre, detail of a daguerreotype by J.E. Mayall
By courtesy of the Gernsheim Collection, Humanities Research Center, The University of Texas at Austin

mercury and then fixed (made permanent) by a solution of common salt. On Jan. 9, 1839, a full description of his daguerreotype process was announced at a meeting of the Academy of Sciences by the eminent astronomer and physicist D.-F.-J. Arago. Daguerre was appointed an officer of the Legion of Honour. In 1839 Daguerre and the heir of Niepce were assigned annuities of 6,000 francs and 4,000 francs, respectively, in return for their photographic process.

daguerreotype, first successful form of photography, named for Louis-Jacques-Mandé Daguerre of France, who invented the technique in collaboration with Joseph-Nicéphore Niepce in the 1830s. Daguerre and Niepce found that if a copper plate coated with silver iodide was exposed to light in a camera, then fumed with mercury vapour and fixed (made permanent) by a solution of common salt, a permanent image would be formed. A great number of daguerreotypes, especially portraits, were made in the mid-19th century; the technique was supplanted by the wet collodion process.

Dagupan, city and port, western Luzon Island, Philippines. It lies on the southern shore of Lingayen Gulf near the mouth of the Dagupan River. It was founded in 1590 by Augustinian missionaries. Dagupan is the port for a region that produces fish, solar-evaporated salt, rice, and fruit and is served by the Manila-North Railroad and a road network. The city has a university, a modern cathedral, and some manufacturing. Inc. city, 1947. Pop. (1990 prelim.) 122,000.

Dahl, Roald (b. Sept. 13, 1916, Llandaff, Wales—d. Nov. 23, 1990, Oxford, Eng.), British writer, a popular author of ingenious, irreverent children's books and of adult horror stories.

Following his graduation from Repton, a renowned British public school, in 1932, Dahl avoided a university education and joined an expedition to Newfoundland, Can. He worked from 1937 to 1939 in Dar es Salaam, Tanganyika (now in Tanzania), but he enlisted in the Royal Air Force (RAF) when World War II broke out. Flying as a fighter pilot, he was seriously injured in a crash landing in Libya. He served with his squadron in Greece and then in Syria before doing a stint (1942–43) as assistant air attaché in Washington, D.C. There the novelist C.S. Forester encouraged him to write about his most exciting RAF adventures, which were published by the *Saturday Evening Post*.

Dahl's first book, *The Gremlins* (1943), was written for Walt Disney and later became a popular movie. He achieved best-seller status with *Someone like You* (1953; rev. ed. 1961), a collection of stories for adults, which was followed by *Kiss, Kiss* (1959). His children's book *James and the Giant Peach* (1961), written for his own children, was a popular success, as was *Charlie and the Chocolate Factory* (1964), which was made into the film *Willy Wonka and the Chocolate Factory* (1971). Dahl also wrote several scripts for films, among them *You Only Live Twice* (1967) and *Chitty Chitty Bang Bang* (1968).

Dahlbergh, Eric, Count (Greve) (b. Oct. 10, 1625, Stockholm, Sweden—d. Jan. 16, 1703, Stockholm), Swedish soldier, civil servant, and graphic artist who served with distinction in the Swedish war against Denmark (1675–79) and the Great Northern War (1700–21) and directed fortifications as part of the military rebuilding program of King Charles XI.

After serving as an engineer (1655–57) in Sweden's Polish campaign, Dahlbergh returned to fight in the war of 1657–58 against Denmark. His diary, which gives a useful account of the war, contains a questionable claim that he played a crucial role in the Swedish victory. After becoming a colonel and quartermaster in 1674, he played an important part in the Swedish war of 1675–79 against Denmark.

After 1680 Dahlbergh was responsible for the construction and rebuilding of many fortresses. Named privy councillor, count, and field marshal (1693) and governor-general of Livonia (1696), Dahlbergh directed the successful defense of Riga against a Saxon attack at the outbreak of the Great Northern War



Dahlbergh, detail from an oil painting by D.K. Ehrenstrahl, 1664; University of Uppsala, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

in 1700. He returned to Sweden two years later. As a draftsman, he is best known for his illustrations to *Suecia Antiqua et Hodierna* ("Sweden Ancient and Modern"), which was published posthumously in 1717.

Dahlgren, John Adolphus Bernard (b. Nov. 13, 1809, Philadelphia, Pa., U.S.—d. July 12, 1870, Washington, D.C.), American inventor of the smooth-bore cannon that was, from its shape, familiarly known as the "soda-water bottle." The shape resulted from a design in which the thickness of metal was varied to match the differences in internal pressure occurring when the cannon was fired. The pressures were determined by boring holes in the walls of the gun and inserting as gauges such objects as pistons or musket balls. Dahlgren's cannons were widely used in the American Civil War.

Dahlgren entered the U.S. Navy in 1826 and in 1847 became ordnance officer at the Washington Navy Yard, where he established a full-fledged ordnance department and began manufacturing cannon of his new type. His cannon were first mounted in an experimental vessel that cruised (1857–59) under his command. When the Civil War broke out, he was one of three officers in the Washington Navy Yard who did not resign because of Confederate sympathies. Promoted to captain, he saw active sea duty and in 1863 became a rear admiral. He was in command of the Washington Navy Yard at the time of his death.

Dahlia, genus of plants in the family Asteraceae, containing 12 to 20 species of tuberous-rooted herbs that are native to the higher elevations of Mexico and Central America. Most have leaves that are often segmented and toothed or cut.



Dahlia variabilis
Sven Samelius

About six of the species in the Dahlia genus have been bred for cultivation as ornamental flowers. Wild species of dahlias have both disk and ray flowers in the flowering heads, but many varieties of ornamentals such as the common garden dahlia (*D. bipinnata*) have shortened ray flowers. The dahlia was first introduced into Great Britain from Spain in 1789, and countless varieties of dahlias, many of them double-flowered, were subsequently developed in Britain and elsewhere from the species *D. variabilis* and *D. coccinea*. The 2,000 horticultural varieties of dahlias are classed into 13 different types, including single, double, show, fancy, pompon, cactus, and peony-flowered dahlias. Dahlia flowers may be white, yellow, red, or purple in colour. Dahlias grow well in most garden soils. They flower late in the summer and do so until interrupted by frost in the autumn.

Dahlmann, Friedrich (Christoph) (b. May 13, 1785, Wismar, Swedish-held city in Mecklenburg [Germany]—d. Dec. 5, 1860, Bonn), prominent liberal historian and advocate of German unification along Kleindeutsch ("Little German," or anti-Austrian) lines, who played a major role in creating the draft constitution of 1848 that attempted unsuccessfully to unite Germany as a constitutional monarchy.

Dahlmann was appointed professor of history at the University of Kiel in Schleswig (1812), and in 1829 he moved to the University of Göttingen, where he helped draft the liberal Hanoverian constitution of 1833. When King Ernest Augustus repudiated the Hanover constitution in 1837, Dahlmann led a famous protest of seven Göttingen professors that aroused great popular sympathy in Germany. Dismissed and banished from Hanover, he spent some years in Leipzig and Jena. He was appointed to the faculty at the University of Bonn by Frederick William IV of Prussia in 1842, and there he wrote several

works in which he expressed his preference for the British form of government.

At the Frankfurt convention during the Revolution of 1848, his ideas were incorporated



Dahlmann, detail from an engraving by Adolf Hohneck, 1844

Archiv für Kunst und Geschichte, West Berlin

into the Declaration of Fundamental Rights, a draft constitution envisaging a constitutional monarchy under Prussian leadership, freedom of speech and religion, and equality before the law. When the Frankfurt assembly elected Frederick William IV emperor of Germany, Dahlmann was appointed a member of the deputation traveling to Berlin to offer the crown to the Prussian sovereign. Frederick William refused, however, and Dahlmann resigned from the national assembly. In June 1849 he nonetheless supported the Gotha Conference and sat in the Prussian (1849–50) and Union (1850) parliaments, both much curtailed and more conservative than the Frankfurt assembly. Afterward, he retired from political life.

Dahlonega, city, seat (1833) of Lumpkin county, northern Georgia, U.S. Gold was discovered in the locality in 1828, and the site was settled and incorporated in 1833 after one of the nation's first gold rushes; its name derives from the Cherokee *taulonica* ("yellow metal"). A U.S. mint operated there from 1837 until 1861, when Georgia seceded from the Union, and Dahlonega-minted gold coins are highly prized by collectors. Dahlonega is the trading centre for surrounding farmlands; the raising of broiler poultry is the chief activity. North Georgia College was established in Dahlonega in 1873. The city is the southern gateway to the Chattahoochee National Forest, which embraces Amicalola Falls State Park and includes the Anna Ruby Falls, Track Rock Gap, and a portion of the Appalachian Trail. Pop. (1990) 3,086.

Dahn, (Julius Sophus) Felix (b. Feb. 9, 1834, Hamburg—d. Jan. 2, 1912, Breslau, Ger. [now Wrocław, Pol.]), German jurist, historian, poet, and novelist who made his greatest contribution as a scholar of German antiquity.

Dahn studied law and philosophy in Munich



Dahn

Bavaria-Verlag

and Berlin (1849–53) and taught jurisprudence at the universities of Munich, Würzburg, Königsberg, and Breslau, where he was appointed rector in 1895.

Dahn's most substantial historical works are *Die Könige der Germanen,* 11 vol. (1861–1907; "The Kings of the Germanic People"); *Die Urgeschichte der germanischen und romanischen Völker,* 4 vol. (1881–90; "The History of the Origins of the Germanic and Latin Nations"); and *Deutsche Geschichte von der Urzeit bis 843* (1883–88; "German History from the Beginning to 843"). His voluminous poetry, although consisting in large part of ballads, is best known for his verse epics on subjects of early German history: *Harald und Theano* (1854–55) and *Die Amalungen* (written in 1857–58, published in 1876; "The Amalings"). The historical novel, however, is the genre in which Dahn was most successful. He won great acclaim for *Ein Kampf um Rom,* 4 vol. (1876–78; "A Struggle for Rome"), in which he reconstructed the decline and fall of the Ostrogothic empire in Italy.

Dahnā', ad- (Arabic: "desert"), great arc of reddish sandy desert, central Saudi Arabia, extending about 800 miles (1,300 km) southward from the northeastern edge of an-Nafūd (desert) to the northwestern borders of the desert Rub' al-Khali (the Empty Quarter). Thus, ad-Dahnā' links the great deserts of Saudi Arabia. It consists of seven major sand ridges, which are separated from one another by plains. It measures about 30 miles (48 km) in width and provides spring and winter pastures. Ad-Dahnā' is crossed by roads connecting Kuwait with az-Zilfī and Riyadh, and Riyadh with Hasa.

Dahomey (people): *see* Fon.

Dahomey, kingdom in western Africa that flourished in the 18th and 19th centuries in the region that is now southern Benin. According to tradition, at the beginning of the 17th century three brothers vied for the kingdom of Allada, which, like neighbouring Whydah (now Ouidah), had grown rich on the slave trade. When one of the brothers won control of Allada, the other two fled. One went southeast and founded Porto Novo, on the coast east of Whydah. The other, Do-Aklin, went north to found the kingdom of Abomey, core of the future Dahomey. They all paid tribute to the powerful Yoruba kingdom of Oyo to the east.

Do-Aklin's grandson Wegbaja (*c.* 1645–85) made Abomey into a powerful state. He was succeeded by Akaba (1685–1708) and Agaja (1708–32). Agaja, eager to buy arms from European traders on the Gulf of Guinea coast, conquered Allada (1724) and Whydah (1727), where European forts had already been established. The enlarged state was called Dahomey; Abomey, Allada, and Whydah were its provinces. Thriving on the sale of slaves to the Europeans, the Kingdom of Dahomey prospered and acquired new provinces under kings Tegbesu (1732–74), Kpengla (1774–89), and Agonglo (1789–97). After King Adandozan (1797–1818) was overthrown by the great Gezu (1818–58), Dahomey reached the high point of its power and fame.

The kingdom was a form of absolute monarchy unique in Africa. The king, surrounded by a magnificent retinue, was the unchallenged pinnacle of a rigidly stratified society of royalty, commoners, and slaves. He governed through a centralized bureaucracy staffed by commoners who could not threaten his authority. Each male official in the field had a female counterpart at court who monitored his activities and advised the king. Conquered territories were assimilated through intermarriage, uniform laws, and a common tradition of enmity to the Yoruba.

Dahomey was organized for war, not only to expand its boundaries but also to take captives as slaves. Slaves were either sold to the Europeans in exchange for weapons or kept to work the royal plantations that supplied food for the army and court. From approximately 1680, a regular census of population was taken as a basis for military conscription. Female soldiers, called Amazons by the Europeans, served as royal bodyguards when not in combat.

Gezu heightened the splendour of the court, encouraged the arts, and refined the bureaucracy. His armies freed Dahomey from the humiliation of paying tribute to Oyo. After about 1840, however, the kingdom's fortunes changed as Britain succeeded in putting an end to the overseas slave trade. Gezu accomplished a smooth transition to palm oil exports; slaves, instead of being sold, were kept to work palm plantations. Palm oil was far less lucrative than slaves, however, and an economic decline followed under Gezu's successor, Glele (1858–89). When the French won control of Porto Novo and Cotonou and attracted coastal trade there, commerce at Whydah collapsed. After the accession of Behanzin (1889–94) hostilities were precipitated. In 1892 a French expedition under Colonel Alfred-Amédée Dodds defeated the Dahomeyans and established a protectorate. Behanzin was deported to the West Indies.

His former kingdom was absorbed into the French colony of Dahomey, with its capital at Porto Novo.

Dahomey (western Africa): *see* Benin.

Dahrīyah, in Islām, the unbelievers who contend that the course of time (Arabic: *dahr*) is all that governs their existence. They were so called because of a reference to them in the Qur'ān, in which they are repudiated for saying, "There is no other than our present life; we die and we live and nothing but the course of time destroys us" (45:24).

The Dahrīyah are portrayed in Islāmic theological literature as naturalists and materialists who deny the existence of anything that cannot be perceived by the senses. In scholarly circles, however, there has been a great deal of confusion as to the origin and precise doctrines of the Dahrīyah. Al-Ghazālī, in the 11th century, traced their origin to ancient Greek philosophy and distinguished them from the naturalists (*tabī'iyūn*), who speak of a creating deity while the Dahrīyah recognize only natural laws. Others described them as believers in a supreme power but not in a soul or demons and angels.

In the popular imagination of devout Muslims, Dahrīyah are opportunists who conduct their lives according to their selfish desires; they do not make a distinction between man and inanimate objects and are devoid of compassion and human feelings.

Dahshūr, ancient Egyptian pyramid site just south of Saqqārah on the west bank of the Nile. Two of its five pyramids date from the 4th dynasty (*c.* 2575–*c.* 2465 BC) and were built by King Snefru (2575–51). The earlier one, because of its peculiar double slope, is variously called the Blunted, Bent, False, or Rhomboidal Pyramid; it represents the first



The Blunted Pyramid of King Snefru at Dahshūr

H. Roger-Viollet

attempt to build a true pyramid, but the initial angle of slope (54°4′) was found to be too steep; the top portion of the pyramid was thereupon reduced to 43°. The best-preserved of the five, it is the only Old Kingdom pyramid with two entrances. The second of Snefru's pyramids at Dahshūr, the North Stone Pyramid, was built at the lower slope angle of 43° and is therefore shorter.

The three remaining pyramids belong to the 12th dynasty (1938–1756 BC) and are not well preserved. The ruins do indicate, however, that the old plan of a pyramid entrance on the north side was abandoned for security reasons in favour of an entrance at a point outside the body of the pyramid. The tombs of the royal families built near the 12th-dynasty pyramids yielded a remarkable collection of jewelry and personal accoutrements—a collection considered by some scholars to represent the highest stage of development in Egyptian metalworking and lapidary art.

Dahūk, also spelled DOHUK, or DHOK, town, northern Iraq, in the Kurdish Autonomous Region. The town lies near the northern end of the Tigris River Valley. The area in which the town is situated is unsuitable for cultivation but is good for fruit orchards and pasturage. Dahūk has a fruit-canning plant and a textile mill. There has been building of new tourist resorts and improvement of existing ones. Pop. (1970 est.) 19,736.

Dahur (people): *see* Daghur.

Dai (people): *see* Tai.

Dai hyakkajiten (Japanese: "Great Encyclopaedia"), comprehensive Japanese general encyclopaedia, published in Tokyo.

It was first published from 1931 to 1935 in 28 volumes, with four supplements published in 1939–52, and was reissued in 15 volumes (1951–53). In 1955–63, a successor encyclopaedia, the *Sekai dai hyakkajiten* ("World Encyclopaedia"), was published in 33 volumes containing approximately 70,000 articles signed by specialists; it quickly became the standard Japanese encyclopaedia. The final three volumes contain supplementary material, which includes not only updated information covering the years 1958–63 but also a chronological table of world history; a comprehensive list of Japanese cities, towns, and villages; and indexes of abbreviations and proper nouns.

Sekai dai hyakkajiten was completely revised (1964–68) in 23 volumes, with two supplementary atlas volumes.

Dai-Ichi Kangyo Bank, Ltd., one of Japan's largest commercial banks, with branches in Japan and operations in foreign countries. Headquarters are in Tokyo.

The bank was established in 1971 in the merger of Dai Ichi Bank Ltd. (founded in 1873) and Nippon Kangyo Bank Ltd. (founded in 1897). The earlier banks were well established as major commercial banks before the merger.

The bank provides the usual range of commercial banking services, plus national lotteries for public agencies, financing and advisory services including advising natural resource companies, and international services, including Eurocurrency markets. The bank is also a specialist in the commissioned bank system, which allows an interchange between the separate functions of underwriting bonds and commercial banking. It has subsidiaries and associated companies throughout the world.

Dai Jin: *see* Tai Chin.

Dai jiten (Japanese: "Great Dictionary"), dictionary of the Japanese language published in 13 illustrated volumes in Tokyo (1953–54).

The work is a reduced-size reprint of the 26-volume edition of 1934–36, augmented substantially with new entries. *Dai jiten* contains more than 400,000 modern, classical, dialect, and technical words, many of them, especially in the technical and modern categories, of foreign origin. Also included are 300,000 biographical and geographic names, literary titles, etc., and some illustrations.

The set also contains an introduction to grammar, as well as indexes of *Kanji* (Chinese characters used in writing Japanese) arranged by stroke count. There are appendixes for difficult pronunciations and for foreign biographical and geographic names.

Dai Namboku: *see* Tsuruya Namboku IV.

Dai Zhen (Chinese philosopher): *see* Tai Chen.

Daia (Roman emperor): *see* Maximinus, Galerius Valerius.

Daiei Motion Picture Company, leading Japanese motion-picture studio that produced some of the major post-World War II film classics, although most of its releases were directed toward urban teenage audiences. The company was formed in 1942, when the Japanese government consolidated the production studios of Shinko, Daito, and Nikkatsu (Nikkatsu remained as an independent distribution company only).

Three successful films, Kurosawa Akira's *Rashomon* (1950), which won the Grand Prize at the 1951 Venice Film Festival; *Ugetsu monogatari* (1953), directed by Mizoguchi Kenji; and *Gate of Hell* (1953–54), the first Japanese film to use colour, eased the company's financial difficulties. Despite its transition to wide-screen productions in the 1950s, the Daiei company was forced to declare bankruptcy in December 1971.

Daigak Guksa, also spelled TAEGAK KUKSA, secular name ŬICH'ŎN (b. 1055, Korea—d. 1101, Korea), Korean Buddhist priest who founded the Ch'ŏnt'ae sect of Buddhism.

A son of the Koryŏ king Munjong, Ŭich'ŏn became a Buddhist monk at age 11, and in 1084 he went to the Sung court of China and stayed a year and a half studying and collecting Buddhist literature. When Ŭich'ŏn returned home to Korea, he brought with him the doctrines of the Chinese T'ien T'ai (Korean pronunciation Ch'ŏnt'ae) sect of Buddhism. Ŭich'ŏn became the chief propagator of the Ch'ŏnt'ae sect in Korea; this sect attempted, with considerable popular success, to reconcile the conflicting doctrines of the two chief Buddhist sects in Korea, the Kyo, or Textual, School and the Sŏn (Chinese Ch'an, Japanese Zen) School. Ŭich'ŏn propagated the Ch'ŏnt'ae doctrine as one that adherents of both of the major schools could embrace. The Ch'ŏnt'ae doctrines initiated a new phase in the development of Buddhism in Korea; in particular they stimulated the reorganization of the Sŏn school into the Chogye school, and these three sects (Chogye, Textual, and Ch'ŏnt'ae) henceforth became the three main divisions of Buddhism in Korea.

In Korea Ŭich'ŏn also applied himself to collecting, cataloging, and publishing Buddhist writings. While working as a master priest at the Hŭngwang-sa temple, he published some 4,750 books of Buddhist scriptures he had collected, including the second publication of the *Tripiṭaka* (a complete collection of Buddhist scriptures) in Korea. He also published an authoritative catalogue of Buddhist sectarian writings.

Daigo, in full DAIGO TENNŌ, personal name ATSUKIMI (b. Feb. 6, 885, Kyōto—d. Oct. 23, 930, Kyōto), 60th emperor of Japan. He was unsuccessful in continuing his father's policy of limiting the power of the important Fujiwara family, which dominated the Japanese government from 857 to 1160.

The son of the emperor Uda, he ascended the throne in 897 and assumed the reign name Daigo; Uda, however, continued to hold power as the retired emperor. Like his father, Daigo attempted to rule without appointing a Fujiwara to the post of *kampaku,* or chancellor, the office through which commands could be issued on behalf of the emperor. He kept the post vacant and continued his father's policy of relying on men of lesser noble families, including the famous scholar Sugawara Michizane.

In 901 Fujiwara Tokihira, the head of the Fujiwara family, managed to have Sugawara exiled. Daigo was thereafter unable to resist the political maneuverings of the Fujiwara, who, after Daigo's death, reoccupied the office of *kampaku* and retained it, except for one three-year period, until 1160.

Daigo, Go-, in full GO-DAIGO TENNŌ, personal name TAKAHARU (b. Nov. 26, 1288, Kyōto—d. Sept. 19, 1339, Mount Yoshino, south of Nara, Japan), emperor of Japan (1318–39), whose efforts to overthrow the shogunate and restore the monarchy led to civil war and divided the imperial family into two rival factions.

Early years. Takaharu ascended the throne at a time when the nation was in one of the more turbulent periods of its history. Political authority was uncertainly divided between two governments—the de jure government of the emperor and his court in Kyōto, and the de facto government of the shogun (the military overlord) and his court in Kamakura in eastern Japan. Neither government was stable and united, and neither emperor nor shogun



Go-Daigo, colour on silk; in the collection of Daitoku-ji, Kyōto

By courtesy of the International Society for Educational Information, Tokyo, Inc.

actually wielded authority in his respective government, each having become the puppet of powerful families.

In Kyōto, political authority was still further diffused by the introduction in the 11th century of a curious practice known as *insei* ("cloistered rule"). Emperors, in their desire to recover their prerogatives, abdicated and entered a monastery, where they organized a new government and proceeded to rule from retirement. A minor would be placed on the vacated throne and would await the day he, too, could retire so that he could begin to rule. Of Takaharu's seven immediate predecessors, six were minors, one of whom acceded at the age of three and another at seven.

Adding to the political confusion in Kyōto was the practice of alternating the throne between the senior and junior branches of the imperial family, which had been feuding over the question of succession for years. It was in accordance with the agreement forced upon the quarreling factions by the shogunate that Takaharu, of the junior branch, ascended the throne in 1318 and took the reign name Go-Daigo ("Later Daigo").

No less anomalous was the situation in Kamakura, where control of the shogunate had passed from the Minamoto to the Hōjō family.

Not being eligible for the office of shogun, the Hōjō were content to rule as regents for the puppet shoguns they appointed, at first from among the younger scions of the Fujiwara family and later from the Imperial family. But by the 14th century Hōjō influence itself had declined considerably, and the regency had become the instrument of yet another family, the Nagasaki. Its ascendancy was facilitated by the youth of the regent, Hōjō Takatoki, who, at investiture, was only eight years old. As he grew to manhood, his questionable intelligence and dissolute ways—spending much time, for example, watching dogfights—led to a widespread loss of confidence in the shogunate. Further alienation of many traditional supporters of the shogunate was caused by the favouritism to friends and relatives shown by Nagasaki Takasuke, the man who controlled the regent.

Overthrow of the shogunate. In view of these and other signs of growing discontent, Go-Daigo, even before his enthronement, began to plot the overthrow of the shogunate and the restoration to power of the Imperial court. He continued these secret efforts after his installation and throughout the decade of the 1320s with encouraging results, but in 1331 the plot was exposed. Captured by Kamakura forces while attempting to flee from Kyōto, Go-Daigo was sent into exile to the Oki Islands in the Sea of Japan.

But the Emperor had triggered the revolt he had plotted so long. During his first year of confinement there was sporadic fighting between his supporters and those of the shogunate, and in 1333 decisive events, marked by much treachery and violence, took place. The commander of some of the shogunate's forces turned and attacked Kamakura instead of the shogunate's enemies. Caught by surprise, Hōjō Takatoki and his supporters chose to take their own lives, thus bringing to an end the 150-year regime of Japan's first military government. Equally dramatic was the defection of Ashikaga Takauji, who was in command of the main armies of the shogunate. Instead of seizing Kyōto for the shogunate, he attacked the shogunate garrison there and turned the city over to the Emperor, who, in the meantime, had contrived to escape from Oki.

If Go-Daigo was grateful to the former vassals of the Hōjō for having made possible the "Kemmu restoration," as this series of events is known, he failed to show it. He neither rewarded them nor brought them into his new government, except for Takauji, who was given some lands and the comparatively low rank of counsellor. Takauji expected to be designated shogun, but Go-Daigo foolishly named his own son, Prince Morinaga, to the post. By such callous acts the sovereign alienated Takauji as well as a large segment of the warrior class at a time when their continued support would have assured the success of the restoration. In fact, historians are generally agreed that Go-Daigo's greatest failing—and the cause of many of his troubles—was his inability to see that rule by a strictly civilian aristocracy was no longer feasible.

By 1335 open warfare broke out between Takauji, who proclaimed himself shogun, and Go-Daigo, who pronounced him a rebel. Although the loyalists distinguished themselves in battle, in the end they were overpowered by the numerically superior forces of Takauji, who had gone as far as Kyushu in the southwest to raise a vast army. In 1336 the Emperor, who had fled from Kyōto a number of times as the tide of battle flowed in and around the city, left the ancient capital for the last time. Takauji reentered Kyōto and promptly elevated Kōgon, of the senior Imperial line, to the throne. Go-Daigo established his own court in the Yoshino Mountains to the south of Nara, where he died in 1339. Thus, from 1336 until 1392, when the rival factions of the Imperial family were to be reunited, Japan witnessed the spectacle of two contending Imperial courts—the southern court of Go-Daigo and his descendants, whose sphere of influence was restricted to the immediate vicinity of the Yoshino Mountains, and the northern court of Kōgon and his descendants, which was under the domination of the Ashikaga family. (M.Sh.)

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Daikoku, in Japanese mythology, one of the Shichi-fuku-jin (Seven Gods of Luck); the god of wealth and guardian of farmers. He is depicted in legend and art as dark-skinned, stout, carrying a wish-granting mallet in his right hand, a bag of precious things slung over his back, and sitting on two rice bags. Rats are sometimes shown nibbling at the rice, further emphasizing the theme of prosperity.



Daikoku, detail of a painting by Hokurei, 1851; in the Museum für Völkerkunde, Vienna

By courtesy of the Museum fur Volkerkunde, Vienna

Daikoku is generally associated with the Indian deity Mahākāla (the Hindu god Śiva in his aspect as time, the great destroyer), who travelled to Japan along with Buddhism. In Shintō worship, he is often identified with the deity and mythological hero Ōkuni-nushi (*q.v.*), whose name written in Chinese ideograms is pronounced Daikoku. *See also* Shichi-fuku-jin.

Daily Express, morning daily newspaper published in London, known for its sensational treatment of news and also for its thorough coverage of international events.

Since its founding in 1900, the *Express* aggressively appealed to a mass readership; it is a perennial competitor with other popular dailies for circulation leadership, which it not infrequently claims. Its determination to cover foreign news thoroughly was reflected as early as World War I, when its war correspondent, Percival Phillips, by chance a U.S. national, was knighted for his war reporting. In contemporary Britain the *Daily Express* has ardently promoted British products and symbols of national identity while maintaining an independent political stance. Other sensational dailies appear in a tabloid format, but the *Daily Express* uses a full-size page. Owned by Express Newspapers, Ltd., the *Daily Express* belonged in 1980 to a family of newspapers that included the *Daily Star* and the *Sunday Express*.

Daily Mail, morning daily newspaper published in London, long noted for its foreign reporting, and one of the first British papers to popularize its coverage to appeal to a mass readership.

The *Daily Mail* was founded in 1896 by Alfred Harmsworth, later 1st Viscount Northcliffe (*see* Northcliffe, Alfred Charles William Harmsworth, Viscount). Its roots can be traced to the *Hull Packet* (founded in 1787), which was merged with the *Hull Evening News* in 1884 and 12 years later moved to London and became the *Daily Mail*.

The paper has been known for its independent editorial policy and was widely noted for its foreign coverage of the Dreyfus affair in France (1894–1906) and of the South African War (1899–1902). The paper also syndicates news, features, and pictures to newspapers in other countries.

Where the same name may denote a person, place, or thing, the articles will be found in that order

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Daily Mirror, morning daily newspaper published in London that emphasizes the sensational and that frequently has the largest circulation in Britain.

The *Daily Mirror* was founded by Alfred Harmsworth, later Viscount Northcliffe, in 1903 as a picture tabloid. It has consistently stressed the sensational, the human-interest, and the personal types of stories. Its independent stance has enabled it to adopt a "common man versus bureaucracy" approach to many stories.

The *Daily Mirror* is owned by the Mirror Group, Ltd., which also publishes *Sporting Life*, the *Sunday Mirror*, and *The Sunday People* and once held interests in newspapers in such developing countries as Ghana, Nigeria, and Sierra Leone—for which the *Daily Mirror* provided technical assistance.

Daily Telegraph, The, newspaper published in London, generally accounted, with *The Times* and *The Guardian*, one of Britain's "big three" quality newspapers.

Founded in 1855 as the *Daily Telegraph and Courier*, the paper has consistently combined a high standard of reporting with the selection of interesting feature subjects and editorial presentation. Its appeal is a conservative and middle-class approach to comprehensive news coverage.

Special reporting has been a commonplace throughout the paper's history. Its correspondents covered the American Civil War, the Franco-German War of 1870–71, and Spain's Carlist War of 1872–76. The paper also co-sponsored Sir Henry Morton Stanley's expedition in the 1870s to trace the Congo.

The *Telegraph* also has engaged in investigative reporting on government and trade unions. It has remained relatively free of labour disputes and maintained financial stability under its family group ownership headed by Lord Hartwell.

Daily World, formerly DAILY WORKER, (1924–58), or THE WORKER (1958–68), daily newspaper published in New York City that generally reflects the views of the Communist Party of the United States.

The *Daily Worker* was variously the organ and the "semi-official" voice of the party, and its readers have included numerous U.S. government intelligence agents, who also have monitored its list of subscribers. In 1958 the paper became a weekly as *The Worker*. A decade later it resumed daily publication Tuesdays through Saturdays and changed names again in an effort to reach a broader audience as the *Daily World*. It has consistently featured coverage of societal developments and labour news, with editorials and political commentary

reflecting the views of the Communist Party. In the United Kingdom a similarly oriented *Daily Worker* was published in London and for similar reasons was renamed the *Morning Star.*

Daimbert, also called DAGOBERT, Italian DAIBERTO (d. June 14, 1107, Messina, Norman Principality of Sicily [now in Italy]), first archbishop of Pisa, who, as patriarch of Jerusalem, played a major role in the First Crusade.

Named bishop in 1088 and elevated to archbishop when Pisa was made an archdiocese in 1092, Daimbert accompanied Pope Urban II to France in 1095 to preach the First Crusade. Returning to Pisa the following year, he raised a crusading fleet that sailed for the Holy Land in 1098. In 1100 he arrived in Jerusalem at the head of his own expedition. Asserting that the patriarch of Jerusalem, Arnulf of Chocques, had been illegally elected, Daimbert had him deposed and took his place, subsequently investing Godfrey of Bouillon, king of Jerusalem, and Bohemond I, prince of Antioch, as his vassals.

When Godfrey died in July 1100, Jerusalem passed completely into Daimbert's hands, but Godfrey's brother Baldwin I, at that time count of Edessa (northeast of Jerusalem), marched on the Holy City and forced Daimbert to crown him king. Daimbert was gradually eased from his position of authority and finally driven from Jerusalem in 1102, Baldwin stripping him of his title and confiscating his treasure. Back in Italy, Daimbert appealed to Pope Paschal II, who supported his claims. Sailing again for Syria, Daimbert reached Messina (in Sicily), where he died.

Daimler, Gottlieb (Wilhelm) (b. March 17, 1834, Schorndorf, Württemberg [Germany]—d. March 6, 1900, Cannstatt, near Stuttgart), German mechanical engineer who was a major figure in the early history of the automotive industry.

Daimler studied engineering at the Stuttgart polytechnic institute and then worked in various German engineering firms, gaining experience with engines. In 1872 he became technical director in the firm of Nikolaus A. Otto, the man who had invented the four-stroke internal-combustion engine. In 1882 Daimler and his coworker Wilhelm Maybach left Otto's firm and started their own engine-building shop. They patented one of the first successful high-speed internal-combustion engines (1885) and developed a carburetor that made possible the use of gasoline as fuel. The two used their early gasoline engines on a bicycle (1885; perhaps the first motorcycle in the world), a four-wheeled (originally horse-drawn) carriage driven by a one-cylinder engine (1886), and a boat (1887). The two men's efforts culminated in a four-wheeled vehicle designed from the start as an automobile (1889). This commercially feasible vehicle had a framework of light tubing, a rear-mounted engine, belt-driven wheels, and four speeds. In 1890 Daimler-Motoren-Gesellschaft was founded at Cannstatt, and in 1899 the firm built the first Mercedes car.

Daimler-Benz AG, German auto manufacturer of Mercedes-Benz luxury cars, jet and motor-vehicle engines, heavy-duty trucks, and buses. Headquarters are in Stuttgart.

Daimler-Benz was formed in 1926 by the merger of two pioneering German automobile companies, one founded by Carl Benz, the other by Gottlieb Daimler. Both Benz and Daimler claimed to have invented the gasoline-powered auto engine. Benz built his first automobile, which was powered by a one-cylinder gasoline engine, in 1885 and started selling cars in 1887. Daimler designed a series of gasoline-powered engines in 1883, and received a German patent on a three-wheeled gasoline-powered vehicle in 1885.

In 1890 Daimler formed the firm of Daimler-Motoren-Gesellschaft to manufacture his rapidly growing line of Daimler autos. The first Daimler-produced luxury car was sold to the sultan of Morocco in 1889. In 1901 Daimler sold the first Mercedes, which was equipped with a four-cylinder engine. Emil Jellinek, a diplomat and major Daimler investor, had suggested that the line be named after his daughter Mercedes because he feared the German-sounding Daimler name would not sell well in France.

The Benz company produced trucks as well as autos. Benz began producing trucks with fuel-saving diesel engines, which sprayed fuel oil into the combustion chamber under high pressure, before World War I.

After the merger of the two rival companies in 1926, their engineering staffs worked together to design the classic "S" series Mercedes. Daimler-Benz was the first company to use diesel engines in passenger cars; the diesel-equipped Mercedes-Benz became available in 1936.

During World War II, Daimler-Benz engines were used extensively in German tanks, bombers, and fighter planes. In 1944 the Daimler-Benz factories were almost totally destroyed by Allied bombing, but they were eventually rebuilt. By the early 1980s high demand for the Mercedes both in Germany and abroad made Daimler-Benz Germany's largest auto maker in terms of sales value. In the mid-1980s Daimler-Benz sought to diversify into high technology by acquiring AEG AG (a maker of electrical systems, turbine engines, and radio and radar communications systems); Dornier GmbH (aerospace and medical products); and Motoren & Turbinen Union GmbH (aircraft engines).

daimyo, any of the largest and most powerful landholding magnates in Japan from about the 10th century until the late 19th century. The term *daimyo* is compounded from *dai* ("large") and *myō* ("name-land," meaning "private land").

Upon the breakdown of the system of public-land domain in Japan after the 8th century, private landholdings of various sorts came into being. These holdings were first consolidated into estates (*shōen*) organized under the authority of the civil nobility and religious establishments, and they remained within the framework of imperial government. As the military class (*buke,* or samurai) increased in numbers and importance during the 11th and 12th centuries, the term daimyo came to be applied to those military lords who began exercising territorial control (and later proprietary rights) over the various private estates into which the country had become divided.

In the 14th and 15th centuries the so-called *shugo* daimyo arose. These daimyo were appointed as military governors (*shugo*) under the Ashikaga shoguns (hereditary military dictators), and they held legal jurisdiction over areas as large as provinces. The *shugo* daimyo's private landholdings were quite limited, however, and they gained much of their income from levying taxes on the cultivated lands owned by civil aristocrats and religious establishments. In the second half of the 15th century the *shugo* daimyo were supplanted by the *sengoku* daimyo; these military lords held small but consolidated domains in which all the land belonged to themselves or was held in fief by their vassals. By the late 15th century the *sengoku* daimyo had divided Japan into a series of small, warring states as each individual daimyo competed for the control of more territory. The *sengoku* daimyo built castles in the hill country from which they controlled their vassals, who likewise were petty landowners with castles.

In the 16th century the *sengoku* daimyo fought among themselves constantly, and a process of consolidation ensued, with fewer and fewer daimyo emerging from the local wars and each holding more and more territory. In 1568 Oda Nobunaga began the movement of decisive military conquest over the daimyo that was later carried on by Toyotomi Hideyoshi and completed in 1603 by Tokugawa Ieyasu. By this time roughly 200 daimyo had been brought under the hegemony of the Tokugawa family, the head of which served as shogun. In the 16th century the term daimyo became limited in its application to territorial lords having lands assessed at 10,000 koku (1 koku = 5 bushels) or more of annual grain production.

The daimyo of the Tokugawa period (1603–1867) served as local rulers in the three quarters of the country not held as grain-producing (granary) land by the shogun. Daimyo were joined to the shogun by oath and received their lands as grants under his vermilion seal. Daimyo were classed according to their relationships to the shogun as kinsmen (*shimpan*), hereditary vassals (*fudai*), and allies (*tozama*).

The *kinsei* daimyo, as the daimyo of the Tokugawa period were called, differed from their predecessors in being more nearly petty monarchs within their domains. Their own samurai vassals, or retainers, were no longer holders of outlying castles but had been drawn off the land and brought into garrison residence at the daimyo's own great castle, which alone stood at the centre of the domain. The daimyo divided his domain between his own personal granary land and the land on which his chief retainers were enfeoffed. Normally his granary land amounted to from 30 to 40 percent of the whole. The daimyo's retainers were divided between fief holders and salaried retainers. All daimyo worked to convert their enfeoffed vassals to the enforced dependence of the salaried status, and by the 18th century most fiefs had been absorbed under the daimyo's expanding authority.

The daimyo used his band of retainers (*kashindan*) to administer his domain. A council of elders (*karō*) held the responsibility for policy and the superintendence of other officials, among whom were the heads of military units, superintendents of the castle town, rural administration, finance, security, public works, religious affairs, education, a secretariat, and many other specific posts. Within their domains the larger daimyo had considerable freedom, even to the point of issuing their own paper currency with the shogun's permission.

Daimyo came under the centralizing influence of the shogunate in two chief ways. In a sophisticated form of hostage-taking that was used by the shogunate, the daimyo were required to alternate their residence between their domains and the shogun's court at Edo (now Tokyo). Second, since shogunate law took precedence within the country, the daimyo adopted within their domains the general principles of Tokugawa law and bureaucratic procedure.

By the end of the Tokugawa regime, the daimyo had become removed from the actualities of government and basically served as aristocratic figureheads in their domains. This in part accounted for the success of the effort to abolish the daimyo. In 1868 the shogunate was abolished, and in 1869 the daimyo were obliged to turn back their land patents to the emperor, being made instead governors of territories corresponding roughly to their former domains. In 1871 the domains were abolished, and the former daimyo were converted into a pensioned nobility residing in Tokyo.

Daing Parani (d. *c.* 1726), leader of adventurers from the vicinity of Makasar, Celebes, who spearheaded the political penetration of the Malay Peninsula by the Buginese, a people

who came from the southern Celebes seeking trade opportunities. The Buginese were skilled and astute fighting men and were soon drawn into Malay political struggles. Daing Parani helped one Raja Kechil win the throne of the kingdom of Johore and then in 1722 shifted allegiance and aided Sulaiman, son of the deposed sultan, in winning back his father's throne. In return, the Buginese were put in control of a specially created office of underking, a post that made them effective rulers of Johore. Daing Parani was killed while interfering in a dynastic conflict in the northern Malay state of Kedah, but his family and followers continued to expand their influence throughout the Malay Peninsula in the 18th century until only the Dutch at Malacca and the Minangkabau people in the area that became the state of Negri Sembilan remained free of Buginese control.

Dainichi-kyō: *see* Mahāvairocana-sūtra.

Dair al-Baḥrī (Egypt): *see* Dayr al-Baḥrī.

Dairen (China): *see* Lü-ta.

dairying, branch of agriculture that encompasses the breeding, raising, and utilization of dairy animals, primarily cows, for the production of milk and the various dairy products processed from it. The most common commodities rendered from milk are butter, cream, cheese, ice cream, dried milk, skim milk, and buttermilk.

A brief treatment of dairying follows. For full treatment, *see* MACROPAEDIA: Farming and Agricultural Technology; Food Processing.

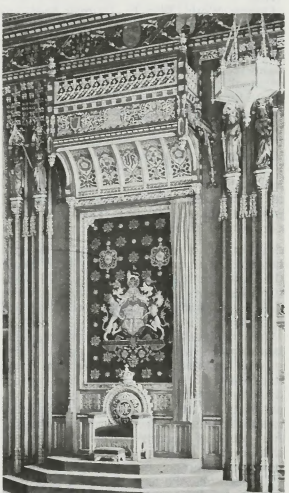
The earliest historical records note the keeping of cattle, goats, and sheep for the production of milk, butter, and cheese. From southwest Asia, the area of the first domestication of herd animals, the custom of using milk and milk products as food for humans spread to other countries. Dairy cattle thrive best in areas where pasturage and other green forage are grown in abundance.

Modern dairy farming is recent in origin. At first, dairy cows were kept to furnish milk for the farm family. The marketing of milk began when customers called at the farm or when farmers distributed their milk directly to users. Within the past 100 years advances along five different lines have caused milk and milk products to become important articles of commerce: (1) The factory system of processing milk was inaugurated about the middle of the 19th century, resulting in greater uniformity of product than was possible under farm processing. (2) About the same time, a method was developed for concentrating milk and sealing it in containers in sterile condition. Approximately 25 years later the distribution of milk in glass bottles was begun. Many other technological advances followed. (3) The first milk sold in towns and cities came from nearby farms. The coming of refrigeration not only aided in keeping milk fresh for a longer time than formerly but also made possible the shipping of dairy products to all parts of the world. (4) An early method of transporting milk to large cities was to ship it on railways. Motor vehicles and paved roads made possible the supplying of fresh milk to markets hundreds or even thousands of miles distant from the farms where the milk is produced. A development of the second half of the 20th century was the greatly expanded use of bulk-cooling tanks on farms from which tank trucks made pickups. (5) The wide adoption of pasteurization and the enforcement of laws requiring proper food value in dairy products greatly benefited the entire dairy industry.

Through the techniques of selective breeding, so-called herd-improvement programs begun in the 18th century have greatly increased the productivity of dairy cattle. Outstanding dairy breeds that have become numerous outside their homelands are the Ayrshire from Scotland, Brown Swiss from Switzerland, Holstein-Friesian, or Holstein, from Holland and Friesland, and Guernsey and Jersey from the Channel Islands. Dairying involving species other than cattle (*e.g.*, buffaloes, goats, and sheep) is relatively small in volume of production, and such milk is largely consumed in or near the community in which it is produced. Some goat and sheep milk enters trade channels, mostly in the form of cheese.

For information on the nature and production of particular dairy products, *see* butter; cheese; cream; ice cream; milk.

dais, any raised platform in a room, used primarily for ceremonial purposes. Originally the term referred to a raised portion of the floor at the end of a medieval hall, where the lord of the mansion dined with his family and friends at the high table, apart from the retainers and servants. A deep-recessed bay window usually placed at one or both ends of the dais provided greater privacy for the diners than the open hall could afford. In France the word is understood as a canopy over a seat.



Dais of the Royal Robing Room in the House of Lords, London, 1840–60
A.F. Kersting

daisy, any of several species of garden plants belonging to the family Asteraceae (also called Compositae). The name daisy commonly denotes the oxeye daisy (*Chrysanthemum leucanthemum*) and the English, or true, daisy (*Bellis perennis*). These and other plants called daisies are distinguished by a flower composed of 15 to 30 white ray flowers surrounding a bright yellow disk flower. The oxeye daisy is native to Europe and Asia but has become a common wild plant in the United States. This perennial grows to a height of about 2 feet (60 cm) and has oblong, incised leaves and long petioles (leafstalks). Its solitary flowers are about 1 to 2 inches (2.5 to 5 cm) in diameter, and the ray flowers are white in colour. The cultivated Shasta daisy (*C. maximum*) resembles the oxeye daisy but has larger flower heads that may reach a diameter of 4 inches (10 cm).

Members of the genus *Bellis* are perennials that have solitary flower heads borne on long stalks; the disk flowers are yellow, the ray flowers white or purple. The English daisy, *B. perennis*, is often used as a bedding plant. It has numerous spoon-shaped, slightly hairy leaves near its base that form a rosette. The plant has leafless flower stalks and hairy bracts (leaflike structures) below the flower heads. Some varieties of the English daisy have double flowers; others may have pink or red ray flowers surrounding the bright yellow disk. Like the oxeye, the English daisy is native to Europe but has become a common wild plant in the United States.



True, or English, daisy (*Bellis perennis*)
Sven Samelius

Daitō, city, Ōsaka *fu* (urban prefecture), Honshu, Japan, on the eastern border of Ōsaka city. Daitō extends eastward from the Ikoma Mountains to the Ōsaka plain on land reclaimed from the lowlands during the 17th and 18th centuries. It was a farming community until the opening of a railway connection to Ōsaka and the subsequent establishment of textile plants. After World War II factories producing metal products and electrical appliances were built at the foot of the mountains, and Daitō became an industrial city. It also serves as a residential suburb of the Ōsaka–Kōbe Metropolitan Area. Pop. (1987 est.) 124,382.

Daitō Islands, Japanese DAITŌ-JIMA, islands, Okinawa *ken* (prefecture), Japan, within the Ryukyu island group in the Pacific. The Daitō Islands lie about 217 miles (350 km) east of Okinawa. North Daitō (Kita-Daitō) and South Daitō (Minami-Daitō) islands are the largest of the group and lie close to one another, while the smaller Oki-Daitō Island lies about 93 miles (150 km) south of them. North and South Daitō have a combined area of 15.7 square miles (40.5 square km). They are coral islands and have steep cliffs but are basically level inland. Most of their arable land is used to grow sugarcane. Pop. (1980) 2,298.

Daizō-kyō: *see* Ta-ts'ang Ching.

Dajabón, town, northwestern Dominican Republic. The town is located along the Dajabón River, just across from Ouanaminthe, Haiti, on the northern slopes of the Cordillera Central (Central Mountains). It was founded between 1771 and 1776, abandoned during the War of Independence, and resettled after the War of Restoration (1865). Dajabón serves as a trade centre for the hides, timber, bananas, coffee, and honey produced in the region. Pop. (1981) 8,808.

Dajjāl, ad- (Arabic: "The Deceiver"), in Islāmic eschatology, the Antichrist who will come forth before the end of time; after a reign of 40 days or 40 years, he will be destroyed by Christ or the *mahdī* ("rightly guided one") or both, and the world will submit to God. Ad-Dajjāl first appears in pseudoapocalyptic Christian literature and is reworked in *ḥadīth* (sayings) ascribed to the Prophet Muḥammad.

There he is described as a plump, one-eyed man with a ruddy face and curling hair and the Arabic letters *k-f-r* ("unbelief") on his forehead. Ad-Dajjāl will appear during a period of great tribulation; he will be followed by the Jews and will claim to be God in Jerusalem. He will work false miracles, and most people will be deceived. At this moment will occur the Second Coming of Christ.

Tradition expects ad-Dajjāl to appear in the East, possibly Khorāsān, or in the West. In the meantime, he is said to be somewhere in the East Indies, on an island from which the sounds of dancing and beautiful music emanate, according to sailors' lore and the tale of Sindbad the Sailor. An alternate version is linked with the Greek Prometheus legend; in this account, ad-Dajjāl is bound to a rock on an island in the sea and is fed by demons.

Dajōkan, council of state of the Japanese imperial government during the Nara and Heian periods (710–857). Following the restoration of imperial power in 1868, the new government's council of state was named after this ancient imperial institution. As reestablished, the Dajōkan was subdivided into an executive branch, a legislative branch, and six other departments. Reorganized several times, the Dajōkan was finally restructured on Sept. 13, 1871, into three chambers: a Left Chamber (Sa-in), the legislative body; a Right Chamber (U-in), which directed the various ministries; and a Central Chamber (Sei-in), which subsumed the powers of the other two chambers.

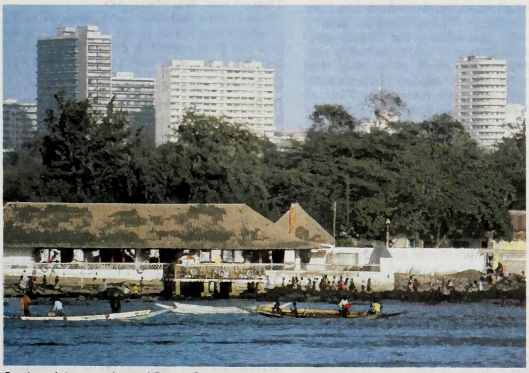
Though the Dajōkan's autocratic structure was suited to the chaotic years immediately following the restoration, the government soon came under pressure to adopt a more parliamentary system. In 1885 the Dajōkan was abolished, and a Cabinet, responsible to the emperor, was created to replace it. Four years later, the first Japanese constitution was promulgated.

Dakar, capital of Senegal and one of the chief seaports on the western African coast. It is located midway between the mouths of the Gambia and Sénégal rivers on the southeastern side of the Cape Verde peninsula, close to Africa's most westerly point. Dakar's harbour is one of the best in western Africa, being protected by the limestone cliffs of the cape de l'Indépendance to safeguard the interests of merchants who had been settling there for 20 years and of the residents of Gorée, a waterless island in the lee of the peninsula. By 1862 a short breakwater had been built on Dakar Point and a town laid out on the low limestone platform behind the sandy beach. Another generation elapsed, however, before Dakar gained its supremacy over Gorée and Rufisque, the latter being a settlement located 13 miles (21 km) east along the peninsula which had become an important export centre for the peanut (groundnut) trade. The opening in 1885 of western Africa's first railway, from Saint-Louis to Dakar, was a great impetus to Dakar's development, and the railroad also stimulated the cultivation of peanuts in the vicinity of its track. In 1904 Dakar replaced Saint-Louis as the federal capital of French West Africa.

During World War I Dakar's port grew in importance. In 1924 a railway line to the French Sudan (now Mali) was opened and brought new transit trade to the port. Extensive improvements were made, and by the 1930s Dakar had become the region's chief peanut-shipping port. During World War II Dakar, like all of French West Africa, recognized the authority of the Vichy administration of France in 1940, and the efforts of the Free French to secure the town in the same year failed badly. Further development of Dakar was delayed until French West Africa rallied to the Allies in 1943.

During World War II, peanut-oil refining became an important industry in Dakar because of local and North African needs for vegetable oil, which had been previously refined mostly in France. Other industries were established in the city, but by 1961 French West Africa had split into eight independent states, and Dakar's markets were consequently reduced. Dakar was the capital of the short-lived Mali Federation (1959–60), and in 1960 it became the capital of the Republic of Senegal. Since World War II the city has undergone much urban expansion.

The city has several contrasting districts. In the southern district are public buildings, hospitals, and embassies. North is the business district, which is focused on the Place de l'Indépendance. North and east lie the quarters



Section of the waterfront of Dakar, Senegal
Owen Franken—Stock, Boston

and by a system of breakwaters. The city's name comes from *dakhar,* a Wolof name for the tamarind tree, as well as the name of a coastal Lebu village that was located south of what is now the first pier.

Dakar was founded in 1857 when the French built a fort on the site of the modern Place associated with the port, such as the port proper, the fishing harbour, and the peanut-export sector. Near the latter, and close to the railway, are the older peanut-crushing plants and other factories, and farther north is the industrial estate of Hann.

Dakar is one of tropical Africa's leading industrial and service centres. Its industries include peanut-oil refining, fish canning, flour milling, brewing, truck assembly, and petroleum refining. There are excellent museums of the sea and of history in nearby Gorée and of ethnography and archaeology in Dakar. The corniche road (cut into the cliff) around Cape Manuel offers fine views of the harbour and the islands. There are some good beaches. Yoff airport, to the north of the city, is an important stopping point for flights between Europe and South America. Pop. (1985 est.) 1,382,000.

Dākhīl Raḥmān, ad- (Umayyad ruler): *see* ʿAbd ar-Raḥmān I.

Dakhin Shāhbāzpur Island, island located in the Meghna River estuary, south-central Bangladesh. The island, 43 miles (69 km) long and 10–15 miles (16–24 km) wide, is separated from Hātia Island (east) by the Shāhbāzpur River, which is an arm of the Meghna River delta, and from the mainland (west) by the Tetulia River. The island is formed of silt brought down by the Meghna River, the strong spring tide (called the "bore") of which impinges on the east and floods the watercourses and creeks. The island is often hit by severe cyclones and storm waves. It is connected by steamer service to the mainland.

Consult the INDEX *first*

dakhma (Avestan: "tower of silence"), Parsi funerary tower erected on a hill for the disposal of the dead according to the Zoroastrian rite. Such towers are about 25 feet (8 m) high, built of brick or stone, and contain gratings on which the corpses are exposed. After vultures have picked the bones clean, they fall into a pit below, thereby fulfilling the injunction that a corpse must not suffer contact with either fire or earth.

Dakin's solution, also called DAKIN'S FLUID, or CARREL–DAKIN FLUID, antiseptic solution containing sodium hypochlorite and developed to treat infected wounds. First used during World War I, Dakin's solution was the product of a long search by an English chemist, Henry Drysdale Dakin, and a French surgeon, Alexis Carrel, for an ideal wound antiseptic.

Stronger germicidal solutions, such as those containing carbolic acid (phenol) or iodine, either damage living cells or lose their potency in the presence of blood serum. Dakin's solution has neither disadvantage; its solvent action on dead cells hastens the separation of dead from living tissue. Dakin's solution is prepared by passing chlorine into a solution of sodium hydroxide or sodium carbonate. The solution is unstable and cannot be stored more than a few days. The Carrel–Dakin treatment consists of the periodic flooding of an entire wound surface with the solution.

Dakota (American Indian): *see* Sioux.

Dakota River (U.S.): *see* James River.

Dal River, Swedish DALÄLVEN, river in Kopparberg, Gävleborg, and Uppsala *län* (counties), central Sweden. It is formed by the confluence of the Österdal and Västerdal rivers, the headstreams of which rise on the Norwegian border. Before meeting the Västerdal River near Djurås, the Österdal River flows through Lake Siljan, an agricultural and tourist region of attractive hills and surviving local customs. The combined stream flows southeastward through the mineral-rich district of Bergslagen to Krylbo, then turns and

flows northeastward into the Gulf of Bothnia at Skutskär, a total length of 323 miles (520 km). It is an important source of power for central Sweden's lumber and iron industries. Some timber floating persists.

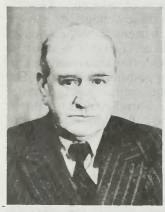


Log pond on Dal River, Sweden
Bernard Wolf—DPI

Daladier, Édouard (b. June 18, 1884, Carpentras, Fr.—d. Oct. 10, 1970, Paris), French politician who as premier signed the Munich Pact (Sept. 30, 1938), an agreement that enabled Nazi Germany to take possession of the Sudetenland (a region of Czechoslovakia) without fear of opposition from either Britain or France.

Daladier was elected to the Chamber of Deputies in 1919 as a member of the Radical Party from Vaucluse *département.* Daladier quickly made his mark in Paris. In June 1924 he joined the first Herriot government as the minister of colonies. In the turbulent years from 1925 to 1933 he served in several different Cabinets as minister of war, minister of public instruction, or minister of public works. On Jan. 31, 1933, he formed his own government, but it survived only until October 1933. In January 1934 he formed a second ministry that survived only four weeks. He continued to move in and out of ministerial assignments as he led his Radical Party into the Popular Front coalition with Léon Blum's Socialists and the Communist Party (1935).

Amid a deteriorating international situation, Daladier, in his effort to avoid war, joined the British prime minister, Neville Chamberlain, in signing the Munich Pact with Adolf Hitler's Germany. When France fell to Germany (June 1940), Daladier was one of those who sought to escape to French North Africa to set up a government-in-exile, but in Morocco he was arrested on Vichy orders and brought back to France. At his trial in Riom in February 1942, he and the other defendants accused the Philippe Pétain group of partial responsibility for the failure to prepare for war. He thereafter was handed over to the Germans, whose prisoner he remained until 1945. After the war he returned to the Chamber of Deputies (1946–58), became president of the moribund Radical Party in 1953, and opposed de Gaulle's new constitution of 1958. He then left politics.



Daladier, *c.* 1950
H. Roger-Viollet

Dalai Lama, head of the dominant Dge-lugs-pa (*q.v.;* Yellow Hat) order of Tibetan Buddhists and, until 1959, both spiritual and temporal ruler of Tibet.

The first of the line was Dge-'dun-grub-pa (1391–1475), founder and abbot of Tashilhunpo monastery (central Tibet). In accordance with the belief in reincarnate lamas, which began to develop in the 14th century, his successors were conceived as his rebirths and came to be regarded as physical manifestations of the compassionate *bodhisattva* ("Buddha-to-be"), Avalokiteśvara.

The second head of the Dge-lugs-pa order, Dge-'dun-rgya-mtsho (1475–1542), became the head abbot of the 'Bras-spungs (Drepung) monastery on the outskirts of Lhasa, which thenceforward was the principal seat of the Dalai Lama. His successor, Bsod-nams-rgya-mtsho (1543–88), while on a visit to the Mongol chief Altan Khan, received from that ruler the honorific title *ta-le* (Anglicized as "dalai"), the Mongolian equivalent of the Tibetan *rgya-mtsho,* meaning "ocean" and presumably suggesting breadth and depth of wisdom. The title was subsequently applied posthumously to the abbot's two predecessors. The Tibetans themselves call the Dalai Lama Rgyal-ba Rin-po-che ("Great Precious Conqueror").

The fourth Dalai Lama, Yon-tan-rgya-mtsho (1589–1617), was a great-grandson of Altan Khan and the only non-Tibetan Dalai Lama.

The next Dalai Lama, Ngag-dbang-rgya-mtsho (1617–82), is commonly called the Great Fifth. He established, with the military assistance of the Khoshut Mongols, the supremacy of the Dge-lugs-pa sect over rival orders for the temporal rule of Tibet. During his reign the majestic winter palace of the Dalai Lamas, the Potala, was built in Lhasa.

The sixth Dalai Lama, Tshangs-dbyangs-rgya-mtsho (1683–1706), was a libertine and a writer of romantic verse, not entirely suited for a seat of such authority. He was deposed by the Mongols and died while being taken to China under military escort.

The seventh Dalai Lama, Bskal-bzang-rgya-mtsho (1708–57), experienced civil war and the establishment of Chinese Manchu suzerainty over Tibet; the eighth, 'Jam-dpal-rgya-mtsho (1758–1804), saw his country invaded by Gurkha troops from Nepal but defeated them with the aid of Chinese forces. The next four Dalai Lamas all died young, and the country was ruled by regents. They were Lung-rtogs-rgya-mtsho (1806–15), Tshul-khrims-rgya-mtsho (1816–37), Mkhas-grub-rgya-mtsho (1838–56), and 'Phrin-las-rgya-mtsho (1856–75).

The 13th Dalai Lama, Thub-bstan-rgya-mtsho (1875–1933), ruled with great personal authority. The successful revolt within China against its ruling Manchu dynasty in 1912 gave the Tibetans the opportunity to dispel the disunited Chinese troops, and the Dalai Lama reigned as head of a sovereign state.

The 14th in the line of Dalai Lamas, Bstan-'dzin-rgya-mtsho, was born in 1935 in Tsinghai province, China, of Tibetan parentage. He was enthroned in 1940 but fled to exile in India with a group of 100,000 followers in 1959, the year of the Tibetan people's unsuccessful revolt against communist Chinese forces that had occupied the country since 1950. The Dalai Lama set up a government-in-exile in Dharmsala, India, in the Himalayan Mountains. In 1989 he was awarded the Nobel Prize for Peace in recognition of his nonviolent campaign to end Chinese domination of Tibet. He wrote a number of books on Tibetan Buddhism and an autobiography.

Dalälven (Sweden): *see* Dal River.

Dalandzadgad, also spelled DALAND ZADAGAD, town, south-central Mongolian People's Republic, in the Gobi (desert). It is connected by road to Ulaanbaatar, the national capital, 320 miles (514 km) north-northeast. Local brown and bituminous coal deposits are worked commercially. Industries include cement production. Pop. (1979) 10,100.

Dalarna, formerly DALECARLIA, *landskap* (province), in Svealand region, central Sweden. Its land area of 11,230 square miles (29,086 square km) extends from the Norwegian border nearly to the town of Gävle, on the Gulf of Bothnia; it consists of the administrative *län* (county) of Kopparberg and a bit of northwestern Gävleborg *län.* Much of the Bergslagen iron-mining region lies within it. Dalarna is of historical importance, twice (1434 and 1521) having been instrumental in freeing Sweden from Danish oppression. Later the copper mine at Falun and the iron of Bergslagen helped finance Sweden's rise to power in the 17th century, climaxed by the military campaigns of Gustav II Adolf in the Thirty Years' War (1618–48).

With mining, industry, and agriculture in the southeast and forests in the northwest, the region has great economic diversity. It is also a popular tourist area. Pop. (1988 est.) 283,845.

Dalatando (Angola): *see* Ndalatando.

Dalberg, Emmerich Joseph von Dalberg, duc de (duke of) (b. May 30, 1773, Mainz, Ger.—d. April 27, 1833, Herrnsheim, Bavaria), nephew and heir of Karl Theodor von Dalberg, and minister and foreign envoy under Napoleon and Louis XVIII of France. As Baden's envoy in Paris from 1803 he became a close friend of Talleyrand. Entering the French service in 1809, he was made a duke and a privy councillor by Napoleon in 1810. A member of Talleyrand's provisional government (1814), he accompanied Talleyrand to the Congress of Vienna as minister plenipotentiary. After the Second Restoration (1815) he was made a minister and a peer of France by Louis XVIII. In 1816 he was French ambassador in Turin. He died at Herrnsheim, which he had inherited from his uncle Karl Theodor. Herrnsheim then passed to his daughter Marie Louise Pelline de Dalberg (d. 1860).

Dalberg, Karl Theodor von (b. Feb. 8, 1744, Herrnsheim, Ger.—d. Feb. 10, 1817, Regensburg, Ger.), archbishop of Mainz and arch-chancellor of the Holy Roman Empire, primate of Germany, and president of the Confederation of the Rhine. A member of an important German noble family, he studied canon law at Göttingen and Heidelberg and

entered the church, becoming administrator of the bishopric of Erfurt in 1772. An advocate of German unity, he supported the League of Princes (Fürstenbund) formed under Frederick II of Prussia in 1785 and, through Prussian influence, became coadjutor of Mainz and Worms in 1787 and of Constance soon after. In 1802 he became archbishop elector of Mainz and so arch-chancellor of the Holy Roman Empire; in 1803 he received the principality of Aschaffenburg and Regensburg. Dalberg, in fact, thanks to Prussian influence, was the only ecclesiastical prince to survive the reorganization of the empire effected in 1803, from which he emerged as chancellor of the empire and primate of Germany, with ecclesiastical jurisdiction over Mainz, Cologne, and Trier. He hoped to establish a national German church, but in 1805 the pope restricted him to the secular administration of his dioceses. Through Napoleon's influence, however, Frankfurt and the countships of Löwenstein-Wertheim and Rieneck were added to Dalberg's territories. He had already turned to Napoleon as the only hope for a unified Germany, and in 1806 he was appointed prince primate of the Confederation of the Rhine. In 1810 Regensburg was ceded to Bavaria, but in compensation Dalberg received the principalities of Fulda and Hanau and the title of grand duke of Frankfurt. After the fall of Napoleon in 1814, the grand duchy was dismembered at the Congress of Vienna; Dalberg retained only the archbishopric of Regensburg.

Dalby, town, southeastern Queensland, Australia. It lies along Myall Creek near the Condamine River. Founded as Myall Creek Station in 1841, it was renamed for Dalby, on the Isle of Man, in the British Isles. It became a town in 1854. Dalby is the commercial centre for the northern Darling Downs, the state's most productive wheat region. Other local products include timber, linseed, livestock, and dairy foods. Dalby has foundries, engineering works, flour mills and sawmills, agricultural machinery and butter factories, and a livestock market. It is the headquarters for the British and Australian Breeds Society (sheep) and holds an important annual stock show. Pop. (1986) 8,338.

Dalcroze, Émile Jaques: *see* Jaques-Dalcroze, Émile.

Dale, Sir Henry (Hallett) (b. June 9, 1875, London, Eng.—d. July 23, 1968, Cambridge), English physiologist who in 1914 isolated acetylcholine and, with the German pharmacologist Otto Loewi, received the Nobel Prize for Physiology or Medicine in 1936 for their discoveries in the chemical transmission of nerve impluses.

A graduate in medicine (1909) from the University of Cambridge, Dale began his research career in 1904 at the Wellcome Physiological Research Laboratories. In 1914 he joined the staff of what later became the Medical Research Council, and from 1928 to 1942 he was director of its successor organization, the National Institute for Medical Research.



Sir Henry Dale, 1956
BBC Hulton Picture Library

Dale was the first to identify the compound histamine in animal tissues (1911), and he studied histamine's physiological effects, concluding that it is responsible for some allergic and anaphylactic reactions. After successfully isolating acetylcholine in 1914, he established that it occurs in animal tissue, and in the 1930s he showed that it is released at nerve endings in the parasympathetic nervous system. His research established acetylcholine's role as a chemical transmitter of nerve impulses.

Dale served as president of the Royal Society and was chairman (during World War II) of the Scientific Advisory Committee to the Cabinet. He was knighted in 1932 and awarded the Order of Merit in 1944.

Dale, Richard (b. Nov. 6, 1756, Norfolk county, Va. [U.S.]—d. Feb. 26, 1826, Philadelphia, Pa., U.S.), U.S. naval officer during the American Revolution.

Dale went to sea at the age of 12 and thereafter had a checkered career as a lieutenant in the Virginia provincial navy, a prisoner of war with the British fleet in Chesapeake Bay, and a mate on a Loyalist brigantine. When the brigantine was taken by the U.S. cap-



Richard Dale, detail from a portrait by an unknown artist
By courtesy of the U.S. Navy

tain John Barry (July 1776), Dale signed on Barry's Continental brigantine *Lexington* as a master's mate. He went to prison in England along with the rest of the crew when the *Lexington* was taken by the British in 1777.

Escaping to France more than a year later, he went on board the *Bonhomme Richard* under Captain John Paul Jones. As first lieutenant, Dale distinguished himself at the taking of the *Serapis* near Flamborough Head, Yorkshire (September 1779). He followed Jones's fortunes on the *Alliance* and the *Ariel* and in August 1781 was on board the *Trumbull* when that frigate was captured by the British.

After the war Dale served in the new U.S. Navy and later in the merchant marine. In May 1801 he was recalled to duty and with a small force maintained a successful blockade off Tripoli, holding the Barbary pirates in check for six months. He resigned in 1802.

Dalecarlia (Sweden): *see* Dalarna.

d'Alembert's principle, alternative form of Newton's second law of motion, stated by the 18th-century French polymath Jean le Rond d'Alembert. In effect, the principle reduces a problem in dynamics to a problem in statics. The second law states that the force F acting on a body is equal to the product of the mass m and acceleration a of the body, or $F = ma$; in d'Alembert's form, the force F plus the negative of the mass m times acceleration a of the body is equal to zero: $F - ma = 0$. In other words, the body is in equilibrium under the action of the real force F and the fictitious force $-ma$. The fictitious force is also called an inertial force and a reversed effective force.

Because unknown forces are more easily determined on bodies in equilibrium than on moving bodies, the force and stress analysis of machine components can usually be simplified by using inertial forces. When developing the formulas for the stresses in a rotating disk, for example, it is convenient to assume that a representative element in the disk is in equilibrium under the action of a system of radial and tangential forces produced by the stresses and an outward-acting inertial (centrifugal) force.

Dalén, Nils (Gustaf) (b. Nov. 30, 1869, Stenstorp, Swed.—d. Dec. 9, 1937, Stockholm), winner of the Nobel Prize for Physics



Nils Dalén, after 1913
Ullstein Bilderdienst

in 1912 for his invention of the automatic sun valve, or Solventil, which regulates a gaslight source by the action of sunlight, turning it off at dawn and on at dusk or at other periods of darkness. It rapidly came into worldwide use for buoys and unmanned lighthouses.

In 1906 Dalén became chief engineer of the Gas Accumulator Company, which marketed acetylene gas. He became managing director of the company in 1909 and then invented Agamassan, a substance that absorbs acetylene, making it possible to concentrate the gas with no danger of explosion. He was blinded by an explosion during an experiment in 1913, but he continued experimental work until his death.

Daley, Richard J(oseph) (b. May 15, 1902, Chicago, Ill., U.S.—d. Dec. 20, 1976, Chicago), mayor of Chicago from 1955 until his death; he was reelected every fourth year through 1975. Daley was called "the last of the big-city bosses" because of his tight control of Chicago politics through widespread job patronage. He attained great power in national Democratic Party politics.

Admitted to the Illinois bar in 1933, Daley served as a state representative and senator (1936–46), state director of revenue (1948–50), and clerk of Cook County (1950–55) before being elected mayor. During his mayoralty he gained the confidence of the business community through large-scale urban renewal and highway construction projects and through a sweeping reform of the police department.

Daley's administration was criticized, however, for its reluctance to check racial segregation in housing and in the public schools; for its encouragement of the construction of tall office buildings in the downtown area; and for its measures taken against demonstrators during the Democratic National Convention in 1968. His last years were marred by scandals centred on members of his administration, though none of these touched Daley himself. Daley's eldest son, Richard M. Daley, became mayor of Chicago in 1989.

Dalgaranga Crater, small meteorite crater near Dalgaranga, Western Australia. Known earlier but not attributed to meteoritic origin until 1938, it is 70 feet (21 m) in diameter and 11 feet deep. Both iron and stony mete-

orite fragments have been collected at the site. Although little studied, it is considered an impact crater because of its size.

Dalhousie, town, seat (1837) of Restigouche county, northern New Brunswick, Canada. It lies at the mouth of the Restigouche River on Chaleur Bay, 17 miles (27 km) northeast of Campbellton. Icebreakers keep the harbour open during the winter months and clear a route through the bay. Settled by Scots in the early 1800s, it was named for the 9th Earl of Dalhousie, governor-general of Canada (1819–28). The town's economic activities focus on the production of newsprint, caustic soda, chlorine, and lumber and on mixed farming, salmon fishing, and summer tourism. Inc. 1905. Pop. (1991) 4,775.

Dalhousie, city, northwestern Himāchal Pradesh state, northwestern India. Situated in the Himalayan foothills at an elevation of 7,500 feet (2,300 m), it is 26 miles (42 km) northeast of Pathānkot, with which it is linked by road. A hill station, Dalhousie is a popular summer resort, offering relief from the heat of the plain to the south. Panjab University has a vacation centre there for teachers of its affiliated colleges. The cantonment of Balun is just to the north. Pop. (1991 prelim.) 6,855.

Dalhousie, Fox Maule Ramsay, 11th Earl of, also called (1852–60) FOX MAULE, 2ND BARON PANMURE (b. April 22, 1801, Brechin Castle, Angus, Scot.—d. July 6, 1874, Brechin Castle), British secretary of state for war (1855–58) who shared the blame for the conduct of the last stage of the Crimean War.

Originally named Fox Maule, he became 2nd Baron Panmure in 1852 and Earl of Dalhousie



11th Earl of Dalhousie, detail of a wash drawing by T. Duncan, 1838; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

in 1860. In 1861 he assumed the Dalhousie family surname, Ramsay. After retiring from the army in 1832 with the rank of captain, he sat in the House of Commons as a Liberal from 1835 to 1837 and from 1838 to 1852. He was an under secretary of state (1835–41) and vice president of the Board of Trade (1841) in the cabinet of Lord Melbourne and then served as secretary at war (1846–52) under Lord John Russell. On the formation of the first Palmerston government in February 1855, Panmure was appointed to the new office of secretary of state for war.

Nicknamed "the Bison" for his brawny physique and resolute temperament, Panmure was a forceful administrator but often proved clumsy and insensitive. His attempt to secure preferential treatment for a young relative stationed in the Crimea provoked severe criticism and typified the aristocratic favouritism that hindered the British war effort.

Dalhousie, James Andrew Broun Ramsay, Marquess and 10th Earl of (b. April 22, 1812, Dalhousie Castle, Midlothian, Scot.—d. Dec. 19, 1860, Dalhousie Castle), British governor-general of India from 1847 to 1856, who is accounted the creator both of the map of modern India, through his conquests and annexations of independent provinces, and of the centralized Indian state. So radical were Dalhousie's changes and so widespread the resentment they caused that his policies



10th Earl of Dalhousie, detail of an oil painting by Sir John Watson-Gordon, 1847; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

were frequently held responsible for the Indian Mutiny in 1857, one year after his retirement.

Early career. Dalhousie was the third son of George Ramsay, the 9th Earl of Dalhousie. His family had traditions of military and public service but, by the standards of the day, had not accumulated great wealth, and, consequently, Dalhousie was often troubled by financial worries. Small in stature, he also suffered from a number of physical infirmities. Throughout his life he derived energy and satisfaction from the thought that he was achieving public success in spite of private handicaps.

After an undistinguished career as an undergraduate at Christ Church, Oxford, he married Lady Susan Hay in 1836 and entered Parliament the following year. From 1843 he served as vice president, and from 1845 as president, of the Board of Trade in the Tory (conservative) ministry of Sir Robert Peel. In that office he handled a number of railroad problems and gained a reputation for administrative efficiency. He lost his post when Peel resigned in 1846. In the following year he accepted the new Whig ministry's offer of the governor-generalship of India, becoming the youngest man ever appointed to that post.

Arrival in India. When Dalhousie arrived in India in January 1848, the country seemed peaceful. Only two years earlier, however, the army of the Punjab, an independent state founded by the religious and military sect of the Sikhs, had precipitated a war that the British had won only with great difficulty. The discipline and economy enforced by the new Sikh regime, sponsored by the British, aroused discontent, and in April 1848 a local rebellion broke out at Multān. This was the first serious problem faced by Dalhousie. Local officers urged immediate action, but he delayed, and Sikh disaffection spread throughout the Punjab. In November 1848 Dalhousie dispatched British troops, and, after several British victories, the Punjab was annexed in 1849.

Dalhousie's critics maintained that he had allowed a local rebellion to grow into a national uprising so that he could annex the Punjab. But the commander in chief of the British army had warned him against precipitate action. Certainly, the steps Dalhousie eventually took were somewhat irregular; the uprising at Multān had been directed not against the British but against policies of the Sikh government. In any event, he was created marquess for his efforts.

Second Burmese War. In 1852 commercial disputes in Rangoon (now Yangôn) prompted new hostilities between the British and the Burmese, a conflict that became the Second Burmese War. It was settled within the year with little loss of life and with the British annexation of Rangoon and the rest of Pegu province. Dalhousie was again criticized for aggressive diplomacy, but Britain profited from the installation of a new Burmese government that was less aggressive abroad and less oppressive at home. Another advantage was that Rangoon, Britain's most valuable acquisition from the war, became one of the biggest ports in Asia.

Policy of "lapse" and annexation. Dalhousie also took advantage of every opportunity to acquire territory by peaceful means. The East India Company, which was no longer an independent corporation but largely under the control of the British government, was rapidly becoming the predominant power in India. It had concluded alliances with Indian rulers, promising to support them and their heirs in return for various concessions, including the right to keep a British resident and a military force within their states. Although this type of agreement gave the British an effective influence over general policy, Dalhousie sought to acquire even more power. It was customary for a ruler without a natural heir to ask the British government whether he could adopt a son to succeed him. Dalhousie concluded that if such permission were refused, the state would "lapse" and thereby become part of the British possessions. On these grounds, Sātāra was annexed in 1848 and Jhānsi and Nāgpur in 1854. Dalhousie maintained that there was a difference in principle between the right to inherit private property and the right to govern, but his main argument was his own belief in the benefits of British rule.

His annexation of Oudh in 1856, however, entailed grave political danger. Here there was no question of lack of heirs; the nawab (ruler) was simply accused of misgovernment, and the state was annexed against his will. The transfer of power over the nawab's protests offended the Muslim elite. More dangerous was the effect on the British army's Indian troops, many of whom came from Oudh, where they had occupied a privileged position before its annexation. Under the British government, however, they were treated as equals with the rest of the population, which represented a loss of prestige. Moreover, after Dalhousie's departure in 1856, the landed aristocracy of Oudh lost many of its privileges. In these various ways, the annexation of Oudh contributed to the mutiny and rebellion of the following year.

Westernization of India. Dalhousie's energy extended beyond the mere acquisition of territories. His greatest achievement was the molding of these provinces into a modern centralized state. His confidence in Western institutions and his ability as an administrator immediately led him to attend to the development of a communication and transportation system. He gave much attention to the planning of the first railways. Drawing on the knowledge he had acquired in London at the Board of Trade, he laid the foundation of future railway development, outlining the basic concept of trunk and branch lines and making provisions to safeguard both the railway workers and the property owners affected by railway construction. He planned and instituted a network of electric telegraph lines, promoted the completion of the Grand Trunk Road between Calcutta and Delhi and its extension into the Punjab, and instituted a centralized postal system, based on a low uniform rate paid in advance by the purchase of stamps, thus replacing a variety of methods characterized by uncertainty of delivery and

high rates. His social reforms included strong support for the suppression of female infanticide in the Punjab and in the northwest generally and the suppression of human sacrifice among the hill tribes of Orissa. Besides encouraging the use of the vernacular languages in schools, he gave particular encouragement to the education of girls.

He left India in 1856, and the controversies aroused by his policy of annexation, which were widely—and justly—criticized as contributory factors to the mutiny and rebellion of 1857, overshadowed his achievements in modernization. Exhausted by his years of overwork in India, he died in 1860. His marquessate became extinct. (K.A.B.)

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Dalhousie University, privately endowed institution of higher learning located in Halifax, Canada. It was founded in 1818 as Dalhousie College by the 9th earl of Dalhousie, then lieutenant governor of Nova Scotia, and became a university in 1863. The school developed rapidly after substantial benefactions in 1879 by George Monro and subsequent financial assistance from the Rockefeller and Carnegie foundations. The academic program is organized into the six faculties of arts and sciences, law, medicine, dentistry, health professions, and graduate studies.

Associated institutions are the University of King's College, Mount St. Vincent University, and the Nova Scotia Technical College. Dalhousie is the only centre in the Atlantic provinces for professional training in medicine and dentistry.

Dali (China): *see* Ta-li.

Dalí, Salvador, in full SALVADOR FELIPE JACINTO DALÍ Y DOMENECH (b. May 11, 1904, Figueras, Spain—d. Jan. 23, 1989, Figueras), Spanish Surrealist painter and printmaker, influential for his explorations of subconscious imagery.

As an art student in Madrid and Barcelona, Dalí assimilated a vast number of artistic styles and displayed unusual technical facility as a painter. It was not until the late 1920s, however, that two events brought about the development of his mature artistic style: his discovery of Sigmund Freud's writings on the erotic significance of subconscious imagery, and his affiliation with the Paris Surrealists, a group of artists and writers who sought to establish the "greater reality" of man's subconscious over his reason. To bring up images from his subconscious mind, Dalí began to induce hallucinatory states in himself by a process he described as "paranoiac critical."

Once Dalí hit on this method, his painting style matured with extraordinary rapidity, and from 1929 to 1937 he produced the paintings which made him the world's best-known Surrealist artist. He depicted a dream world in which commonplace objects are juxtaposed, deformed, or otherwise metamorphosed in a bizarre and irrational fashion. Dalí portrayed these objects in meticulous, almost painfully realistic detail and usually placed them within bleak, sunlit landscapes that were reminiscent of his Catalonian homeland. Perhaps the most famous of these enigmatic images is "The Persistence of Memory" (1931), in which limp, melting watches rest in an eerily calm landscape. With the Spanish director Luis Buñuel, Dalí also made two Surrealistic films—*Un Chien andalou* (1928; *An Andalusian Dog*) and *L'Âge d'or* (1930; *The Golden Age*)—that are similarly filled with grotesque but highly suggestive images.

In the late 1930s Dalí switched to painting in a more academic style under the influence of the Renaissance painter Raphael, and as a consequence he was expelled from the Surrealist movement. Thereafter he spent much of his time designing theatre sets, interiors of fashionable shops, and jewelry, as well as exhibiting his genius for flamboyant self-promotional stunts in the United States, where he lived from 1940 to 1955. In the period from 1950 to 1970 Dalí painted many works with religious themes, though he continued to explore erotic subjects, to represent childhood memories, and to use themes centring on his wife, Gala. Notwithstanding their technical accomplishments, these later paintings are not as highly regarded as the artist's earlier works. The most interesting and revealing of Dalí's books is *The Secret Life of Salvador Dali* (1942–44).



"Dali Atomicus," or Dalí with everything in suspension, photograph by Philippe Halsman, 1948

© Philippe Halsman

Dalin, Olof von (b. Aug. 29, 1708, Vinberg, Swed.—d. Aug. 12, 1763, Stockholm), writer and historian who wrote the first easily readable and popular Swedish works and who helped bring the ideas of the Enlightenment into Swedish culture.

Dalin, a poor clergyman's son, was educated at the University of Lund, and upon arriving in Stockholm he became a favourite with aristocratic families as a tutor and salon habitué. Dalin became the centre of Swedish literary attention when he was discovered to be the previously anonymous author of the first literary periodical to appear in Sweden, the extremely popular *Then swänska Argus* (1732–34), modeled on Joseph Addison's *Tatler* and *Spectator*. This periodical helped introduce the ideas of the Enlightenment into Sweden, but its language and literary style were of even greater importance; it is regarded as ushering in the age of modern Swedish prose. Neither of Dalin's two dramatic works nor his rather ambitious epic poem, *Swenska friheten* (1742; "Swedish Liberty"), proved very successful. His best and most popular work is the allegory *Sagan om hästen* (1740; "The Tale About the Horse"), in which a horse represents the Swedish people and its masters represent the various Swedish kings. Of his folk ballads, which indirectly conveyed his political views, the best known is *Hattvisan* ("The Hat Ballad"). Dalin's great interest was history; he wrote three volumes of a lively *Svea rikes historia* (1747–62; "History of the Swedish Kingdom"). He was a central figure of Queen Louisa Ulrica's literary salon and tutor to the Crown Prince, later Gustavus III.



Dalin, detail of an oil painting by J.H. Scheffel; in Krageholm Castle, Skåne, Swed.

By courtesy of the Svenska Portrattarkivet, Stockholm

Dalip Singh, also spelled DHULIP SINGH (b. September 1837, Lahore, India—d. Oct. 22, 1893, Paris), Sikh maharaja of Lahore (1843–49) during his childhood.

Dalip was the son of Ranjit Singh, the powerful "Lion of Lahore," who controlled the Punjab for nearly 50 years. After Ranjit's death (1839), assassinations and struggles for power prevailed, but the boy's mother finally succeeded in having him proclaimed maharaja in 1843. Real power, however, remained in the hands of her brother Jawahir Singh and her Brahman lover. The Sikh army daily gained power, dismissed its foreign officers, and had doubled its strength from that in 1839 to more than 70,000 in 1845, when the First Sikh War against the British erupted. A peace treaty in 1846 recognized Dalip as maharaja of a reduced Sikh kingdom and made him a ward of the government of British India, whose resident at Lahore ruled in his name.

In 1848 an anti-British outbreak at Multān and another in Hazāra were allowed to develop into widespread Sikh risings that led to the Second Sikh War (1848–49). At the Battle of Gujrāt (Feb. 21, 1849) the Sikhs were defeated, and in March the Maharaja was deposed and his kingdom annexed to British India. Given a pension of £12,000 a year, he became a Christian and chose to live in En-

gland, where he was well-received in society. In 1882, after an appeal for an increase in his pension was refused, he left England for France and repudiated Christianity.

Dalkeith, burgh, Midlothian district, Lothian region, Scotland. It is situated near the capital, Edinburgh, and has an increasing population of workers who commute to that city. Dalkeith is an agricultural and electronic-engineering centre, with some of the latter activity housed in the former corn exchange (1854). Dalkeith Palace (rebuilt *c.* 1700) also houses a computer-manufacturing firm. Other developing industries include carpet making, brewing, and printing. Located 1 mile (1.6 km) south is Newbattle Abbey, former seat of the marquesses of Lothian and now a residential college for adult education. Esbank Valley Technical College was established at Dalkeith in 1969. Pop. (1981) 11,253.

Dall sheep (*Ovis dalli*), species of bighorn (*q.v.*).

Dallam, Thomas (b. *c.* 1570, Lancashire, Eng.—d. after 1614), prominent English organ builder, whose sons were also known for their organ-building.

Little is known of Dallam's early life, except that he was apprenticed to a member of the Blacksmiths' Company, later attaining the status of liveryman. In 1599–1600 he traveled to Constantinople, delivering a mechanical clock-organ to the sultan; his diary of this journey was published in 1893.

In 1605–06 Dallam moved to Cambridge and built an organ for King's College. In 1613 he constructed a two-manual organ designed by Thomas Tomkins for Worcester Cathedral and a double organ for the Royal Chapel at Holyroodhouse, Edinburgh. While engaged in the construction of an organ for Eton College in 1613–14, Dallam may have been assisted by his son Robert, who, like his father, became a member of the Blacksmiths' Company. Two other sons, George and Ralph, also were organ builders in England and in Brittany, where the family settled during the period of the English Commonwealth.

Dallán Forgaill (fl. late 6th century AD), chief Irish poet of his time, probably the author of the *Amra Choluim Chille,* or *Eulogy of St. Columbkille* (Columba), one of the earliest Irish poems of any length. Composed after St. Columba's death in 597, it is preserved in *The Book of the Dun Cow* and in the *Liber hymnorum,* a collection of Irish and Latin hymns; both texts are obscure. It is written in the archaic, alliterative style that reappears in the later Irish sagas.

Nothing certain is known of Dallán Forgaill's life. According to the preface to the *Eulogy,* he met St. Columba at the assembly of Druim Cetta in 595, when the saint successfully defended the *filid* (professional bards) against charges of demanding excessive payment. He reputedly died as a result of leading the *filid* in their demands at a later assembly.

Dallapiccola, Luigi (b. Feb. 3, 1904, Pisino, Istria, Austrian Empire [now Pazin, Croatia]—d. Feb. 19, 1975, Florence), Italian composer, noteworthy for putting the disciplined 12-tone serial technique at the service of warm, emotional expression.

Dallapiccola spent much of his childhood in Trieste and was interned with his family in Graz, Austria, during World War I; there he became acquainted with the music of Giuseppe Verdi and Richard Wagner. In 1921 Dallapiccola entered the Conservatorio Luigi Cherubini in Florence and was named to its faculty in 1934. Known before World War II as a teacher and pianist, Dallapiccola had an early interest in the music of Ferruccio Busoni, Arnold Schoenberg, and Anton von Webern. He began experiments in the 12-tone idiom around 1939. His triptych *Canti di prigionia* (1938–41; *Songs of Prison*) marked him as a mature composer; this work, for chorus with an orchestra of percussion, harps, and pianos, was a protest against Fascist doctrine and was based in part on the chant "Dies Irae" ("Day of Wrath") from the mass for the dead. In it he used an original version of 12-tone technique.

Dallapiccola's vocal music is considered among his most effective. Using impassioned texts and a variety of imaginative effects of articulation, his choral writing is Latin in its warmth and at the same time technically complex. The rhythmic intricacies of the *Quaderno musicale di Annalibera* (1952; *Musical Notebook of Annalibera*), a piano book written for his daughter, serve as the basis for much of his *Canti di liberazione* (1955; *Songs of Liberation*), a triptych for chorus and orchestra, celebrating the liberation of Italy from Fascist control. An opera, *Volo di notte* (*Night Flight*), was first performed in Florence in 1940.

Dallapiccola taught composition in the United States in the 1950s and '60s at the Berkshire Music Center at Tanglewood, in Massachusetts, and at other centres and was a great influence, particularly on the younger Italian composers. Among his students was Luciano Berio, one of the leading composers of electronic music.

Dallas, city, seat (1846) of Dallas county, northern Texas, U.S. It lies along the Trinity River near the junction of that river's three forks, in an area of prairie and gentle hills. Dallas is the state's second largest city (after Houston) and the metropolis of an urban complex that includes the cities of Farmers Branch, Garland, Grand Prairie, Highland Park, Irving, Mesquite, Richardson, and University Park. Fort Worth is 33 miles (53 km) west. Dallas' winters are mild but its summers are extremely hot.

In 1841 John Neely Bryan built the first cabin in the area on the riverbank. The hamlet that grew there was probably named for George Mifflin Dallas, vice president (1845–49) of the United States. Its early settlement was augmented in 1858 by French and Swiss artisans from the unsuccessful Fourierist utopian colony at nearby La Réunion. Commercial growth was stimulated by the arrival of the railroads in the 1870s. A huge wholesale market developed, with many of the city's retail stores serving the Southwest; one, Neiman-Marcus, has become internationally known.

Cotton fed the town's growth at first and was followed by oil and insurance. The Dallas Cotton Exchange was organized in 1907, and by the 1920s some 40 percent of the nation's cotton crop came from the black clay fields around Dallas. Cotton's importance in the city's economy has since declined, but the manufacture of cotton-ginning machinery remains important. On Sept. 30, 1930, C.M. ("Dad") Joiner discovered the great East Texas oil field, which attracted investment and made the city a major centre of the petroleum industry. Hundreds of oil companies are still headquartered in Dallas, as are many drilling-equipment supply firms and geophysical exploration firms.

The city began a period of spectacular growth in the decades after World War II, when several large aircraft-manufacturing firms became located in the area. These were followed by electronics and automobile-assembly plants. The city is now the headquarters of more than 100 insurance companies. Dallas is the leading banking and financial centre for the Southwest, as well as the principal centre for publishing, printing, and advertising in that region. It is a leader in computer sciences and is an outstanding medical centre (the American Heart Association is headquartered there).

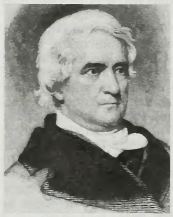
The city's industry is now highly diversified and includes food processing and the manufacture of transportation equipment, machinery, and aircraft parts; clothing manufacture is important, and the city is known as a regional fashion and women's apparel centre. Dallas is a transportation and communications hub and is the world headquarters of the U.S. Army and Air Force Exchange Service. In 1973 the Dallas–Fort Worth International Airport was opened. Dallas has a council-manager form of government that was established there in 1931.

The John F. Kennedy Memorial Plaza is near the spot where that president was assassinated as he rode in a motorcade through the city in November 1963.

Educational institutions in the area include Bishop College (1881), Dallas Baptist University (1898), Baylor College of Dentistry (1905), Southern Methodist University (1911), University of Texas Health Science Center at Dallas (1943; formerly Southwestern Medical College), University of Dallas (1956), El Centro College (1966), the University of Texas at Dallas (1969), and Richland College (1972).

The city is known for its cultural activities, including opera, ballet, musicals, and symphony concerts, while its Theater Center is the only theatre building to have been designed by Frank Lloyd Wright. There are recreational facilities around three large lakes north of Dallas from which the city draws its water supply. The State Fair Park contains extensive recreational facilities, including the Cotton Bowl (home of the annual football classic), a music hall, museums of natural history and science, a planetarium, an aquarium, a garden centre, and the fairgrounds of one of the largest annual state expositions. Dallas also has a well-known zoo. Texas Stadium in Irving is the home of the Dallas Cowboys (football), while the Texas Rangers (baseball) play at nearby Arlington Stadium. The Dallas Market Center complex (a wholesale trade centre) and the Sculpture Gardens in Dallas' arts district are outstanding among the city's impressive array of buildings. Inc. town, 1856; city, 1871. Pop. (1990) city, 1,006,877; Dallas PMSA, 2,553,362; Dallas–Fort Worth CMSA, 3,885,415.

Dallas, George Mifflin (b. July 10, 1792, Philadelphia—d. Dec. 31, 1864, Philadelphia), vice president of the United States (1845–49) and minister to Great Britain.



Dallas, engraving by T.B. Welch

By courtesy of the Library of Congress, Washington, D.C.

Dallas was the son of Alexander J. Dallas, secretary of the Treasury (1814–16), and went abroad for a year as a private secretary to Albert Gallatin, who was on a diplomatic mission to Russia for the United States. After working for his father in the U.S. Department of the Treasury and with the legal staff of the Second Bank of the United States, he entered Pennsylvania politics. He completed an unexpired term as U.S. senator (1831–33) and served as minister to Russia (1835–39), vice president under President James K. Polk, and minister to Great Britain (1856–61). The cities of Dallas in Texas and Oregon are named for him.

Dallas Zoo, municipal zoological garden in Marsalis Park, Dallas, Texas, U.S. It is noted for its fine reptile collection, which includes the world's largest holdings of rattlesnakes (more than 50 species). Opened in 1904, the zoo houses about 1,700 specimens of nearly 500 species on its 20-hectare (50-acre) site. Among these specimens is the largest flamingo flock in North America. Another interesting feature of the Dallas Zoo is its large desert-ecology display, consisting of two dozen species of lizards in an outdoor enclosure amid desert vegetation.

Dalles, The, formally CITY OF THE DALLES, also called DALLES CITY, inland port, seat (1854) of Wasco county, Oregon, U.S., on the south bank of the Columbia River, 75 miles (121 km) east of Portland. Its name originated with French *voyageurs* who likened the basaltic rocks through which the river races to flagstones (French: *les dalles*). A trading post and Methodist mission were established in 1838, and Fort Lee and Fort Dalles were built during the 1840s and '50s. The settlement became the terminus of the Oregon Trail. The discovery of gold in the 1860s boosted the town's growth as a trading and supply depot; for a time a federal mint was located there. With the completion in 1957 of The Dalles Dam (3 miles [5 km] east), the city became the eastern terminal for oceangoing craft from the Pacific (200 miles [320 km] west), handling grain, fruit, lumber, meat, wool, and oil. About 50 miles (80 km) south is the Warm Springs Indian Reservation.

Incorporated as Fort Dalles in 1857, it was later known as Dalles City and The Dalles. By a 1966 charter amendment, it was renamed City of The Dalles. Pop. (1990) 9,422.

Dalling and Bulwer (of Dalling), William Henry Lytton Earle Bulwer, Baron: *see* Bulwer, Henry Lytton.

Dallmeyer, John Henry (b. Sept. 6, 1830, Loxten, Westphalia [Germany]—d. Dec. 30, 1883, at sea off New Zealand), British inventor and manufacturer of lenses.

Showing an aptitude for science, Dallmeyer was apprenticed to an Osnabrück optician, and in 1851 he went to London, where he obtained work with an optician and later with Andrew Ross, a lens and telescope manufacturer. After a year spent in a commercial post, he was reengaged by Ross as scientific adviser. He married Ross's second daughter, Hannah, and in 1859 inherited part of his employer's large fortune and the telescope-manufacturing portion of the business. Turning to the making of photographic lenses, he introduced improvements in both portrait and landscape lenses, in object glasses for the microscope, and in condensers for the optical lantern. He constructed several photoheliographs (telescopes adapted for photographing the Sun).

His son Thomas Rudolphus Dallmeyer (1859–1906) introduced telephoto lenses into ordinary practice (patented 1891) and wrote a standard book on the subject (*Telephotography,* 1899).

Dalmatia, Serbo-Croatian DALMACIJA, region of Croatia, comprising a central coastal strip and a fringe of islands along the Adriatic Sea. Its greatest breadth, on the mainland, is about 28 miles (45 km), and its total length, from the Kvarner (Quarnero) gulf to the narrows of Kotor (Cattaro), is about 233 miles (375 km). The major islands from north to south (with Italian names in parentheses) are Krk (Veglia), Cres (Cherso), Rab (Arba), Pag (Pago), Dugi Otok (Isola Lunga), Brač (Brazza), Hvar (Lesina), Vis (Lissa), Korčula (Curzola), Mljet (Meleda), and Lastovo (Lagosta). A rugged and barren range of mountains, the Dinaric Alps, divides Dalmatia from the interior. With peaks ranging from 1,500 feet (450 m) to more than 6,200 feet (1,900 m), the Dinaric Alps offer only two main passes: the Krka River canyon and the Neretva River valley. The Dalmatian coastline has numerous bays and harbours and is noted for its scenic beauty. The climate is mild, with dry summers, abundant rain in autumn and winter, and very little snow.

The first recorded inhabitants of Dalmatia were Illyrians (the name Dalmatia probably comes from the name of an Illyrian tribe, the Delmata, an Indo-European people who overran the northwestern part of the Balkan Peninsula beginning about 1000 BC). The Greeks began to settle there from the 4th century, founding a number of colonies on the islands, the most famous of which were Issa (Vis), Pharos (Hvar), and Corcyra Melaina (Korčula), and a few towns on the mainland coast, one of which is Salona (Solin), near modern Split. The Greeks, opposed by the Illyrians, appealed to the Romans for help, and a long series of Roman-Illyrian wars began in 229. The fall of the Dalmatian capital, Delminium, in 155 brought Roman civilization to the country. On the collapse of the Western Roman Empire, Dalmatia fell under the power of Odoacer in AD 481 and later under that of Theodoric, to become a battlefield during the wars between the Goths and the Byzantine emperor Justinian I.

By the time permanent Venetian rule had been established (1420), Dalmatia had passed through about 30 changes of sovereignty. Byzantines, Greeks, Magyars, Tatars, Croatian and Serbian princes, Venetians, Sicilians, and Normans were among its conquerors. The Croatian kings and the Venetian doges were the only rulers who held power long enough to leave a permanent mark on Dalmatian character and consciousness.

Venetian rule, established in 1420 when the king of Croatia, Ladislas of Naples, ceded the country to the Venetian republic, ended in 1797. This period was marked by Venetian warfare against the Turks. When the French gave Venice to Austria under the Treaty of Campo Formio (1797), Dalmatia became Austrian also; but in 1805, under the Treaty of Pressburg, Austria had to cede Dalmatia to Napoleon. It was returned to Austria after Napoleon's fall and remained an Austrian crownland until 1918.

During World War I, by the secret Treaty of London (1915), the Allies had promised large territories, including northern Dalmatia, to the Italians in return for their support. This treaty embittered negotiations for a peace settlement. Finally, the Treaty of Rapallo (Nov. 12, 1920) between Italy and Yugoslavia gave all Dalmatia to the Yugoslavs except the mainland Zadar (Italian: Zara) enclave and the coastal islands of Cres, Lošinj (Lussino), and Lastovo. The Palagruza islands, in the mid-Adriatic, also passed to Italy. During World War II, when Yugoslavia was partitioned by the Axis powers, Dalmatia was annexed by Italy, but it passed to Yugoslavia in its entirety in 1947 as part of the Croatian republic (independent from 1992), with the city of Split serving as provincial capital.

Dalmatia's principal cities are Zadar, Split (Spalato), Šibenik (Sebenico), Dubrovnik (Ragusa), Trogir (Trau), Korčula, and Kotor. The region's economy is mainly agricultural. The soil is unsuitable for the cultivation of cereal grains but favours olive trees, vegetables, and, above all, vines. Dalmatian vineyards are rich in wine production. There are deposits of bauxite that are exploited by the aluminum refinery near Šibenik. Abundant reserves of limestone coming from the neighbourhood of Split account for much of Croatia's cement output. There are also chemical factories as well as food-processing plants. Major shipbuilding yards are at Split. The rivers, except for a few miles on the Krka and on the Neretva, are unsuitable for navigation, but their precipitous fall makes them a natural source of hydroelectric power. Tourism has become a major economic factor; Dubrovnik and Split (*qq.v.*) are major Mediterranean tourist attractions.

Dalmatian, dog breed named after the Adriatic coastal region of Dalmatia, its first definite home. The time and place of origin of



Dalmatian
Sally Anne Thompson

the breed are unknown. The Dalmatian has served as a sentinel, war dog, fire department mascot, hunter, shepherd, and performer. It is best known, however, as a coach or carriage dog, functioning as an escort and guard for horse-drawn vehicles. A sleek, symmetrically built, short-haired dog, the Dalmatian is characterized by its dark-spotted white coat. It stands 19 to 23 inches (48 to 58.5 cm) and weighs 35 to 55 pounds (16 to 25 kg). In general, it is even-tempered and friendly. Among its nicknames are English coach dog, firehouse dog, and plum-pudding dog.

dalmatic, liturgical vestment worn over other vestments by Roman Catholic and some Anglican deacons. It probably originated in Dalmatia in Greece and was a commonly worn outer garment in the Roman world in the 3rd century and later. Gradually, it became the distinctive garment of deacons.

The dalmatic was a long, full, closed, white gown with an opening for passage of the head and had long, full sleeves. Worn ungirdled, it was made of linen, cotton, wool, or silk. It was decorated with coloured stripes around the cuffs of the sleeves and coloured vertical



Dalmatic, gold embroidery and cording on cut velvet, Spanish, 16th century; in the collection of the Hispanic Society of America, New York City
By courtesy of the Hispanic Society of America, New York City

stripes (*clavi*) descending front and back from the shoulders.

From the 9th century it was made of heavy velvet, damask, or brocaded silk and was shortened to the knees, the sides opened for freedom of movement, and the sleeves shortened. By the 12th century it was being made in the liturgical colours; all deacons wore it as the outer vestment, and bishops wore it under the chasuble. In the mid-20th century the original long, white garment without excessive decoration was again being worn.

A shorter dalmatic, called the tunicle, is worn by subdeacons. Both the dalmatic and tunicle were worn by Roman Catholic bishops under the chasuble, but since 1960 these vestments have not been obligatory for bishops.

Dalmatie, Nicolas-Jean de Dieu Soult, duc de (duke of): *see* Soult, Nicolas-Jean de Dieu.

Dalny (China): *see* Lü-ta.

Daloa, town, administrative headquarters (since 1969) of Daloa *département,* west central Ivory Coast, at the intersection of major north–south and east–west routes. It is the chief collecting point for a forest region that sends coffee, cocoa, kola nuts, and timber (sipo) to the coast for export. Daloa is also a local trade centre for rice, cassava, yams, bananas, and cotton and has several sawmills, a rural technical institute (1967), and a regional office of the Department of Agriculture; it is also the seat of a Roman Catholic bishop and several Protestant churches. Originally founded by two Africans, Gboto (of the Bete tribe) and Dalo (of the Guro), the town became a French military post in 1903. The Bete and Guro (Kouéni) peoples are still the most numerous, but the town has also attracted large numbers of Baule (Baoule), Diula (Dioula), and Mossi immigrants. Ebony and ivory sculptures are exhibited at the local craft centre. Nearby is Marahoué Park, a 250,000-ac (101,000-ha) wildlife reserve. Pop. (1981 est.) town, 85,000; (1979 est.) *département,* 368,585.

Dalou, (Aimé-) Jules (b. Dec. 31, 1838, Paris—d. April 15, 1902, Paris), French sculptor noted for allegorical group compositions of Baroque inspiration and for simpler studies of common people, representative of the naturalist trend in French sculpture.



"Peasant," terra-cotta statue by Jules Dalou, 1897; in the Petit Palais, Paris

R. Guillemot—Connaissance des Arts, Paris

Dalou's early reliefs and large public monuments are enlivened by the classicist style that he learned from his teacher, Jean-Baptiste Carpeaux. His most notable Parisian monuments include the bronze "Triumph of the Republic" (1879–99) at the Place de la Nation and the memorial to painter Eugène Delacroix in the Luxembourg Gardens (1890). His later, smaller sculptures reveal an increasing sympathy with the compassionate, somewhat sentimental view of human life and toil found in the paintings of Jean-François Millet. Representative of this approach are several mother-and-child groups and the terra-cotta figures of workers (Petit Palais, Paris) for a projected "Monument to the Workers" (*c.* 1889–98).

Dalradian Series, sequence of highly folded and metamorphosed sedimentary and volcanic rocks of late Precambrian to Early Cambrian age, about 570 million years old, that occurs in the southeastern portions of the Scottish Highlands of Great Britain, where it occupies a belt 720 kilometres (450 miles) long.

Containing no fossils over most of its outcrop area, the Dalradian has yielded rare specimens of the trilobite genus *Pagetides,* a Lower Cambrian form known from North America, collected from strata near the top of the series. Thus, it is known that the upper portion of the Dalradian is Lower Cambrian, but the position of the Precambrian–Cambrian boundary is uncertain.

Metamorphism (chemical and physical alteration from elevated temperatures and mechanical stresses in the Earth's crust) related to the Caledonian orogenic (mountain-building) episode, has not obscured the original nature of Dalradian sedimentary types. Primary features are still evident in quartzites, calcareous limes, conglomerates, and graywackes, whereas fine-grained sedimentary rocks are represented by slates, phyllites, and schists. Current bedding can be seen in the graywackes and quartzites. Combined thicknesses of the Dalradian are thought to approach 9,100 metres (30,000 feet) and probably represent geosynclinal (downward flexures in the Earth's crust) accumulations.

Dalradian sequences are also known from Ireland, especially in northern Donegal.

Dalriada, Gaelic kingdom that, at least from the 5th century AD, extended on both sides of the North Channel and composed the northern part of the present County Antrim, Northern Ireland, and part of the Inner Hebrides and Argyll, in Scotland. In earlier times, Argyll had received extensive immigration from the Irish (known as Scoti) of northern Ireland and had become an Irish (*i.e.,* "Scottish") area. In the latter half of the 5th century, the ruling family of Irish Dalriada crossed into Scottish Dalriada and made Dunadd and Dunolly its chief strongholds. Irish Dalriada gradually declined; and after the Viking invasions early in the 9th century, it lost all political identity. Despite heavy onslaughts from the Picts, the Dalriada of the Scottish mainland continued to expand. In the mid-9th century its king Kenneth I MacAlpin brought the Picts permanently under Dalriadic rule; and thereafter the whole country was known as Scotland.

Dalrymple, Alexander (b. July 24, 1737, New Hailes, Midlothian, Scot.—d. June 19, 1808, London), Scottish geographer, first hydrographer of the British Admiralty and proponent of the existence of a vast, populous continent in the South Pacific, which he called the Great South Land.

Dalrymple spent most of the time between 1757 and 1764 in the East Indies trying to further trade for the East India Company and became the company's hydrographer in 1779. Recommended by the Royal Society of London to lead an expedition to the South Pacific to observe a transit of Venus (1769), Dalrymple hoped to find the Great South Land in the course of his voyage. But command of the expedition went instead to Capt. James Cook, who returned without having sighted the continent.

In 1770–71 Dalrymple published his two-volume *Historical Collection of the Several Voyages and Discoveries in the South Pacific Ocean,* in which he continued to assert the existence of the continent. The book aroused wide popular interest, and on his next voyage Cook again went in search of the Great South Land. When Cook returned with proof that the continent did not exist, Dalrymple became his bitter opponent, eventually attacking him in print.

From 1795 until his death, Dalrymple was hydrographer to the Admiralty. As such, he organized its hydrographic department and collected and published many valuable ocean charts.

Dalsland, *landskap* (province), southwestern Sweden, on the Norwegian border. With a land area of 1,432 sq mi (3,708 sq km), it is one of the smaller traditional *landskap* (provinces). It is bounded on the east by Vänern (lake), on the west by the Norwegian frontier and the *landskap* of Bohuslän, and on the north by that of Värmland. Most of Dalsland is included in the administrative *län* (county) of Älvsborg. Dalsland's landscape has great contrasts, ranging from flatland in the southeastern part to forests, mountains, and lakes in the rest of the province.

Because of its location, Dalsland was often involved in warfare between Sweden and Norway, but only for a short time (*c.* 1100) did it belong to the latter. Toward the end of the 19th century, with the decline of the important iron industry of the previous two centuries and the failure of antiquated farming methods to meet the needs of the growing population, there was mass emigration to the United States and Norway. To curb this trend, new industries were started, including sawmilling, metalworking, and the manufacture of wood pulp and paper. There are rail connections with Norway and the neighbouring *landskap.* The Göta älv (Göta River) carries shipping between Vänern and the Kattegat, and Dalslands Kanal, built in the 1860s, makes it possible to travel by water from Vänern to the Norwegian border. Åmål has a good harbour on Vänern and maintains regular communications with harbours in England and on the Continent. Other important towns are Mellerud, Bengtsfors, Ed, and Brålanda. Pop. (1983 est.) 56,430.

Dalton, city, seat (1851) of Whitfield county, northwestern Georgia, U.S., encircled by the Cohutta Mountains. Although founded in 1837 as Cross Plains, it was renamed either for John Dalton, the engineer who laid out the town, or for the wife of Edward White (head of the syndicate that bought the townsite), whose maiden name was Dalton. It developed as a shipping point for copper mined nearby.

During the Civil War several battles were fought in the area, and Dalton served as the headquarters of Confederate Gen. Joseph Johnston. The tufted-textile industry (carpets, bedspreads, and robes), which began in 1900 as a home handicraft, became mechanized in the 1930s; Dalton now produces much of the national output. Dalton Junior College opened in 1967. The Cohutta National Fish Hatchery and Fort Mountain State Park are nearby. Inc. 1847. Pop. (1990) 21,761.

Dalton BROTHERS, four train and bank robbers famous in U.S. Western history: Grattan ("Grat"; 1861–92), William ("Bill"; 1863–94), Robert ("Bob"; 1870–92), and Emmett (1871–

1937). Their older cousins were the outlaw Younger brothers.

Their father, Lewis Dalton, a rambler and saloonkeeper, abandoned his wife Adeline (*née* Younger), who was forced on her own to rear their 15 children during the difficult period of the American Civil War and Reconstruction. The Daltons resided first in Cass county, Mo., then Coffeyville, Kan., then back in Missouri, and finally in the wild Oklahoma Indian Territory. The four future outlaws first worked as cowboys, but, in 1887, their older brother Frank, a federal deputy marshal, was killed by whiskey runners; in deference, Grat, Bob, and Emmett pinned on lawmen's badges. By 1889, however, they had drifted into horse stealing, while still wearing badges, and a year later were discredited and forced out of policing altogether and took up horse thievery full-time, gathering together a gang. In 1890–91 they took to robbing gambling houses, trains, and banks and were joined by their brother Bill, until then a married, respectable citizen, whose career had been wrecked by his being linked to his brothers.

On the morning of Oct. 5, 1892, Bob, Grat, and Emmett, together with Dick Broadwell and Bill Powers, rode into Coffeyville, Kan., intent upon robbing the town's two banks. They were recognized and, coming out of one bank, were met by wild gunfire from vigilante citizens. All in the band were killed except Emmett, who was wounded and spent 14 years in Kansas State Penitentiary in Lansing. (He was pardoned in 1907, reformed, and led a respectable businessman's life in Los Angeles until his death on July 13, 1937.) Before the Coffeyville raid, Bill Dalton had returned to Oklahoma, later joining Bill Doolin's gang and then forming his own gang. On June 8, 1894, while he was playing with his daughter on the front porch of his farm home in Ardmore, Okla., lawmen crept up on him from behind and shot him dead.

Dalton, John (b. Sept. 6, 1766, Eaglesfield, Cumberland, Eng.—d. July 27, 1844, Manchester), British chemist and physicist who developed the atomic theory of matter and hence is known as one of the fathers of modern physical science.



John Dalton, detail of an engraving by W. Worthington, after a portrait by William Allen, 1814

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Dalton was the son of a Quaker weaver. When only 12 he took charge of a Quaker school in Cumberland and two years later taught with his brother at a school in Kendal, where he was to remain for 12 years. He then became a teacher of mathematics and natural philosophy at New College in Manchester, a college established by the Presbyterians to give a first-class education to both laymen and candidates for the ministry, the doors of the Universities of Cambridge and Oxford being open at that time only to members of the Church of England. He resigned this position in 1800 to become secretary of the Manchester Literary and Philosophical Society and served as a public and private teacher of mathematics and chemistry. In 1817 he became president of the Philosophical Society, an honorary office that he held until his death.

In the early days of his teaching, Dalton's way of life was influenced by a wealthy Quaker, a capable meteorologist and instrument maker, who interested him in the problems of mathematics and meteorology. His first scientific work, which he began in 1787 and continued until the end of his life, was to keep a diary—which was ultimately to contain 200,000 entries—of meteorological observations recording the changeable climate of the lake district in which he lived. In 1793 Dalton published *Meteorological Observations and Essays.* He then became interested in preparing collections of botanical and insect species. Stimulated by a spectacular aurora display in 1787, he began observations about aurora phenomena—luminous, sometimes coloured displays in the sky caused by electrical disturbances in the atmosphere. His writings on the aurora borealis reveal independent thinking unhampered by the conclusions of others. As Dalton himself notes, "Having been in my progress so often misled by taking for granted the results of others, I have determined to write as little as possible but what I can attest by my own experience." In his work on the aurora he concluded that some relationship must exist between the aurora beams and the Earth's magnetism: "Now, from the conclusions in the preceding sections, we are under the necessity of considering the beams of the aurora borealis of a ferruginous (iron-like) nature, because nothing else is known to be magnetic, and consequently, that there exists in the higher regions of the atmosphere an elastic fluid partaking of the properties of iron, or rather of magnetic steel, and that this fluid, doubtless from its magnetic property, assumes the form of cylindric beams."

Some of his studies in meteorology led him to conclusions about the origin of trade winds involving the Earth's rotation and variation in temperature—unaware, perhaps, that this theory had already been proposed in 1735 by George Hadley. These are only some of the subjects on which he wrote essays that he read before the Philosophical Society: others included such topics as the barometer, thermometer, hygrometer, rainfall, the formation of clouds, and evaporation and the distribution and character of atmospheric moisture, including the concept of the dew point. He was the first to confirm the theory that rain is caused not by any alteration in atmospheric pressure but by a diminution of temperature. In his studies with water he determined the point of the maximum density of water to be 42.5° F (later shown to be 39.16° F). Along with his other researches he also became interested in colour blindness, a condition that he and his brother shared. The results of this work were published in an essay, "Extraordinary Facts Relating to the Vision of Colours" (1794), in which he postulated that deficiency in colour perception was caused by discoloration of the liquid medium of the eyeball. Although Dalton's theory lost credence in his own lifetime, the meticulous, systematic nature of his research was so broadly recognized that Daltonism became a common term for colour blindness.

An indefatigable investigator and researcher, Dalton had an unusual talent for formulating a theory from a variety of data. The mental capacity of the man is illustrated by his major work that was to begin at the turn of the century—his work in chemistry. Although he taught chemistry for six years at New College, he had no experience in chemical research. He embarked on this study with the same intuitiveness, independence of mind, dedication, and genius for creative synthesis of a theory from the available facts that he had demonstrated in his other work. His early studies on gases led to development of the law of partial pressures (known as Dalton's law; *q.v.*), which states that the total pressure of a mixture of gases equals the sum of the pressures of the gases in the mixture, each gas acting independently. These experiments also resulted in his theory according to which gas expands as it rises in temperature (the so-called Charles's law, which should really be credited to Dalton). On the strength of the data gained in these studies he devised other experiments that proved the solubility of gases in water and the rate of diffusion of gases. His analysis of the atmosphere showed it to be constant in composition to 15,000 feet. He devised a system of chemical symbols and, having ascertained the relative weights of atoms (particles of matter), in 1803 arranged them into a table. In addition, he formulated the theory that a chemical combination of different elements occurs in simple numerical ratios by weight, which led to the development of the laws of definite and multiple proportions. Dalton discovered butylene and determined the composition of ether, finding its correct formula. Finally, he developed his masterpiece of synthesis—the atomic theory, the thesis that all elements are composed of tiny, indestructible particles called atoms that are all alike and have the same atomic weight.

Dalton's studies and writings, many included in his *New System of Chemical Philosophy* (part I, 1808; part II, 1810), cast light on the man. Dedicated to scientific research, independent in his approach, often diffident in seeking help in scientific papers that would aid him—or misguide him, as he often thought—he was a genius in synthesizing facts and ideas. Almost a recluse, with few friends, and unmarried, he was deeply dedicated to a search for the answer to scientific problems. His homemade equipment was crude, and his data were not usually exact, but they were good enough to give his alert and creative mind clues to the probable answer. Dalton remained a man of simple wants and uniform habits, keeping his dress and manners consistent with his Quaker faith.

Dalton's record keeping, although remarkable for quantity, often lacked exactness in dating, probably because he revised his manuscripts as secretary of the Philosophical Society between the time of the oral presentation and the publication. The exact date of some of his work, especially the atomic theory, is still in doubt because of this opportunity for revision. His documents were destroyed during the bombings of England in World War II. A fellow of the Royal Society, from whom he received the Gold Medal in 1826, and a corresponding member of the French Academy of Sciences, John Dalton was also cofounder of the British Association for the Advancement of Science. At his death more than 40,000 people came to Manchester to pay their final respects. (A.B.Ga.)

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Dalton, William (vaudeville star): *see* Eltinge, Julian.

Dalton Plan, secondary-education technique based on individual learning. Developed by Helen Parkhurst in 1919, it was at first introduced at a school for the handicapped and

then in 1920 in the high school of Dalton, Mass. The plan had grown out of the reaction of some progressive educators to the inadequacies inherent in the conventional grading system, which ignored individual variables in learning speed.

The Dalton Plan divided each subject in the school's curriculum into monthly assignments. Although pupils were free to plan their own work schedules, they were responsible for finishing one assignment before starting another. Pupils were encouraged to work in groups. Although popular for a time in the United States, Great Britain, Europe, and the Western colonial world, the Dalton Plan was criticized for being too individualistic and was finally given up. *See also* progressive education.

Dalton's law, the statement that the total pressure of a mixture of gases is equal to the sum of the partial pressures of the individual component gases. The partial pressure is the pressure that each gas would exert if it alone occupied the volume of the mixture at the same temperature.

This empirical relation was stated by the English chemist John Dalton in 1801. It follows from the kinetic theory of gases under the assumption of a perfect (ideal) gas and assumes no chemical interaction between the component gases. It is approximately valid for real gases at sufficiently low pressures and high temperatures.

Daly, (John) Augustin (b. July 20, 1838, Plymouth, N.C., U.S.—d. June 7, 1899, Paris, Fr.), American playwright and theatrical manager whose companies were major features of the New York and London stage.

Although Daly's childhood was spent in amateur performances of the Romantic blank-verse drama of the period, it was as a writer of more realistic melodramas that he enjoyed his greatest influence. Beginning in 1859, he was dramatic critic for several New York newspapers. *Leah the Forsaken,* adapted from a German play in 1862, was Daly's first success as a playwright. His first important original play, *Under the Gaslight* (1867), was popular for years. In 1869 he formed his own company and later developed such outstanding actresses as Fanny Davenport and Maude Adams. Daly's best play, *Horizon* (1871), drew heavily upon the Western-type characters of Bret Harte and gave important impetus to the development of a drama based on American themes and characters rather than European models. *Divorce* (1871), another of his better plays, ran for 200 performances. After opening Daly's Theatre in New York City in 1879, with a company headed by John Drew and Ada Rehan, he confined himself to adaptations and management and in 1893 opened Daly's Theatre in London.

Daly, Marcus (b. Dec. 5, 1841, County Cavan, Ire.—d. Nov. 12, 1900, Anaconda, Mont., U.S.), American mining tycoon. Called the "Copper King," he was the prime mover behind the Anaconda Copper Mining Co., one of the world's largest copper producers.

Emigrating from Ireland to New York City in 1856, Daly soon moved westward, finding work in mines in California and Utah and eventually becoming foreman for the syndicate working the famed Comstock Lode in Nevada. A self-educated mining engineer, he invested in smaller mining interests and enlisted the aid of such backers as George Hearst (father of newspaper magnate William Randolph Hearst) in order to purchase the Anaconda mine near Butte, Mont., for $30,000 in 1880. Though at first the mine was thought to contain only silver, a rich vein of copper was soon discovered and proved to be the largest bed of the metal discovered up to that time. Daly built a large smelting plant and within a few years had become a millionaire. By 1895 the Anaconda Company was the world's largest producer of copper.

Daly was active in Montana politics, engaging in a long battle with Senator William Clark, another mining entrepreneur, for control of the state. The town of Anaconda was built largely through Daly's efforts, and he had many investments throughout the region, including a large horse-breeding ranch. At the time of his death he controlled property in Montana worth $75 million.

Daly, Reginald Aldworth (b. May 19, 1871, Napanee, Ont., Can.—d. Sept. 19, 1957, Cambridge, Mass., U.S.), Canadian-American geologist who independently developed the theory of magmatic stoping, whereby molten magma rises through the Earth's crust and shatters, but does not melt, the surrounding rocks. The rocks, being denser than the magma, then sink, making room for the magma to rise. This theory was instrumental in explaining the structure of many igneous rock formations.

In 1898 Daly was appointed geology instructor at Harvard University. In 1901 he became a geologist with the Canadian International Boundary Commission, and for six years he conducted surveys of the mountainous region of western Alberta and southern British Columbia. During this period, in 1903, he first proposed his theory of magmatic stoping.

After he became professor of geology at Massachusetts Institute of Technology, Cambridge, in 1907, his travels took him to Hawaii and Samoa. From his studies of those islands came his theory of "glacial control" of the formation of coral atolls and reefs. He found that the fluctuations of sea level during the building up and melting down of glaciers during the Pleistocene Epoch played a major role in allowing the coral to slowly build up structures more than 75 m (250 feet) high. In 1912 Daly became Sturgis Hooper Professor of Geology at Harvard University, retiring in 1942.

Daly River, river in northwestern Northern Territory, Australia; it is formed by the juncture of the King, Katherine, and Flora rivers in the hills west of Arnhem Land and flows northwest for about 200 miles (320 km) to Anson Bay on the Timor Sea. With its major tributary, the Fergusson, the Daly drains a 22,640-square-mile (58,640-square-kilometre) basin comprising flat or gently rolling country that supports cattle ranching. Cultivation, centring on the town of Daly River, 50 miles (80 km) from the river's mouth, is limited largely to peanuts (groundnuts) and tobacco because of inadequate transportation facilities and periodic flooding. The Daly, explored in 1865 by Boyle Finniss, first governor of a proposed settlement in the territory, and named after Sir Dominick Daly, then governor of South Australia, is navigable for 70 miles (115 km) above its tidal mouth. The river is the eastern boundary of an Aboriginal reserve that extends to the Fitzmaurice.

dam, barrier built across a stream, river, or estuary to confine and check the flow of water for such uses as human consumption, irrigation, flood control, and electric power generation.

A brief treatment of dams follows. For full treatment, *see* MACROPAEDIA: Public Works.

Dams are categorized according to their profiles (cross sections) and construction materials. The principal types are earth fill, rock fill, gravel fill, solid-masonry gravity, solid-masonry arch, arch gravity, structural masonry, and steel or timber. The first four types have been used from antiquity, while the others have been developed in the 19th and 20th centuries. The choices made by modern engineers regarding the materials and design that are best suited for a particular dam depend upon complicated analyses of foundation conditions, load strains, temperature and pressure changes, the chemical characteristics of local groundwater, and the probability of seismic activity.

For centuries dam design was based upon previous experience. Remains of ancient earth-fill dams still exist in India and Sri Lanka. The earliest recorded dam is believed to be a masonry structure 15 m (49 feet) high that was built across the Nile River in Egypt around 2900 BC. A rockfill dam built around 1300 BC in what is modern Syria is the oldest dam still in use.

Dam builders in ancient Rome did not show the engineering genius that was employed in other projects, but Byzantine engineers utilized the Roman masonry arch to build a prototypical arch-gravity dam in AD 550. There was little dam building in Europe for several centuries; it began in earnest only when the Industrial Revolution gave rise to the need for water power in the 18th and 19th centuries.

The profession of civil engineering emerged in the 1850s, mainly through the influence of the Scottish engineer, William J.M. Rankine. During the next 100 years theoretical knowledge that had been accumulating since the discoveries of Isaac Newton, G.W. Leibniz, Robert Hooke, and others was finally brought to bear on dam design.

Modern dams generally fall into two categories: earth fill (embankment) and masonry (concrete). Earth-fill dams are usually used to retain water across broad rivers; the reason is partly that huge amounts of material are needed and earth and rock are usually more available and less expensive, but another reason is that earth fill and rock fill tend to adapt to deformation caused by movements in the dam foundation. The profile of an earth-fill dam, such as the Aswān High Dam across the Nile in Egypt, looks like a broad-based triangle. Although these dams are generally known more for their length than their height, the Nurek Dam in Tajikistan is 300 m (984 feet) high. The bulk of the construction material is a highly compactable soil that stays in place because of its enormous weight. The danger to such a structure comes from the water that gradually permeates the entire embankment and emerges on the downstream slope; the dam can eventually be washed away. Engineers build strata of different permeabilities into the embankment either to stop this process or to allow seeping water to drain harmlessly through the dam. These designs usually include a core of impermeable clay and transition zones of more permeable materials.

There are several different design possibilities for a masonry dam. The gravity dam utilizes the downward force of the weight of the construction materials to resist the horizontal force of the water. The base, where the force of the water is greatest, is made of concrete; its width is roughly three-fourths the height of the dam. Concrete-buttress dams have less material in the wall itself through the use of support buttresses around the outside base. Extra rigidity is possible if the buttresses can be linked together, as in the multiple-arch dam, but such a structure is possible only where no movement is anticipated in the buttress foundations. The Daniel Johnson Dam in Quebec has 14 buttresses across its crest (length) of 1,314 m (4,311 feet).

The arch dam is built in a convex arch facing the reservoir. It has the unique advantage of reinforcement from the water pressure itself, which keeps the masonry joints closed tight. The strength of this design was tested in Italy in 1963, when the Vaiont Dam remained basically undamaged after a huge quantity of soil and rock slid into the reservoir, causing water to surge over the top of the dam.

Once water has been retained by dams it

can be utilized. Outlets called sluices, or gates, allow sufficient water through the dam for irrigation, water supply, or power generation; they can also control the level of water in the riverbed below the dam for ecological reasons. Some dams have special gates in the form of stepped pools, locks, or fish ladders for the upstream and downstream passage of migratory fish. Sluices are also used to drain the silt that accumulates behind a dam. In addition to causing additional pressure on the structure, accumulated silt can eventually fill a reservoir.

The most important auxiliary structure of a dam is a spillway, the lack of which greatly increases the probability of structural failure. The spillway automatically discharges any water in excess of the capacity of the dam due to heavy rain or landslide. Spillway water is usually diverted along the side of the dam or made to shoot out from the dam in what is called a ski-jump spillway. In this way the dam's foundation is not eroded.

World's greatest dams

name	type*	date of completion	river	country	
by height					height (m)
Rogun	ER	. . .	Vakhsh	Tajikistan	335
Ching-p'ing	EG	. . .	Ya-lung	China	314
Nurek	E	1980	Vakhsh	Tajikistan	300
Hsiao-wang	ER	. . .	Mekong	China	296
Grand Dixence	G	1961	Dixence	Switzerland	285
Lung-t'an	RCC	. . .	Hung-shui	China	285
Inguri	A	1980	Inguri	Georgia	272
Boruca	ER	. . .	Térraba	Costa Rica	267
Vaiont‡	A	1961	Vaiont	Italy	262
Pancheswor	G	. . .	Kali	Nepal	262
Chicoasén	ER	1980	Grijalva	Mexico	261
Tehri	ER	1995†	Bhāgirathi	India	261
by volume					volume ('000 cubic m)
Syncrude Tailings	E	. . .	. . .§	Canada	540,000
Chapetón	EG	. . .	Paraná	Argentina	296,200
Pati	EG	. . .	Paraná	Argentina	238,180
New Cornelia Tailings	E	1973	Ten Mile Wash	United States	209,500
Kambaratinsk	ER	. . .	Naryn	Kyrgyzstan	112,200
Tarbela	ER	1976	Indus	Pakistan	106,000
Fort Peck	E	1937	Missouri	United States	96,050
Lower Usuma	E	1990	Usuma	Nigeria	93,000
Cipasang	ER	. . .	Cimanuk	Indonesia	90,000
Atatürk	ER	1990	Euphrates	Turkey	84,500
Guri	EGR	1986	Caroni	Venezuela	77,971
Rogun	ER	. . .	Vakhsh	Tajikistan	71,000
by size of reservoir					reservoir capacity ('000 cubic m)
Owen Falls	G	1954	Victoria Nile	Uganda	2,700,000,000 ‖
Kakhovsk	EG	1955	Dnieper	Ukraine	182,000,000
Kariba	A	1959	Zambezi	Zimbabwe-Zambia	180,600,000
Bratsk	EG	1964	Angara	Russia	169,270,000
Aswān High	ER	1970	Nile	Egypt	168,900,000
Akosombo	ER	1965	Volta	Ghana	148,000,000
Daniel Johnson	M	1968	Manicouagan	Canada	141,852,000
Guri	EGR	1986	Caroni	Venezuela	138,000,000
Krasnoyarsk	G	1967	Yenisey	Russia	73,300,000
Bennett, W.A.C.	E	1967	Peace	Canada	70,309,000
Zeya	B	1978	Zeya	Russia	68,400,000
Cabora Bassa	A	1974	Zambezi	Mozambique	63,000,000
by power capacity					planned power capacity (megawatts)
Turukhansk	EG	. . .	Lower Tunguska	Russia	20,000
Three Gorges	G	. . .	Yangtze	China	17,680
Itaipú	EGR	1982	Paraná	Brazil-Paraguay	12,600
Grand Coulee	G	1941	Columbia	United States	10,830
Guri	EGR	1986	Caroni	Venezuela	10,300
Tucuruí	EGR	1984	Tocantins	Brazil	7,960
Corpus Christi	EG	. . .	Paraná	Argentina-Paraguay	6,900
Sayano-Shushensk	GA	1989	Yenisey	Russia	6,400¶
Krasnoyarsk	G	1967	Yenisey	Russia	6,000¶
Churchill Falls	E	1971	Churchill	Canada	5,428
La Grande 2	R	1978	La Grande	Canada	5,328
Xingo	ER	1994†	São Francisco	Brazil	5,020

*Key: A, arch; B, buttress; E, earth fill; G, gravity; M, multi-arch; R, rock fill; RCC, roller-compacted-concrete. . . . Data are not available. †Estimated year of completion. ‡Vaiont Dam was severely damaged by a massive landslide in 1963 and no longer operates. §Near Fort McMurray, Alberta. ‖ Most of this reservoir is a natural lake. ¶Planned and actual power capacity.
Source: *International Water Power and Dam Construction Handbook* (1992).

Dam, Henrik, in full CARL PETER HENRIK DAM (b. Feb. 21, 1895, Copenhagen, Den.—d. April 1976, Copenhagen), Danish biochemist who, with Edward A. Doisy, was awarded the Nobel Prize for Physiology or Medicine in 1943 for research into antihemorrhagic substances and the discovery of vitamin K (1939).

Dam, a graduate of the Polytechnic Institute of Copenhagen (1920), taught in the School of Agriculture and Veterinary Medicine there and later at the Physiological Laboratory of the University of Copenhagen. He went to the United States in 1940, lecturing and continuing his research, mainly at the University of Rochester, N.Y. In 1946 he returned to the Polytechnic Institute.

Dam and his associates demonstrated (1929–34) a deficiency disease of chicks characterized by a tendency to bleed and an increased blood-clotting time. He ascribed the disease to lack of an antihemorrhagic vitamin, which he later showed to be fat-soluble and present in green leaves. He named it vitamin K (Koagulations-Vitamin). In 1939 both he and Doisy, working independently, isolated the vitamin from alfalfa.

damages, in law, money compensation for loss or injury caused by the wrongful act of another. Recovery of damages is the objective of most civil litigation.

Originally redress of wrongs was direct—an eye for an eye, a tooth for a tooth. The introduction of monetary systems and dissatisfaction with the inequities of this vengeful redress led to settling disputes by awarding money damages. Today the concept is present in virtually every body of law. Although there was a developed system of monetary compensation for wrongs in Roman law and although the remedy appeared early in the development of English law and became the primary remedy of the common-law courts, the growth of the modern law of damages is a function in large part of the importance of the jury in Anglo-American legal procedure. In the United States particularly, a body of legal doctrine has developed around such issues as how evidence may be submitted to a jury, how a judge may instruct a jury on the law, and what damages a jury may award for particular wrongs.

Damages are generally awarded under contract and tort law. When one party to a contract fails to perform his obligation, the other can seek damages under three headings: (1) restitution, which restores to him whatever goods, services, or money he has given the breaching party, (2) expectation, which rewards him as if the contract had been fully performed (this includes profits anticipated on the contract), and (3) reliance, which gives him compensation for expenditures made or liabilities incurred "in reliance on" the contract's being performed. Reliance damages are limited to consequences that are reasonably foreseeable by the parties at the time that they contracted. These remedies can be invoked in various combinations, as long as the aggrieved party is not left better off than if the breach had not occurred.

Under tort law, the measure of compensation is usually the money value of any losses or injuries sustained as a "natural and proximate" result of the wrongful act (*e.g.,* negligently causing an automobile accident). Exactly what losses or injuries are "natural and proximate" results is often very difficult to determine. Usually no damages for speculative items—such as profits—can be recovered.

The personal-injury action (*e.g.,* one arising out of an automobile accident) exemplifies the kind of litigation for which damages are awarded. The elements of recovery that can be considered in such an action include the loss of time as a result of the injury (frequently measured by the loss of wages that has occurred), the amount that has been expended for medical services, and a sum designed to compensate the injured person for the pain and suffering that has resulted from the injury. Because only one award is made in a common-law system for an injury resulting from a single wrongful act, it is necessary also to include in this award the damages that will occur in the future as a result of the injury. These future losses, though obviously speculative, usually can include the loss of earning capacity, the reasonable cost of the medical services that the injured person will incur, and the future suffering that the injured person is reasonably certain to undergo.

The theory of an award of damages in a personal-injury or other tort case is that the injured party should be placed in the position he would have been in if the injury had not occurred, so far as this can be done with a monetary award. The possibility of achieving

this goal is obviously far greater where the injury has been to a property interest rather than to the person. Where the legal wrong sued for is the breach of a contract, the theoretical end of the damages remedy is to give the injured contracting party the benefit of his bargain by putting him in the position he would have enjoyed if the contract had been performed. Applied, for example, to a contract to build a house which has been breached by the owner, this formula would give the builder the contract price less what it would cost to finish building the house.

In addition to damages that are designed to compensate directly for loss suffered, other items may be recovered. Interest on money damages is frequently awarded on the reasoning that, when a sum of money is adjudged appropriate compensation as of a particular date, further loss occurs when the amount is not received until later. In some jurisdictions attorney fees are also recoverable. If the wrongful conduct that caused the loss is especially reckless or malicious, the court may award punitive (also called exemplary) damages in addition to compensatory damages, in order to express society's moral disapproval of the wrongdoer.

Damān, formerly DAMÃO, town, Damān and Diu (*q.v.*) union territory, western India. The town, together with numerous villages in the surrounding area, forms an enclave in southeastern Gujarāt state and is situated on the Gulf of Khambhāt (Cambay) of the Arabian Sea. The town of Dāman, which has a fort, is the centre of business activities. The surrounding area is traversed by the Damāngangā River. Rice is the main crop of the region, but wheat has been introduced. There is a dairy and some light industry. Fishing and tapping of the toddy palm for its juice are also important. *Ghol,* a dried fish product used in making isinglass, is exported to Europe.

Damān (Portuguese: Damão) was a part of Portuguese India. Damão town was sacked and burned by the Portuguese in 1531. It was subsequently rebuilt, and in 1559 it was again taken by the Portuguese, who made it a permanent settlement. Damão became a flourishing port, but its importance waned with the decline of Portuguese sea power. The settlement remained under Portuguese rule until it was taken over by India in December 1961. Pop. (1991 prelim.) town, 26,895.

Damān and Diu, union territory of western coastal India. Its capital is the town of Damān.

A brief treatment of Damān and Diu follows. For full treatment, *see* MACROPAEDIA: India.

The union territory consists of two widely separated districts. (Goa, once a constituent member of the union territory of Goa, Damān, and Diu, was made a state in 1987.) The district of Damān is located on the Gujarāt coast to the north of Bombay. The other district, composed of the island of Diu, lies off the southern coast of Gujarāt's Kāthiāwār Peninsula. Formerly Portuguese possessions, Damān and Diu (along with Goa) were annexed by India in 1962. The population of Damān and Diu is predominantly Hindu; the most widely spoken language is Gujarātī.

Agriculture and fishing are the major economic activities. Crops include rice, corn (maize), sugarcane, peanuts (groundnuts), bananas, and coconuts. Area 43 square miles (112 square km). Pop. (1991 prelim.) 101,439.

Damanhūr, city, capital of Al-Buḥayrah *muḥāfaẓah* (governorate) in the western Nile River delta, Lower Egypt. Its name is derived from the ancient Egyptian Timinhor ("City of Horus") and has historically applied to several centres in Egypt, mostly in the delta. The capital of a Ptolemaic nome, Damanhūr was known as Hermopolis Parva in Hellenistic times. It was severely damaged in 1302 by an earthquake, but in the late 14th century the Mamlūk caliph Barqūq restored its fortifications to thwart Bedouin incursions. It was first made a provincial capital under Fatimid rule (11th century AD), and in the European Middle Ages it prospered as a caravan town on the post road from Cairo to Alexandria.

Damanhūr is now a major centre of the western delta; it is the hub of a system of narrow-gauge railways transporting the cotton, dates, vegetables, and cereals of the region's agricultural hinterland. The city has date-packing, potato-processing, cotton-ginning, and textile industries. Damanhūr is served by the Cairo-Alexandria main railway and is an important branch railway, road, and canal junction. Pop. (1986 prelim.) 190,840.

Damaraland, historical region of Namibia; the name is in part a misnomer, as it was originally applied to lands of north-central Namibia predominantly occupied by the Herero and Khoisan (Hottentot) people rather than the Bergdama (Damara), the latter having been displaced and subjugated by the other two when the Bergdama were first visited by a European in 1791. The territory encompassing historic Damaraland extends between the Namib and Kalahari deserts (west and east, respectively) and from Ovamboland (north) to Great Namaqualand (south), centring upon Windhoek.

The region is predominantly grassland, with an annual rainfall of from 13 to 20 inches (330 to 500 mm), and is suited both to the nomadic hunting and pastoral life of its original inhabitants and to the cattle breeding of the Europeans who displaced the indigenous peoples and confiscated their herds beginning in the early 20th century.

damascening, art of encrusting gold, silver, or copper wire on the surface of iron, steel, bronze, or brass. A narrow undercut is made in the surface of the metal with a chisel and the wire forced into the undercut by means of a hammer. The name is derived from the city of Damascus, which was celebrated for its damascened wares as early as the 12th century. The armourers of northern Italy used damascening to decorate their products during the 16th century. In the 19th century the art underwent a revival in Europe, particularly in France and Spain. Damascened work of high quality is still produced by craftsmen there and in Egypt and Iran.

Damascius (b. *c.* AD 480—d. *c.* 550), Greek Neoplatonist philosopher and last in the succession of Platonic scholars at the Greek Academy at Athens, which was founded by Plato about 387 BC.

A pupil and close friend of the Greek philosopher Isidore of Alexandria, whose biography he wrote, Damascius became head of the Academy about 520 and was still in office when the Christian emperor Justinian closed it, along with other pagan schools, in 529. Damascius, with six other members of the Academy, went to Persia to serve the court of King Khosrow I. By a clause in the treaty of 533 between Justinian and Khosrow, however, the scholars were allowed to return to Athens, where they found the attitude toward philosophy to be more congenial than at the Persian court.

The chief surviving work of Damascius, *Aporiai kai lyseis peri tōn prōtōn archōn* (*Problems and Solutions About the First Principles*), elaborates the comprehensive system of the Neoplatonist thinker Proclus. Despite its retention of Athenian Neoplatonism's hairsplitting logic and theosophical fantasy, Damascius' work opens the way to genuine mysticism by his insistence that human speculation can never attain to the ineffable first principle. Unwilling even to call this principle by the customary name, "the One," Damascius declared that men cannot adequately describe its relation to derived reality. This first principle is beyond the reach of human thought and language and is utterly outside the hierarchy of reality. Because it is outside, everything, and particularly the soul of man, can participate in it directly and without intermediary, though in an unspeakably mysterious way. Though a pagan, Damascius thus pointed the way to later Christian mystics.

Damascus, Arabic DIMASHQ, city, capital of Syria. Located in the southwestern part of the country, it has been called the "pearl of the East" and was the capital of the Islāmic Caliphate from AD 661 to 750. Its origins can be traced to the 3rd millennium BC, and it has been known by its present name since at least the 15th century BC. Many scholars believe it to be the world's oldest city.

A brief treatment of Damascus follows. For full treatment, *see* MACROPAEDIA: Damascus.

Situated at the base of Qāsiyūn Mountain, among the orchards of Al-Ghūṭah oasis, Damascus is open to the surrounding plain in all directions except on the west side, where it is bordered by mountains. The city has grown up along the slope of Qāsiyūn Mountain, but its main expansion has been to the northeast and south, where the terrain is gentler. Although Damascus is only 50 miles (80 km) east of the Mediterranean Sea, the blockage of moisture-laden westerly winds by the Lebanon and Anti-Lebanon mountains results in a subdesert climate.

Al-Ghūṭah oasis, fed by the Baradā River, which cuts the city in two, supports temperate and subtropical vegetation in the surrounding area. Fruits (including olives and grapes), cereals, and legumes are cultivated, and there is extensive truck gardening. Cows, goats, and sheep are raised for food.

Damascus' handicraft industries produce mother-of-pearl mosaics, inlaid woodwork, silk brocades (damask), copper goods, blown glass, and cabinetry. Textiles are also important. Modern industries include food and leather processing, printing, and the manufacture of furniture, clothing, and shoes. Damascus plays a large role in transit trade among Middle Eastern cities and distributes imported goods to other parts of Syria. The city has a large number of retail shops and small trademen, attributable to emigration from the countryside.

The Old City of Damascus lies to the south of the river and contains the principal mosques, khans (caravansaries), and markets. Particularly noteworthy are the Great Mosque of Damascus (or Umayyad Mosque; begun *c.* 705) and the citadel (rebuilt in 1219). A modern city plan dating from 1929 fostered the development of modern residential neighbourhoods such as Abū Rummānah. Government ministries are scattered to the west of the Old City, and many are located at fashionable Marjah Square. Though they are no longer being built, houses with patios and outdoor water fountains, typical of the Old City, are still common.

The city's educational and scientific institutions include the University of Damascus (1903); the Damascus National Museum (1921), which oversees foreign archaeological missions in Syria; the Arab Academy (1919); and the Az-Zāhirīyah (National Library, 1880). The modern Assad Library, completed in 1984, is a major Middle Eastern research centre.

Intracity transport is provided by buses, taxis, and automobiles. Highways connect the city to Aleppo and to such foreign cities as Amman, in Jordan, and Beirut, in Lebanon. Damascus has an international airport about 20 miles (32 km) east of the city. Area city, 41 square miles (105 square km). Pop. (1989 est.) 1,361,000.

Damascus, Great Mosque of, also called UMAYYAD MOSQUE, the earliest surviving stone mosque, built between AD 705 and 715 by the Umayyad Caliph al-Walīd I. The mosque stands on the site of a 1st-century Hellenic temple to Jupiter and of a later church of St. John the Baptist. Some Syrio-Roman fragments remain in the structure, as does a shrine supposedly enclosing a relic honoured by Muslims as well as Christians, the head of St. John the Baptist.

The mosque occupies a huge quadrangle 515 by 330 feet (157 by 100 m) and contains a large open courtyard surrounded by an arcade of arches supported by slender columns. The *liwan,* or hall of worship, running the length of the south side of the mosque, is divided into three long aisles by rows of columns and arches. A transept with a central octagonal dome, originally wooden, cuts across the aisles at their midpoint. The marble grilles that cover the windows in the south wall are the earliest example of geometric interlace in Islāmic architecture. The walls of the mosque were once covered with more than an acre of mosaics depicting a fanciful landscape thought to be the Qu'rānic paradise, but only fragments survive. The mosque was destroyed by Timur in 1401, rebuilt by the Arabs, and damaged by fire in 1893. Although it could not be restored to its original splendour, the mosque is still an impressive architectural monument.

Damascus Document, in full THE DOCUMENT OF THE NEW COVENANT IN THE LAND OF DAMASCUS, also called ZADOKITE FRAGMENTS, one of the most important extant works of the ancient Essene community of Jews at Qumrān in Palestine. The Essenes fled to the Judaean desert wilderness around Qumrān during Antiochus IV Epiphanes' persecution of Palestinian Jews from 175 to 164/163 BC. Though a precise date for the composition of the *Damascus Document* has not been determined, it must have been written before the great Jewish revolt of 66–70 AD, which forced the Qumrān community to disband. *See also* Dead Sea Scrolls.

Two medieval manuscripts dating from the 10th and 12th centuries were discovered in 1896–97 in the geniza (storeroom) of the Ezra synagogue in Cairo. They were published under the title *Fragments of a Zadokite Work* because members of the Essene community also called themselves Sons of Zadok (the Righteous One). The subsequent discovery of extensive Hebrew fragments from caves IV and VI at Qumrān confirmed that the document was indeed one of the major doctrinal and administrative codes of the Essene sect.

The *Damascus Document* consists of two major sections. The "exhortation" sets forth the sect's religious teaching, emphasizing fidelity to God's covenant with Israel and strict observance of the sabbath and other holy days. It also introduces the sect's enigmatic leader, the Teacher of Righteousness, whom scholars have not been able to identify. Opposed by the Wicked Priest (possibly either of two high priests of the Hasmonean dynasty in Jerusalem: Jonathan, 152–143/142 BC, or Alexander Jannaeus, 103–76 BC), he was persecuted and exiled. The sect believed that a messianic age would commence 40 years after the death of the Teacher. The second section contains a list of statutes dealing with vows and ritual purity, guidelines for community assemblies, the selection of judges, and the duties of the Guardian, who controlled the admission and instruction of new members.

Damascus rug, usually small floor covering, reportedly made in Damascus, Syria, in the 16th or 17th century in continuation of the rug art of the Mamlūk rulers of that land. The usual Damascus field pattern is a grid of small squares or rectangles (hence the European term chessboard carpets), each of which includes a hexagon or octagon filled with tiny



Detail of the field pattern of a Damascus rug, 17th century; in the Textile Museum, Washington, D.C.
Textile Museum Collection, Washington, D.C.; photograph, Otto E. Nelson

radial motifs that surround a star interlace. Among the other field patterns that occur is a large one with several medallions.

The material is thought to be goat hair throughout. These rugs, like the Mamlūk and Ottoman carpets of Egypt, were made with the Sehna form of knot.

Damascus steel, also called DAMASKED STEEL, one of the famous steels of the preindustrial era, typically made into weapon blades. Manufacture involved a secret carburization process in which a form of wrought iron was heated to red heat in contact with various carbonaceous materials in closed vessels. The result was an iron-carbon alloy containing as much as 1.8 percent carbon. It is probable that the carburized product was then annealed to dissipate some of the carbon before being hammered into bars for later fashioning into articles such as swords.

Damascus steel is characterized by exceptional hardness and by a watered, streaked appearance caused by the varying carbon levels of the original material. Sometimes a single bar is welded up from various kinds of steel. The bar is doubled over, welded, redoubled, and rewelded until the various layers of steel become intertwined, and it is then worked out to form the blade. The patterns that result after quenching and finishing are distinctive and complex. Damascus blades are judged largely by their watering, which serves as a guide to the quality of the steel.

damask, patterned textile, deriving its name from the fine patterned fabrics produced in Damascus (Syria) in the European Middle Ages. True damask was originally wholly of silk, but gradually the name came to be applied to a certain type of patterned fabric regardless of fibre. Single damask has one set each of warps and wefts, or fillings, and may be woven in one or two colours; compound or double damask has a greater number of fillings. Damask is woven on a Jacquard loom, the satin field being produced by floats of warp that pass over from two to seven and in some instances nine fillings. The design is a plain or taffeta weave, the warp and filling being at right angles that create less lustre than the satin areas.

Crusaders who had passed through Damascus introduced the fabric to Europe in the 11th century, and the weaving of linen damask became established in flax-growing countries—in France, for example, by the mid-13th century. The Flemish city of Courtrai was noted for its table linen in the 15th century, as was Haarlem, Neth., in the 17th and 18th centuries. William III established damask weaving in Ireland in the late 17th century.

Antique damask was 18 to 25 inches (45 to 63 cm) wide, the distance a shuttle carrying the weft threads could be thrown by hand from selvage to selvage through the raised warps. Widths of 50 inches (127 cm) and more could be produced by mechanized weaving, which was introduced about 1835.

Damaskinos, original name GEORGE PAPANDREOU (b. March 3, 1891, Dhorvitsiá, Greece—d. May 20, 1949, Athens), archbishop of Athens and regent of Greece during the civil war of 1944–46, under whose regency came a period of political reconstruction. He was a private in the army during the Balkan Wars (1912) and was ordained priest in 1917.

In 1922 Damaskinos became bishop of Corinth, and in 1938 he was elected archbishop of Athens. His election was voided by Premier John Metaxas because of his opposition to Metaxas' regime, and Bishop Chrysanthos of Trebizond was appointed instead. Damaskinos was exiled but then recalled in July 1941, after Greece had been occupied by the Germans during World War II, to replace Chrysanthos. As archbishop, he opposed the German occupation and urged the concealment of Jews to save them from the Nazis.



Damaskinos, 1948
BBC Hulton Picture Library

On Dec. 31, 1944, during the civil war initiated by the communist-controlled guerrilla forces after the Germans left, Damaskinos was appointed regent with the permission of King George II, then in exile. His integrity and impartiality made him the only person available for this position who was acceptable to all parties. During the subsequent 16 months of political crisis, Damaskinos appointed five premiers, and, in October 1945, he formed an interim cabinet. He resigned as regent on Sept. 28, 1946, four days after the Greeks voted for the restoration of the monarchy. Thereafter, he devoted himself to his archiepiscopal duties.

Damastes (Greek mythology): *see* Procrustes.

Damasus I, SAINT (b. *c.* 304, Rome—d. Dec. 11, 384, Rome; feast day December 11), pope from Oct. 1, 366, to Dec. 11, 384. During his rule the primacy of the Roman see was asserted.

Damasus was a deacon during the reign of his predecessor, Pope Liberius, and accompanied him when Liberius was exiled by the Roman emperor Constantius for his opposition to Arianism, a belief that denied Christ's divinity. Later, however, Damasus returned to Rome and acknowledged Antipope Felix II, a pro-Arian placed on the papal throne by the emperor. After Felix' death (Nov. 22, 365), Damasus became reconciled with Liberius, but the enemies he made during this period of shifting allegiance troubled his entire pontificate. The election of Damasus as pope was immediately challenged by a minority who supported a rival claimant, Ursinus. The civil

authority sided with Damasus, and Ursinus and his partisans were banished.

Damasus was active in suppressing heresy. In two synods (368 and 369) the unorthodox teachings of Bishop Macedonius of Constantinople and of Bishop Apollinaris (the Younger) of Laodicea were condemned. Among Damasus' literary remains are 24 anathemas against various 4th-century heresies. With a view to the elimination of Arianism in the East, he entered into lengthy negotiations with St. Basil who, as bishop of Caesarea, was head of the church throughout most of Turkey. Their dealings were not a success: though united against Arianism, they failed to agree on policies.

Damasus was the first pope to refer to Rome as the apostolic see, to distinguish it as that established by the apostle St. Peter, founder of the church. In 380 the emperors Gratian in the West and Theodosius in the East declared Christianity as preached by Peter to be the religion of the Roman Empire and defined orthodoxy as the doctrines proclaimed by the bishops of Rome and Alexandria. Rome's primacy was officially pronounced by a synod called in Rome in 382 by Damasus, who was perhaps wary of the growing strength of Constantinople, already claiming to be the New Rome. St. Jerome (*c.* 342–420) attended the synod and stayed on to become Damasus' secretary, close adviser, and friend. Damasus commissioned him to revise the Latin translations of the Bible for what subsequently became known as the Vulgate.

Latin was introduced as the language of the mass during Damasus' pontificate. He was notable also for his work in discovering the tombs of martyrs, for which he wrote many verse inscriptions, and was responsible for the restoration of the catacombs. Damasus was an active builder and restorer of churches.

Damasus II, original name POPPO (b. Bavaria [Germany]—d. Aug. 9, 1048, Palestrina, Papal States [Italy]), pope from July 17 to Aug. 9, 1048. His brief reign, delayed by a rival claimant to the papal throne, occurred during a period when the German emperors and factions of the Roman nobility vied for control of the papacy.

He was bishop of Brixen when nominated (December 1047) by the German emperor Henry III to succeed Clement II. In the previous month, however, the papal throne had been seized by Benedict IX, a member of the powerful Tusculani family of Rome. Benedict had been pope in 1045 when he relinquished the office. His attempt to reclaim the papacy failed when he was expelled on Henry's orders, and Damasus assumed the throne. Damasus died of malaria after reigning only 23 days.

Damāvand, Qolleh-ye (Iran): *see* Demavend, Mount.

Damazin, Ad-, also spelled ED-DAMAZIN, town, east-central Sudan, on the western bank of the Blue Nile River. Irrigation made possible by the Ruṣayriṣ dam to the east of Ad-Damazin has increased the agricultural potential of The Sudan. Industries include flour mills, sugar refineries, and oilseed mills. The town is connected with Al-Garef, Bagawi, Sinjah, and Sannār by a road and a railway route. A domestic airport is located at Ad-Damazin. Pop. (latest est.) 8,751.

Damba, town, northwestern Angola. In a fertile area, it is a market centre for coffee, rice, and sugarcane. The Kongo peoples of the town's hinterland cultivate beans and cassava (manioc). About 1950 Damba was the site of an unsuccessful government-sponsored African resettlement project; the area was subsequently resettled with immigrants from Portugal and Cape Verde, who in turn abandoned the area prior to independence in 1975. Damba is on the principal highway running north-south through northwestern Angola, connecting Luanda, Angola's capital, with Zaire, about 50 miles (80 km) north, and it has an airfield. Pop. (1970 prelim.) town, 27,931.

Daṁbadeṇiya DYNASTY, rulers of most of Ceylon from 1255 to about 1330 whose seat was at Daṁbadeṇiya. Arising in opposition to the Malay usurper Māgha, who seized power in northern Ceylon in 1215, the Daṁbadeṇiya dynasty is of uncertain origin.

Officially acceding to power in southern Ceylon in 1232, the kings of the Daṁbadeṇiya line had defeated Māgha by 1255, with the help of a South Indian ally. Other Malay invaders, however, attacked Ceylon again about 1260 and, for almost a century thereafter, continued to maintain a small kingdom in northern Ceylon. Although from about 1280 Daṁbadeṇiya ceased as the capital, the dynasty bearing the name lasted until the accession of the Gampola dynasty about 1340.

d'Amboise, Jacques, original name JACQUES JOSEPH AHEARN (b. July 28, 1934, Dedham, Mass., U.S.), dancer and choreographer of the New York City Ballet (1949–84), admired for his energetic, virile interpretations of both character and classical roles.

Trained principally by George Balanchine's School of American Ballet, he made his professional debut at the age of 12 with the Ballet Society and at 15 joined the New York City Ballet. After his popular and acrobatic performance in 1953 as Mac, the gas station attendant and all-American hero of Lew Christensen's *Filling Station,* d'Amboise was promoted to soloist. He created important roles in *Western Symphony* (1954), *Stars and Stripes* (1958), *Meditation* (1964), and *Who Cares?* (1970), establishing himself as a technically skillful character dancer. His repertoire eventually included roles ranging from the princes of *Swan Lake* and *The Nutcracker* to the title role in *Apollo* and the creation (1958) of a leading role in the abstract *Gounod Symphony.* He also appeared in the films *Seven Brides for Seven Brothers* (1954), *The Best Things in Life Are Free* (1956), *Carousel* (1956), and *Off Beat* (1986) and appeared on Broadway in the musical comedy *Shinbone Alley* (1957).

As a choreographer, his works include *The Chase* (1963), a 15-minute comic ballet danced to Wolfgang Amadeus Mozart's *Horn Concerto No. 3; Quatuor* (1964), a semi-abstract study for three men and a woman to Dmitry Shostakovich's *String Quartet No. 1;* and *Irish Fantasy* (1964), to music by Camille Saint-Saëns.

D'Amboise taught at the School of American Ballet, served as professor and dean of the school of dance at the State University of New York, and then became director of the nonprofit National Dance Institute, which he founded in order to take the teaching of dance into an ever-widening circle of public schools.

dame school, small private school for young children run by women; such schools were the precursors of nursery or infant schools in England and colonial America. They existed in England possibly before the 16th century in both towns and rural areas and survived into the 19th century. The school was frequently the teacher's home, in which the children were taught the alphabet and some reading from the New Testament and given household chores.

dame's violet, also called DAME'S ROCKET (species *Hesperis matronalis*), Eurasian plant, of the mustard family (Brassicaceae), widely naturalized in Great Britain and North America. A garden ornamental with flowers of violet-like fragrance, dame's violet reaches about 90 cm (3 feet) in height. It bears narrow, toothed leaves and upright spires of four-petaled, usually distinctly veined, flowers of lilac, purple, or sometimes white.



Dame's violet (*Hesperis matronalis*)
A.J. Huxley—EB Inc.

Dāmghān, town, northern Iran, at an elevation of 3,900 feet (1,200 m), just south of the Elburz Mountains on a large, barren gravel plain. It is on the road and railway to Khorāsān. Possibly the oldest mosque in Iran, the Tārīk Khāneh (*c.* 9th century), and several tomb towers of the Seljuq period still stand. Archaeological excavations at nearby Tappa Ḥiṣār reveal occupation from prehistoric times through the Sāsānian period. Dāmghān was an important town and capital of the medieval province of Qumis but was destroyed by Afghans in 1723. The town trades in pistachios and almonds. Pop. (1986) 34,057.

Damian, SAINT: *see* Cosmas and Damian, Saints.

Damien, FATHER, original name JOSEPH DE VEUSTER (b. Jan. 3, 1840, Tremelo, Belg.—d. April 15, 1889, Molokai, Hawaii), Belgian priest who devoted his life to missionary work among the Hawaiian lepers.

He was educated at the College of Braine-le-Comte, and in 1858 he joined the Society of the Sacred Hearts of Jesus and Mary (Picpus Fathers) at Louvain. In place of his brother, Father Pamphile, who had been stricken by illness, he went as a missionary to the Sandwich (Hawaiian) Islands in 1863. He reached Honolulu in 1864 and was ordained a priest the same year. Moved by the miserable condition of the lepers, whom the Hawaiian government deported to Kalaupapa on Molokai Island (1873), he volunteered to take charge of the settlement. He served as pastor and physician, improved water and food supplies and housing, and founded two orphanages, receiving help from other priests for only 6 of his 16 years on Molokai. In 1884 he contracted leprosy and refused cure because it would have necessitated his leaving the lepers. His remains were transferred to Louvain in 1936.

Rumours before and after Damien's death accused him of immorality, but he was exonerated by an investigation held shortly after his death. In 1965 Hawaii nominated him for a place of honour in the National Statuary Hall in Washington, D.C.

Damiens, Robert-François (b. Jan. 9, 1715, La Tieuloy, Fr.—d. March 28, 1757, Paris), French fanatic who in 1757 made an unsuccessful attempt on the life of King Louis XV.

Damiens, the son of a gatekeeper, held a succession of jobs as a household servant and was dismissed from several of them for stealing from his employers. On Jan. 5, 1757, he stabbed Louis as the king was about to



Damiens, engraving by Gabriel, 18th century
By courtesy of the Bibliotheque Nationale, Paris

enter his carriage at Versailles. Louis was only slightly wounded, but the incident might have had severe political repercussions involving the Society of Jesus and the Jansenists, two rival factions within the French Roman Catholic Church. Many charged that Damiens was part of a Jesuit plot against the crown, while others suspected that he was an agent for the Parlements (high courts of justice), which had come into conflict with the king by supporting the Jansenists. Nevertheless, the government was unable to prove that the obviously deranged Damiens had been involved in a conspiracy.

Condemned as a regicide, he was sentenced to be torn in pieces by horses in the Place de Grève. For four hours, before being put to death, he was barbarously tortured with red-hot pincers; and molten wax, lead, and boiling oil were poured into his wounds. After his death his house was razed to the ground, his brothers and sisters were ordered to change their names, and his father, wife, and daughter were banished from France.

Damietta, Arabic DUMYĀṬ, also spelled DIMYAT, city, capital of Dumyāṭ *muḥāfaẓah* (governorate), in the Nile Delta, Lower Egypt, on the Mediterranean. Damietta, the port of the *muḥāfaẓah,* is located 8 miles (13 km) from the Mediterranean, on the right bank of the Damietta (ancient Phatnitic) Branch of the Nile. The name is a corruption of the ancient Coptic *Tamiati.*

An important city of ancient Egypt, Damietta was formerly closer to the sea than at present. It declined with the development of Alexandria (after 322 BC). In AD 638 it fell to Arab invaders, who made it a commercial centre famous for its textiles. Frequently attacked by the crusaders, it was briefly in their hands (1219–21; 1249–50). The settlement's vulnerability to sea attacks led the Mamlūk sultan Baybars I (reigned 1260–77) to raze the town and fortifications, block access to the river, and erect a new Damietta 4 miles (6.4 km) inland on the present site. During both the Mamlūk and the Ottoman periods the centre was used as a place of banishment. After the construction of the Mahmudiyah Canal in 1819, which diverted much of the Nile trade to Alexandria, Damietta lost much of its importance as a trade centre, although it retained some trade, principally with Syria.

In modern times dredging of the channel has revived Damietta's port; construction has taken place to upgrade the port facilities to relieve the overcrowding at Alexandria. The centre's industries include leatherworking, flour milling, and fishing, with a sardine-canning factory at 'Izbat al-Burj on the Damietta mouth. The city has several fine mosques. Damietta is linked to Cairo by rail via Banhā and to Port Said and the Suez Canal zone by highway. Pop. (1986 est.) 121,200.

Dāmir, ad-, also spelled ED-DAMER, or AD-DAMAR, town, northeastern Sudan, on the eastern bank of the Nile, about 155 miles (250 km) northeast of Khartoum. Located at an elevation of 1,158 feet (353 m), it is a local commercial centre for the date-producing areas to the north. Industries include date packing, distilling of alcohol and liqueurs, and canning of other local produce, such as tomatoes, mangoes, and vegetables. Ad-Dāmir is linked by road and railway, which almost parallel the Nile River, with Shandī, 'Aṭbarah, and Barbar. An oil pipeline, about 530 miles (850 km) in length, between Port Sudan and Khartoum passes by the outskirts of the city. Pop. (1973) 17,086.

Damīrī, ad-, in full MUḤAMMAD IBN MŪSĀ KAMĀL AD-DĪN AD-DAMĪRĪ (b. 1341, Cairo—d. Oct. 27, 1405, Cairo), Muslim theologian, best-known for his encyclopaedia of animals.

A student of some of the leading scholars of his day, ad-Damīrī mastered theology as well as law and philology. He gave lectures and sermons regularly at several schools and mosques of Cairo, including al-Azhar University. A Ṣūfī, or mystic, he was known for his asceticism, prayers, and fastings. He performed the pilgrimage to Mecca six times.

His encyclopaedia, *Ḥayāt al-ḥayawān* (c. 1371; partial Eng. trans. by A.S.G. Jayakar, *A Zoological Lexicon,* 2 vol.), is extant in three Arabic versions of different lengths and in Persian, Turkish, and Latin translations. It treats in alphabetical order the 931 animals mentioned in the Qur'ān. There are also digressions; *e.g.,* the discussion of geese is dominated by a history of the caliphs and is intended to show that every sixth caliph abdicated. The other works of ad-Damīrī were devoted to subjects more typical of Islāmic scholastic tradition.

Dammām, ad-, also spelled DAMMAN, city, eastern Saudi Arabia, on the Persian Gulf northwest of Bahrain Island. The discovery of immense oil reserves there in 1938 led to the radical transformation of the once-small coastal settlement into a boom town that is now a major seaport, a petroleum and natural-gas centre, the commercial hub of eastern Saudi Arabia, and the eastern terminus of the country's only railroad, leading to Riyadh. Ad-Dammām is strikingly modern, with sprawling suburbs—most of the town has been built since the 1940s. Apart from the oil industry, the city's economy is supported by agriculture, especially dairying. Large herds of imported beef and dairy cattle are kept on experimental farms. King Faysal University opened in 1975. Pop. (1980 est.) 200,000.

dammar, also spelled DAMMER, any of a variety of hard varnish resins obtained from coniferous trees characteristic of southeastern Asia, including *Shorea* species (especially *S. wiesneri*), several species of the family Dipterocarpaceae, and a few species of Burseraceae. Dammar is much-esteemed for incense burning and is also used in plasters, varnishes, and lacquers. Rapid-drying lacquers are formulated using dammar in combination with nitrocellulose. A solution of dammar in chloroform or xylene is used to preserve and mount thin biological sections for microscopic examination. With oil of turpentine, dammar forms a fine varnish that dries clear, smooth, and hard.

dammar pine: *see* kauri pine.

Dammartin, medieval French countship, whose seat was at Dammartin-en-Goële, northwest of Meaux (in the modern *département* of Seine-et-Marne).

Hugh, the first recorded count, built a castle in the area in the 10th century. In the 11th and 12th centuries its possessors were strong enough to oppose either the French kings or the counts of Flanders. Raynald I of Dammartin, who was also count of Boulogne, was a member of the great coalition crushed by Philip II Augustus of France at the Battle of Bouvines in 1214; he killed himself in prison in 1227. Seized by the king, Dammartin then passed to his son Philip Hurepel and thereafter passed through a number of families, coming finally into the hands of Antoine de Chabannes in 1439. This Antoine de Chabannes (d. 1488), who had already distinguished himself in campaigns with Joan of Arc, later became a leader of the Ecorcheurs and fought against Louis XI in the League of the Public Weal and then for Louis against the Burgundians. His great-granddaughter Françoise d'Anjou-Mézières, however, left heirs by both of her marriages, and one family sold Dammartin to the Montmorencys while the other sold it to the Guises. There followed a long lawsuit, which the Montmorencys won. King Louis XIII confiscated the countship after the treason of Henry de Montmorency (1632), had the castle dismantled, and finally gave the property to the House of Condé.

Damme, municipality, West Flanders province, northwestern Belgium, on the Brugge-Sluis Canal. Originally on the Zwijn Estuary of the North Sea, it was the North Sea port for Brugge in the 13th and 14th centuries; its maritime law governed the merchants of the Hanseatic League. It declined when the Zwijn silted up and landlocked the port in the 15th century, and it is now an agricultural village on polder (land reclaimed from the sea). Damme was the birthplace (1235) of Jacob van Maerlant, "father of Flemish poetry." The forces of Edward III of England defeated the French fleet in the estuary off



Church of Notre Dame, Damme, Belg.
Toni Schneiders—Bruce Coleman Inc./EB Inc.

Sluis in 1340. Medieval relics include the remains of the Church of Notre Dame (1225–1485, partly destroyed by fire in 1578) and the town hall (1464–68). The 13th-century St. John's Hospital and Count Wyt's Mansion (where Charles the Bold of Burgundy married Margaret of York on July 2, 1468) now both house museums. Pop. (1982) mun., 9,989.

Damocles (fl. 4th century BC), a courtier of Dionysius the Elder of Syracuse, in Sicily, tyrant from 405 to 367 BC, known to history through the legend of the "Sword of Damocles."

According to the legend, when Damocles spoke in extravagant terms of his sovereign's

happiness, Dionysius invited him to a sumptuous banquet and seated him beneath a naked sword that was suspended from the ceiling by a single thread. Thus did the tyrant demonstrate that the fortunes of men who hold power are as precarious as the predicament in which he had placed his guest. The story is related in Cicero's *Tusculanae disputationes*, 5.61.

Dāmodar River, river in northeastern India, rising with its many tributaries, notably the Bokāro and Konār, in the Chota Nāgpur plateau of south-central Bihār state. It follows a generally eastward course for 368 miles (592 km) through West Bengal to join the Hooghly River southwest of Calcutta.

The Dāmodar valley along the Bihār–West Bengal border includes India's most important coal- and mica-mining fields and has long been an area of active industrial development. The major coalfields (Jharia, Rānīganj, and Girīdih) are mostly open-pit and are easily mined. The Dāmodar Valley Corporation, which began work in 1948, constructed four multipurpose dams to form a series of reservoirs—Tilaiya, Maithon, Konār, and Pānchet Hill. Also included is the Durgāpur diversionary barrage (dam) and an 80-mile (130-kilometre) navigation canal linking the coalfields with the Hooghly-Calcutta industrial complex. The project provides for flood control, hydroelectricity, coal-fed power plants, irrigation of about 950,000 acres (385,000 hectares) chiefly in West Bengal, afforestation, fish breeding, recreation, and the general development of agriculture and industry throughout the valley, which experienced a great influx of people during the 20th century. Numerous towns, including Dhānbād, Jharia, and Sindri, are connected by a dense rail and road network.

Damoh, town, central Madhya Pradesh state, central India. An agricultural trade centre, it has industries that include oilseed milling, handloom weaving and dyeing, and the manufacture of bell-metal vessels and pottery. The town has a weekly cattle market. Damoh rose to importance in the 14th century when occupied by the Muslims and was the seat of Marāthā governors. It was constituted a municipality in 1867 and has a hospital and three colleges affiliated with the University of Saugar. Pop. (1981) town, 75,573; metropolitan area, 76,758.

Damophon (fl. 2nd century BC), ancient Greek sculptor of Messene, who executed many statues at Messene, Megalopolis, Aegium, and other cities of the Peloponnesus. Soon after 183 BC he repaired Phidias' sculpture of Zeus at Olympia, which had been damaged by an earthquake. Considerable fragments, including three colossal heads from a group sculpted by Damophon and representing Despoina, Demeter, Artemis, and the giant Anytus, were found on the site of Lycosura in Arcadia, where there was a temple of Despoina. The garment of Despoina is decorated with reliefs. A coin shows the statue with two figures standing, two seated.

Dampier, town and port in Roebourne shire, northwestern Western Australia, on Nickol Bay (an inlet of the Indian Ocean). Beginning in 1965, it was built to handle iron ore mined at Mount Tom Price (182 miles [293 km] south) and Paraburdoo in the Hamersley Range. The port takes its name from the offshore archipelago, named after William Dampier (a British buccaneer who explored the north and west coasts of Australia in 1688 and 1699). A pelletizing plant treats the ores, which are bound principally for Japan and Europe. Dampier lies just west of Roebourne, an old pearling port (1866) that served the Pilbara goldfield from 1888 until 1912, when a rail line bypassed it in favour of Port Hedland further east; the development of Dampier thus represents a revival of shipping in the Roebourne area. Just north of the North West Coastal Highway to Perth (1,018 miles [1,638 km] south), Dampier is supplied with fresh water from the nearby intermittent Maitland River and from a desalinization plant. Salt is a significant commercial product. Pop. (1981) 2,471.

Dampier, William (b. August 1651, East Coker, Somerset, Eng.—d. March, 1715, London), buccaneer who later explored parts of the coasts of Australia, New Guinea, and New Britain for the British Admiralty. A keen observer of natural phenomena, he was, in some respects, a pioneer in scientific exploration.



Dampier
By courtesy of the American Geographical Society

Dampier, orphaned at the age of 16, voyaged to Newfoundland and later sailed to the East Indies and the Gulf of Mexico. Between 1678 and 1691 he was engaged in piracy, chiefly along the west coast of South America and in the Pacific. On one voyage he reached Australia (1688), probably the north coast near Melville Island. He found nothing to plunder, however, and took a dislike to the people and their customs.

Little is known of his life for the next 10 years, until he was appointed to command of the *Roebuck* to explore for the British Admiralty. He sailed from England on Jan. 14, 1699, rounded the Cape of Good Hope, and reached Shark Bay off western Australia on July 26. After exploring the coast northward to what was thereafter called Dampier Archipelago, he went on to New Guinea and, passing around the north of the island, reached New Britain. With a deteriorating ship and a discontented crew, he then continued to Batavia, Java (now Jakarta, Indon.), for repairs and provisions. He sailed for England on Oct. 17, 1700, but, by the time he reached the South Atlantic off Ascension Island on February 22, the dangerously leaking *Roebuck* had to be abandoned. The crew remained on the island until April 3, when they were picked up by a convoy of homeward-bound warships and East Indiamen. After returning to England, Dampier made two more voyages as a privateer, capturing booty worth about £200,000 on the second venture. His popular book, *A New Voyage Round the World,* was published in 1697. One of his ship's logs contains the earliest known European description of a typhoon.

damping, in physics, restraining of vibratory motion, such as mechanical oscillations, noise, and alternating electric currents, by dissipation of energy. Unless a child keeps pumping a swing, its motion dies down because of damping. Shock absorbers in automobiles and carpet pads are examples of damping devices.

A system may be so damped that it cannot vibrate. Critical damping just prevents vibration or is just sufficient to allow the object to return to its rest position in the shortest period of time. Additional damping causes the system to be overdamped, which may be desirable, as in some door closers. The vibrations of an underdamped system gradually taper off to zero.

There are many types of mechanical damping. Friction, also called in this context dry, or Coulomb, damping, arises chiefly from the electrostatic forces of attraction between the sliding surfaces and converts mechanical energy of motion, or kinetic energy, into heat.

Viscous damping is caused by such energy losses as occur in liquid lubrication between moving parts or in a fluid forced through a small opening by a piston, as in automobile shock absorbers. The viscous-damping force is directly proportional to the relative velocity between the two ends of the damping device.

The motion of a vibrating body is also checked by its friction with the gas or liquid through which it moves. The damping force of the fluid in this case is directly proportional to a quantity slightly less than the square of the body's velocity and, hence, is referred to as velocity-squared damping.

Besides these external kinds of damping, there is energy loss within the moving structure itself that is called hysteresis damping or, sometimes, structural damping. In hysteresis damping, some of the energy involved in the repetitive internal deformation and restoration to original shape is dissipated in the form of random vibrations of the crystal lattice in solids and random kinetic energy of the molecules in a fluid.

There are other types of damping. Resonant electric circuits, in which an alternating current is surging back and forth, as in a radio or television receiver, are damped by electric resistance. The signal to which the receiver is tuned supplies energy synchronously to maintain resonance (*q.v.*).

In radiation damping, vibrating energy of moving charges, such as electrons, is converted to electromagnetic energy and is emitted in the form of radio waves or infrared or visible light.

In magnetic damping, energy of motion is converted to heat by way of electric eddy currents induced in either a coil or an aluminum plate (attached to the oscillating object) that passes between the poles of a magnet.

damping-off, disease of plant seedlings, caused by such seed- and soil-borne fungi as *Rhizoctonia solani, Aphanomyces cochlioides,* and species of *Pythium, Phytophthora, Botrytis, Fusarium, Cylindrocladium, Diplodia, Phoma,* and *Alternaria.* There are two types of damping-off: preemergence, in which sprouting seeds decay in soil and young seedlings rot before emergence; and postemergence, in which newly emerged seedlings suddenly wilt, collapse, and die from a soft rot at the soil line. Woody seedlings wilt and wither but remain upright; root decay often follows. Greatest losses occur in cold, wet soils in which germination and emergence are slow, often in indoor conditions.

Damping-off can be avoided by starting seed in light, well-drained, well-prepared soil or sterile mix (containing perlite, peat moss, or vermiculite); treating soil with steam, dry heat or a fumigant; avoiding overcrowding, excessive shade, overwatering, too deep planting, and overfertilizing; and sowing crack-free, healthy seed dusted with fungicide seed protectant. An early outbreak can be controlled by applying a fungicide solution.

Dâmrei Mountains, Khmer CHUŎR PHNUM DÂMREI, formerly ELEPHANT MOUNTAINS, French CHAÎNE DE L'ÉLÉPHANT, north-south-trending range of high hills, an offshoot of the Krâvanh Mountains, southwestern Cambodia. Chuŏr Phnum Dâmrei literally translated means "The mountains round which the

clouds turn." Extending 70 miles (110 km) north from the Gulf of Thailand, they reach a high point in the Bok Koŭ ridge at Mount Bokor (3,547 feet [1,081 m]). The densely wooded hills receive rainfall of 150–200 inches (3,800–5,000 mm) annually on their western slopes (which are subject to southwest monsoons) but only 40–60 inches (1,020–1,520 mm) on their eastern, or rain shadow, slopes. The Dâmrei Mountains were, until 1975, the principal centre of Cambodia's pepper-growing industry.

Damrong Rajanubhab (b. June 21, 1862—d. Dec. 1, 1943, Bangkok, Thailand), Thai prince, son of King Mongkut and brother of King Chulalongkorn. He was the founder of modern education and provincial administration and was Thailand's leading intellectual of his generation.

Damrong himself had only four years of formal education in short-lived palace Thai and English schools founded by King Chulalongkorn for his brothers in the early 1870s. Following this schooling he joined the Royal Pages' Bodyguard Regiment to prepare for a military career. When he became head of the regiment in 1880, at the age of 18, he found that the sons of royalty and nobility passing through the pages' corps were ill-prepared for military and bureaucratic careers and so founded Suan Kulap (Rose Garden Palace) School in 1881. In 1885 an education department was created under Damrong's control, which in 1887 was made a separate department of government and in 1892 a ministry.

Damrong was slated to become the minister of education in 1892 but instead, because of his exceptional ability, was appointed minister of interior, the most powerful position in the bureaucracy. He modernized what had been a decentralized system of provincial administration by grouping almost 100 provinces into only 14 "circles," each staffed by modern-educated young officers and royal commissioners, thus quickly ending provincial autonomy. Damrong's officers collected taxes, controlled leasing for the extraction of natural resources, and introduced modern law and education.

After being encouraged to resign by his young nephew King Vajiravudh in 1915, Damrong turned his energies to scholarship. He took a leading role in preserving and publishing the traditional texts of Thai literature and history, and he was one of the founders of the Siam Society and the National Library. Damrong went into exile in Pinang after the 1932 revolution. He was the author of more than 1,000 books and articles in various fields.

Damrosch, Walter Johannes (b. Jan. 30, 1862, Breslau, Prussia [now Wrocław, Pol.]—d. Dec. 22, 1950, New York, N.Y., U.S.), Prussian-born American orchestral conductor and composer whose activities spanned more than half a century of American musical life.

Damrosch studied with his father, Leopold Damrosch (1832–85), German violinist and conductor, who settled in New York City in 1871. Upon his father's death, he assumed the conductorship of the New York Symphony Society and the New York Oratorio Society, founded by his father, and also conducted at the Metropolitan Opera Company (1885–91). Later he organized the Damrosch Opera Company (1894–1900), specializing in German operas. In 1903 Damrosch reorganized the New York Symphony Society and conducted it until 1927, when it was combined with the Philharmonic Society.



Damrosch
Brown Brothers

Like his father, Damrosch was an avowed propagandist of the Romantic composer Richard Wagner; as early as March 3, 1886, he gave a concert performance of the opera *Parsifal* in New York. He also presented first American performances of symphonies by Johannes Brahms and Peter Ilich Tchaikovsky. Although not in sympathy with new music, he introduced several works by contemporary European and American composers. He was a pioneer of symphonic broadcasting and also established a weekly series of radio lectures on music appreciation for schools (1928–42).

A competent composer, Damrosch wrote several operas, which, however, lacked distinction: *The Scarlet Letter* (1896), *Cyrano de Bergerac* (1913), *The Man Without a Country* (1937), and *The Opera Cloak* (1942). He also composed incidental music to plays and published an autobiography, *My Musical Life* (1923; 2nd ed., 1930). He led the New York Oratorio Society (1898–1912); was the founder of the Institute of Musical Art, New York City (1905–26); and published some teaching manuals. His brother Frank Damrosch (1853–1937) was also a conductor.

damsel bug, also called NABID BUG, any predacious aphid- and caterpillar-eating bug of the family Nabidae (order Heteroptera).



Damsel bug (*Nabis*)
William E. Ferguson

Damsel bugs are generally divided into two types. One is about 8 mm (0.3 inch) long and yellow-brown in colour with well-developed wings; the second is larger, shiny black, and usually has very short wings.

Each foreleg of the damsel bug is slightly thickened and has a double row of spines that act as grasping organs when the leg bends. *Nabis* is one of the most common genera in this family, which contains about 300 species found throughout the world.

damselfish, also called DEMOISELLE, any of about 250 species of small, primarily tropical marine fishes of the family Pomacentridae (order Perciformes) found in the Atlantic and Indo-Pacific oceans. Damselfishes are deep-bodied and usually have forked tails. They resemble the related cichlids, and, like them, have a single nostril on each side of the head. Many species are brilliantly coloured, often in shades of red, orange, yellow, or blue; most do not exceed a length of about 15 cm (6 inches).

Damselfishes are lively and quick, and are usually strongly territorial and aggressive. Some feed mainly on plant matter or small animals suspended in the water; others are omnivorous. Most damselfishes live along reefs, but certain species, the anemone fishes, are noted for living among the stinging tentacles of sea anemones.



Damselfishes (*Pomacentrus*)
Gene Wolfsheimer

Better-known members of the family include the bright-coloured species of *Pomacentrus,* the black-and-white, or three-stripe, damselfish (*Dascyllus aruanus*) of the Indo-Pacific; the garibaldi (*Hypsypops rubicunda*), a bright orange California fish about 30 cm long; the beau gregory (*Eupomacentrus leucostictus*), a blue-and-yellow Atlantic species; and the sergeant major (*Abudefduf saxatilis*), a black-banded, bluish and yellow fish of the tropics.

damselfly (suborder Zygoptera), any of numerous odonate insects (order Odonata) having laterally projecting eyes and petiolate wings. When at rest, its narrow, membranous, net-veined wings are held vertically along the longitudinal body axis rather than horizontally, as in dragonflies (suborder Anisoptera). It is a delicate, weak-flying insect and is sometimes known as a snake doctor after the superstition that it nurses ill snakes back to health. Damselflies commonly fly in tandem during mating.

The nymph breathes with three leaflike structures called gills at the end of the abdomen.



Damselfly (*Agrion splendens*)
G.I. Bernard—Oxford Scientific Films Ltd.

These function also as a fishtail during the nymph stage, which is spent in water.

Damu, in Mesopotamian religion, Sumerian deity, city god of Girsu on the Euphrates River near Ur in the southern orchards region. Damu, son of Enki, was a vegetation god, especially of the vernal flowing of the sap of trees and plants. His name means "the child," and his cult—apparently celebrated primarily by women—centred on the lamentation and

search for Damu, who had lain under the bark of his nurse, the cedar tree, and had disappeared. The search finally ended when the god reappeared out of the river.

The cult of Damu influenced and later blended with the similar cult of Dumuzi the Shepherd, a Sumerian deity worshiped by the central grasslands people. A different deity called Damu was a goddess of healing and the daughter of Nininsina of Isin.

Damville, Henri, sieur de (sire of): *see* Montmorency, Henri I, duc de (duke of).

Dan, also called GIO, or YAKUBA, an ethnolinguistic grouping of people inhabiting the mountainous west-central Côte d'Ivoire and adjacent areas of Liberia. The Dan belong to the Southern branch of the Mande linguistic subgroup of the Niger-Congo language family. They originated somewhere to the west or northwest of their present lands, perhaps among the Malinke (Mandingo). The Dan are closely related to the Gere (also spelled Ngere, or Guere) to the south.

The roughly 1,500–4,000-foot- (450–1,200-metre-) high Dang (Dans) and Toura mountains are hot and humid and covered with lush vegetation. Precolonial people of the region probably lived largely by hunting and gathering. The area is isolated, and even the most general lines of history are unknown. The Dan and their neighbours are said to have a history of warfare, but it has been debated whether they actually fought the battles attributed to them or whether these are part of oral tradition and a cultural model. The traditional isolation of the area probably served to accentuate myths of bellicose, "primitive" mountain people best avoided because dangerous. Christian proselytism proved difficult as well, as the Dan have preferred to maintain their own religious beliefs.

The Dan traditionally divided themselves into alliance groups associated with clans but of only occasional centralized political organization (*i.e.,* in time of war). Neighbourhoods in larger villages (created as the government seeks more efficient administration) or towns in Côte d'Ivoire like Man and Danané reflect these older affiliations. Kinship is bilateral, with important bonds to fathers' and mothers' patrilineages. Most marriages are monogamous.

The Dan grow rice and cassava on mountain slopes. Rubber and especially coffee are important cash crops. Some plantations, upon which Dan may work as labourers, are maintained by Malinke or other outsiders.

Dan are known for the small, dark hardwood masks they make. Dan masks also are made by other local groups, and are used in important rituals. Large wooden "spoons," representing first wives of important men, and murals painted on exterior house walls are other art forms.

Dan, one of the 12 tribes of Israel that in biblical times comprised the people of Israel who later became the Jewish people. The tribe was named after the first of two sons born to Jacob (also called Israel) and Bilhah, the maidservant of Jacob's second wife, Rachel. Nine of the other 11 tribes were also named after sons of Jacob, while two bear the names of Jacob's grandsons, children of Joseph.

After the death of Moses, the Israelites were led into the Promised Land by Joshua, who divided the territory among the 12 tribes. The portion assigned to the tribe of Dan was a region west of Jerusalem. At least part of the tribe later moved to the extreme northeast and took the city of Laish, renaming it Dan. As the northernmost Israelite city it became a point of reference in the familiar phrase "from Dan to Beersheba."

The great hero of the Danites was Samson, who, until his betrayal by Delilah, used his mighty strength against the Philistine invaders. Dan was one of the 10 northern tribes that disappeared from history after the Assyrian conquest of the kingdom of Israel in 721 BC. They are known in Jewish legends as the Ten Lost Tribes of Israel.

Dan Patch (foaled 1896), American harness racehorse (Standardbred), a nearly legendary horse in his time, who established in 1905 a world pacing record of 1:55¼ that endured for 33 years. (In 1906 he paced a mile in 1:55 flat—Billy Direct's record-breaking time in 1938—but this feat was not officially recognized.) He paced a mile in 2 minutes or less on 30 occasions, a world record that was not surpassed until the 1960s (by Bret Hanover, with 31). Never defeated in a race, Dan Patch lost only two of 56 heats (divisions of a harness race) in his three years of competition (1900–02). Thereafter, until his retirement in 1909, he traveled around the United States in his own railroad car and raced against the clock in exhibitions that drew large crowds.

Dan Takuma (b. Sept. 7, 1858, Fukuoka, Chikuzen province, Japan—d. March 5, 1932, Tokyo), manager of the giant Mitsui *zaibatsu,* the greatest of the family-owned combines in pre-World War II Japan. A graduate of the Massachusetts Institute of Technology and an important member of Japan's business elite, Dan was assassinated by right-wing nationalists who regarded him as a symbol of the evil power of high finance in government.

Dana, Charles A(nderson) (b. Aug. 8, 1819, Hinsdale, N.H., U.S.—d. Oct. 17, 1897, Glen Cove, N.Y.), American journalist who became a national figure as editor of the New York *Sun.*

In 1839 Dana entered Harvard College, but health and lack of money forced him to leave in 1841. From 1841 to 1846 he lived at the utopian Brook Farm community, where he was one of the trustees, but when his ideals for social change were unfulfilled he left it and went to work for the Boston *Weekly Chronotype.* The next year he joined the staff of the *New York Tribune,* and in 1848 he wrote letters from Europe on the revolutionary movements of that year. Returning to the *Tribune* in 1849, he became its managing editor and actively promoted the antislavery cause in the paper. In 1862 his resignation was asked for, apparently because of wide temperamental differences between him and Horace Greeley, the editor-publisher. Secretary of War Stanton



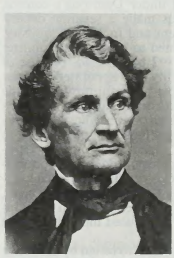
Charles Dana
By courtesy of the New-York Historical Society

immediately made him a special investigating agent of the War Department; Dana spent much time at the front and sent Stanton frequent reports. In 1864–65 Dana was second assistant secretary of war.

Dana became editor and part owner of the New York *Sun* in 1868 and remained in control of it thereafter. Under his control the *Sun* opposed the impeachment of President Andrew Johnson; supported Ulysses S. Grant for the presidency in 1868; was a sharp critic of Grant as president; and in 1872 took part in the liberal Republican revolt and gave lukewarm support to Greeley's candidacy. In the presidential election of 1876, the *Sun* was a strong supporter of the Democrat Samuel J. Tilden; after Rutherford B. Hayes's inauguration, the paper often referred to him by such epithets as "His Fraudulency the President."

For two decades after Dana became editor, the *Sun* was a newspaperman's newspaper, much admired and imitated. It lived up to its claim that its news was "the freshest and sprightliest current," and it specialized in the "human interest story," for which Dana hired bright young men, many fresh from college. Editorially the paper was lively but notoriously inconsistent. Dana swung from the early liberalism evidenced by his Brook Farm connection and his syndicated letters from Europe in 1848 to a later disillusioned conservatism and unswerving support of laissez-faire capitalism. With George Ripley, Dana edited *The New American Cyclopaedia* (1857–63). He also edited a highly successful American verse anthology, *The Household Book of Poetry* (1857), and among his books were *Recollections of the Civil War* (1898) and *The Art of Newspaper Making* (1895).

Dana, James D(wight) (b. Feb. 12, 1813, Utica, N.Y., U.S.—d. April 14, 1895, New Haven, Conn.), American geologist, mineralogist, and naturalist who, in explorations of the South Pacific, the U.S. Northwest, Eu-



James Dana
By courtesy of the Yale University Library

rope, and elsewhere, made important studies of mountain building, volcanic activity, sea life, and the origin and structure of continents and ocean basins.

Dana attended Charles Bartlett's Academy, then entered Yale College as a sophomore in 1830. On graduation from Yale in 1833 he instructed midshipmen in mathematics on a U.S. Navy cruise to the Mediterranean; he returned to New Haven in 1836 as an assistant to his former teacher, Benjamin Silliman, professor of chemistry and mineralogy at Yale. Evidence of Dana's great productive energy came at age 24 with the publication in 1837 of *A System of Mineralogy,* a work of 580 pages that has persisted through numerous editions.

In 1838 Dana joined a United States exploring expedition to the South Seas with Charles Wilkes; he served four years as a geologist and also was responsible for much of the zoological work. In 1844, two years after his return from that expedition, Dana married Henrietta Silliman, the daughter of his mentor at Yale, and settled in New Haven. Dana spent his intense energy largely on science. From 1844 to 1854, his most productive years, he published about 7,000 printed pages in addition to hundreds of plates, most of which he drew. His writings on the Wilkes expedition include four illustrated quarto volumes and numerous short papers.

The main thrust of Dana's effort was geological. Among his many publications were the text *Manual of Mineralogy* (1848) and three

editions of *A System of Mineralogy* (1st ed., 1837), including a complete revision in which he founded a classification of minerals based on mathematics, physics, and chemistry. More significant to Dana's impact on American geology during this decade was the start of his long association with the *American Journal of Science*, a leading organ of scientific inquiry founded by Benjamin Silliman. As an editor and contributor of critical reviews, original papers, and perceptive syntheses, Dana exerted a vitalizing influence on American geology. One of the best-informed men of science in his day, his concern with the physical processes that produced geologic phenomena led to brilliant generalizations on such fundamental questions as the formation of the physical features of the Earth, the origin and structure of continents and ocean basins, the nature of mountain building, and volcanic activity. From his own studies and his mastery of the works of other American and foreign geologists, Dana constructed a view of the Earth as a geologic unity developing through time. Adopting the theory of a contracting Earth cooling from a molten condition, he argued that the present continents mark areas that cooled first; subsequent contractions caused the intervening oceanic areas to subside. As settling oceanic crusts adapted periodically to a shrinking interior, pressure was exerted against continental margins causing upheaval of great mountain chains such as the Appalachians, Rockies, and Andes. Dana stressed the progressive change of the Earth's physical features but at first was reluctant to accept the idea of the evolution of living things.

By the early 1850s Dana had attained international recognition and was corresponding with other outstanding scientists of his day, among them Asa Gray, noted American botanist; Louis Agassiz, Swiss-born naturalist and teacher at Harvard; and Charles Darwin. All had measurable influence on his thinking. Spurred by tentative proposals from Harvard for Dana's services, friends at Yale established the Silliman Professorship of Natural History, which Dana accepted in 1856. But in 1859, the strain of his self-imposed overwork resulted in a physical breakdown from which he never fully recovered. During his remaining 35 years he was forced to live a secluded existence, largely withdrawn from the public. For a less modest man this would have been difficult, for many academic honours came to him during this period. Recognition included the presidencies of the American Association for the Advancement of Science and the Geological Society of America; he was also a founding member of the National Academy of Sciences.

Despite ill health Dana continued to publish: in 1862 his influential textbook, *Manual of Geology* (4 eds.); in 1864 *A Text-book of Geology*, a more elementary work; and in 1872 *Corals and Coral Islands*, which was the climax to his notable studies of coral reefs, begun on the Wilkes expedition. Dana investigated coral islands in greater detail than anyone before him, substantiating Darwin's observation that atolls were evidence of subsidence of the ocean bottom. Reef-building corals, Dana independently concluded, lived only in shallow, tropical waters on hard substrates, commonly forming fringing reefs about volcanic islands. Coral rock found at some depth on island flanks and atolls made only of reef rock indicated that extensive volcanic lands had disappeared beneath the Pacific leaving clusters of atolls to mark their former existence.

During his later years he wrestled with the challenge of organic evolution proposed by Darwin. Always a deeply religious man, Dana believed in the special creation of species, yet he was keenly aware of the intricate relationships between species and their environment. Darwin's impressive argument, coupled with Dana's own zoological knowledge, was persuasive in the end, however, and he adopted evolution theory in the last edition of his *Manual*. For Dana the natural and the divine had to be inseparable—all nature and the design of continual improvement of life that he read into it were a manifestation of the divine.

During Dana's lifetime, and largely under his leadership, American geology grew from a collection and classification of unrelated facts into a mature science. (K.M.W.)

Dana, Richard Henry (b. Aug. 1, 1815, Cambridge, Mass., U.S.—d. Jan. 6, 1882, Rome), American lawyer and author of the popular autobiographical narrative *Two Years Before the Mast*.

Dana withdrew from Harvard College when measles weakened his eyesight, and he shipped to California as a sailor in August 1834 to regain his health. After voyaging among California's ports and gathering hides ashore, he rounded Cape Horn, returned home in 1836, and reentered Harvard. His travel experiences



Richard Henry Dana

By courtesy of the Library of Congress, Washington, D.C.

cured him physically and evoked his sympathy for the oppressed.

In 1840, the year of his admission to the bar, he published *Two Years Before the Mast*, a personal narrative presenting "the life of a common sailor at sea as it really is" and showing the abuses endured by his fellow sailors. The book was immediately popular, and its realistic descriptions made it an American classic. In 1841 he published *The Seaman's Friend* (also published as *The Seaman's Manual*), which became known as an authoritative guide to the legal rights and duties of seamen. Against vigorous opposition in Boston, Dana gave free legal aid to blacks captured under the Fugitive Slave Law. In 1863, while serving as U.S. attorney for Massachusetts (1861–66), he won before the U.S. Supreme Court the case of the *Amy Warwick*, securing the right of the Union to blockade southern ports without giving the Confederate states an international status as belligerents.

His scholarly edition of Henry Wheaton's *Elements of International Law* (1866) precipitated a lawsuit by an earlier editor. The charges of plagiarism that resulted from the suit contributed to Dana's defeat in a congressional election (1868) and caused the Senate to refuse his confirmation when President Ulysses S. Grant named him minister to Great Britain (1876). Among Dana's other works are *To Cuba and Back* (1859), *Speeches in Stirring Times* (1910), and *An Autobiographical Sketch* (1953).

Danakil (people): *see* Afar.

Danakil Plain (Ethiopia): *see* Denakil Plain.

Danané, town, western Côte d'Ivoire. It lies along the Boan River, a tributary of the Nuon (Nipoué, Cestos) River, and at the intersection of roads from Liberia, Guinea, and the Ivoirian town of Man. It is the chief trade centre (rice, coffee, and kola nuts) of a forested region mainly inhabited by the Dan people. Pop. (1975) town, 19,608.

Danao, city, eastern Cebu Island, Philippines, about 17 miles (27 km) northeast of Cebu City. It was founded in 1844 and is a port on the Camotes Sea for nearby coalfields. It is also a service centre for the coastal agricultural area that produces rice and corn (maize). Its name is derived from *danawan*, a local word meaning "shallow lagoon"; there are beaches for swimming nearby. Inc. city, 1961. Pop. (1980) 56,967.

Dānāpur, also called DINAPORE, OF DINAPUR, town, northern Bihār state, northeastern India, on the Ganges River. It is a major road and rail junction and agricultural trade centre. Industries include printing, oilseed milling, and metalworks. There is a college affiliated with Magadh University and an army cantonment. Dānāpur was constituted a municipality in 1887. Pop. (1981) 58,684.

Danaus, in Greek legend, son of Belus, king of Egypt, and twin brother of Aegyptus. Driven out of Egypt by his brother, he fled with his 50 daughters (the Danaïds) to Argos, where he became king. Soon thereafter the 50 sons of Aegyptus arrived in Argos, and Danaus was forced to consent to their marriage with his daughters. Danaus, however, commanded each daughter to slay her husband on the marriage night. They all obeyed except Hypermestra, who spared Lynceus. Being unable to find suitors for the other daughters, Danaus offered them in marriage to the youths of the district. (According to another story, Lynceus slew Danaus and his daughters and seized the throne of Argos.) In punishment for their crime the Danaïds were condemned to the endless task of filling with water a vessel that had no bottom. The murder of the sons of Aegyptus by their wives is thought to represent the drying up of the rivers and springs of Argolis in summer.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Danbury, city, coextensive with the town (township) of Danbury, Fairfield county, southwestern Connecticut, U.S. It lies along the Still River, in the foothills of the Berkshires. Settled in 1685, it was named (1687) for Danbury, Eng., and was incorporated as a town in 1702. The municipality within the original town tract became a city in 1889, and the town and city were consolidated in 1965. An important military depot for the Revolutionary armies, it was burned and looted in April 1777 by the British under General William Tryon. Danbury is now a manufacturing city whose products include electrical equipment and machinery. It is also the location of the corporate headquarters of Union Carbide Corporation, a major manufacturer of petrochemicals. Danbury was best known for its hat industry, begun in 1780 by Zadoc Benedict and now declining. The Scott-Fanton Museum has a historical display of hats. The Danbury Fair, held annually from 1869 until it closed in 1981, was Connecticut's largest. Western Connecticut State College (1903) is in Danbury. A resort area based on the artificial Candlewood Lake (with more than 60 miles [97 km] of shoreline) adjoins the town. Pop. (1990) city, 65,585; Danbury PMSA, 187,867.

Danbury Hatters' Case, formally LOEWE V. LAWLOR (208 U.S. 274), U.S. Supreme Court case in which unions were held to be subject to the antitrust laws. In 1902 the United Hatters of North America, having failed to organize the firm of D.E. Loewe in Danbury, Conn., called for a nationwide boycott of the firm's products. The firm brought suit under the Sherman Anti-Trust Act, and in 1908 the union was assessed triple damages. The case was a severe setback to the use of the secondary boycott by unions.

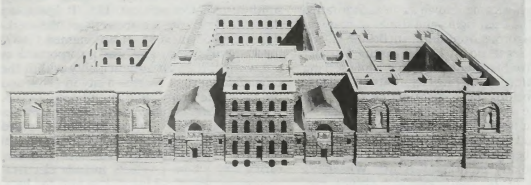
Danby, Thomas Osborne, Earl of: *see* Leeds, Thomas Osborne, 1st Duke of.

dance, a form of expression that utilizes bodily movements that are usually rhythmic, patterned (although they may be improvised), and accompanied by music. Dance seems to be one of the oldest of art forms, being found in virtually every culture and attested to in records of cultures long since extinct. Dance may be performed for a variety of motives: ceremonial, liturgical, magical, theatrical, social, or purely aesthetic.

Dance is treated in a number of articles in the MACROPAEDIA. For a general treatment of dance and its history chiefly in European cultures, *see* Dance, The Art of; Dance, The History of Western; Folk Arts. For discussions of dance forms and styles in non-European cultures, *see* African Arts; American Peoples, Arts of Native; Central Asian Arts; East Asian Arts; Islāmic Arts; Oceanic Arts; South Asian Arts; Southeast Asian Arts.

Dance, George, THE YOUNGER (b. 1741, London, Eng.—d. Jan. 14, 1825, London), British architect who was responsible for extensive urban redevelopment in London. He was a founding member of Great Britain's Royal Academy.

The youngest son of George Dance, senior, who was clerk of works to the City of London from 1735 to 1768, the younger Dance received his formal training in the office of his father and during several years spent in Italy. He succeeded his father as supervisor of all planning and building within the City of London upon his father's death in 1768. Soon afterward he designed his best-known structure, Newgate Prison (*c.* 1770–78; demolished 1902), which was notable for the strength and severity of its rusticated (rough-hewn) masonry.



Newgate Prison, London, drawing by George Dance the Younger; in Sir John Soane's Museum, London

By courtesy of the Trustees of Sir John Soane's Museum; photograph, Geremy Butler

In his earliest works Dance created graceful versions of the Neoclassical style then popular in England. An example is All Hallows Church, London Wall (1765–67), one of the few surviving Dance structures. It has an unconventional Neoclassical interior that typifies Dance's original approach to architectural design. He introduced the use of the circus (a circular area at an intersection of streets) and the crescent (a semicircular row of houses) into London street planning. Many of his proposals were never carried out, but he did complete America Square, Minories (1768), Finsbury Square (1777), and Finsbury Circus (*c.* 1814). He also rebuilt the Guildhall (the administrative headquarters of the City of London) and designed the Port of London's West India Docks.

dance fly, any insect of the family Empididae (order Diptera), named for their movements while in flight. Dance flies are small with a proportionately large thorax and a long tapering abdomen, which in males usually bears conspicuous genitalia at the posterior end.

Courtship involves the presentation of a dead fly to the female by the male. Mating does not take place until the female accepts the fly and sucks its juices. The adults usually inhabit moist regions and feed on smaller insects; the larvae occur in soil, water, or decaying plant material and also feed on insects.

dance notation, the written recording of dance movements. The earliest surviving attempt at dance notation was in the form of letter-symbols found in the municipal archives of Cervera, Spain, from the last half of the 15th century. Also during this period, word abbreviations were found as dance notations in two documents from the library of Margaret of Austria—*Livre des basses danses* (*c.* 1460; "Book of Low Dances") and *L'Art et instruction de bien danser* (*c.* 1488; "The Art and Teaching of Fine Dancing"). Methods of dance notation became more sophisticated through time, notably in Thoinot Arbeau's *Orchésographie* (1588), Raoul Feuillet's *Chorégraphie, ou l'art de décrire la danse* (1700; "Choreography, or the Art of Describing the Dance"), and Arthur Saint-Léon's *La Sténochorégraphie* (1852). In 1892 the Russian Vladimir Stepanov made a great improvement in the field by using a special stave for rhythm notation. At the time, however, only rudimentary rhythm designations were utilized, and they were separate from the dance-step designations.

The Hungarian Rudolf Laban published *Choreographie* (1926) and *Kinetographie* (1928), formulating the basis for the still widely used Labanotation (*q.v.*), the first technique to provide a means of simultaneously combining precise movement notation with precise rhythm notation. About this time Margaret Morris also developed Danscript, her method of notation, published as *Notation of Movement* (1928). Morris' system of notation was as versatile as Labanotation in its ability to notate general movement, not just dance steps. Timing and rhythm were indicated separately, however, a major drawback of the method. Another notation method of merit is the Benesh system, which was founded by Rudolf and Joan Benesh in the mid-1950s. Its base is the Institute of Choreology in London (1962), and it is used primarily by the Royal Ballet. Benesh is simpler to use than Labanotation but is criticized for its limitations in notating timing and rhythm.

Labanotation's popularity continues to grow, particularly owing to the Dance Notation Bureau in New York City, originally founded in 1940 to further Laban's method. Many dances have been preserved for future generations by dance notation, yet the procedures of recording are still slow and cumbersome. Efforts to increase efficiency are being made currently, particularly at Columbia University, to create a system that combines notation with a computer-driven video display terminal.

BIBLIOGRAPHY. A history of notation theory from the Renaissance to the present is found in Ann Hutchinson Guest, *Dance Notation: The Process of Recording Movement on Paper* (1984).

dance of ———: *see under* substantive word (*e.g.,* death, dance of).

dance suite, musical arrangement consisting of related dance movements. *See* suite.

Dancourt, Florent Carton (b. Nov. 1, 1661, Fontainebleau, Fr.—d. Dec. 7, 1725, Courcelles-le-Roi, near Orléans), actor and playwright who created the French comedy of manners and was one of the most popular of French dramatists before the Revolution.

Born into an established bourgeois family, Dancourt was educated in Paris by Jesuits and studied law. In 1680 he married an actress, Thérèse de La Thorillière. They debuted with the Comédie-Française in 1685, beginning an



Dancourt, detail of an oil painting by Gabriel Gence, 1706; in the collection of the Comédie-Française, Paris

Giraudon—Art Resource

association that flourished for 33 years. Dancourt's skill as a comic actor and playwright brought him the favour of Louis XIV and established him as the successor to Molière.

Like Molière, Dancourt was expert at portraying current social types, and his comedies often seized on recent scandals to ridicule the decadence and social pretenses of the period. Written in prose and never assuming artistic greatness, they were peopled by characters whose vices were made hilarious by Dancourt's witty, effortless dialogue and his ability to make the most of a comic situation. His best-known work, *Le Chevalier à la mode* (1687; "The Knight à la Mode"), deals with a fortune hunter's simultaneous courtship of three women. Other plays are *Les Bourgeoises à la mode* (1692) and *Les Bourgeoises de qualité* (1700), in which middle-class women ape the nobility, *La Désolation des joueuses* (1687), on the current gambling rage, and *La Maison de campagne* (1688; "The Country House"), making fun of crude provincial manners.

Of over 50 plays printed under Dancourt's name, an undetermined number were collaborations with other writers. In 1718 Dancourt abruptly retired to his estate, devoting himself until his death to translating the Psalms.

Dandakāranya, physical region in east-central India. Extending over an area of about 35,600 square miles (92,300 square km), it includes the Abujhmar Hills in the west and borders the Eastern Ghāts in the east. The Dandakāranya includes parts of Madhya Pradesh, Orissa, and Andhra Pradesh states. It has dimensions of about 200 miles (320 km) from north to south and about 300 miles (480 km) from east to west. The region derives its name from the Dandak Forest (the abode of the demon Dandak) in the Hindu epic the *Rāmāyaṇa.* It was successively ruled by the Nalas, Vākāṭakas, and Cālukyas (Chalukyas)

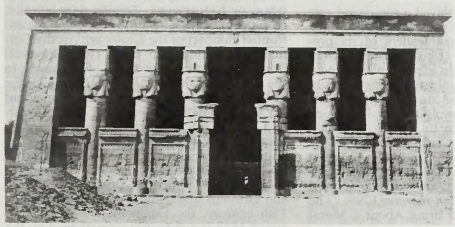
in ancient times and is the home of the Ādivāsi (Goṇḍ) people. Most of the region is a sanded-over peneplain with a gradual slope from north to southwest. The Dandakāranya consists of wide, forested plateaus and hills that rise abruptly on the eastern side and gradually decrease in elevation toward the west. There are also several relatively extensive plains. It is drained by the Mahānadi River (with its tributaries, including the Tel, Jonk, Udanti, Hatti, and Sandul) and the Godāvari River (with its tributaries, including the Indrāvati and Sabari). The plateaus and hillsides have a thin veneer of loamy soils; the plains and valleys have fertile, alluvial soils. The region has economically valuable moist forests of sal (*Shorea*) that occupy almost half of its total area. The economy is based on subsistence agriculture; crops include rice, pulse (legumes), and oilseeds. Industries consist of rice and dal (pigeon-pea) milling, sawmilling, bone-meal manufacturing, *bidi* (cigarette) making, beekeeping, and furniture making. There are deposits of bauxite, iron ore, and manganese. The Dandakāranya Development Authority was created by the union (central) government in 1958 to assist refugees from Pakistan. It constructed the Bhaskel Dam and Pakhanjore reservoir; wood-working centres at Jagdalpur, Boregaon, and Umerkote; and roads and railways in the refugee resettlement areas, including the Bolāngir–Kozilum railway project. The Aero-Engine Factory, mainly producing aircraft engines, is located at Sunabeda. The National Mineral Development Corporation works iron ore at Bailādila. Important towns are Jagdalpur, Bhawānipatna, and Koraput.

Consult the INDEX *first*

Dandarah, also spelled DENDERA, agricultural town on the west bank of the Nile, in Qinā *muḥāfaẓah* (governorate), Upper Egypt. The modern town is built on the ancient site of Ta-ynt-netert (She of the Divine Pillar), or Tentyra. It was the capital of the sixth nome (province) of pharaonic Upper Egypt and was dedicated to the sky and fertility goddess Hathor. Her temple is one of the best preserved in Egypt. The present building dates to the Ptolemaic Period (305–30 BC) and was completed by the Roman emperor Tiberius (AD 14–37), but it rests on the foundations of earlier buildings dating back at least as far as Khufu (Cheops; second king of the 4th dynasty [*c.* 2613–*c.* 2494 BC]).

The sandstone temple is approximately 260 ft (79 m) long and was built within a 900,000-sq-ft (83,570-sq-m) area enclosed by a wall of dried mud brick. Within the temple a great, elaborately decorated hypostyle hall is supported by 18 Hathor-headed columns, giving it a forestlike appearance. The ceiling is carved with astronomical scenes and the walls with the details of a royal visit. Off the hall a smaller one with six columns is surrounded by six magazines, and it, in turn, leads into two vestibules, the second of which opens into the sanctuary where the sacred boat was kept containing the image of the goddess. On the roof of the temple are several chapels dedicated to the god Osiris, in one of which a zodiac and sundial, now in Paris, were discovered.

Behind the temple lies a small temple of Isis. On the north side is a sacred lake. There also was found a gate of Mentuhotep II (reigned 2060–10 BC), now in the Cairo Museum. Two birth-houses and a Christian church stand east of the sacred lake. Pop. (1966) 21,279.



Facade of the Temple of Hathor, Dandarah
By courtesy of the Oriental Institute, University of Chicago

dandelion, weedy perennial herb of the genus *Taraxacum* of the family Asteraceae, native to



Dandelion (*Taraxacum officinale*)
F.K. Anderson—EB Inc.

Eurasia but widespread throughout much of temperate North America. The most familiar species is *T. officinale*.

It has a rosette of leaves at the base of the plant; a deep taproot; a smooth, hollow stem; leaves that may be nearly smooth-margined, toothed, or deeply cut; and a solitary yellow flower head composed only of ray flowers (no disk flowers). The fruit is a ball-shaped cluster of many small, tufted, one-seeded fruits. The bitter young leaves are used in salads, and the roots can be used to make a coffee-like beverage.

Dandenong Ranges, mountain ranges, part of the Eastern Highlands, east of Melbourne in southern Victoria, Australia. Several peaks exceed 1,600 ft (500 m), the highest of which is Mt. Dandenong (2,077 ft). With nearly twice as much rainfall as the nearby coastal plain and with fertile volcanic soils, the mountains have dense vegetative cover. The name is derived from an Aboriginal word, *tanjenong*, meaning "lofty." The district, well penetrated by Melbourne suburbia, produces orchard fruits, flowers, garden crops, dairy products, and berries.

The town of Dandenong, on the southwestern slopes and on a creek of the same name, is a traditional agricultural marketing and processing centre; a eucalyptus oil plant established in 1852 at Dandenong was perhaps the earliest distinctively Australian business. Since the early 1960s it has experienced rapid industrial development. This rapid development led to the creation in 1977 of the Dandenong Ranges (planning) Authority to control future development. The ranges provide major recreation facilities for Melbourne as well as much of its water supply. Conservation areas include Sherbrooke Forest Park, known for its lyrebirds, and Ferntree Gully and Churchill national parks.

Dandie Dinmont terrier, breed of terrier developed in the border country of England and Scotland. First noted as a distinct breed about 1700, it was later named after a character created by Sir Walter Scott in his novel *Guy Mannering* (1815). Unlike other terriers, the Dandie Dinmont has a softly curved, rather than angular, body. It has large eyes, a long body, short legs, and a large, domed head crowned by a silky topknot. Its crisp-textured coat, a combination of hard and soft hairs, may be pepper (silver-gray to blue-black) or mustard (light fawn to reddish brown) in



Dandie Dinmont terrier
Sally Anne Thompson—EB Inc.

colour. The Dandie Dinmont stands 8 to 11 inches (20 to 28 centimetres) and weighs 18 to 24 pounds (8 to 11 kilograms).

Daṇḍin (fl. late 6th and early 7th centuries, India), Indian Sanskrit writer of prose romances and expounder on poetics. Scholars attribute to him with certainty only two works: the *Daśakumāracarita*, translated in 1927 as *The Adventures of the Ten Princes*, and the *Kāvyādarśa* ("Mirror of Poetry").

The *Daśakumāracarita* relates the vicissitudes of 10 princes in their pursuit of love and royal power. The work is imbued both with realistic portrayals of human vice and with supernatural magic, including the intervention of deities in human affairs.

The *Kāvyādarśa* is a work of literary criticism defining the ideals of style and sentiment appropriate to each genre of *kāvya* (courtly poetry).

Dandolo FAMILY, an ancient Italian family distinguished in the history of Venice. It rose quickly to prominence when expansion from the lagoons to the mainland began. By the 11th century it was rich, and by the 12th (when the branches of San Luca, San Severo, and San Moisè can already be distinguished) it was competing for the highest posts in church and state. In the middle decades of the 12th century, when Enrico di Domenico Dandolo, as patriarch of Grado from 1146 to 1154, strove to defend his prerogatives against Pietro Polani (doge from 1130 to 1148) and the Michiel family, the whole Dandolo family was exiled until, after about 10 years, peace was made on the basis of political concessions and matrimonial alliances.

As the power of the Michiel family declined, trouble arose between the restless Dandolo family and the Ziani family, headed by the doge Sebastiano, who wanted to impose a policy of peace and internal reform instead of his predecessors' war program. In 1192 the elderly Enrico Dandolo (d. 1205), of the branch of San Luca, himself became doge. His rule was

chiefly important for his preponderant role in promoting the Fourth Crusade, which led to the overthrow of the Greek Byzantine Empire and the establishment of the Latin Empire in its place. He reserved a wide field of activity in the East for his own family: Marco Dandolo became lord of Andros, and Giovanni founded a powerful company that long exploited the colony of Tyre. The Dandolo policy, however, proved an embarrassment to Venice when the colonists tended to secede. In reaction against it, the Ziani and Tiepolo families came to power in Venice for much of the 13th century, so that the Dandolo family had to confine its energies to Crete, to the Negropont (Euboea), to the Aegean islands, and to Dalmatia.

Reaction in turn against the Tiepolo family brought Giovanni Dandolo (d. 1289), of the San Severo branch, to the dogeship in 1280, in a period of internal crisis in Venice. At the same time, the conflict between Venice and Genoa was on the point of developing into a general Mediterranean crisis. When this came to a head, two more Dandolo doges had to bear the brunt of it: Francesco from 1329 to 1339 and Andrea from 1343 to 1354. Seeking allies near and far, the Dandolo doges resolutely refused compromise and also surmounted the further disasters of earthquake, plague (1348), financial crisis, and ultimate defeat by the Genoese (1354).

After Andrea, no Dandolo was ever doge again, but members of the family still held high offices in the Venetian service until the fall of the republic.

Dandolo, Enrico (b. 1107?, Venice—d. 1205, Constantinople), doge of the Republic of Venice from 1192 to 1205, noted for his promotion of the Fourth Crusade, which led to the overthrow of the Greek Byzantine Empire and the aggrandizement of Venice.

Dandolo's father, Vitale, had held important public positions; and during Enrico Dandolo's public life he was sent on many important missions for the Venetian government. He accompanied the doge Vitale II Michiel on an expedition to Constantinople in 1171. The following year, with the Byzantine ambassador, he went again to Constantinople, where, according to one account, he was so assiduous in defending the interests of the Venetians that the Emperor had him blinded. But the chronicler Geoffroi de Villehardouin, who wrote the history of the Fourth Crusade and knew Enrico Dandolo personally, stated merely that he did not see well because of an injury to his head. After his diplomatic mission to Constantinople, Dandolo went as ambassador to the King of Sicily (1174) and then to Ferrara (1191). When the doge Orio Mastropiero retired to a monastery, Dandolo was elected doge on June 1, 1192, at the age of 85.

In one of his first actions as doge, he swore the "ducal promise," spelling out the rights and duties of the office of doge. Dandolo also revised the penal code and published the first collection of civil statutes, setting the customary law of Venice on a firm juridical basis. He also revised the coinage, issuing a silver coin called the *grosso,* or *matapan.* This began a wide-ranging economic policy intended to promote trade with the East. Dandolo's image appears on the *grosso* coin; he is wearing a cloak and holding the "ducal promise" in his left hand and the gonfalon (banner) of St. Mark's in his right.

He also concluded treaties with Verona and Treviso (1192), with the Patriarch of Aquileia (1200), with the King of Armenia (1201), and with the Byzantine Empire (1199) and the Holy Roman Emperor (1201). He fought a victorious war against the Pisans in 1199.

But the prominent place Enrico Dandolo occupies in history must be attributed to the part he played in the Fourth Crusade: the arrangements made with the French barons for the transportation of their army; his provision of funds in exchange for their assistance in conquering Zara (Zadar), a Christian town on the Dalmatian coast then held by the King of Hungary; and his success in persuading the crusaders to help the Venetians conquer Constantinople. The personality of the Doge stands out vividly in the accounts of the chroniclers. Although quite old, he was always found in the front line. At the assault of Constantinople he stood in the bow of his galley, completely armed and with the gonfalon of St. Mark's in front of him, encouraging his men as they made their landing.

After the capture of Constantinople, Dandolo took for himself and the doges of Venice the title "lord of the fourth part and a half of the whole empire of Romania." The title corresponded exactly to that part of the territories of the Byzantine Empire apportioned to the Venetians in the division of spoils among the crusaders. Since he had been one of the most powerful leaders of the expedition, Dandolo remained in Constantinople to direct all the operations there and also to look out for the interests of Venice. It is said that he had some valuable marble shipped to his son Renier for the construction of the great palace of the Dandolos on the Grand Canal. Ruins of a building in Moorish style and an ancient column of green marble were discovered in an excavation performed during the 19th century in the San Luca section of Venice, where the Dandolo palace had been located.

Dandolo died in Constantinople in 1205 and was buried in the vestibule of the church of Sta. Sophia in a marble tomb, on top of which was sculptured the doge's cap and the coat of arms of St. Mark's. The tomb was probably destroyed when Sta. Sophia was converted to a mosque after the conquest by the Turks in 1453.

When Dandolo became doge, the Venetian republic faced considerable problems both internally and abroad. He resolved the internal problems by giving Venice an advanced civil code and constitutional system. In his pursuit of Venetian interests in the Adriatic and in the East, he was able, through shrewd commercial transactions, to acquire large territorial possessions. His burial at Constantinople was symbolic of that city's importance in the rise of Venice to wealth and power. (An.L.)

Dandolo, Vincenzo (b. Oct. 12, 1758, Venice—d. Dec. 12, 1819, Varese, Kingdom of Lombardy-Venetia), Italian chemist and statesman, an innovator in both science and politics. He helped further democratic ideas in Italy, while his writings, especially on agriculture, won him a reputation throughout Europe.

Of modest origins, Dandolo, after studying chemistry at the University of Padua, became a champion of new scientific theories, especially those of the French chemist Antoine-Laurent Lavoisier.

Politically, Dandolo played a significant role in the revolt against Venice's oligarchy, and, as one of the principal leaders of its provisional municipality (May–October, 1797), he espoused democratic ideals, envisioning a democratic Italian, or at least Venetian, republic. With the fall of the municipality and the Treaty of Campo Formio (October 17), which gave control of Venice to Austria, Dandolo became senator of the Cisalpine Republic, the state created by Napoleon in 1797, and then went to France, where he wrote his chief political work, *Les Hommes nouveaux, ou Moyens d'opérer une régéneration morale* (1799; "The New Men, or Ways to Bring About a Moral Regeneration").

In 1804 Napoleon appointed him general superintendent of Dalmatia. In the five years he held that post, he reorganized somewhat the administration of that province, jealously guarding Dalmatian interests as well as his own prerogatives, a policy that led to his recall. In 1809 he was made a count.

With the fall of Napoleon (1814), Dandolo returned to the huge estates he had amassed in Varese, where he devoted himself to scientific study and writing. His work on wool-bearing animals and on silkworms was notable.

Dandong (China): *see* Tan-tung.

dandruff, skin disorder, a form of seborrheic dermatitis (*q.v.*) that affects the scalp.

dandy fever: *see* dengue.

Danegeld, a tax levied in Anglo-Saxon England to buy off Danish invaders in the reign of Ethelred II (978–1016); it also designates the recurrent gelds, or taxes, collected by the Anglo-Norman kings. The word is not recorded before the Norman Conquest, the usual earlier (Old English) term being *gafol* ("gavel," or "tribute"). Though the Danes were sometimes bought off in the 9th century, the word Danegeld is usually applied to the payments that began in 991 and continued at intervals until 1016. Danegeld is distinct from heregeld, an annual tax levied between 1012 and 1051 to pay Danish mercenaries. The Anglo-Norman and Angevin kings continued the geld until 1162.

Danei, Paolo Francesco: *see* Paul of the Cross, Saint.

Danelaw, also spelled DANELAGH, or DANELAGA, the northern, central, and eastern region of Anglo-Saxon England colonized by invading Danish armies in the late 9th century. In the 11th and 12th centuries, it was recognized that all of eastern England between the Rivers Tees and Thames formed a region in which a distinctive form of customary law prevailed in the local courts, differing from West Saxon law to the south and Mercian law to the west. The region derived its name from the Old English *Dena lagu* ("Danes' law") under the assumption that its unique legal practices were of Danish origin, an assumption borne out by modern scholarship.

The Danes did not settle the whole of this wide area intensively, but their powerful military aristocracy dominated for a sufficient period to leave its imprint on local custom. The area of the Danelaw is marked by the survival of Danish personal names and place-names. In local administration the hundred (*q.v.*) was generally called a wapentake, and the hide (*q.v.*) was generally replaced by the plowland. Its law was distinguished by procedural differences, severe fines for breach of peace, and the existence of an aristocratic jury of presentment to initiate the prosecution of criminal suspects. In the areas of intensive Danish settlement, there were an unusually high number of sokemen, a class of personally free peasants attached to a lord rather than to the land.

Danewirk, also spelled DANEWERK, DANNEWIRK, or DANNEWERK, Danish DANNEVIRKE, or DANEVIRKE (Danes' Bulwark), the ancient frontier rampart of the Danes against the Germans, extending 10.5 miles (17 kilometres) from just south of the town of Schleswig to the marshes of the river Trene near the village of Hollingstedt. The rampart was begun about AD 808 by Godfred (Gudfred), king of Vestfold. In 934 it was penetrated by the German king Henry I, after which it was extended by King Harald I Bluetooth (*c.* 940–*c.* 985); but it was again stormed by the German emperor Otto II in 974. After the union of Schleswig and Holstein under the Danish crown in the 15th century, the Danewirk fell into decay; but in 1848 it was hastily strengthened by the

Danes, who were, however, unable to hold it in face of the superiority of Prussian artillery, and on April 23 it was stormed.

From 1850 onward, Danewirk was again repaired and strengthened at great cost and was considered impregnable; but in the war of 1864 the Prussians turned it by crossing the Schlei, and it was abandoned by the Danes on February 6 without a blow. It was thereupon destroyed by the Prussians. In spite of this destruction, however, a long line of imposing ruins still remains. The systematic excavation of these, begun in 1900, yielded some notable finds, especially of valuable runic inscriptions.

Dang Xuan Khu (Vietnamese Communist leader): *see* Truong Chinh.

Dangerfield, Thomas (b. 1650, Waltham, Essex, Eng.—d. 1685, London), British informer who falsely accused British Roman Catholics of conspiracy during the panic created by the fictitious Popish Plot of 1678, based on Titus Oates's allegations that Catholics were plotting to murder King Charles II and take over the government.

As a young man, Dangerfield robbed his father, a farmer, and was imprisoned several times for counterfeiting and other crimes. Entering the pay of Mrs. Elizabeth Cellier, a Roman Catholic, Dangerfield took on the job of aiding Catholic suspects by defaming their accusers. But he soon betrayed his employer and publicly charged that, through Mrs. Cellier, Catholic nobles had paid him to assassinate Charles II and the Whig leader Anthony Ashley Cooper, 1st Earl of Shaftesbury. Although incriminating papers, planted by Dangerfield, were found in a meal tub at Mrs. Cellier's house, his testimony at her trial was so suspect that she was acquitted of treason.

Dangerfield continued to level charges against high-ranking Catholics, including Charles II's brother James, Duke of York. Finally, in 1685 he was convicted of libel for his anti-Catholic tract "Narrative" (1679). After being publicly pilloried and whipped, he was assaulted and struck in the eye with a cane by a barrister, Robert Frances; he died shortly afterward from the blow.



"Portraitures of the Pillorying and the Whipping of Thomas Dangerfield, 2 July 1685," woodcut; in the Bagford Collection, the British Library

The British Library

Dângrêk Mountains, Khmer CHUŎR PHNUM DÂNGRĒK, French CHAÎNE DE DANGREK, forested range of hills averaging 1,500–2,000 feet (450–600 m) and dividing Thailand from Cambodia. This east–west-trending range extends from the Mekong River westward for approximately 200 miles (320 km), merging with the highland area near San Kamphaeng, Thailand. Essentially the southern escarpment of the sandstone Khorat Plateau of northeastern Thailand, the Dângrêk range slopes gradually northward to the Mun River in Thailand but falls more abruptly in the south to the Cambodian plain. Its highest point is 2,497 feet (761 m).

Dangriga, formerly STANN CREEK, town, east-central Belize, at the mouth of the 20-mile- (32-kilometre-) long North Stann Creek, on the Caribbean coast. Founded in 1823 by black refugees from Honduras, it developed as a port and trading centre for bananas, timber, coconuts, and fish. It has a plant for canning and freezing orange juice. Dangriga is linked by coastal craft to Belize City, 40 miles (65 km) north, by coastal craft and by road to Roaring Creek, 50 miles (80 km) inland. Pop. (1986 est.) 7,700.

Danican-Philidor, André and François-André: *see* Philidor, André; Philidor, François-André.

Daniel OF KIEV, also called DANIEL THE PILGRIM, Russian DANIIL KIEVSKY, OF DANIIL POLOMNIK (fl. 1107), the earliest known Russian travel writer, whose account of his pilgrimage to the Holy Land describes the region as it was before the Crusades. Abbot of a Russian monastery, he visited Palestine probably during 1106–07. His narrative begins at Constantinople; from there he traveled along the west and south coasts of Asia Minor to Cyprus and the Holy Land. Despite his credulity and errors in topography and measurement, his description of Jerusalem, where he lived for more than a year, is detailed and accurate. His account of Easter services there sheds light on the liturgy and ritual of the time. Daniel made three excursions, to the Dead Sea, to Hebron, and to Damascus, where he claims to have accompanied Baldwin I, the Latin king of Jerusalem.

There are 76 manuscripts extant of his account, only five of which are dated earlier than 1500. The work, in an English translation, annotated by C.W. Wilson, is in the Library of the Palestine Pilgrims' Text Society, vol. 4 (1895).

Daniel ROMANOVICH, byname DANIEL OF GALICIA, Russian DANILO, OF DANIIL, ROMANOVICH, OF DANILO GALITSKY (b. 1201—d. 1264), ruler of the principalities of Galicia and Volhynia (now in Poland and the Ukraine, respectively), who became one of the most powerful princes in east-central Europe.

Son of Prince Roman Mstislavich, Daniel was only four years old when his father, who had united Galicia and Volhynia, died in a battle against the Poles (1205). Not until 1221 did Daniel begin to overthrow other pretenders to Roman's succession and assert his authority over Volhynia; and only in 1238 did he finally gain control of Galicia. He then directed his efforts toward enriching his domain, encouraging migrants to settle there, building cities, including Lvov and Chełm, and promoting the development of a flourishing trade through his lands.

After the Mongol invasions (1240–41), however, Daniel was compelled to recognize the khan's suzerainty. Despite his acknowledged allegiance to the khan, he developed close relations with his western neighbours, hoping thus to secure allies who would support his attempt to overthrow the Mongol overlords. To further this plan, he married his sons into the ruling houses of Hungary, Austria, and Lithuania and promised to acknowledge the pope as head of the church in his realm.

No military aid was forthcoming, however, and in 1256 Daniel launched his own campaign and drove the Mongols out of Volhynia (*c.* 1257). But in 1260 another Mongol force entered Volhynia and forced Daniel to destroy the fortifications he had constructed in his major cities. The invaders withdrew but asserted the permanency of their authority by leaving administrative agents to collect taxes and recruit soldiers. Daniel, giving up plans of resistance, lived the rest of his life as an obedient, if a reluctant, vassal of the khan.

Daniel, Arnaut: *see* Arnaut Daniel.

Daniel, The Book of, also called THE PROPHECY OF DANIEL, a book of the Old Testament found in the Ketuvim (Writings), the third section of the Jewish canon, but placed among the Prophets in the Christian canon. The first half of the book (chapters 1–6) contains stories in the third person about the experiences of Daniel and his friends under Kings Nebuchadrezzar II, Belshazzar, Darius I, and Cyrus II; the second half, written mostly in the first person, contains reports of Daniel's three visions (and one dream). The second half of the book names as author a certain Daniel who, according to chapter 1, was exiled to Babylon.

The language of the book—part of which is Aramaic (2:4–7:28)—probably indicates a date of composition later than the Babylonian Exile (6th century BC). Numerous inaccuracies connected with the exilic period (no deportation occurred in 605 BC; Darius was a successor of Cyrus, not a predecessor; etc.) tend to confirm this judgment. Because its religious ideas do not belong to the 6th century BC, numerous scholars date Daniel in the first half of the 2nd century BC and relate the visions to the persecution of the Jews under Antiochus IV Epiphanes (175–164/163 BC).

Daniel, extolled for his upright character, is presented as a model for the persecuted community. The unknown author may have drawn inspiration from Ugaritic and Phoenician sources that speak of a legendary figure notable for his righteousness and wisdom.

The book takes an apocalyptic view of history: the end time is vividly anticipated when the reign of God will be established and the faithful, through a resurrection of the just, will be relieved of their suffering. The book exhorts its hearers and readers to endure, even to the point of martyrdom.

In the Roman Catholic Old Testament, the book includes also The Prayer of Azariah, Song of the Three Young Men, Susanna, and Bel and the Dragon—writings considered apocryphal by Jews and Protestants.

Daniel, Gabriel (b. Feb. 8, 1649, Rouen, Fr.—d. June 23, 1728, Paris), French Jesuit historian whose writings include an outstanding history of France.

Daniel entered the Society of Jesus in 1667, later became librarian of the professed house at Paris, and was appointed historiographer of France by King Louis XIV. In this last capacity he wrote a pioneering work, *Histoire de France depuis l'établissement de la monarchie*

française (1st complete ed., 1713; ed. by P. Griffet, 1755–60; *The history of France from the time the French monarchy was establish'd,* 1732). He also wrote *Histoire de la milice française,* 2 vol. (1721; "History of the French Militia"), and works opposing the ideas of Pascal (*Entretiens de Cléandre et d'Eudoxe sur les lettres provinciales,* 1694) and of Descartes (*Voiage du monde de Descartes,* 1691; *A Voyage to the World of Cartesius,* 1694).

Daniel, Peter V(ivian) (b. April 24, 1784, Crows Nest, Stafford County, Va., U.S.—d. May 31, 1860, Richmond, Va.), associate justice of the U.S. Supreme Court.

Daniel studied law under Edmund Jennings Randolph and quickly rose in politics after his admission to the bar in 1808. He entered the Virginia legislature in 1809 and was elected to the Privy Council in 1824. In 1834 he was made U.S. attorney general by Pres. Andrew Jackson and in 1836 was appointed a federal district judge. Following the death of Justice Philip P. Barbour, Daniel was named to the U.S. Supreme Court by Pres. Martin Van Buren in 1841. He remained a Jeffersonian and an upholder of the principle of states' rights.

Daniel, Samuel (b. 1562?, Taunton, Somerset, Eng.—d. 1619), English contemplative poet, marked in both verse and prose by his philosophic sense of history.

Daniel entered Oxford in 1581. After publishing a translation in 1585 for his first patron, Sir Edward Dymoke, he secured a post with the English ambassador at Paris; later he travelled in Italy, visiting the poet Battista Guarini in Padua. After 1592 he lived at Lincoln in the service of Sir Edward Dymoke, at Wilton as tutor to William Herbert, later earl of Pembroke, and at Skipton Castle, Yorkshire, as tutor to Lady Anne Clifford. In 1604 Queen Anne chose him to write a masque, *The Vision of the Twelve Goddesses,* in which she danced. She awarded him the right to license plays for the boy actors at the Blackfriars Theatre and a position as a groom, and later gentleman, of her privy chamber.

Edmund Spenser praised Daniel for his first book of poems, *Delia,* with *The Complaint of Rosamond* (1592). Daniel published 50 sonnets in this book, and more were added in later editions. The passing of youth and beauty is the theme of the *Complaint,* a tragic monologue. In *The Tragedie of Cleopatra* (1594) Daniel wrote a Senecan drama. *The Civile Warres* (1595–1609), a verse history of the Wars of the Roses, had some influence on Shakespeare in *Richard II* and *Henry IV.*

Daniel's finest poem is probably "Musophilus: Containing a Generall Defence of Learning," dedicated to Fulke Greville. His *Poeticall Essayes* (1599) also include "A Letter from Octavia to Marcus Antonius." His *Defence of Ryme,* answering Thomas Campion's *Observations in the Art of English Poesie,* a critical essay, was published in 1603. Fame and honour are the subjects of "Ulisses and the Syren" (1605) and of *A Funerall Poeme upon the Earle of Devonshire* (1606). He had to defend himself against a charge of sympathizing with the Earl of Essex in *The Tragedie of Philotas,* acted in 1604 (published 1605). His other masques include *Tethys' Festival* (1610), staged with scenery by Inigo Jones, and *The Queenes Arcadia* (published 1606), a pastoral tragicomedy in the Italian fashion. Daniel's last pastoral was *Hymens Triumph* (1615). He also wrote *The Collection of the Historie of England* (1612–18) as far as the reign of Edward III.

Daniell, John Frederic (b. March 12, 1790, London—d. March 13, 1845, London), British chemist and meteorologist who invented the Daniell cell, which was a great improvement over the voltaic cell used in the early days of battery development.

In 1820 Daniell invented a dew-point hygrometer (a device that indicates atmospheric humidity), which came into widespread use. In his *Meteorological Essays and Observations* (1823), Daniell revealed his findings on the behaviour of the atmosphere and on trade winds, in addition to giving details of improved meteorological equipment. In a later edition he also discussed the meteorological effects of solar radiation and the cooling of the Earth. Daniell's *Essay on Artificial Climate Considered in Its Applications to Horticulture* showed the importance of humidity in greenhouses.

In 1831 he became the first professor of chemistry at the newly founded King's College in London. One year later, for his invention of a new pyrometer (a heat-measuring device) and for his papers detailing uses for the pyrometer, Daniell received the Rumford Medal of the Royal Society.

The voltaic cell, though important as the first source of continuous electricity, is of limited use because it begins losing power rapidly as current is drawn. In 1836 Daniell proposed an improved electric cell that supplied an even current during continuous operation. The Daniell cell gave new impetus to electric research and found many commercial applications. In 1837 Daniell was presented the highest award of the Royal Society, the Copley Medal, for the invention of the Daniell cell.

Daniels, Josephus (b. May 18, 1862, Washington, N.C., U.S.—d. Jan. 15, 1948, Raleigh, N.C.), U.S. editor, secretary of the U.S. Navy during World War I, and diplomat.

Daniels was a newspaper publisher in Raleigh, N.C., and became influential in the Democratic Party. He worked for the nomination of Woodrow Wilson for the presidency in 1912 and, upon Wilson's election, was appointed secretary of the Navy, serving until 1921.

In 1933 Pres. Franklin D. Roosevelt appointed Daniels ambassador to Mexico, a post he held until 1944. The appointment was controversial, because in 1914 the U.S. Navy had bombarded the Mexican port of Tampico and had blockaded Veracruz, actions the Mexicans deeply resented. Daniels made special efforts to demonstrate his friendship for the Mexican officials and people; he eventually won their confidence and became Roosevelt's most trusted adviser on issues affecting Mexico. When in 1938–39 Pres. Lázaro Cárdenas expropriated the properties of foreign oil corporations in Mexico, Daniels helped to prevent the incident from disrupting Mexican–U.S. relations.

Danielsen, Karen: *see* Horney, Karen.

Danielsson, Anders (b. Jan. 14, 1784, Bondarp, Swed.—d. April 22, 1839, Surte), the foremost peasant leader in early 19th-century Sweden.

Danielsson was elected to the peasant chamber of the Riksdag (Parliament) in 1809. At the height of his career he came to represent 27 districts in that body, a unique achievement in Swedish parliamentary history. The peasant program for which he fought included such points as reduced military expenditures, mass public education, sharp cutbacks in civil-service spending, free trade, free choice of occupation, and abolition of land taxes. These points were ultimately achieved, as was increased representation in the Riksdag, a persistent demand of the general liberal opposition to the government during the middle decades of the century. Danielsson was a leader of that opposition and worked closely with his counterpart in the nobles' chamber, Count Carl Henrik Anckarsvärd.

Daniil KIEVSKY, also called DANIIL POLOMNIK: *see* Daniel of Kiev.

Danilevsky, Nikolay Yakovlevich (b. Dec. 10 [Nov. 28, old style], 1822, Obertse, Oryol Guberniya (province), Russia—d. Nov. 19 [Nov. 7, O.S.], 1865, Tiflis, Russian Georgia), Russian naturalist and historical philosopher, author of *Rossiya i Evropa* (1869; "Russia and Europe"), who was the first to propound the philosophy of history as a series of distinct civilizations. According to him, Russia and the Slavs should remain indifferent to the West and concentrate on the development of political absolutism, their own special cultural heritage—not necessarily better than but different from that of the West. Danilevsky was said to have "given Russian nationalism a biological foundation." His ideas influenced Konstantin Leontev among Russian thinkers and, among Western philosophers, Oswald Spengler.

Danilo I, in full DANILO NIKOLA PETROVIĆ-ŠĆEPČEVIĆ (b. *c.* 1670—d. Jan. 11, 1735), the first ruler of Montenegro of the Petrović-Njegoš dynasty, which lasted from 1697 to 1918, when Montenegro was absorbed into the new Yugoslav state.

In 1696, Danilo was nominated *vladika,* or bishop-prince, with power to select his successor from among his relatives—thus confirming the hereditary principle in the nation's theocratic system. The succession was henceforth regularly from uncle to nephew, owing to the rule of celibacy imposed on the ruling monastic order.

The reign of Danilo I was memorable for the massacre of the Muslims settled in the principality (the "Montenegrin Vespers") on Christmas Eve 1702; the great defeat of the Turkish invaders at Tzarevlatz (1712); the capture of Cetinje by the Turks and the destruction for the third time of its monastery (1714); and the inauguration of intimate relations with Russia when Danilo visited Peter the Great in 1715. With Russian aid, Danilo was enabled in some degree to repair the ruin that had overtaken his little realm. He was succeeded by his nephew Sava Petrović (reigned 1735–67).

Danilo II, in full DANILO PETROVIĆ NJEGOŠ (b. May 25, 1826, Njegoš, Montenegro—d. Aug. 13, 1860, Kotor), prince-bishop (1851–52) and then prince (1852–60) of Montenegro, who elevated Montenegro to a hereditary principality.

He became ruler of Montenegro upon the death of his uncle, Peter II Petrović Njegoš, the elective prince-bishop, and assumed the title of prince the following year (1852). He defeated the Turks near Ostrog in 1853 but refrained from attacking them during the Crimean War. His pacific policy produced much discontent among the warlike mountaineers, which culminated in an open revolt. His demand for the recognition of Montenegrin independence and other claims were set aside by the Congress of Paris. In 1858 his brother Mirko, "the Sword of Montenegro," routed the Turks with great slaughter at Grahovo. In 1855 Danilo II promulgated a new code, assuring civil and religious liberty to his subjects. On Aug. 11, 1860, he was shot at Persano on the Bocche di Cattaro by a Montenegrin whom he had exiled after the revolt, and he died two days afterward. He left no male offspring and was succeeded by Nicholas, the son of his brother Mirko.

Danilo Romanovich: *see* Daniel.

Danilova, Alexandra, Russian in full ALEKSANDRA DIONISYEVNA DANILOVA (b. Nov. 20, 1904, Peterhof, Russia), prima ballerina who brought to U.S. ballet the training and traditions of both the classical Russian and the modern Diaghilev repertoires.

Danilova attended the Russian Imperial and Soviet State Ballet schools in Leningrad, where she studied under Agrippina Vaganova and became soloist at the Mariinsky (now Kirov)



Danilova in *Swan Lake*
Penguin Photo Collection

Theatre. In 1924 she visited western Europe with a small ballet ensemble headed by George Balanchine. The entire group joined Sergey Diaghilev's Ballets Russes and never returned to Russia. Danilova soon rose to prominence in the Diaghilev company, creating leading roles in *Apollon Musagète, La Pastorale,* and *The Triumph of Neptune.* After Diaghilev's death in 1929, she joined the Ballet Russe de Monte Carlo and, as its prima ballerina, made her American debut in 1933 and toured the United States extensively. Danilova appeared as guest artist with several ballet companies, including Sadler's Wells Ballet, and with her own company (Great Moments of Ballet, 1954–56) toured Japan, the Philippines, and South Africa. She won note both for her extensive repertoire, ranging from romantic to abstract Balanchine roles, and for the individuality of her characterizations, particularly the street dancer in *Le Beau Danube,* the glove seller in *Gaîté Parisienne,* Odette in *Swan Lake,* and Swanilda in *Coppélia.*

Danilova also appeared in musical comedy (*Oh Captain!,* 1958), taught, and made lecture tours. She played a small but significant role in the motion picture *The Turning Point* (1977). As a faculty member of the School of American Ballet, she staged excerpts from classical ballets for the annual workshops and staged, with Balanchine, the full *Coppélia* for the New York City Ballet (1974–75). She also staged ballets for other companies.

danio, any of several slender tropical fishes of the genera *Danio* and *Brachydanio* in the carp family, Cyprinidae. Danios are hardy and swim actively about in schools. They are generally about 4–5 cm (1.5–2 inches) long. Several are often kept in home aquariums. Among these are the zebra danio, or zebra fish (*B. rerio*), a popular species with lengthwise blue and yellow stripes, and the giant danio (*D. malabaricus*), a striped blue and yellow fish about 11 cm (4 inches) long.

Danish language, Danish DANSK, official language of Denmark; it belongs to the East Scandinavian branch of the North Germanic languages. The language began to separate from the other Scandinavian languages, to which it is closely related, about AD 1000. The oldest Danish records are runic inscriptions (*c.* AD 250–800) found from Jutland to southern Sweden; the earliest manuscripts in Danish date from the 13th century.

Danish is clearly the Scandinavian language that has undergone the greatest amount of change away from the earlier Common Scandinavian norm. During the Middle Ages it gradually lost the old case system and acquired many Low German words, prefixes, and suffixes from contact with the traders of the Hanseatic League. Modern Danish has only two cases (nominative and genitive) and two genders (common and neuter). The most outstanding feature of its sound system is the glottal stop (*stød*), derived from what was originally a tonal accent.

Because of the great amount of political power and influence wielded by Denmark throughout Scandinavia and in Iceland, Danish had some influence on the Swedish and Icelandic languages and was the official written and administrative language of Norway from the Reformation until the 19th century.

Danish literature, the body of writings in the Danish language.

A brief treatment of Danish literature follows. For full treatment, *see* MACROPAEDIA: Scandinavian Literature.

The first written evidences of Danish may be found in runic inscriptions, the extant majority of which date from 800 to 1100. With the introduction of Christianity in the 12th century, Latin became the predominant literary language of Denmark and remained so until the Protestant Reformation of 1536, when a new literary movement was inaugurated in the native tongue.

The European literary Renaissance that reached Denmark in the 17th century led to a strict adherence to classical forms and a great era of science and scholarship. Ludvig Holberg and Johan Herman Wessel, both Norwegian by birth, were influential in the 18th century in creating a modern Danish literature. Adam Oehlenschläger was the leader of the 19th-century Romantic movement in Denmark. The religious philosopher Søren Kierkegaard, on the other hand, occupies a somewhat isolated position in Danish literature. Hans Christian Andersen, the 19th-century master of the fairy tale, was Danish. About 1870 Georg Brandes initiated a naturalistic movement that influenced August Strindberg, Henrik Ibsen, and other Scandinavian writers. Denmark subsequently produced several important fiction writers, among whom were Henrik Pontoppidan, Martin Andersen Nexø, and Isak Dinesen.

Dānishmend DYNASTY, also spelled DANIŞMEND, Turkmen dynasty that ruled in the Sivas-Kayseri-Malatya-Kastamonu region of central and northeastern Anatolia from about 1071 to 1178.

Dānishmend (Danişmend), founder of the dynasty, first appeared in Anatolia as a *gazi* (warrior for the faith of Islām) during a period of confusion that followed the death of the Seljuq sultan Sulaymān ibn Qutalmīsh in 1086. In 1102 Dānishmend took Malatya, but, when he died in 1104, the city was captured by the Seljuq sultan Qilij Arslan.

Dānishmend's son and successor, Gazi, intervened in dynastic struggles among the sons of Qilij Arslan and helped Mas'ūd seize power in 1116. Gazi then captured Malatya, Ankara, Kayseri, and Kastamonu from Mas'ūd's rivals (1127). Finally in 1133 Gazi recaptured Kastamonu from the Byzantine emperor John II Comnenus, who had taken it the previous year. The caliph al-Mustarshid and Sanjar, the Seljuq sultan of Iraq-Iran, rewarded Gazi for his victories over the Christians by granting him the title of malik (king). Gazi died, however, in 1134, and his son Mehmed (Muḥammad) took the title instead.

When Mehmed died (1142), the Dānishmend territory was divided among his two brothers—Yağibasan (Yaghibasan) in Sivas and ʿAyn ad-Dawlah in Malatya-Elbistan—and his son Dhū an-Nūn in Kayseri. After Yağibasan's death (1164), the Seljuq sultan Qilij Arslan II intervened repeatedly in the affairs of the Sivas and Kayseri branches and finally invaded Dānishmend territory; but he was stopped by Dhū an-Nūn's father-in-law, Nureddin of Mosul. Nureddin died in 1174, however, and Qilij was able to take Sivas, the Yeşil Irmak (Iris) valley, Tokat, and Amasya (1175), and Dhū an-Nūn was slain. The Malatya branch came under Seljuq control in 1178, thus marking the end of the Dānishmend dynasty.

Dānishmend, the first ruler, is the hero of an oral epic tradition, the *Dānishmendnāme,* which first appeared in written form about 1245.

Danjon, André-Louis (b. April 6, 1890, Caen, France—d. April 21, 1967, Paris), French astronomer noted for his important developments in astronomical instruments and for his studies of the Earth's rotation.

Danjon served in the French army (1914–19) and then became an astronomer at the University Observatory at Strasbourg. In 1930 he became its director, and the following year he was appointed professor of astronomy at the University of Strasbourg. In 1945 Danjon became director of the Paris Observatory and in 1946 attained the post of professor of astronomy at the Sorbonne. He became director of the Institute of Astrophysics of Paris in 1954.

While studying the methods of positional astronomy, Danjon concluded that the transit had reached its ultimate in precision and began looking for a fundamentally new instrument. The result of his work was the prismatic 60° astrolabe, now known as the Danjon astrolabe. Within four years of its introduction (1956), the Danjon astrolabe was being used in more than 30 major observatories.

Danjon developed other precise instruments for positional and magnitude determinations and used them to investigate the irregularities in the rotational period of the Earth. In 1958 he concluded that certain sudden increases in the Earth's rotational period coincided with exceptionally intense solar activity.

He served as president of the International Astronomical Union (1955–58) and retired from academic life in 1963.

Danmark: *see* Denmark.

Dannay, Frederic: *see* Queen, Ellery.

Dannewirk, also spelled DANNEWERK (Danish fortification): *see* Danewirk.

D'Annunzio, Gabriele (b. March 12, 1863, Pescara, Italy—d. March 1, 1938, Gardone Riviera, on Lake Garda), Italian poet, novelist, dramatist, short-story writer, journalist, military hero, and political leader, the leading writer of Italy in the late 19th and early 20th centuries.

The son of a politically prominent and wealthy Pescara landowner, D'Annunzio was educated at the University of Rome. When he was 16 his first poems, *Primo vere* (1879; "In Early Spring"), were published. The poems in *Canto novo* (1882; "New Song") had more individuality and were full of exuberance and passionate, sensuous descriptions.



D'Annunzio
EB Inc.

The autobiographical novel *Il piacere* (1898; *The Child of Pleasure*) introduces the first of D'Annunzio's passionate Nietzschean-superman heroes; another appears in *L'innocente* (1892; *The Intruder*). D'Annunzio had already become famous when his best-known novel, *Il trionfo della morte* (1894; *The Triumph of Death*), appeared. It and his next major novel, *Le vergini delle rocce* (1896; *The Maidens of the Rocks*), featured viciously self-seeking and wholly amoral Nietzschean heroes.

D'Annunzio continued his prodigious literary production until World War I. His major poetic work is the lyrical collection *Laudi del cielo del mare della terra e degli eroi* (1899; "In Praise of Sky, Sea, Earth, and Heroes"). The third book in this series, *Alcyone* (1904), a re-creation of the smells, tastes, sounds, and experiences of a Tuscan summer, is considered by many his greatest poetic work.

In 1894 D'Annunzio had begun a long liaison with the actress Eleonora Duse and had turned to writing plays for her, notably the tragedies *La gioconda* (performed 1899) and *Francesca da Rimini* (performed 1901). He eventually broke off the relationship and exposed their intimacy in the erotic novel *Il fuoco* (1900; *The Flame of Life*). D'Annunzio's greatest play was *La figlia di Iorio* (performed 1904; *The Daughter of Jorio*), a powerful poetic drama of the fears and superstitions of Abruzzi peasants.

New plays and a novel followed, but these failed to finance D'Annunzio's extravagant lifestyle, and his indebtedness forced him to flee to France in 1910. When World War I broke out, he returned to Italy to passionately urge his country's entry into the war. After Italy declared war he plunged into the fighting himself, seeking out dangerous assignments in several branches of the service, finally in the air force, where he lost an eye in combat.

In 1919 D'Annunzio and about 300 supporters, in defiance of the Treaty of Versailles, occupied the Dalmatian port of Fiume (Rijeka in present-day Croatia), which the Italian government and the Allies were proposing to incorporate into the new Yugoslav state but which D'Annunzio believed rightly belonged to Italy. D'Annunzio ruled Fiume as dictator until December 1920, at which time Italian military forces compelled him to abdicate his rule. Nevertheless, by his bold action he had established Italy's interest in Fiume, and the port became Italian in 1924. D'Annunzio subsequently became an ardent Fascist and was rewarded by Benito Mussolini with a title and a national edition of his works, but he exercised no further influence on Italian politics. He retired to Gardone Riviera in Lombardy and wrote some memoirs and confessions.

D'Annunzio's colourful career, his scandalous amours, his daring in wartime, his eloquence and political leadership in two national crises, all contributed to make him one of the most striking personalities of his day. D'Annunzio's literary works are marked by their egocentric perspective, their fluent and melodious style, and an overriding emphasis on the gratification of the senses, whether through the love of women or of nature. Apart from certain interesting autobiographical works such as *Il notturno* (1921), D'Annunzio's prose is somewhat tedious; he was too receptive of contemporary thought and style, so that his work is liable to indiscriminately reflect the influences of other writers. The same can be said of most of his plays, with the exception of *La figlia di Iorio,* which has powerful and vivid characterizations.

As a poet D'Annunzio derived much of his power from his great emotional susceptibility. Already in *Primo vere* and *Canto novo,* he had shown an astonishing gift for rendering with precision and power the healthy exuberance and youthful intensity of a boy in love with nature and women. Though he then turned to morbid and decadent themes in his subsequent poems, he recovered the vitality of his inspiration and found a new, more musical form for its expression in the great work of his maturity, the *Laudi,* and especially its third book, *Alcyone.* Some of the poems in this book, in which D'Annunzio proclaims his sensuous, joyful feeling of communion with nature, are among the masterpieces of modern Italian poetry.

Danquah, J.B., in full JOSEPH KWAME KYERETWI BOAKYE DANQUAH (b. December 1895, Bepong, Gold Coast [now Ghana]—d. Feb. 4, 1965, Nsawam, Ghana), the dean of Ghanaian nationalist politicians and one of the principal opposition leaders against Kwame Nkrumah.

Educated in law and philosophy in London, Danquah established a private law practice after his return to the Gold Coast (later Ghana) in 1927. He founded a newspaper, the *Times of West Africa,* in 1931 and served as secretary-general of the Gold Coast Youth Conference (1937–47).

Danquah actively sought constitutional reforms in the early 1940s and became a member of the Legislative Council in 1946. In 1947 he helped found the moderate United Gold Coast Convention (UGCC), a party mainly of the westernized elements of Gold Coast society that demanded eventual self-government. Nkrumah was asked to be secretary-general, but in 1949 he left the UGCC to found the more radical and mass-oriented Convention People's Party (CPP). Meanwhile, Danquah and several other UGCC members had joined an official commission on constitutional reform, which probably contributed to a loss of mass support; CPP leaders publicly accused him of selling out.

Danquah was elected to the Legislative Assembly in 1951, but he failed to be reelected in 1954 and 1956. Nevertheless, in 1960 he decided to run against Nkrumah for president; he received only 10 percent of the vote, however. Danquah continued to attack the dictatorial aspects of Nkrumah's government, and in 1961 he was imprisoned under the Preventive Detention Act. Released in 1962 and chosen president of the Ghana Bar Association, he was again imprisoned early in 1964 and died a year later.

Dansalan (Philippines): *see* Marawi.

danse basse (dance): *see* basse danse.

danse macabre: *see* death, dance of.

Dante, in full DANTE ALIGHIERI (b. *c.* May 21–June 20, 1265, Florence, Italy—d. Sept. 13/14, 1321, Ravenna), Italian poet, prose writer, literary theorist, moral philosopher, and political thinker. His Christian epic, *The Divine Comedy,* is a landmark of world literature.

A brief treatment of Dante Alighieri follows. For full treatment, *see* MACROPAEDIA: Dante.

Born of a Florentine family of noble ancestry, Dante grew up in Florence. A member of the White Guelf party, he played a part in the political struggles that divided the city, and he served the city administration during the White Guelf ascendancy (1295–1301). After the triumph of the Black Guelfs, who were supported by the pope, Dante and his associates were exiled, and after 1302 he never entered Florence again. A wanderer sheltered by various Italian cities and princely rulers, he made his final home in Ravenna.

Dante married about 1285, but his life was given its direction by his spiritual love for Beatrice Portinari (d. 1290), whom he first saw as a child when he himself was nine years old. She remained his ideal lady, the inspiration of his poetry and of his Christian devotion.

Dante's chief works are *La vita nuova* (*c.* 1293; *The New Life*), a celebration in verse and prose of his love for Beatrice; the *De vulgari eloquentia* (1304–07; *Concerning Vernacular Eloquence*), the first theoretical discussion and definition of the Italian literary language; *Il convivio* (*c.* 1304–07; "The Banquet"); and a Latin treatise on man's temporal and spiritual goals, *De monarchia* (*c.* 1313; *On Monarchy*), which sets forth his view of the Christian polity. The epic poem *La divina commedia* (*The Divine Comedy*), probably begun in the first decade of the 14th century but not completed until late in the poet's life, sums up all his thoughts and feelings about himself and the temporal and eternal worlds. Inspired by the ideal of Beatrice, the poet describes his journey through hell, conducted by Virgil, through purgatory, and up to paradise under the guidance of Beatrice. *See also* Divine Comedy, The.

Dante chair: *see* scissors chair.

Dantin, Louis: *see* Seers, Eugène.

Dantiscus, Johannes (Latin), Polish JAN DANTYSZEK, also called JAN FLACHSBINDER (b. Oct. 31, 1485, Gdansk, Pol.—d. Oct. 27, 1548, Lidzbark Warmiński), Polish author, in Latin, of incidental verse, love poetry, and panegyric (formal speeches of praise). Dantiscus was among the first representatives in Poland of Renaissance humanism. He was a courtier to the Polish king Sigismund I and accompanied the king to Vienna in 1515. Later in life he joined the Roman Catholic church, becoming bishop of Chełmno in 1530 and prince bishop of Warmiński in 1537.

Danton, Georges, in full GEORGES-JACQUES DANTON (b. Oct. 26, 1759, Arcis-sur-Aube, France—d. April 5, 1794, Paris), French Revolutionary leader and orator, often credited as the chief force in the overthrow of the monarchy and the establishment of the First French Republic (Sept. 21, 1792). He later became the first president of the Committee of Public Safety, but his increasing moderation and eventual opposition to the Reign of Terror led to his own death at the guillotine.

Early years. Danton was the son of Jacques Danton, an attorney, and his second wife, Marie-Madeleine Camus. After attending school in Champagne, Danton was from 1773 educated by the Oratorians at Troyes. After



Danton, portrait by Mme Constance-Marie Charpentier; in the Musée Carnavalet, Paris

J.E. Bulloz

obtaining his law degree in 1784 at Reims, he went to Paris to practice and in 1787 bought the office of advocate in the Conseil du Roi (council with legislative and judicial functions). He then married Antoinette Charpentier.

At the outbreak of the Revolution in July 1789, Danton enrolled in the *garde bourgeoise* (civic guard) of the Cordeliers district and was elected president of the district in October. In the spring of 1790, with some militants from his district, he founded the popular association that was to become famous as the

Club of the Cordeliers. So far, however, Danton's fame had been merely local. Elected a member of the provisional Paris Commune (city council) in January 1790, he was excluded from the council in its final form in September. Although elected administrator of the *département* of Paris in January 1791, he actually exercised no influence on that body.

Meanwhile, however, Danton shone at the Club of the Cordeliers and at another political association, the Club of the Jacobins, before both of which he frequently made speeches during 1791. During the crisis following Louis XVI's attempt to leave the country in June, he became increasingly prominent in the Revolutionary movement. His signature, however, does not appear on the famous petition of the Cordeliers demanding the abdication of Louis XVI that, on July 17, resulted in the massacre of some of the petitioners by the national guard. During the repression following these events, Danton took refuge in London.

He returned to Paris to take part in the elections to the Legislative Assembly as elector for the Théâtre Français section, and in December 1791 he was elected second assistant to the *procureur* (public prosecutor) of the Paris Commune.

During the national crisis in the spring of 1792 (war was declared on Austria and Prussia on April 20), Danton resumed his role of tribune of the people. On June 18 he attacked the Marquis de Lafayette, an adviser of the King and a general, for using his position to play politics. Yet he took no part in the demonstrations before the royal palace of the Tuileries on June 20. Although his part in the overthrow of the monarchy by the insurrection of Aug. 10, 1792, remains obscure, he was largely credited with its success.

The overthrow of the monarchy. Speaking before the Revolutionary Tribunal, Danton boasted that he had "been responsible for" the events of August 10; that insurrection, however, was not the result of the efforts of Danton or any other man but, rather, the collective act of obscure militants from all over the city. However small a part he played in removing the King, he was elected minister of justice by the Legislative Assembly. Though not officially its president, in the new government Danton dominated his colleagues by his strength of character, the aura of his Revolutionary past, and his ability to make swift decisions.

When the news arrived that Longwy had been taken by the invading allies on Aug. 25, 1792, and Jean-Marie Roland, minister of the interior, proposed that the government should move from Paris to Blois, Danton objected vigorously. The proclamation he then caused the Executive Council to adopt bears his stamp: it was a summons to battle. On the morning of September 2, when it was learned in Paris that Verdun was besieged and while the populace broke into the prisons to search for suspects and traitors, Danton, in the Legislative Assembly, delivered the most famous of his speeches: "To conquer the enemies of the fatherland, we need daring, more daring, daring now and always, and France is saved!"

The massacres of September 1792. While Danton was delivering this speech, the prison massacres began for which the Girondins, the moderate wing of the Revolution, charged Danton with responsibility. There is no proof, however, that the massacres were organized by him or by anyone else, though it is certain that he did nothing to stop them. Just as in the case of the August insurrection, the September massacre was not the act of one man but of the people of Paris.

On September 6 Danton was elected deputy for Paris to the National Convention. He immediately made every effort to end all the disputes between the Revolutionary parties, but his policy of conciliation was thwarted by the Gironde, which demanded that he render an accounting when he left his post as minister of justice. Danton could not justify 200,000 livres of secret expenditures. He emerged from this conflict embittered and with his political prestige diminished.

Sent on a mission to Belgium, Danton took no part in the opening of Louis XVI's trial in the Convention. He was present, however, on Jan. 15, 1793, and voted for death without reprieve. Although absent from the trial, Danton had played a part in it since the autumn of 1792. According to the *Mémoires* of Théodore, comte de Lamath, a former Revolutionary, Danton wanted to spare the King. It seems that, having failed, despite strenuous efforts, to gain the support of the Girondins, Danton plotted with Gen. Charles-François du Périer Dumouriez to obtain the intervention of the English government by bribery. Only when the plan miscarried did he vote for the death of the King.

Danton remained in the mainstream of the Revolution, not without often engaging in intrigue. His dealings with Dumouriez, who commanded the army of Belgium, have never been clarified. After the defeat of Neerwinden (March 18, 1793), when Dumouriez went over to the Austrians, the Gironde accused Danton of complicity with the General. Boldly turning the tables, Danton made the same accusation against the Girondins. The break was irreparable.

Danton's Committee of Public Safety. On April 7, 1793, Danton became a member of the first Committee of Public Safety, which, created the previous day, became the executive organ of the Revolutionary government. For three months Danton was effectively the head of the government, charged especially with the conduct of foreign affairs and military matters. During this second period in the government he pursued a policy of compromise and negotiation. He tried in every direction to enter into diplomatic conversations with the enemy. No doubt he could in all honesty think it useful to negotiate in an attempt to dissolve the allied coalition or even to obtain a general peace. By the spring of 1793, however, a policy of negotiation was no longer conceivable: it was useless to try to disarm the enemy by concessions when he was victorious. On July 10, when the Committee of Public Safety's term expired, the Convention elected a new committee without Danton.

Leader of the moderate opposition. From that time Danton's political conduct became more complex. On various occasions he supported the policy of the Committee of Public Safety though at the same time refusing to play a part in it—which would have stabilized the political situation. Danton still reappeared from time to time as the tribune of the people, voicing the demands of the masses. He quickly showed, however, that he sought to stabilize the Revolutionary movement; very soon—whether he wanted it or not—he appeared as the leader of the Indulgents, the moderate faction that had risen out of the Cordeliers.

During the great Parisian popular demonstrations of Sept. 4 and 5, 1793, Danton spoke eloquently in favour of all the popular demands. Yet at the same time he tried to set bounds to the movement and keep it under control. He demanded, for instance, that the meetings of the hitherto permanent sectional assemblies be reduced to two per week.

Disapproval of terror. Danton's moderate position became more marked in the autumn of 1793. He did not, however, intervene personally but left it to his friends to criticize the policy of the government. His disapproval of the terrorist repression had become so strong that he withdrew from political life, alleging reasons of health or of family. Of the Girondins he is reported to have said to a friend at the beginning of October 1793, "I shall not be able to save them," and to have burst into tears. On October 12 he obtained leave from the Convention and left for his native town. He returned on November 21, although the reasons for his return remain ambiguous.

Danton at once resumed political activity. He vigorously supported the Committee of Public Safety against excesses of the anti-Christian movement and later opposed the abolition of the salaries of constitutional priests and hence the separation of church and state. Danton's support of the governmental policy of stabilization was doubtless not without ulterior motives, both personal and political; he was determined to save friends of his who had been arrested or who were in danger of arrest. But he also wanted to slow the Revolutionary drive of the government. The Dantonist policy was opposed in all points to the program of popular extremism supported by Jacques Hébert and his Cordeliers friends: extreme terror, war to the hilt.

Danton defined his moderate political line on Dec. 1, 1793, when he informed the Revolutionary radicals that their role was ended. From then on, whether such had been his intention or not, he was looked upon as the leader of the moderate opposition. At the beginning of 1794, Danton and his friends took an even more critical attitude, with the Revolutionary journalist Camille Desmoulins, of *Le Vieux Cordelier,* serving as their spokesman. They were challenging not only the system of the terror of Robespierre but the whole policy of the Revolutionary government, while awakening the hopes of the opponents of the regime.

Once the government realized it could not allow itself to be overwhelmed from the right, however, the tide turned abruptly. When Fabre d'Églantine, the dramatist and zealous Revolutionary, compromised in the affair of the Compagnie des Indes, was arrested in January 1794, Danton tried to defend him obliquely by demanding that the arrested deputies should be judged before the people. "Woe unto him who sat beside Fabre and who is still his dupe!" cried a deputy, clearly threatening Danton himself.

The incident signalled more than the defeat of the offensive of the Indulgents, for, already compromised, they were themselves soon threatened by the counteroffensive of their adversaries, Hébert's ultra-left faction, the Exagérés, or Enragés. When the crisis, however, became more acute and the Exagéré opposition hardened its position, the government lost its patience: in March 1794, Hébert and the principal Cordeliers leaders were arrested. Sentenced to death, they were executed on March 24. The Indulgents, believing that their hour had come, increased their pressure. The government, however, had no intention of letting itself be overwhelmed by the moderate opposition of the right. Warned several times of the threats that hung over him, Danton remained unafraid: "They will not dare!" Finally, during the night of March 29–30, 1794, he and his friends were arrested.

Trial of Danton. Before the Revolutionary tribunal, Danton boldly spoke his mind. To silence him, the Convention decreed that a suspect on trial who insulted national justice be excluded from the debate. "I will no longer defend myself," Danton cried. "Let me be led to death, I shall go to sleep in glory." Danton was guillotined with his friends on April 5, 1794. "Show my head to the people," he said to the executioner. "It is worth the trouble."

Assessment. Denigrated during the first half of the 19th century, Danton was rehabilitated under the Second Empire and enshrined as a hero under the Third Republic. A chief controversy about him is the problem of his wealth and, hence, of his venality. To his con-

temporaries, Danton's venality was obvious, even though, for lack of documentation, it was not proved during his lifetime. It is now generally accepted that Danton was used as an informer by the court and that in return he received payments from the funds of the Civil List. At the same time, however, his attachment to the nation and to the Revolutionary cause is beyond doubt.

Danton was a leader of men. More than any other Revolutionary leader, he could enter into communion with the sansculottes—the Revolutionary have-nots—to share their passions. He pleased the people by his generosity, his indulgence, his verve. All these were characteristics that won him the sympathy of the people and that, during the crisis of the summer of 1792, enabled him to serve the Revolution well. (Al.S./Ed.)

BIBLIOGRAPHY. Biographies examining his life and influence on the events of the French Revolution include Louis Madelin, *Danton* (1921); the excellent work by Hermann Wendel, *Danton* (1935); and Norman Hampson, *Danton* (1978, reprinted 1988).

Dantzig, François-Joseph Lefebvre, Duke (duc) **de:** *see* Lefebvre, François-Joseph.

Danube River, German DONAU, Slovak DUNAJ, Serbo-Croatian and Bulgarian DUNAV, Romanian DUNĂREA, Russian DUNAY, river of Europe, second longest after the Volga, rising in the Black Forest of Germany; it flows for approximately 1,770 miles (2,850 km) through the southeastern portion of the continent to the Black Sea.

A brief treatment of the Danube River follows. For full treatment, *see* MACROPAEDIA: Europe.

During its course the river flows along or through Germany, Austria, Slovakia, Hungary, Croatia, Yugoslavia, Bulgaria, Romania, and Moldova. The Danube basin covers an area of 315,000 square miles (817,000 square km); approximately 56 percent of this is drained by its right bank tributaries, which collect their waters from the Alps and other mountainous areas. Its average annual discharge is 227,000 cubic feet per second (6,430 cubic metres per second).

The Danube begins as two small springs—the Breg and the Brigach—that emerge from the eastern slopes of the Black Forest mountains. The headstreams unite at Donaueschingen, and the river flows northeastward in a narrow, rocky bed. Between Ingolstadt and Regensburg the Danube forms a scenic, canyonlike valley on the left side. Located to the right of the river's course is the Bavarian Plateau, which is covered with thick layers of river deposits from the Alpine tributaries. The Danube reaches its northernmost point at Regensburg, then it veers to the southeast through Passau and into Austria, where it cuts into the slopes of the Bohemian Forest and forms a narrow valley. After flowing through Vienna, the Danube enters the Little Alfold plain immediately after its emergence from the Hungarian Gates Gorge near Bratislava, Slovakia. The river in this area is characterized by low banks and a riverbed that reaches a width of more than 1 mile (1.6 km). East of Komárno the Danube enters the Visegrád Gorge, squeezed between the foothills of the Western Carpathian and the Hungarian Transdanubian mountains. The river flows southward past Budapest and across the vast Great Alfold plain and then eastward past Belgrade until it reaches the Iron Gate Gorge, the site of a major hydroelectric and navigation development. In this long stretch the river takes on the waters of its major tributaries: the Drava, the Tisza, and the Sava. Beyond the Iron Gate the lower Danube flows across a wide plain, running between the tableland of the Danubian Plain of Bulgaria (south) and the Romanian Plain (north). Entering Romania west of Călăraşi, it flows northeastward until, at Rasovar, the river heads northward toward Galaţi, where it veers abruptly to the east. Near Tulcea it begins to spread out into its delta. Here the Danube splits into three channels that make their way to the Black Sea some 50 miles (80 km) further east. The lower Danube is a major avenue for freight transport, and in its upper course it is an important source of hydroelectricity.

The Main-Danube Canal (*q.v.*) runs for 106 miles (171 km) between Kelheim on the Danube and Bamberg on the Main River, permitting traffic to flow between the North Sea and the Black Sea. Construction of the canal was completed in 1992.

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Danube school, German DONAUSCHULE, a tradition of landscape painting that developed in the region of the Danube River valley in the early years of the 16th century.

A number of painters are considered to have been members of the Danube school. Chief among them was the Regensburg master Albrecht Altdorfer (*c.* 1480–1538), whose real subject, although he often included figures in his compositions and gave some of his paintings religious titles, was nature; he saw man's presence in nature as more or less incidental. Altdorfer's interest in the changes caused by light at different times of the day and the changes of the seasons of the year, as well as the continuous cycle of growth, decay, and rebirth, link him spiritually with both Baroque and the 19th-century Romantic landscapists.



"Danube Landscape near Regensburg," Danube school painting by Albrecht Altdorfer, oil on panel, *c.* 1522–25; in the Alte Pinakothek, Munich
By courtesy of the Alte Pinakothek, Munich

The early works of Lucas Cranach (1472–1553) are also typical of the Danube landscape style. Altdorfer's landscapes can be characterized as poetic and enchanting, whereas Cranach's were expressive and dramatic in contrast. In Cranach's work the mood of nature has been adjusted to complement the subject.

Other important painters of this school include the Austrian Wolf Huber and the German Jorg Breu the Elder. Also notable was the German sculptor Hans Leinberger.

Danubian culture: *see* LBK culture.

Danvers, urban town (township), Essex county, eastern Massachusetts, U.S., just northeast of Boston. Founded in the 1630s by Governor John Endecott, it was part of Salem and originally known as Salem Village (site of the witchcraft hysteria of 1692). Set off from Salem as a district in 1752, it was incorporated in 1775 (a 1757 act of incorporation had been invalidated because of supposed opposition by the British king George II) and renamed for the Danvers Osborne family of New York. In 1855 South Danvers became a separate town and was renamed Peabody in 1868. Shoemaking, carpet making, and brickmaking were early industries. Danvers has some light manufacturing and is the site of a state hospital and the Hawthorne State School for Children. Many colonial homes have been restored, and the town is the birthplace of the Revolutionary



Birthplace of General Putnam, Danvers, Mass.
Mark Sexton



The confluence of the Sava (foreground) and Danube rivers from the Kalemegdan Fortress, Belgrade, Yugos.
Jean S. Buldain/Berg & Assoc

War leader Gen. Israel Putnam. Pop. (1990) 24,174.

Danville, city, seat (1827) of Vermilion county, eastern Illinois, U.S., on the junction of forks of the Vermilion River (there bridged). The city stands on the site of a former Piankashaw Indian village, and a number of trails passed through or terminated there in the early days. The location of salt deposits a few miles west of the village provided the chief incentive for early white settlement. Shortly after Vermilion County was organized in 1826, Dan Beckwith and Guy W. Smith, two early settlers who were interested in the salt works, offered to donate the 100 acres (40 hectares) of land required for a "seat of justice." The offer was accepted, and the new county seat was named Danville in honour of Beckwith. Formerly a coal-mining centre, with a few strip mines remaining, Danville's present economy is based on agriculture and diversified industry, notably automotive products. Danville Area Community College was established in 1946. Kickapoo State Park (built on restored strip-mining land) and Lake Vermilion are nearby. Inc. city, 1869. Pop. (1990) 33,828.

Danville, city, seat of Boyle county, central Kentucky, U.S., in the Bluegrass region, 36 miles (58 km) southwest of Lexington. Located along the Old Wilderness Road, it was settled *c.* 1775 and named for Walker Daniel, who purchased the deed for the site (1784). It was capital of the Kentucky District of Virginia (1785–92). Constitution Square (site of nine conventions that drafted the first state constitution) is preserved as a state shrine. The house where Dr. Ephraim McDowell performed the first successful ovariotomy (1809) has been restored by the Kentucky State Medical Association. Danville is the seat of Centre College (1819) and of the Kentucky School for the Deaf (1823). It serves as a market for burley tobacco, livestock, and horses and has some light manufacturing. Herrington Lake, impounded on the Dix River, lies 5 miles to the northeast. Perryville Battlefield State Shrine, scene of Kentucky's bloodiest Civil War battle (Oct. 8, 1862), is located 10 miles west of the city. Inc. town, 1789; city, 1836. Pop. (1990) 12,420.

Danville, city, within, but administratively independent of, Pittsylvania county, south central Virginia, U.S. It lies along the Dan River, 48 miles (77 km) northeast of Greensboro, N.C. The earliest settlement on the site was known as The Ford at Wynn's Falls (a site visited by explorer William Byrd in 1728). Chartered in 1793, it became an inspection warehouse and river transport point for tobacco. After completion of the railroad (1848), it became one of the nation's largest flue-cured, bright-leaf tobacco markets. During the Civil War, Danville was the site of a Confederate prison camp, and many Union prisoners are buried in Danville National Cemetery. For a few days following the fall of Richmond on April 3, 1865, Danville was the seat of the Confederacy; the Confederate Memorial Mansion, now the Danville Museum of Fine Arts and History, is known as the Last Capitol of the Confederacy.

Development of the Dan River Cotton Mills in the 1880s made the city a leading textile centre; the Dan River Mills were once the largest single-unit textile factory in the world. Besides textiles and tobacco, the city's manufactures include gypsum products, tires, glass, and hardware. Cheap hydroelectric power for the city was gained by harnessing the falls (pinnacles) of the Dan River. The city owns and operates the Pinnacles of Dan Hydroelectric Project, completed in 1938. Danville has two colleges, Averett (1859) and Danville Community (1968). Lady Astor (*née* Nancy Witcher), the first woman to sit in the British House of Commons, was born (1879) in Danville. Inc. town, 1830; city, 1870. Pop. (1990) city, 53,056; Danville MSA, 108,711.

Danzi, Franz (Ignaz) (b. June 15, 1763, Schwetzingen, Baden—d. April 13, 1826, Karlsruhe), the most important member of a German family of musicians of Italian ancestry. Although Danzi was a prolific composer of operas, church music, lieder, symphonies, and concerti, it is for his chamber music, particularly for woodwind ensemble, that he is best known today.

Danzi studied the cello with his Italian-born father, and by age 15 he was playing in the famous Mannheim orchestra. In 1790 he married the singer Margarethe Marchand, with whom he toured successfully as a conductor. At his wife's death in 1800 he retired, but in 1807 he accepted the appointment of Kapellmeister in Stuttgart. He went to Karlsruhe to fill a similar post in 1812.

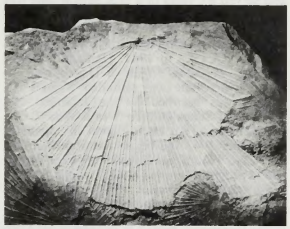
Danzig (Poland): *see* Gdańsk.

Danzig, Gulf of: *see* Gdańsk, Gulf of.

Dao Khung (Vietnamese philosopher): *see* Huynh Phu So.

Daoguang (Chinese emperor): *see* Tao-kuang.

Daonella, genus of extinct pelecypods (clams) useful as a guide, or index, fossil in Triassic rocks. The shell is characterized by a wide



Daonella of Triassic age

By courtesy of the trustees of the British Museum (Natural History); photograph, Imitor

dorsal region and by fine, radiating, riblike lineations. The shell is circular in outline and may show fine growth lines.

Daoud (Algeria): *see* Aïn Beïda.

Daphnae, also spelled DAPHNAI, biblical TAHPANHES, modern TALL AD-DAFANA, ancient fortress town (Fortress of Penhase), situated near Qantarah, in present-day ash-Sharqīyah *muḥāfaẓah* (governorate), northeastern Egypt. Excavations by Sir Flinders Petrie in 1886 uncovered a massive fort and enclosure surrounded by a wall 40 feet (13 m) thick, built by Psamtik I in the 7th century BC. A garrison of mercenaries, mostly Carians and Ionian Greeks, was established in the fort. After the Babylonian destruction of Jerusalem (587 BC), many Jewish fugitives, including the prophet Jeremiah, fled to Tahpanhes. Its decline began in the 6th century BC when Ahmose II gave Naukratis the monopoly of Greek trade.

Daphne, in Greek mythology, the personification of the laurel (Greek *daphnē*), a tree whose leaves, formed into garlands, were particularly associated with Apollo (*q.v.*). Traditionally, the special position of the laurel was connected with Apollo's love for Daphne, the beautiful daughter of a river god (probably Ladon) who lived a pastoral existence in either Thessaly, the Peloponnese, or Syria. She rejected every lover, including Apollo. When the god pursued her, Daphne prayed to the Earth or to her father to rescue her, whereupon she was transformed into a laurel. Apollo appropriated the laurel for poets and, in Rome, for triumphs. Daphne was also loved by Leucippus, who was killed because of Apollo's jealousy.

Daphne, genus of about 50 species of flowering shrubs of the mezereum family (Thymelaeaceae) native to Eurasia but widely cultivated for their form and flower clusters. The most popular species include low-growing evergreen types that are often grown in borders and rock gardens in mild climates. Among them is the spurge-laurel (*D. laureola*), with thick, glossy leaves and small greenish flowers near the ends of the branches. It produces poisonous black berries. The mezereon (*D. mezereum*) is a larger shrub, up to 1.5 m (5 feet), with deciduous leaves and spicy-fragrant pink flowers; the entire plant, including its bright-orange berries, is poisonous. The garland flower (*D. cneorum*) is a hardy evergreen trailing shrub, or ground cover, with pink, sweet-scented flowers. Popular greenhouse subjects include the several varieties of winter daphne (*D. odora*), which have very fragrant white to purplish flowers in crowded clusters. *D. indica,* with red blossoms, and *D. japonica,* with white or pinkish-purple flowers, are also grown as greenhouse evergreens.



Daphne

A.J. Huxley—EB Inc

Daphnephoria, in Greek religion, festival held every ninth year at Thebes in Boeotia in honour of Apollo Ismenius (after the Theban river called Ismenus) or Apollo Chalazius (god of hail). It consisted of a procession in which the chief figure was a boy who was of good family and whose parents were still alive. In front of the boy walked one of his nearest relatives, carrying an olive branch hung with laurel (*daphnē*) flowers and bronze balls and twined round with ribbons. Then followed the *Daphnēphoros* ("Laurel Bearer"), *i.e.,* the young priest of Apollo Ismenius. There is little doubt that the branch was a kind of maypole. The *Daphnēphoros* also dedicated a bronze tripod in the temple of Apollo. According to tradition, the festival originated because of a vision sent to the Theban general Polematas, in which the Thebans were promised victory in their war against the Aeolians and the Pelasgians if the Daphnephoria were instituted.

Daphnia, well-known water flea (*q.v.*) genus.

Daphnis, legendary hero of the shepherds of Sicily and the reputed inventor of bucolic poetry. According to tradition, Daphnis was the son of Hermes and a Sicilian nymph and was found by shepherds in a grove of laurels (Greek *daphnē*). He later won the affection of a nymph, but, upon his proving unfaithful to her, she blinded him. Daphnis tried to console himself by playing the flute and singing shepherds' songs, but he soon died or was taken

up to heaven by Hermes. According to Theocritus, Daphnis offended Eros and Aphrodite and, in return, was smitten with unrequited love; he died, although Aphrodite, moved by compassion, unsuccessfully attempted to save him.

Dapitan, chartered city and port, western Mindanao, Philippines, situated on Dapitan Bay of the Sulu Sea. One of the principal cities located on the Zamboanga Peninsula, it lies 8 miles (12 km) northwest of Dipolog, the largest settlement of the region. José Rizal, the Filipino patriot whose writings inspired the nationalist movement, was exiled there from 1892 to 1896. The dwelling in which he stayed survives. Dapitan's main industries are fishing (round scad, sardines, bonito, and anchovy) and agriculture. Copra is the most important commercial agricultural product. Inc. city, 1963. Pop. (1980) 54,694.

Dapsang (Jammu and Kashmir): *see* K2.

Daqahlīyah, ad-, *muḥāfaẓah* (governorate), northeastern Nile Delta, Lower Egypt, bordering on the Mediterranean Sea. Its triangular area, with the "point" to the south, is traversed by the Damietta Branch of the Nile. Its name, an Arabicized form of the Coptic Tkehli, comes from the small village of Daqahlah, southwest of Damietta. Its area is 1,340 square miles (3,471 square km); the capital and largest town is al-Manṣūrah (*see* Manṣūrah, al-). Ad-Daqahlīyah was created a political unit under the Fāṭimid caliphs (late 11th century AD), and it has, with brief exceptions, survived as such to the present, though with many changes in its boundaries. Toward the south, ad-Daqahlīyah takes in part of the very fertile middle delta land, but in the northeast it borders the saline al-Manzilah Lake, from which about 140,000 acres (57,000 hectares) have been reclaimed for agricultural use. There are additional land reclamation projects under way. The flat countryside has many irrigation ditches and canals, the most important of which is as-Ṣaghīr Canal.

While northern ad-Daqahlīyah is a prime rice-growing centre of Egypt, in the southern and central regions of the *muḥāfaẓah*, cotton is more prevalent. Other crops include corn (maize), wheat, and berseem (clover). Principal industries are based on agricultural production; they include cotton ginning, flour and rice milling, and oil pressing. Al-Manṣūrah has diversified manufactures. There are textile mills at Mīt Ghamr. Commercial fishing along the coasts has declined since the opening of the Aswān High Dam, but fishing on the salt lake remains economically important. In 1974 a major natural gas field at Abū Madi in the northern part of the governorate started production. It provides energy for industries in the area, including a fertilizer plant at Talkhā. Principal towns are al-Manṣūrah, al-Matarīyah, al-Manzilah, Mīt Ghamr, and as-Sinbillāwayn. An institute affiliated with al-Azhar University at Cairo is located in al-Manṣūrah, and southwest of the city is Samannūd, site of the ancient city of Sebennytus. Part of ad-Daqahlīyah was detached in 1955 to form Dumyāṭ (Damietta) *muḥāfaẓah*. Pop. (1986 est.) 3,540,000.

Daqing (China): *see* Ta-ch'ing oil field.

Daqīqī, in full ABŪ MANṢŪR MUḤAMMAD IBN AḤMAD DAQĪQĪ (d. *c.* 976–981, Ṭūs, Iran), poet, one of the most important figures in early Persian poetry.

Very little is known about Daqīqī's life. A panegyrist, he wrote poems praising various Sāmānid princes, and much lyrical poetry, but he is remembered chiefly for an uncompleted epic dealing with the introduction of Zoroastrianism and the conflicts and exploits of mythical heroes from the Persian past. He paved the way for the great Ferdowsī, who included Daqiqi's verses in his own *Shāh-nāmeh* ("Book of Kings"). Although Daqīqī cannot be wholly credited with originating the metre and style that became dominant in Persian epic literature, he most certainly contributed a great deal to its creation. He was murdered by his Turkish slave.

Daquin, Louis-Claude (b. July 4, 1694, Paris—d. June 15, 1772, Paris), French harpsichordist, organist, and composer of keyboard music whose playing was noted for its neatness and precision and whose music was admired for its gentle charm.

The godson of the composer Élisabeth Jacquet de La Guerre, Daquin was a prodigy who played before Louis XIV at the age of six. By the age of 12 he was a professional organist, and, after a series of appointments he became organist in the Chapel Royal in 1739. He published *Premier livre de pièces de clavecin* (1735; *First Book of Pieces for the Harpsichord*), containing his best-known work, *Le Coucou,* and a successful collection of carols, *Noëls pour l'orgue et le clavecin.*

D'Aquino, Iva Toguri, *née* IKUKO TOGURI, byname TOKYO ROSE (b. July 4, 1916, Los Angeles), Japanese-American broadcaster from Japan to U.S. troops during World War II, who, after the war, was convicted of treason and served six years in a U.S. prison. She was later pardoned by President Gerald R. Ford.

Iva Toguri grew up in Los Angeles and graduated from the University of California, Los Angeles (UCLA), in 1941. Her aunt's illness in July 1941 sent Toguri, a U.S. citizen, to Japan, where she was stranded when Pearl Harbor was bombed by the Japanese and the United States entered World War II. She was considered an enemy alien in Japan. In November 1943 she began radio announcing for "Zero Hour," an English-language propaganda program beamed at U.S. troops. Toguri, now married to Felipe d'Aquino, was one of 13 women announcers, all native speakers of American English, who were collectively known as Tokyo Rose. When the war ended, Iva Toguri d'Aquino was interviewed by American journalists and was subsequently indicted, charged with treason for giving aid and comfort to the enemy in time of war. When she returned to the United States in 1947, an outcry arose, demanding her trial, which began on July 5, 1949. On September 29 she was found guilty and was sentenced to 10 years in a federal penitentiary and a fine of $10,000. She served six years and was released in 1956, her sentence having been reduced for good behaviour.

Later, mitigating information came to light. In Tokyo, she had refused to become a Japanese citizen. Eventually, she found a job at Radio Tokyo. There she met an Australian and an American who were prisoners of war. These men had been ordered to write English-language broadcast material to demoralize Allied servicemen. Secretly, they were attempting to subvert the entire operation. Iva d'Aquino was recruited to announce for them and made her first broadcast in November 1943. Much later, President Ford became convinced that she had been wrongly accused and convicted, and in January 1977 he pardoned her.

DAR (U.S. organization): *see* Daughters of the American Revolution.

Dār al-Bayḍāʾ, ad-, also spelled DAR EL-BEÏDA (Morocco): *see* Casablanca.

Dar es Salaam, also spelled DĀR AS-SĀLAM, seat of government, largest city, industrial centre, and major port of Tanzania, eastern Africa. Its climate is hot and humid, with an annual rainfall of 43 inches (1,100 mm). Dar es Salaam (from the Arabic *dar salaam,* or "haven of peace") was founded in 1862 by the sultan of Zanzibar on the site of the village of Mzizima. It remained only a small port until the German East Africa Company established a station there in 1887. The starting point (1907) for the Central Line railroad, it served



The harbour at Dar es Salaam, Tanzania
Kay Honkanen—Ostman Agency

as the capital of German East Africa (1891–1916), of Tanganyika (1961–64), and subsequently of Tanzania. Since 1974 it has been the seat of government of Tanzania, pending completion of the transfer of official functions to the new national capital at Dodoma. It is now the terminus of the rail line west to Kigoma on Lake Tanganyika and north to Mwanza on Lake Victoria. Post-World War II expansion brought modern, multistoried buildings, including a hospital complex, a technical institute, and a high court. Educational facilities include the University of Dar es Salaam (founded in 1961 as University College and given university status in 1970), several libraries and research institutes, and the National Museum (whose collection contains the 1,750,000-year-old hominid skull discovered by Mary Leakey at Olduvai Gorge in 1959). Dar es Salaam's natural, nearly landlocked harbour is the outlet for most of mainland Tanzania's agricultural and mineral exports and is also a transit port for the Congo River, whose navigable tributary, the Lualaba, can be reached by rail. The Tanzam Railway, completed in 1975, also connects Zambia with the port at Dar es Salaam. Local products include soap, paint, cigarettes, food products, metalware, glassware, textiles, wood carvings, and shoes. Pop. (1978) 769,445.

Dar'ā, also spelled DER'Ā, Greek EDREI, town, southwestern Syria. Dar'ā, which is the chief town of the Ḥawrān (a region of southwestern Syria), is a road and rail junction located less than 6 miles (10 km) from the Jordanian border on the Wadi Jride. It is the focal point for communications between Amman, Jerusalem, Ḥaifa, and Damascus. There are no local industries, but Dar'ā serves as a market centre and garrison town. The town contains ruins from the Greco-Roman period and a mosque built in 1253. The decisive Battle of the Yarmūk River (636), which led to the annihilation of the Byzantine forces and the capture of Syria by the Arabs, was fought near the town; it also was the scene of fighting during World War I.

Dar'ā is the centre of a grain-growing (especially wheat and barley) region. Pop. (1981 prelim.) 49,534.

Dārāb, town southwestern Iran, at an elevation of about 4,000 feet (1,200 m) in a well-watered basin just south of some high ranges. The winter climate is mild, and fruits, cereals, cotton, and tobacco are grown, though the lower lands are used for winter pastures by the Bahārlū tribe. Nearby salt mines have long been important.

Modern Dārāb lies just northeast of the ruined ancient city of Dārābjird. Though reputedly Achaemenid in origin, the main ruins of the town are Sāsānian. The layout of the Sāsānian town was circular, 1 mile (1.6 km) in diameter, with a citadel, or fire temple,

crowning a rock in the centre, and four gates. Pop. (1985 est.) 31,300.

darabukka, also spelled DARBUKA, or DĀRBŪQAH, also called TOMBAK, goblet-shaped small drum widely played in Islāmic classical and folk music, especially in North Africa and Turkey. It is usually made of clay or wood and is held upright, upside down, or under the arm. It is played with the hands striking the edge and centre of the single head. The darabukka is one of many goblet-shaped drums found in Africa and Asia. It was used by Hector Berlioz in his opera *Les Troyens* (1890; "The Trojans") and by Darius Milhaud in his *Symphonic Suite* (1932).

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Darányi, Kálmán (b. March 22, 1886, Budapest—d. Nov. 1, 1939, Budapest), Hungarian statesman under whose premiership (1936–38) right-wing political elements gained increased influence in pre-World War II Hungary.

After earning a degree in law in 1909, Darányi began a career in regional government service. At the end of World War I, he took part in the overthrow of the brief Communist rule of Hungary, and by 1927 he was elected to Parliament as a member of the Union Party. In 1935 he became minister of agriculture in the Cabinet of the nationalist, pro-Fascist Gyula Gömbös, whom Darányi replaced on Oct. 10, 1936, when Gömbös died. He continued the foreign policies of his predecessor, aligning the country with German and Italian interests. In his internal legislation, Darányi introduced curbs on the press, extended the legal powers of the central government, and adopted the first anti-Jewish measures. He resigned on May 13, 1938, amid mounting pressures from the extreme right. Darányi then became president of the legislature.

Darayavaush: *see under* Darius.

Darazī, Muḥammad ibn Ismāʿīl ad- (b. Bukhara, Turkistan—d. 1019/20), propagandist (*dāʿī*) for the Ismāʿīlī sect of Islām and the man after whom the religion of the Druze sect is named.

He was probably at least part-Turkish and is believed to have traveled from Bukhara to Egypt as an Ismāʿīlī preacher in 1017/18. He gained favour with the Fāṭimid caliph al-Ḥākim and, along with Ḥamzah ibn ʿAlī and others, created a theology based on the caliph's divinity. According to ad-Darazī, the divine spirit that had been invested in Adam had been transmitted through successive *imāms* to al-Ḥākim. Al-Ḥākim actively promoted belief in his own divinity, and, when ad-Darazī publicly proclaimed the doctrine in the main mosque of Cairo, rioting ensued that probably led to his own death. The Druze religion was named after ad-Darazī because his preaching established his preeminence among the founders in the public's mind, even though Ḥamzah had first organized the movement.

Darbār Sāhib (temple): *see* Harimandir.

Darbhanga, town, northern Bihār state, northeastern India, just east of the Bāghmati River, a tributary of the Ganges. A major rail and road junction, Darbhanga trades in agricultural produce, mangoes, and fish. Rice, jute, and sugar milling and shoelace manufacture are the chief industries. The town was the capital of the Darbhanga rāj, an estate established in the 16th century, and contains the Anandbāgh palace. It was constituted a municipality in 1864. Darbhanga is the seat of Kameshwara Singh Darbhanga Sanskrit University (1961), which is located on the grounds of the palace. There is also a museum containing archaeological materials as well as historical and handicraft exhibits.

The town is situated on a vast alluvial plain, with low-lying areas containing marshes and lakes. Grains, oilseeds, tobacco, sugarcane, and mangoes are important crops in the region. Pop. (1981) 176,301.

Darboux, (Jean-)Gaston (b. Aug. 14, 1842, Nîmes, Fr.—d. Feb. 23, 1917, Paris), French mathematician who made important contributions to geometry and analysis and after whom the Darboux integral is named.

After acting as an assistant in mathematical physics (1866–67) at the Collège de France, Paris, Darboux taught at the Lycée Louis le Grand (1867–72), the École Normale Supérieure (1872–73), and the Sorbonne (1873–



Darboux
By courtesy of the Archives de l'Academie des Sciences de Paris; photograph, J. Colomb-Gerard, Paris

90). Besides being an excellent teacher and a notable mathematician, he was a very capable administrator.

Practically all Darboux's mathematical work was in geometry. His early papers (1864 and 1866) on orthogonal surfaces were followed by a memoir (1870) on partial-differential equations of the second order, which embodied a new method of integration. In his treatise *Sur une classe remarquable de courbes et de surfaces algébriques et sur la théorie des imaginaires* (1873; "On a Class of Remarkable Curves and Algebraic Surfaces and on the Theory of Imaginary Numbers"), he developed the theory of the class of surfaces called cyclides.

Leçons sur la théorie générale des surfaces et les applications géométriques du calcul infinitésimal, 4 vol. (1887–96; "Lessons on the General Theory of Surfaces and the Geometric Applications of Infinitesimal Calculus"), one of his most important works, deals with infinitesimal geometry and embodies most of his previous research work. In 1898 the publication of *Leçons sur les systèmes orthogonaux et les coordonnées curvilignes* ("Lessons on Orthogonal Systems and Curvilinear Coordinates") was begun. He was the author of a number of papers and memoirs on the approximation to functions of very large numbers, discontinuous functions, dynamics, and other mathematical subjects.

darbuka, also spelled DĀRBŪQAH (drum): *see* darabukka.

Darby, Abraham (b. 1678?, near Dudley, Worcestershire, Eng.—d. March 8, 1717, Madeley Court, Worcestershire), British ironmaster who first successfully smelted iron ore with coke.

Darby, who had used coke in smelting copper in Bristol, in 1708 founded the Bristol Iron Company. He acquired premises at Coalbrookdale, on the Severn, close to supplies of low-sulfur coal. In 1709 he produced marketable iron in a coke-fired furnace. He presently demonstrated the superiority of coke in cost and efficiency by building much larger furnaces than were possible with charcoal as a fuel, the latter being too weak to support a heavy charge of iron.

The quality of Darby's iron made it possible for him to manufacture thin castings that could compete successfully with brass in such applications as the manufacture of pots and other hollow ware.

The advent of the Thomas Newcomen steam engine in 1712 created an important new market for iron; by 1758, when Darby had been succeeded by his eldest son, Abraham Darby (1711–63), more than 100 Newcomen cylinders had been cast at Coalbrookdale. In 1779 Darby's grandson, Abraham Darby III (1750–91), completed one of the world's first cast-iron bridges at Coalbrookdale, and in 1802 the Coalbrookdale Works built the first railway locomotive with a high-pressure boiler, for Richard Trevithick, an English engineer and inventor.

Darchan (Mongolia): *see* Darhan.

Darcy, Henri-Philibert-Gaspard (b. June 10, 1803, Dijon, Fr.—d. Jan. 3, 1858, Paris), French hydraulic engineer who first derived the equation (now known as Darcy's law) that governs the laminar (nonturbulent) flow of fluids in homogeneous, porous media and who thereby established the theoretical foundation of groundwater hydrology.

After studying in Paris, Darcy returned to his native city of Dijon, where he was entrusted with the design and construction of the municipal water supply system. During the course of this work, he conducted experiments on pipe flow and demonstrated that resistance to flow depended on the surface roughness of the pipe material, which previously had not been considered a factor. Planning to use the technique of water purification by filtration through sand, he also studied cases in which the pipe was filled with sand. From the data gathered, he derived the law that bears his name. The darcy is the standard unit of permeability.

Darcy, Thomas Darcy, Lord, also called LORD DARCY OF DARCY, or LORD DARCY OF TEMPLE HURST (b. *c.* 1467—d. June 30, 1537, London), powerful English nobleman who, disliking the separation of England from papal jurisdiction, was implicated in the rebellion in 1536, in the north, against the ecclesiastical policy of Henry VIII.

Darcy served in several military and ambassadorial posts for Henry VII and in 1504 (or perhaps 1509) was raised to the peerage. Darcy led English troops to Spain in 1511 to help Ferdinand and Isabella against the Moors, but his forces never left Cádiz; and during Henry VIII's French campaign in 1513 he took part in the siege of Thérouanne. In 1529 he turned against his former friend Cardinal Thomas Wolsey, the lord chancellor, by asserting, contrary to the policy of Wolsey and Henry VIII, that the papacy was the only proper judge of matrimonial cases. In 1535 he corresponded with the ambassador of the Holy Roman emperor Charles V about a possible invasion of England by the continental Catholic powers.

The northern pro-Catholic and neofeudal rebellion, called the Pilgrimage of Grace, began on Oct. 1, 1536, in Lincolnshire. Darcy held the castle of Pontefract, Yorkshire, for the king until October 21, but he surrendered it to the rebel leader Robert Aske sooner than its strength warranted. Although he may have aided in suppressing a renewal of the rising in January 1537, Darcy was still suspected by Henry of treason, probably with justification. At a trial in London he was found guilty and was beheaded.

Darcy's law, mathematical relationship discovered (1856) by the French engineer Henri Darcy that governs the flow of groundwater through granular media or the flow of other fluids through permeable material, such as petroleum through sandstone or limestone. As the basic relationship from which many

sophisticated theoretical and practical derivations have been devised, it has become the foundation for quantitative work in the field of groundwater flow. One of the most useful derivations from the formula, which can be used to calculate the amount of water flowing through a given cross-sectional area of an aquifer, equates the discharge to the product of the cross-sectional area through which the discharge occurs, the hydraulic gradient (the change in head for a unit of length), and a coefficient of permeability. Symbolically, $Q_d = PIA$, in which Q_d is the discharge water in gallons per day; P is the coefficient of permeability in gallons per day per square foot; I is the hydraulic gradient in foot of head per foot of length; and A is the cross-sectional area through which the discharge occurs.

Dard languages: *see* Dardic languages.

Dardanelles, formerly HELLESPONT, Turkish ÇANAKKALE BOĞAZI, narrow strait in northwestern Turkey, 38 mi (61 km) long, linking the Aegean Sea with the Sea of Marmara. It is 3/4 to 4 mi wide and lies between the peninsula of Gallipoli in Europe (northwest) and the mainland of Asia Minor (southeast). The strait's average depth is 180 ft (55 m), reaching a maximum of 300 ft in the narrowest central section. There is a rapid surface current from the Sea of Marmara to the Aegean and a compensatory undercurrent returning more saline water. Important ports along the shores are Gallipoli (Gelibolu Limani), Eceabat, and Çanakkale; and many famous castles stand along its banks. The waters are rich in various kinds of fish that migrate between the Black and Aegean seas.

The strait holds a significant place in history. The Hellespont is the scene of the Greek legend of the two lovers Hero and Leander. The ancient city of Troy defended the Dardanelles from its strategic position at the southwest end (Asian side). In 480 BC the Persian army of Xerxes I crossed the strait by a bridge of boats; and Alexander the Great, king of Greece, did the same in 334 BC on his expedition against Persia. The strait has always been of great strategic and economic importance as the gateway to Istanbul and the Black Sea from the Mediterranean. The strait was forced by an English fleet under Adm. Sir John T. Duckworth in 1807, but during World War I the Allies failed to capture it, although a British submarine penetrated the minefields and sank a Turkish battleship off the Golden Horn, an inlet on the Bosporus strait. The Dardanelles' location has given it international political importance (*see* Straits Question).

The city of Dardanus in the Troad (territory around ancient Troy), where Mithradates VI (king of Pontus) and Sulla (the Roman general) signed a treaty in 85 BC, gave the strait its name.

Dardanelles, Treaty of the: *see* Çanak, Treaty of.

Dardanelles Campaign, also called GALLIPOLI CAMPAIGN (February 1915–January 1916), in World War I, an Anglo-French operation against Turkey, intended to force the 38-mile-long Dardanelles channel and to occupy Constantinople. Plans for such a venture were considered by the British authorities between 1904 and 1911, but both military and naval opinion was against it. When war between the Allies and Turkey began early in November 1914 the matter was reexamined and classed as a hazardous, but possible, operation.

On Jan. 2, 1915, in response to an appeal by the Grand Duke Nicholas, commanding the Russian armies, the British government agreed to stage a demonstration against Turkey to relieve pressure on the Russians on the Caucasus front. The Dardanelles were selected as the place, a combined naval and military operation being strongly supported by the then first lord of the Admiralty, Winston Churchill. On January 28 the Dardanelles committee decided on an attempt to force the straits by naval action alone, using mostly obsolete warships too old for fleet action. On February 16 this decision was modified, as it was agreed that the shores of the Dardanelles would have to be held if the fleet passed through. For this purpose, a large military force under Gen. Sir Ian Hamilton was assembled in Egypt, the French authorities also providing a small contingent. The naval bombardment began on February 16 but was halted by bad weather and not resumed until February 25. Demolition parties of marines landed almost unopposed, but bad weather again intervened. On March 18 the bombardment was continued; but, after three battleships had been sunk and three others damaged, the navy abandoned its attack, concluding that the fleet could not succeed without military help.

Troop transports assembled off the island of Lemnos, and landings began on the Gallipoli peninsula at two places early on April 25, 1915, at Cape Helles (29th British and Royal Naval divisions) and at "Anzac" beaches (Australian and New Zealand troops). A French brigade landed on the Anatolian coast opposite, at Kum Kale, but was later withdrawn. Small beachheads were secured with difficulty, the troops at "Anzac" being held up by Turkish reinforcements under the redoubtable Mustafa Kemal, later to became famous as Atatürk. Large British and Dominion reinforcements followed, but little progress was made. On August 6 another landing on the west coast, at Suvla Bay, took place, but after good initial progress the assault was halted.

In May 1915 the first sea lord, Admiral Lord Fisher, had resigned because of differences of opinion over the operation. By September 1915 it was clear that without further large reinforcements there was no hope of decisive results, and the authorities at home decided to recall Hamilton to replace him by Lieut. Gen. Sir Charles Monro. The latter recommended the withdrawal of the military forces and abandonment of the enterprise, advice that was confirmed in November by the secretary of state for war, Lord Kitchener, when he visited the peninsula. This difficult operation was carried out by stages and successfully completed early on Jan. 9, 1916.

Altogether, the equivalent of some 16 British, Australian, New Zealand, Indian, and French divisions took part in the campaign. British Commonwealth casualties, apart from heavy losses among old naval ships, were 213,980. The campaign was a success only in so far as it attracted large Turkish forces away from the Russians. The plan failed to produce decisive results, because of poor military leadership in some cases, faulty tactics including complete lack of surprise, the inexperience of the troops, inadequate equipment, and an acute shortage of shells.

The campaign had serious political repercussions. It gave the impression throughout the world that the Allies were militarily inept. Before the evacuation had been decided, Henry Asquith's Liberal administration was superseded by his coalition government. Winston Churchill, the chief protagonist of the venture, resigned from the government and went to command an infantry battalion in France. In the end the campaign hastened Asquith's resignation, and his replacement as prime minister by David Lloyd George, in December 1916.

Dardanus, in Greek legend, the son of Zeus and the Pleiad Electra, mythical founder of Dardania on the Hellespont. He was the ancestor of the Dardans of the Troad and, through Aeneas, of the Romans.

According to tradition, having slain his brother Iasius, or Iasion, Dardanus fled from Arcadia across the sea to Samothrace. When that island was visited by a flood, he crossed over to the Troad, a region surrounding Troy in Asia Minor. Being hospitably received by Teucer (ruler of Phrygia), he married Teucer's daughter Bateia and became the founder of the royal house of Troy.

Dardic languages, also called DARD, PISACA, or PISACHA LANGUAGES, group of closely related Indo-Iranian languages spoken in Pakistan, Kashmir, and Afghanistan. They are often divided into three subgroups: Kafiri, or Western; Khowari, or Central (spoken in the Chitrāl district of northwestern Pakistan); and the Eastern group, which includes Shina and Kashmiri. (Some scholars use the term Dardic to refer only to the Eastern subgroup of languages and use the name Pisaca to refer to the group as a whole.)

The exact position of the Dardic languages within the Indo-Iranian language family has been a matter of dispute among scholars. Some scholars believe the languages to stem from an undifferentiated stage of Indo-Iranian; others believe the Eastern and Khowari groups to be Indo-Aryan, with the Kafiri subgroup being separate.

Kashmiri is the only Dardic language that has been used extensively for literary purposes. Except for Shina, the languages of the Eastern subgroup have been radically changed by the influence of the Indo-Aryan languages spoken farther south. The Dardic languages differ from the other Indo-Iranian languages in their sound systems and in the preservation of a number of words lost in India and Iran after the time of Vedic Sanskrit.

Dardistān, region inhabited by the so-called Dard peoples in the north of Pakistan and northern Kashmir. It includes Chitrāl, the upper reaches of the Panjkora River, the *Kohistān* (highland) of Swāt, and the upper portions of the Gilgit Agency. Mentioned by the classical historians Pliny the Elder, Ptolemy, and Herodotus, the Dards (Daradae, Daradrae, or Derdae) are said to be people of Aryan origin who ascended the Indus Valley from the Punjab plains, reaching as far north as Chitrāl. They were converted to Islām in the 14th century and speak three distinct dialects of Gilgit, Khowari, Burushaskī, and Shina, employing the Persian script in writing.

Dare, Virginia (b. Aug. 18, 1587, Roanoke Island), the first English child born in the Americas. She was given the name Virginia because she was the first Christian born in Virginia.

Her father was Ananias Dare. Her mother, Ellinor (Eleanor) White Dare, was the daughter of the Roanoke colony governor, John White. The Dares were among the 117 settlers who left England on May 8, 1587, on an expedition sponsored by Sir Walter Raleigh. Raleigh had intended that the settlement should be established in the Chesapeake Bay area, but the captain of their ship, the "Lion," had his passengers land instead on Roanoke Island, the site of an unsuccessful earlier colonization venture.

Aside from the circumstances of her birth, Virginia Dare's life remains a mystery. Nine days after her birth, on Aug. 27, 1587, her grandfather, Governor White, left the colony for England, acting as Roanoke's agent in obtaining further aid and assistance for the colony. He arrived in England that November as the nation was about to go to war with Spain. It was not until August 1590 that White reached Roanoke with a relief expedition. It found no trace of the settlers—only the word croatoan carved on a post. The infant Virginia Dare had vanished along with all the other Roanoke colonists.

Dares PHRYGIUS, a Trojan priest of Hephaestus who appears as one of the characters in Homer's *Iliad* and is the reputed author of a lost pre-Homeric "eyewitness" account of the Trojan War. The *Daretis Phrygii de Excidio Trojae historia,* a Latin work purporting to be a translation of this, dates probably from the 5th century AD. The influence of this pro-Trojan work in the Latin-speaking West from the fall of the Roman Empire to the Renaissance, a period when the works of Homer were known only by hearsay, was enormous. It was widely used as a source by medieval writers of Troy romances. *See also* Troy.

Dareste de la Chavanne, Antoine(-Élisabeth-Cléophas) (b. Oct. 28, 1820, Paris—d. Aug. 6, 1882, Lucenay-lès-Aix, Fr.), French historian whose reputation rests on his authoritative major work, *Histoire de France,* 9 vol. (1865–79).

Dareste de la Chavanne was educated at the École des Chartes (School of Paleography) in Paris, later becoming professor of history at Grenoble in 1847 and at Lyon in 1849. He remained at Lyon for many years, eventually becoming rector of the university.

Among his other works are *Histoire de l'administration en France,* 2 vol. (1848), *Histoire des classes agricoles en France* (1853), and *Histoire de la Restauration,* 2 vol. (1879).

Daret, Jacques, also called JAMES DARET (b. *c.* 1404, Tournai, Fr.—d. *c.* 1470), early French Renaissance painter of Tournai whose work shows the strong influence of the Master of Flémalle. Only one group of his works is known, that from the period 1433–35. The Flemish realism developed by the Master of Flémalle was adapted by Daret, who later headed the guild of Tournai. Daret's style, though imitative, can be seen at its best in the altarpiece for St. Vaast, Arras (part of which is now in the Staatliche Museen, Berlin). He was also an illuminator, a tapestry-cartoon designer, and a decorator for royal festivities.

Darfur, also spelled DĀRFŪR (Arabic: "House of the Fur"), historical region of the Bilād as-Sūdān (Arabic: "Land of the Blacks"), a region roughly corresponding to the western-most portion of the present-day Republic of The Sudan. It lay between Kordofan in the east and Wadai in the west and extended southward to the Baḥr al-Ghazāl and northward to the Libyan Desert.

In prehistoric times the northern inhabitants of Darfur were related to the predynastic peoples of the Nile River valley. From about 2500 BC Darfur was probably within the sphere of the Egyptian caravans that traded southward from Aswān. Its first traditional rulers, the Daju, or Dagu, were possibly in some way connected with ancient Egypt, and trade was no doubt conducted from Darfur both with Egypt during the New Kingdom and with the cities of Napata and Meroe in the kingdom of Cush (Kush; now in the northern Sudan). The rule of the Daju in Darfur was eventually followed by that of the Tunjur, or Tungur.

The Christian period, which probably lasted in Darfur from 900 to 1200, was ended by the advance of Islām eastward from the empire of Kanem-Bornu (centred on Lake Chad). By 1240 the king of Kanem was claiming control of a trade route with Egypt that extended eastward as far as Sai, and it is from this date that the influence of Kanem and Bornu on Darfur probably derived. Indeed, Darfur may have been a province either of Kanem or of Bornu at one or more of their great periods.

The chiefly clan of the Keira were the ruling dynasty in Darfur from about 1640 to 1916. The first historic mention of the name Fur occurred in 1664. During that period the kings of the Keira sultanate of Darfur apparently used the term Fur to refer to the Negroid inhabitants who accepted both their Islamic religion and their rule. As the Keira dynasty became progressively Negroid, its members became known as Fur. The inhabitants of Darfur were completely Islāmized under the rule of the Keira sultans. The sultans fought intermittently with the Wadai kingdom (to the east) and also tried to subjugate the semi-independent Arab tribes who inhabited the country.

In the 1870s Darfur came under Egyptian rule, with provincial status. Various revolts were suppressed by the Egyptians, and in 1881 Rudolf Karl Slatin was appointed governor. Though he defended the province against the forces of al-Mahdi, a religious reformer and Sudanese political leader, he was obliged ultimately to surrender to him in December 1883. Darfur was thereafter incorporated into al-Mahdī's dominions. Following the overthrow of al-Mahdī's successor, 'Abd Allāh, or the Khalīfah, in 1898, the new (Anglo-Egyptian) government of the Sudan recognized 'Ali Dinār as sultan of Darfur (1899). A rising by him in 1915 provoked a punitive expedition, in which he was killed (November 1916). Thereafter Darfur became a province (and later two provinces) of the Sudan.

Geographically, Darfur consists of an immense rolling plain that is approximately 170,000 square miles (440,000 square km) in area. The volcanic highlands of the Marrah Mountains dominate the central part of this plain. The Marrah Mountains stand at an average elevation of 7,200 feet (2,200 m), with the highest peak, Mount Marrah, rising to 10,131 feet (3,088 m). Elsewhere, the sparsely populated plains of Darfur are relatively featureless and arid, particularly in the north, where they merge into the Libyan Desert. Soils, which are generally stony or sandy, support some seasonal grass and low, thorny shrubs with tropical maquis vegetation. The Marrah highlands receive heavier rainfall than other parts of Darfur, and a number of large wadis (seasonal watercourses) rise in the mountains and flow southward across the plains.

Arabs constitute the majority of the population in the northern part of Darfur, while Arabs and Furs predominate in the southern portion. Other ethnic groups include the Beja, Zaghāwa, Nubian, and Daju peoples. Heavy rainfall in the Marrah highlands permits the intensive cultivation of cereals, rice, and fruits. Crops grown at other locations in the southern part of Darfur include sorghum, millet, sesame, peanuts (groundnuts), other root crops, and vegetables. In the arid north, camels, sheep, and goats are raised. Traditional handicrafts include work in leather and wood as well as carpet weaving. Nyala and Al-Fāshir are the principal towns.

Dargomyzhsky, Aleksandr (Sergeyevich) (b. Feb. 14 [Feb. 2, Old Style], 1813, near Tula, Russia—d. Jan. 17 [Jan. 5], 1869, St. Petersburg), Russian composer of songs and operas.

Dargomyzhsky grew up in St. Petersburg as a talented amateur musician, playing the violin and piano and dabbling in composition.



Dargomyzhsky, oil painting by K.Y. Makovsky
Novosti Press Agency

His acquaintance with the composer Mikhail Glinka (1833) turned his thoughts more seriously toward composition, and in 1839 he completed his first opera, *Esmeralda* (after Victor Hugo; performed 1847). Two other operas followed: *The Triumph of Bacchus* (1845; performed 1867) and *Rusalka* (after Aleksandr Pushkin; produced 1856). In his songs Dargomyzhsky developed an individual vein of humour and satire. His orchestral pieces (*e.g., Finnish Fantasia, Cossack Dance,* and *Baba-Yaga*) were notable for their harmonic experiments.

After 1866 he became interested in developing a Russian national music of great dramatic realism and began to set Pushkin's play *The Stone Guest* to a species of declamatory musical prose, with entire passages composed in the whole-tone mode. This work aroused the interest of Mily Balakirev and his circle, particularly Modest Mussorgsky; when Dargomyzhsky died, the score was completed by César Cui and orchestrated by Nikolay Rimsky-Korsakov.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Darhan, also called DARCHAN, town, northern Mongolia, northwest of Ulaanbaatar. A large industrial complex, built in the late 1960s with Soviet and eastern European aid, makes Darhan one of the largest industrial centres in Mongolia. A building- industry combine produces concrete, lime cement, bricks, and wood and steel products. Other industries include food processing, vehicle repair, and the production of woolen textiles, carpets, dressed sheepskins, and clothing. A power station, fueled by coal brought by rail from Sharīn Gol, 42 miles (68 km) to the north, supplies power for Sühbaatar and Ulaanbaatar as well as for local industry. Pop. (1989 prelim.) 85,800.

Dari language, member of the Iranian branch of the Indo-Iranian family of languages; it is, along with Pashto, one of the two official languages of Afghanistan. Dari is the Afghan dialect of Farsi (Persian). It is written in a modified Arabic alphabet, and it has many Arabic and Persian loanwords. The syntax of Dari does not differ greatly from Farsi, but the stress accent is less prominent in Dari than in Farsi. To mark attribution, Dari uses the suffix *-ra.* The vowel system of Dari differs from that of Farsi, and Dari also has additional consonants.

About one-third of the population of Afghanistan, *i.e.,* about 5,000,000 people, speak Dari. It is the primary language of the Tadzhik, Hazāra, and Chahar Aimak peoples. Dari, rather than Pashto, serves as the means of communication between speakers of different languages in Afghanistan.

Dariên, traditional region of eastern Panama and of the easternmost Isthmus of Panama; it extends into northwestern Colombia, around the Gulf of Urabá, and forms the link between Central and South America. A hot, humid area of tropical rain forests, Dariên always has been sparsely populated.

Dariên was first reached in 1501 and was seen by Columbus on his last voyage two years later. The first European settlement in South America, Santa María de la Antigua del Dariên, was attempted in 1510 on the western side of the Gulf of Urabá. From this failing colony Vasco de Balboa made his famous march to the Pacific in 1513. A few years later some colonists left the Dariên settlement to found Panama City; eventually, Santa María was abandoned. Another short-lived attempt

at colonization was made in the 17th century, when a Scottish trading company founded a settlement about halfway between Portobelo and Cartagena.

The chief town in Darién, La Palma, on the Tuira River estuary near the Gulf of San Miguel, remains isolated in spite of air connections with Panama City; it declined in population between 1970 and 1980. In Darién plantains, corn (maize), and rice are cultivated, livestock is raised, and lumber is cut and milled.

Darien, town, Fairfield county, southwestern Connecticut, U.S., on Long Island Sound. Originally part of Stamford, the area was settled in about 1641, and a separate community life began in 1773 when the Middlesex Ecclesiastical Society was established, giving the people a degree of independence in matters of religion and education. Middlesex Parish was separated from Stamford and was incorporated as a town in 1820. It included the village of Noroton and was renamed by Thaddeus Bell, who supposedly likened its location to the Darién region in Panama, an area in which local shipowners and merchants had traded. The capture of the town (1781) and of the Reverend Moses Mather, a strong Colonist advocate, by British soldiers and local Tories is depicted in a mural at Mather Junior High School. Darien's oldest house, Weed Homestead, dates from 1680. Pop. (1990) 18,196.

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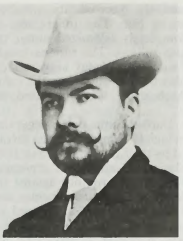
Darien, city, seat (1818) of McIntosh county, southeastern Georgia, U.S. It is situated near the mouth of the Altamaha River on the Atlantic coast. The site, near Fort King George, was settled in 1736 by Scottish Highlanders under John McIntosh Mohr, who called the place New Inverness and established Fort Darien (named for the location of a former Scottish colony in Panama). After the War of 1812, the demand for lumber from surrounding forest lands caused an economic boom. The Bank of Darien, opened in 1818, became one of the state's largest banks. During the American Civil War, the Reverend Mansfield French, known as the "White Jesus," formed a "Gospel Army" of black crusaders who burned the city on July 11, 1863. The city's economy is now centred on fishing, canning, and pulpwood milling. Inc. town, 1816; city, 1818. Pop. (1990) 1,783.

Darién, Gulf of, Spanish GOLFO DE DARIÉN, triangular southernmost extension of the Caribbean Sea, bounded by Panama on the southwest and by Colombia on the southeast and east. The inner section, which is called the Gulf of Urabá, is a shallow, mangrove-lined arm lying between Caribana Point and Cape Tiburón, Colombia. The delta of the Atrato River protrudes into the gulf. Farther northwest along the Panama coast of the gulf, Caledonia Bay is the site of remains of a 17th-century Scottish colony (New Caledonia), a shipwreck (the *Olive Branch,* sunk 1699), and a fortification (Fort St. Andrew, in use 1698–1700), all of which were discovered by archaeologists in 1979.

Darío, Rubén, pseudonym of FÉLIX RUBÉN GARCÍA SARMIENTO (b. Jan. 18, 1867, Metapa, Nic.—d. Feb. 6, 1916, León), influential Nicaraguan poet, journalist, and diplomat. As a leader of the Spanish-American literary movement known as Modernism, which flourished at the end of the 19th century, he revivified and modernized poetry in Spanish



Darío
By courtesy of the Archivo General de la Nacion, Buenos Aires

on both sides of the Atlantic through his experiments with rhythm, metre, and imagery. Darío developed a highly original poetic style that founded a tradition.

Precocious and prolific, from the age of 14 he signed the name Rubén Darío to his poems and stories of love, heroism, and adventure, which, although imitative in form, showed a strikingly vivid imagination. In 1886 he left Nicaragua, beginning the travels that continued throughout his life. He settled for a time in Chile, where in 1888 he published his first major work, *Azul* ("Blue"), a collection of short stories, descriptive sketches, and verse. This volume was soon recognized in Europe and Latin America as the herald of a new era in Spanish-American literature. Darío had only recently become acquainted with French Parnassian poetry, and *Azul* represents his attempt to apply to Spanish the tenets of that stylistic movement. In the prose works in *Azul* he discarded the traditional long and grammatically complex Spanish sentence structure, replacing it with simple and direct language. Both the prose and poetry are generally concerned with objective description, and both deal with exotic subjects, chiefly classical mythology, France, and the Orient. The volume exhibits Dario's concern with "art for art's sake," and little interest is shown in everyday life.

After his return to Central America and two brief marriages (the first ended by his wife's death and the other by separation), he left to take up an appointment as Colombian consul in Buenos Aires, in 1893, where he found the cosmopolitan atmosphere stimulating. Young writers there hailed him as their leader, and Modernism became organized around him as a movement. Darío's next significant work, *Prosas profanas y otros poemas* (1896; "Profane Hymns and Other Poems"), a collection of verse, continued the innovative stylistic trends of *Azul* but treated its exotic scenes and personages in a manner more symbolic than objective, for it was influenced by the contemporary French Symbolist poets. The work is the high point of the "escapist" phase of Modernism.

Darío went to Europe in 1898 as a correspondent for the Buenos Aires newspaper *La Nación.* Based in Paris and Majorca, he traveled extensively on the European continent on journalistic and diplomatic missions. By this time, world events and his own advancing age had brought about a profound change in his outlook on life. He became vitally concerned with the world outside the realm of art: the threat of supposed North American imperialism after the defeat of Spain in 1898; the solidarity of Spanish-speaking peoples; the future of Spanish America after the collapse of Spain's empire in the New World; and the age-old problems of human existence. The collection that is generally considered to be his masterpiece, *Cantos de vida y esperanza* (1905; "Songs of Life and Hope"), reflects these concerns and is the culmination of his technical experimentation and his artistic resourcefulness.

On the outbreak of World War I in 1914, Darío left Europe, physically ill and on the brink of poverty. In an attempt to alleviate his financial difficulties, he began a lecture tour of North America, but he developed pneumonia in New York and died shortly after his return to his homeland.

In addition to the three major collections on which his greatest fame rests, Darío also wrote approximately 100 short stories and tales, several other volumes of poetry and penetrating literary criticism, and the journalistic articles that appeared in *La nación* and elsewhere.

From the standpoint of artistic resourcefulness and technical perfection, Darío is considered by many to be one of the greatest poets who ever wrote in Spanish. Throughout his career he boldly experimented with many forms of verse, and he probably introduced more metrical innovations than any other Spanish-language poet. Dario's poetry is notable for its remarkable musicality, grace, and sonority, and he had a masterly command of rhyme and metrical structure. His earlier anecdotal and descriptive poems treat faraway places, mythology, and other exotic subjects with a rich lyricism, while the later poems in *Cantos de vida* contain a pronounced philosophical note and exhibit a poignant and powerful sense of the tragic side of life.

Among the many editions of Darío's work in Spanish is *Obras completas,* 2 vol. (1971), edited by A.M. Plancarte. *Selected Poems,* translated by Lysander Kemp (1965), contains an introduction by Mexico's Octavio Paz and a tribute by Spain's Federico García Lorca and Chile's Pablo Neruda.

Darius, Old Persian DARAYAVAUSH, name of Achaemenid kings, grouped below chronologically and indicated by the symbol •.

• **Darius I,** byname DARIUS THE GREAT (b. 550 BC—d. 486), king of Persia in 522–486 BC, one of the greatest rulers of the Achaemenid dynasty, who was noted for his administrative genius and for his great building projects. Darius attempted several times to conquer Greece; his fleet was destroyed by a storm in 492, and the Athenians defeated his army at Marathon in 490.



Darius I seated before two incense burners, detail of a bas-relief of the north courtyard in the Treasury at Persepolis, late 6th–early 5th century BC; in the Archaeological Museum, Tehrān
By courtesy of the Oriental Institute, the University of Chicago

Ascension to monarchy. Darius was the son of Hystaspes, the satrap (provincial governor) of Parthia. The principal contemporary sources for his history are his own inscriptions, especially the great trilingual inscription on the Bisitūn (Behistun) rock at the village of the same name, in which he tells how he gained the throne. The accounts of his accession

given by the Greek historians Herodotus and Ctesias are in many points obviously derived from this official version but are interwoven with legends.

According to Herodotus, Darius, when a youth, was suspected by Cyrus II the Great (who ruled from 559 to 529 BC) of plotting against the throne. Later Darius was in Egypt with Cambyses II, the son of Cyrus and heir to his kingdom, as a member of the royal bodyguard. After the death of Cambyses in the summer of 522 BC, Darius hastened to Media, where, in September, with the help of six Persian nobles, he killed Bardiya (Smerdis), another son of Cyrus, who had usurped the throne the previous March. In the Bisitūn inscription Darius defended this deed and his own assumption of kingship on the grounds that the usurper was actually Gaumata, a Magian, who had impersonated Bardiya after Bardiya had been murdered secretly by Cambyses. Darius therefore claimed that he was restoring the kingship to the rightful Achaemenid house. He himself, however, belonged to a collateral branch of the royal family, and, as his father and grandfather were alive at his accession, it is unlikely that he was next in line to the throne. Some modern scholars consider that he invented the story of Gaumata in order to justify his actions and that the murdered king was indeed the son of Cyrus.

Darius did not at first gain general recognition but had to impose his rule by force. His assassination of Bardiya was followed, particularly in the eastern provinces, by widespread revolts, which threatened to disrupt the empire. In Susiana, Babylonia, Media, Sagartia, and Margiana, independent governments were set up, most of them by men who claimed to belong to the former ruling families. Babylonia rebelled twice and Susiana three times. In Persia itself a certain Vahyazdata, who pretended to be Bardiya, gained considerable support. These risings, however, were spontaneous and uncoordinated, and, notwithstanding the small size of his army, Darius and his generals were able to suppress them one by one. In the Bisitūn inscription he records that in 19 battles he defeated nine rebel leaders, who appear as his captives on the accompanying relief. By 519 BC, when the third rising in Susiana was put down, he had established his authority in the east. In 518 Darius visited Egypt, which he lists as a rebel country, perhaps because of the insubordination of its satrap, Aryandes, whom he put to death.

Fortification of the empire. Having restored internal order in the empire, Darius undertook a number of campaigns for the purpose of strengthening his frontiers and checking the incursions of nomadic tribes. In 519 BC he attacked the Scythians east of the Caspian Sea and a few years later conquered the Indus Valley. In 513, after subduing eastern Thrace and the Getae, he crossed the Danube River into European Scythia, but the Scythian nomads devastated the country as they retreated from him, and he was forced, for lack of supplies, to abandon the campaign. The satraps of Asia Minor completed the subjugation of Thrace, secured the submission of Macedonia, and captured the Aegean islands of Lemnos and Imbros. Thus, the approaches to Greece were in Persian hands, as was control of the Black Sea grain trade through the straits, the latter being of major importance to the Greek economy. The conquest of Greece was a logical step to protect Persian rule over the Greeks of Asia Minor from interference by their European kinsmen. According to Herodotus, Darius, before the Scythian campaign, had sent ships to explore the Greek coasts, but he took no military action until 499 BC, when Athens and Eretria supported an Ionian revolt against Persian rule. After the suppression of this rebellion, Mardonius, Darius' son-in-law, was given charge of an expedition against Athens and Eretria, but the loss of his fleet in a storm off Mount Athos (492 BC) forced him to abandon the operation. In 490 BC another force under Datis, a Mede, destroyed Eretria and enslaved its inhabitants but was defeated by the Athenians at Marathon. Preparations for a third expedition were delayed by an insurrection in Egypt, and Darius died in 486 BC before they were completed.

Darius as an administrator. Although Darius consolidated and added to the conquests of his predecessors, it was as an administrator that he made his greatest contribution to Persian history. He completed the organization of the empire into satrapies, initiated by Cyrus the Great, and fixed the annual tribute due from each province. During his reign, ambitious and far-sighted projects were undertaken to promote imperial trade and commerce. Coinage, weights, and measures were standardized and land and sea routes developed. An expedition led by Scylax of Caryanda sailed down the Indus River and explored the sea route from its mouth to Egypt, and a canal from the Nile River to the Red Sea, probably begun by the chief of the Egyptian delta lords, Necho I (7th century BC), was repaired and completed.

While measures were thus taken to unite the diverse peoples of the empire by a uniform administration, Darius followed the example of Cyrus in respecting native religious institutions. In Egypt he assumed an Egyptian titulary and gave active support to the cult. He built a temple to the god Amon in the Kharga oasis, endowed the temple at Edfu, and carried out restoration work in other sanctuaries. He empowered the Egyptians to reestablish the medical school of the temple of Sais, and he ordered his satrap to codify the Egyptian laws in consultation with the native priests. In the Egyptian traditions he was considered as one of the great lawgivers and benefactors of the country. In 519 BC he authorized the Jews to rebuild the Temple at Jerusalem, in accordance with the earlier decree of Cyrus. In the opinion of some authorities, the religious beliefs of Darius himself, as reflected in his inscriptions, show the influence of the teachings of Zoroaster, and the introduction of Zoroastrianism as the state religion of Persia is probably to be attributed to him.

Darius was the greatest royal architect of his dynasty, and during his reign Persian architecture assumed a style that remained unchanged until the end of the empire. In 521 BC he made Susa his administrative capital, where he restored the fortifications and built an audience hall (apadana) and a residential palace. The foundation inscriptions of his palace describe how he brought materials and craftsmen for the work from all quarters of the empire. At Persepolis, in his native country of Fars (Persis), he founded a new royal residence to replace the earlier capital at Pasargadae. The fortifications, apadana, council hall, treasury, and a residential palace are to be attributed to him, although not completed in his lifetime. He also built at Ecbana and Babylon.

(J.M.M.-R.)

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• **Darius II Ochus** (d. 404 BC, Babylon [now in Iraq]), Achaemenid king (reigned 423–404 BC) of Persia.

The son of Artaxerxes I by a Babylonian concubine, he seized the throne from his half brother Secydianus (or Sogdianus), whom he then executed. Ochus, who had previously been satrap of Hyrcania, adopted the name of Darius on his accession; he was also known as Nothus (Bastard). Darius was dominated by eunuchs and by his half sister and wife, the cruel and ambitious Parysatis. Intrigue and corruption were rife at the Achaemenid court, and revolts in Hyrcania and Media, although quickly suppressed, were symptomatic of the discontent caused by his rule.

After the Athenian defeat at Syracuse in 413 BC, Darius decided to recover the Greek coastal cities of Asia Minor, which had been under Athenian control since 448. The satraps of Asia Minor, Tissaphernes and Pharnabazus, were ordered to collect overdue tribute, and an alliance against Athens was formed with Sparta. In the ensuing war the greater part of Ionia was recovered, but elsewhere the allies had less success, partly because of the policy of Tissaphernes, who gave Spartan forces only limited support. In 407, however, Darius decided to put all his resources behind Sparta. He appointed his son Cyrus the Younger in place of Tissaphernes as commander in chief of Asia Minor and gave him funds to re-create the Spartan fleet. As a result Athenian power was broken in 405 at Aegospotami. Not long after, Darius died of an illness.

• **Darius III,** also called CODOMMANUS (d. 330 BC, Bactria), the last king (reigned 336–330 BC) of the Achaemenid dynasty.

Darius belonged to a collateral branch of the royal family and was placed on the throne by the eunuch Bagoas, who had poisoned the two previous kings, Artaxerxes III and Arses. When Darius asserted his independence, Bagoas also attempted his murder but was forced by the king to drink the poison himself.

In 337 Philip II of Macedon had formed the League of Corinth for the purpose of liberating the Greek cities under Achaemenid rule and, early in 336, had sent an advance force into Asia Minor. In July, however, he was assassinated, perhaps at the instigation of Darius. In the spring of 334 Philip's son Alexander the Great crossed the Hellespont. Because Darius had made no serious preparations to resist the invasion, Alexander defeated an Achaemenid army at the Granicus and, by the following year, had won most of Asia Minor and reached Cilicia. Darius finally advanced against him but was defeated at Issus in the autumn of 333. Darius fled from the field, abandoning his mother, wife, and children.

Darius twice sent Alexander a letter of friendship, the second time offering a large ransom for his family, cession of all the Achaemenid Empire west of the Euphrates River, and the hand of his daughter in return for an alliance. Alexander rejected both letters and marched into Mesopotamia. Darius made no attempt to resist his crossing of the Euphrates and Tigris but offered battle at Gaugamela, east of modern Mosul. On Oct. 1, 331, he was decisively defeated, and, as at Issus, he turned his chariot and fled, although his subordinates fought on. He escaped to Ecbatana, and then, on the approach of Alexander, he retired toward Bactria but was deposed and killed by the Bactrian satrap Bessus.

Darjeeling, also spelled DĀRJILING, Tibetan DORJE-LING, town, extreme northern West Bengal state, northeastern India. Darjeeling lies 305 miles (491 km) north of Calcutta. The town is situated on a long, narrow mountain ridge of the Sikkim Himalayas that descends abruptly to the bed of the Great Rangit River. The town lies at an elevation of about 7,000 feet (2,100 m). On a clear day Darjeeling affords a magnificent view of Kānchenjunga (28,169 feet [8,586 m]), and Mount Everest can just be seen. The name of the town means "place of the thunderbolt." Darjeeling is a noted hill resort that has major road, rail, and air connections with Calcutta.

The town was purchased in 1835 from the raja of Sikkim and was developed as a sanatorium for British troops. It was constituted a municipality in 1850. Chaurāsthā, with the Mall, is the town's main shopping centre and the most attractive promenade. Observatory

Hill, the town's highest point (7,137 feet), is crowned by Mahākāl Temple, which is sacred to both Hindus and Buddhists. Birch Hill contains a natural park and the Institute of



Dirdham Temple in Darjeeling, West Bengal, India
Picturepoint, London

Mountaineering. The Lloyd Botanic Gardens were laid out in 1865. Besides these attractions, Darjeeling has a zoo, a natural history museum, a racecourse, and several hospitals. It is also the seat of the University of North Bengal, founded in 1962, with a number of affiliated colleges, including a medical school, in the town.

The area in which Darjeeling is situated receives plentiful rainfall and has a wide range of climates, from tropical to subalpine, owing to its varying elevations. Local coniferous and oak forests yield valuable timber. The local economy is based primarily on tea, which is plantation-grown from the Tarai up to elevations of 6,000 feet (1,800 m). Other crops are rice, corn (maize), cardamom, and wheat. Pop. (1981) town, 57,603.

Dark Ages, the early medieval period of western European history. Specifically, the term refers to the time (476–800) when there was no Roman (or Holy Roman) emperor in the West; or, more generally, to the period between about 500 and 1000, which was marked by frequent warfare and a virtual disappearance of urban life. It is now rarely used by historians because of the value judgment it implies. Though sometimes taken to derive its meaning from the fact that little was then known about the period, the term's more usual and pejorative sense is of a period of intellectual darkness and barbarity. *See* Middle Ages.

dark nebula, interstellar dust and gas concentrated sufficiently to produce conspicuous obscuring of the stars beyond (*see* nebula).

darkling beetle, any member of the approximately 12,000 species of the insect family Tenebrionidae (order Coleoptera), so named because of their nocturnal habits. These beetles tend to be short and dark; some, however, have bright markings. Although found on every continent, they are more common in warm, dry climates. Most members feed on dry, decomposing vegetation or animal tissue. Some bore in wood; others feed on larvae or live in ant nests.

Adult darkling beetles vary greatly in size and shape: from 2 to 35 mm (1/12 to about 1½ inches) and from flat to cylindrical. The larvae are about 25 mm (1 inch) long, cylindrical, and wormlike.

The larvae of a widely distributed darkling beetle known as the mealworm (*Tenebrio*) are used as food for such pets as birds and fish. Both the mealworm and the smaller flour beetle (*Tribolium confusum*) are pests in dried foods. Remains of *Tribolium* have been found



Mealworm larva (*Tenebrio molitor*)
John Markham

in a grain jar in an Egyptian tomb dating back to about 2500 BC. The flour beetle is also used in laboratory studies of population ecology, heredity, and behaviour because large numbers can be raised under a variety of experimental conditions.

The forked fungus beetle (*Bolitotherus cornutus*) is easily recognized by a pair of blunt, hornlike projections on the head. The dark adult is 10 to 12 mm (0.4–0.5 inch) long and has wing covers that resemble pieces of bark. The larvae live in woody bracket fungi.

The pinacate bug (*Eleodes*) is large and smooth with no hindwings. In dry climates the wing covers (elytra) are fused together to reduce evaporation of water from the body. When disturbed the bug elevates the hind part of its body and secretes a foul-smelling, oily fluid for protection.

Darlan, François, in full JEAN-LOUIS-XAVIER-FRANÇOIS DARLAN (b. Aug. 7, 1881, Nérac, Fr.—d. Dec. 24, 1942, Algiers [Algeria]), French admiral and a leading figure in Marshal Philippe Pétain's World War II Vichy government.

Darlan graduated from the French naval school in 1902 and then advanced through the various ranks, becoming a rear admiral in 1929, vice admiral, admiral, and in June 1939, admiral of the fleet. He served as naval chief of staff from 1936 and was commander in chief of the navy from August 1939.

Darlan entered Pétain's government after France's defeat by Germany in June 1940, serving as vice premier and foreign minister from February 1941 to April 1942. He then gave up his ministerial posts to become commander in chief of all (Vichy) French military forces in 1942. In November of that year Dar-



Darlan
Harlingue—H. Roger-Viollet

lan happened to be in Algiers when the Allied invasion of French-ruled Morocco and Algeria began on Nov. 8, 1942. Darlan persuaded the local Vichy French forces to let the landings continue unopposed, and he then concluded an armistice with the Allies under which his forces came under Free French command. In December 1942 he was killed by an anti-Vichy assassin.

Darley, George (b. 1795, Dublin, Ire.—d. Nov. 23, 1846, London, Eng.), poet and critic little esteemed by his contemporaries but praised by 20th-century writers for his intense evocation, in his unfinished lyrical epic *Nepenthe* (1835), of a symbolic dreamworld. Long regarded as unreadable, this epic came to be admired in the 20th century for its dream imagery, use of symbolism to reveal inner consciousness, and tumultuous metrical organization.

Darley became a free-lance writer in London in 1821. A perceptive critic, he wrote for the literary *London Magazine* and other journals, meanwhile publishing a succession of failures. In his own day, Darley's greatest successes were his mathematical textbooks. Combined with his failure as a creative writer, an incurable stammer sapped his self-confidence, but he kept in touch with his many friends by letter writing, at which he excelled.

Darling, Jay Norwood, byname DING DARLING (b. Oct. 21, 1876, Norwood, Mich., U.S.—d. Feb. 12, 1962, Des Moines, Iowa), American political cartoonist who in his long career commented on a wide range of issues and twice received a Pulitzer Prize.

Darling began drawing cartoons at an early age. While at Beloit (Wis.) College, he was suspended for a year for drawing the faculty as a line of ballerinas, but he graduated in 1900. He joined the staff of a Sioux City (Iowa) newspaper and, after sketching a courtroom scene, was given the assignment of drawing a daily cartoon.

In 1906 he became the cartoonist for the Des Moines *Register,* an association that continued, except for a two-year stint with the New York *Globe,* until he retired in 1949. Beginning in 1917 his cartoons were distributed by the *New York Tribune* and its syndicate. His cartoons on the deaths of William F. "Buffalo Bill" Cody and of President Theodore Roosevelt (in 1917 and 1919, respectively) were particularly notable. After World War I his work stressed the League of Nations as a hope for world peace. He won his first Pulitzer Prize in 1923 and his second in 1943. Darling was also a vigorous conservationist who served as chief of the U.S. Biological Survey (1934–35) and first president (1936) of the National Wildlife Federation.

Darling Downs, pastoral and agricultural region in southeastern Queensland, Australia. It extends westward from the Great Dividing Range and southward to the Dumaresq and Macintyre rivers, generally occupying the basin of the Condamine River. The Darling Downs is a tableland that covers an area of about 5,500 square miles (14,200 square km) and has an elevation of 1,500–2,000 feet (450–600 m). A closely settled region with an adequate rainfall (average 25 inches [635 mm]) and fertile basaltic soils, it is a major wheat and dairy belt that also produces barley, oats, rye, corn (maize), sorghum, and millet. Sheep, poultry, pigs, and beef cattle are the principal livestock raised in the Downs. The Moonie oil field and natural gas fields are located there, and the region has large coal reserves. Toowoomba is the commercial centre. The Downs were explored in 1827 by Allan Cunningham and named for Sir Ralph Darling, governor of New South Wales.

Darling Range, scarp or fault at the edge of the Great Plateau in Western Australia, paralleling the southwest coast east of Perth for 200 miles (320 km) from the Moore River (north) to Bridgetown (south). Average heights range from 800 to 1,000 feet (250 to 300 m), and the highest peaks are Mounts Cooke (1,910 feet), Solus (1,827 feet), and Dale (1,781 feet). The scarp is dissected by ravines cut by rivers flowing to the sea. Some of these, including the Helena (site of Mundaring Weir), the Canning, and the Collie, are dammed to provide irrigation and domestic water. The region, which embraces John Forrest National Park (near Perth), produces wood distillation products and charcoal from eucalyptus, as well as pig iron and bauxite. The range was named

for Sir Ralph Darling, governor of New South Wales (1825–31).

Darling River, river, longest member of the Murray–Darling river system in Australia; it rises in several headstreams in the Great Dividing Range (Eastern Highlands), near the New South Wales–Queensland border, not far from the east coast, and flows generally southwest across New South Wales for 1,702 mi (2,739 km) to join the Murray at Wentworth (on the Victoria border), 150 mi from the Murray's mouth in South Australia.

The main source of the Darling is usually considered to be the Severn, which becomes successively the Dumaresq, Macintyre, Barwon, and, finally, the Darling. Discharge of the lower tributaries (Culgoa, Warrego, Paroo, Gwydir, Namoi, Macquarie, and Bogan) of the main stream fluctuates as a result of droughts and floods. Because much of the Darling's course runs through extensive saltbush pastures, receiving an average of less than 10 in. (250 mm) of rain annually, the river often loses more water by evaporation than is gained from its tributaries, many of which sometimes fail to reach the main stream. There are instances in which distributaries leave the main stream and disappear in inland basins. Several, however, flow into salt flats and in wet years emerge to rejoin the parent stream. The Great Anabranch (which leaves below the Menindee Lakes to join the Murray) and the Talyawalka Creek (which leaves near Wilcannia to rejoin the Darling 80 mi downstream near Menindee) are examples of these anastomosing distributaries (*i.e.,* streams that leave and link up again with the main river). The entire Darling system drains a 250,000-sq-mi (650,000-sq-km) basin with an average annual discharge of 3,600 cu ft (102 cu m) per second at Menindee. The river has an average gradient of 1 in. to the mile.

Headwaters of the Darling were gradually colonized by pastoralists from 1815 onward. In 1828 the explorer Charles Sturt was dispatched by the governor of New South Wales, Sir Ralph Darling, to investigate the lower course of the Macquarie River. He chanced first upon the Bogan and then, early in 1829, the Darling main stream from the Barwon–Culgoa confluence. In the latter part of the 19th century, the river was of importance to navigation, but waterborne traffic has long been superseded by the railway.

The 10-in. winter rainfall line separates the Darling Basin into a western arid or semiarid (steppe) pastoral region and an eastern humid farming portion. The 125,000 sq mi of the pastoral region are owned almost exclusively by wool growers with large holdings suited to grazing. Agriculture is possible only in small irrigated areas along the Darling; there is fodder cropping at Wilcannia, Bourke, and Brewarrina and grape and citrus farming further south in the Mallee region. Several engineering projects have given the drainage area great potential for development. The Darling River Weirs Act of 1945 authorized construction of a series of dams to impound water in reservoirs that provide town water and support irrigation. The Menindee Lakes Storage Scheme, completed in 1960, has created reservoirs with 1,454,000 ac-ft (1,794,000,000 cu m) of water for irrigation and domestic use; by regulating the flow in the Lower Murray, the system also provides a more dependable irrigation supply in South Australia. On the coastal tablelands and western slopes, a system of dams controls floods and allows for diversified agriculture and closer settlement than on the drier western plains.

Darlington, district (borough), southern extreme of the county of Durham, England, bounded on the south by the River Tees. The borough centre, old Darlington town, lies on the River Skerne near its confluence with the Tees. The town is Saxon in origin, and its parish Church of St. Cuthbert dates from the 12th century. In the 19th century textile industries were overshadowed by locomotive manufacture and railway repair work. The Stockton and Darlington Railway, the world's first, opened in 1825, and "Locomotive No. 1," the first engine to run on a public railway, is on exhibition in Bank Top station. Darlington remains a centre of heavy and construction engineering. The area of the district is 77 sq mi (198 sq km). Pop. (1981) urban area, 86,358; (1984 est.) district, 100,300.

Darlington, city, seat of Darlington county, northeastern South Carolina, U.S. Settled in the 1780s, the city and the county (formed 1785) were both named for Darlington, Eng. Its basic agricultural economy (tobacco, cotton, livestock, soybeans, timber) is supplemented by manufacturing (electronics, textiles, paper, and steel). The city has a large automobile auction market and is the home of Darlington Raceway, noted for stock-car racing events including the Rebel 500 in May and the Southern 500 on Labor Day. A stock-car museum was opened in 1965. Inc. town, 1835; city, 1950. Pop. (1990) 7,311.

Darlington, Cyril Dean (b. Dec. 19, 1903, Chorley, Lancashire, Eng.—d. March 26, 1981), British biologist whose research on chromosomes influenced the basic concepts of the hereditary mechanisms underlying the evolution of sexually reproducing species.

Darlington received a B.S. degree from Wye College, Kent, and subsequently joined the staff of the John Innes Horticultural Institution in Merton (later in Bayfordbury), of which he became director in 1939. In 1953 he was appointed Sherardian professor of botany at the University of Oxford.

Darlington began his genetic studies under William Bateson at Innes during the 1920s. Unlike Bateson, however, Darlington became an early adherent of the theory that chromosomes are the cellular components that transmit hereditary information from generation to generation. He went on to elucidate the behaviour of chromosomes during the formation of gametes (meiosis). Building on the work of Thomas Hunt Morgan, who had demonstrated that portions of homologous chromosomes cross over—*i.e.*, are exchanged—during meiosis, Darlington formulated a theory of evolution in which crossing over became the central variable in determining the inherited characteristics of the next generation.

Darlington's published works ranged from the purely scientific (*e.g., The Evolution of Genetic Systems,* 1939) to broader discussions of the role of genetics in human history. *The Evolution of Man and Society* (1969) raised controversy by insisting that the intelligence of races was determined by inheritance.

Darmesteter, Arsène (b. Jan. 5, 1846, Château-Salins, Fr.—d. Nov. 16, 1888, Paris), language scholar who advanced knowledge of the history of French, particularly through his elucidation of Old French.

Prior to becoming professor of Old French language and literature at the Sorbonne (1881), he published *Traité de la formation des mots* . . . (1873; "Treatise on the Formation of Words . . .") and *La Vie des mots* . . . (1887; *The Life of Words* . . .). He collaborated with the French linguists Adolphe Hatzfeld and Antoine Thomas on the preparation of *Dictionnaire général de la langue française* . . . 2 vol. (1890–1900; "General Dictionary of the French Language . . ."). Arsène Darmesteter was the brother of the Orientalist James Darmesteter.

Darmesteter, James (b. March 28, 1849, Château-Salins, Fr.—d. Oct. 19, 1894, Maisons-Laffitte), French scholar noted for ancient Iranian language studies, especially his English and French translations of the Avesta, the sacred scripture of Zoroastrianism.

Darmesteter's thesis on Zoroastrian mythology (1875) was his first important work. He began teaching ancient Iranian at the École des Hautes Études (School of Advanced Studies), Paris, in 1877 and, continuing his research, published *Études iraniennes* (1883; "Iranian Studies"). Appointed professor at the Collège de France (1885), he traveled to India the following year and, upon his return, published a translation of Afghan songs and a valuable essay on Afghan language and literature. His English translation of the Avesta, prepared in collaboration with L.H. Mills, appeared in *Sacred Books of the East* (vol. 4, 23, and 31, 1883–87), edited by the Anglo-German Orientalist and linguist Max Müller. Darmesteter's French translation, *Le Zend-Avesta,* 3 vol. (1892–93), was accompanied by a historical commentary. He placed the earliest portion of the extant Avestan texts in the 1st century BC but the bulk of them in the 3rd century AD. He also published the posthumous papers of his brother, Arsène, the French language scholar.

Darmstadt, *Regierungsbezirk* (administrative district), southern Hesse *Land* (state), southcentral Germany. Darmstadt is bordered by the *Länder* of Bavaria to the east, Baden-Württemberg to the south, Rhineland-Palatinate to the west, and the *Regierungsbezirke* of Giessen and Kassel to the north. The district occupies an area of 2,875 square miles (7,446 square km) and is coextensive with the northern portion of the larger historic region of Hesse-Darmstadt and Nassau. First created in 1945 as the southernmost of two Hesse *Regierungsbezirke,* Darmstadt was divided by a 1980 administrative reorganization, its northern territory becoming part of the new district of Giessen. Darmstadt *Regierungsbezirk* takes its name from that of the administrative seat of the district.

Central Darmstadt is drained by the east–west flowing Main River and its tributaries the Nidda and Kinzig. The Main converges with the Rhine River, Darmstadt's western boundary, near the cities of Wiesbaden and Mainz. The fertile Upper Rhine Plain, noted for the production of asparagus and other vegetable crops, extends from the southern border north to the city of Darmstadt, where it broadens eastward to form the Rhine-Main Basin. The basin is surrounded by uplands situated along the district's fringes, including the steep southern scarp of the Taunus uplands to the northwest, the Vogelsberg to the northeast, the Spessart to the east, and the Odenwald to the south.

Rail, road, and water transportation networks pass through gaps in the uplands and converge on the large urban industrial complex situated in the Rhine-Main Basin. The principal centres of the complex include Frankfurt am Main, the largest city of Hessen; Wiesbaden, the capital of the *Land;* and the cities of Darmstadt, Offenbach, Hanau, Rüsselsheim, and Bad-Homburg. Large stretches of coniferous forest are found on the sandy soils south of Frankfurt am Main. North of Frankfurt the basin merges with the fertile loess-covered Wetterau plain, the southernmost basin of the West Hessen Depression, which extends between the Middle Rhine Highlands and Hessen Central Uplands from Frankfurt to the northern Hessen border. The Wetterau is protected from cold north winds by the Taunus uplands, resulting in a mild climate supportive of Darmstadt's principal agricultural region. Wheat and sugar beets are the chief crops produced.

Population densities in the district range from fewer than 50 persons per sq mi (20 per sq km) in the Taunus highlands west of Wiesbaden to densities averaging more than 1,300

persons per sq mi (500 per sq km) in much of the Rhine-Main Basin. Approximately 60 percent of the population live in cities and towns with more than 20,000 inhabitants. The Rhine-Main Basin, one of Germany's principal industrial regions, specializes in diversified light industries, most importantly engineering and machine construction, and in chemical industries. Frankfurt am Main is one of Germany's leading commercial cities and communications centres. Offenbach is the nation's major producer of leather goods, and Hanau is an important manufacturer of rubber products. Wine production is concentrated in the Rheingau region located on the steep south face of the Taunus uplands west of Wiesbaden and along the Bergstrasse on the western slopes of the Odenwald. The tourist resorts, mineral springs, and beautiful beech and oak forests of Darmstadt's upland regions offer ideal escapes from the congested urban areas of the basin. Wiesbaden boasts 27 thermal springs, making it a world-renowned health resort as well as an industrial centre.

The majority of the population of Darmstadt *Regierungsbezirk* is of Hessian Frankish descent and speak the Rhenish Franconian dialect. About two-thirds are Protestants and one-third Roman Catholics. The predominant rural settlement pattern is one of large, irregular villages, except in the high upland regions where isolated farms and small hamlets are common. Farmsteads are generally styled after the Franconian (Central German) type consisting of a two-story, half-timbered house and a barn set around a rectangular courtyard entered through a gateway. The district's leading university is Johann Wolfgang Goethe-Universität, located in Frankfurt. Pop. (1989 est.) 3,440,194.

Darmstadt, city, Hesse *Land* (state), south-central Germany, situated on a gently sloping plain between the Odenwald (a forested plateau) and the Rhine, south of Frankfurt am Main and southeast of Mainz. First mentioned in the 11th century, Darmstadt was by the 14th century a small village held by the counts of Katzenelnbogen. Chartered in 1330, it was deeded to the landgraves of Hesse in 1479. In 1567 it became the residence of the Hesse-Darmstadt line (a grand duchy from 1806), and from 1919 until 1945 it was the capital of the state of Hesse. Its most brilliant period was under the landgrave Ludwig X (1790–1830), the first grand duke as Ludwig I, under whom the new town was built. Industrialization, especially the development of chemicals, brought rapid expansion in the 19th century. A noted chemist, Justus von Liebig, was born there in 1803. Darmstadt formerly consisted of an old and a new town, and, although badly damaged in World War II, many historic buildings survived, and the city was rebuilt.

Notable landmarks include the statue of Ludwig X (108 ft [33m] high); the ducal castle (1568–95); the Kranichstein hunting lodge, now a museum and game park; and the Russian Church (1898–99), commissioned by Tsar Nicholas II in honour of Tsarina Alexandra, a native of Darmstadt. In the Mathildenhöhe, east of the city, is the artist's colony established (1899) by the grand duke Ernst Ludwig. To the west, on Kuhkopf Island in the Rhine, is a nature reserve with rare waterfowl. Darmstadt is the site of the Landesmuseum and library, a technical university (founded 1836), schools of engineering, art, and music, and a porcelain museum. The Darmstädter Gesprache, a seminar devoted to intellectual issues and combined with art exhibits, is an annual event.

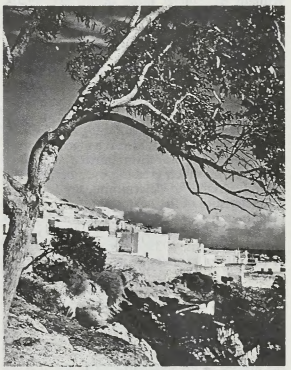
Darmstadt is a highly diversified industrial centre. Its principal manufactures are chemicals, machinery, radios, and kitchen ranges. Pop. (1989 est.) 136,067.



(Left) The Hochzeitsturm (Wedding Tower) by Joseph Olbrich, 1907, and the Russian Church, 1898–99, Darmstadt, Ger.

By courtesy of the German National Tourist Office

Darnah, also spelled DERNA, town of northeastern Libya, on the Mediterranean coast, east of Banghāzī. It lies on the eastern ridges of the Jabal al-Akhḍar in the delta of the small Wādī (seasonal river) Darnah. The town was founded in the 15th century on the site of Darnis, an ancient Greek colony (rock tombs remain). A ruined fort overlooking the town was built by the Americans under William Eaton, who landed there in 1805, to curb piracies on U.S. shipping. Darnah experienced several natural disasters (a plague in 1816, a cholera outbreak and an earthquake in 1834), and until the 1850s it was a slave port. Fortified by the Italians (1911–12) against the Turco-Libyans, it was made an integral part of metropolitan Italy in 1939 and suffered severely during the World War II North African campaigns until finally occupied by the British in 1942.



Darnah, Libya, on the slopes of Jabal al-Akhḍar

Shostal Assoc.—EB Inc

Modern Darnah has whitewashed houses, vine-trellised streets, and palm gardens irrigated by perennial springs. Its minor port offers good offshore anchorage and is used as a seasonal sponge-fishing base. There is light manufacturing, including a garment factory, and local crops (bananas, grapes, and other fruits and vegetables) are marketed. Darnah is also a small winter resort. Pop. (1979 est.) 36,900.

darnel, also called TARE, noxious weed of the ryegrass (*q.v.*) genus *Lolium*.

Darnel's case (1627–28), also called FIVE KNIGHTS' CASE, celebrated case in the history of the liberty of English subjects. It contributed to the enactment of the Petition of Right. In March 1627, Sir Thomas Darnel—together with four other knights, Sir John Corbet, Sir Walter Earl, Sir Edmund Hampden, and Sir John Hevingham—was arrested by the order of King Charles I for refusing to contribute to forced loans. The knights demanded that the crown show cause for their imprisonment or that they be released on bail. In November 1627 their appeal for a writ of habeas corpus was argued before the King's Bench. Counsel for the knights appealed mostly to medieval precedents, including clause 39 of the Magna Carta, which stipulated that no man should lose his liberty without due process of law. On Tudor precedents the crown argued that it had a large discretionary power of arrest. The judges refused bail but did not decide that the crown could always commit without cause. After the release of the knights in 1628, the issue continued to be debated in Parliament. Charles I's agreement not to imprison subjects who refused to pay forced loans did not mollify a House of Commons that sought to impose on the reluctant monarch its own interpretation of the Magna Carta. From this impasse was born the Petition of Right (1628).

darner, also called DARNING NEEDLE: *see* dragonfly.

Darnley, Henry Stewart, Lord, Stewart also spelled STUART, also called (1565–67) EARL OF ROSS, DUKE OF ALBANY (b. Dec. 7, 1545, Temple Newsom, Yorkshire, Eng.—d. Feb. 9/10, 1567, Edinburgh), cousin and second husband of Mary, Queen of Scots, father of King James I of Great Britain (James VI of Scotland), and direct ancestor of all subsequent British sovereigns.

Darnley was the son of Matthew Stewart, 4th earl of Lennox, whose pretension to the throne of Scotland was contested by James Hamilton, 2nd earl of Arran. Darnley's mother, formerly Margaret Douglas, had a claim to the English crown as granddaughter of Henry VII. She planned to secure her son's succession in England by his marriage with the other candidate, Mary. The couple had become acquainted in France shortly after the death of Mary's first husband, the French king Francis II.

In February 1565 Darnley, who had been living in England, went to Scotland with the permission of Queen Elizabeth I. By late April it was known that Mary wished to make him her husband. She created him successively earl of Ross (a rank previously reserved for a son of the Scottish king) and duke of Albany. Elizabeth and the English privy council sent word



Darnley, detail of an engraving by R. Elstrack

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd

that the proposed marriage was "dangerous to the common amity" of the two countries.

Nonetheless, on July 29, 1565, the marriage was celebrated according to the Roman Catholic rite. It was offensive to the Scottish Protestant ministry, for whom John Knox was the spokesman; to the political ambition of James Stewart, earl of Moray (Mary's illegitimate half brother); and to the Hamilton claim to the Scottish throne.

It became evident, even to Mary, that superficial charm was Darnley's only positive attribute. This gave way to indolence, arrogance, drunkenness, and jealousy of Mary's secretary, David Riccio, in whose murder (March 9, 1566) Darnley was involved. He betrayed his accomplices, but they showed Mary his written agreement to Riccio's murder, and he was unable to clear himself with her.

The birth (June 19, 1566) of a son, James, to Mary and Darnley was eventually to solve the problem of the English succession. But Darnley remained an embarrassment to all. While Mary was absent from their temporary residence, Kirk o'Field, near Edinburgh, the house was blown up. The body of Darnley, who had apparently been strangled, was found in a nearby garden. Three months later Darnley's widow married James Hepburn, 4th Earl of Bothwell, the instigator of the murder.

Darqāwā, brotherhood of Ṣūfīs (Muslim mystics) founded at the end of the 18th century by Mawlāy al-'Arbi ad-Darqāwī (*c.* 1737–1823) in Morocco. An offshoot of the Shadhilī Ṣūfīs, the order brought together individuals of varied social class. Its doctrine is orthodox, emphasizing devotion to, contemplation of, and union with God, attainable by frequent solitary prayer or in communal sessions where phrase repetition, poetry, song, and dance induce a state of ecstasy. Members of the Darqāwā generally refuse to participate in public life, though they did agitate against the Ottoman Turks in the early 19th century in Morocco and in Algeria upheld the nationalist cause in opposition to the policies of Abdelkader. The order is found in Morocco, Algeria, Egypt, Lebanon, and Sri Lanka.

Darquier de Pellepoix, Louis (b. Dec. 19, 1897, Cahors, Fr.—d. 1945?), French politician who was notorious as an anti-Semite and collaborator with Nazi Germany.

His family was an old one of some distinction. After studying science at the University of Toulouse, he had a checkered career as a business administrator. As a right-wing demonstrator he was wounded in the antigovernment riot of Feb. 6, 1934, following the Stavisky affair. He became a member of the Paris municipal council, organized the Anti-Jewish Rally of France, and established a virulent journal, *La France enchaînée,* which was subsidized by the German-based International Anti-Semitic Organization and which was suppressed at the start of World War II. In 1939 he was twice sentenced to imprisonment for anti-Semitic propaganda.

At the outset of World War II he served with distinction in the French army and was captured by the Germans but swiftly released. Appointed commissioner of Jewish questions in the Vichy government in May 1942, he promoted the Nazi policy of the extermination of the Jews; Marshal Philippe Pétain, disgusted, addressed him as "Monsieur le Tortionnaire" ("Mr. Torturer"). In January 1944, however, Darquier was arrested on a charge of misusing confiscated goods and was forced to resign. At the liberation he was reported to have been captured, tried, and executed, but later he was rumoured to be alive in Spain. In December 1947 he was tried in absentia and was sentenced to death.

Darracq, (Pierre-)Alexandre (b. Nov. 10, 1855, Bordeaux, Fr.—d. 1931, Monaco), French automobile manufacturer, one of the first to plan mass production of motor vehicles.

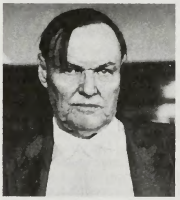
After obtaining experience as a draftsman in the Tarbes Arsenal, Darracq founded the Gladiator Cycle Company in 1891. He sold his company in 1896 and for a short time manufactured electric cars. He also had a major role in producing Millet motor bicycles.

Darracq's first effort in large-quantity production of automobiles occurred in 1898, when he began building Léon Bollée voiturettes under license. The Darracq Flying Fifteen of 1904 was a production model of exceptional quality. He built racing cars and founded a school for racing drivers; a V-8 racing Darracq was timed at 197.06 km (122.45 miles) per hour in 1906. His organization, which merged with Talbot–Sunbeam in 1920 and was dissolved in 1952, produced automobiles under the trademarks Darracq, Talbot–Darracq, and Talbot.

Darriwilian Stage, division of geologic time of the Ordovician period in Australia and, to some extent, New Zealand (the Ordovician period lasted from 505 million to 438 million years ago). The Darriwilian is younger than the Yapeenian Stage but older than the Gisbornian and is distinguished by the presence of a graptolite fossil fauna composed of the genus *Glyptograptus* and several species of the genus *Diplograptus.* Darriwilian faunas evidence closer affinities with fossil assemblages in North America than with those from Europe.

Darrow, Clarence (Seward) (b. April 18, 1857, near Kinsman, Ohio, U.S.—d. March 13, 1938, Chicago), lawyer whose work as defense counsel in many dramatic criminal trials earned him a place in American legal history. He was also well-known as a public speaker, debater, and miscellaneous writer.

Darrow attended law school for only one year before being admitted to the Ohio bar in 1878. He moved to Chicago in 1887 and immediately took part in attempts to free the anarchists charged with murder in the Haymarket Riot (May 4, 1886). Through his friendship with Judge John Peter Altgeld, afterward governor of Illinois, Darrow was appointed Chicago city corporation counsel in 1890, and then he became general attorney for the Chicago and North Western Railway. He left the North Western to defend Eugene V. Debs, president of the American Railway Union, and other union leaders arrested on



Darrow, 1924
By courtesy of Chicago Historical Society

a federal charge of contempt of court arising from the Pullman Strike (May–July 1894). Although Debs and his associates were convicted and the decision was upheld by the U.S. Supreme Court, Darrow established a national reputation as a labour and criminal lawyer. In arbitration hearings during the Pennsylvania anthracite coal strike (1902–03), Darrow represented the striking miners and in cross-examination illumined not only the arduous working conditions in the mines but also the degree to which child labour was used. Subsequently (1907), he secured the acquittal of the labour leader William D. ("Big Bill") Haywood for the assassination of the former governor Frank R. Steunenberg of Idaho. He abandoned labour litigation after the McNamara brothers, two labour leaders whom he defended against charges of dynamiting the *Los Angeles Times* building, unexpectedly switched their plea to guilty during the course of their trial (1911).

After World War I, Darrow defended several war protesters charged with violating state sedition laws. He saved (1924) Richard Loeb and Nathan Leopold from a death sentence (though not from imprisonment) for the murder of 14-year-old Robert Franks in Chicago. In the famous trial of John T. Scopes at Dayton, Tenn. (July 10–21, 1925), Darrow defended a high-school teacher who had broken a state law by presenting the Darwinian theory of evolution. In the Sweet case (1925–26), he won acquittal for a black family that had fought against a mob trying to expel it from its residence in a white neighbourhood in Detroit.

At various times Darrow was a law partner of Altgeld and of the poet Edgar Lee Masters. His courtroom pleas were filled with allusions based on his wide reading. In his speeches and writings he advocated the closed shop and unrestricted freedom of expression and opposed capital punishment, Prohibition, protective tariffs, and the League of Nations. Among his books are *An Eye for an Eye* (1905; a novel), *Crime: Its Cause and Treatment* (1922), *The Prohibition Mania* (1927; with Victor S. Yarros), and *The Story of My Life* (1932).

darshan, Sanskrit DARŚANA ("auspicious viewing"), in Hindu worship, the beholding of an auspicious deity, person, or object. The experience results in a blessing of the viewer. The *rathayātrās* (car festivals), in which images of gods are taken in procession through the streets, enable even those who in former days were not allowed to enter the temple to have darshan of the deity. The capability of darshan is also imparted by a guru (spiritual leader) to his followers, by a ruler to his subjects, and by objects of veneration such as pilgrimage shrines to its visitors.

Darshan, as a point of view in Indian philosophy, refers to the different systems, each with its own way of looking at things and each with a particular exposition of the sacred scriptures, the Vedas. The traditional account is that there are six such darshans, all of them orthodox: sankhya, yoga, nyaya, vaisheshika, mimamsa, and vedanta. But other darshans are also mentioned, such as the heterodox ones of Buddhism, Jainism, and the materialistic Cārvākas.

Dart, Raymond A(rthur) (b. Feb. 4, 1893, Toowong, Brisbane, Queensland, Australia—d. Nov. 22, 1988, Johannesburg, S.Af.), Australian-born South African physical anthropologist and paleontologist whose discoveries of fossil hominids led to significant insights into the evolutionary origins of human beings.

In 1924, at a time when Asia was believed to have been the cradle of mankind, Dart's recognition of the humanlike features of the Taung skull, recovered in South Africa near the great Kalahari desert, substantiated Charles Darwin's prediction that such ancestral hominid forms would be found in Africa. Dart made the skull the type-specimen of a new genus and species, *Australopithecus africanus.* His claim that a creature with an ape-sized brain could have dental and postural characteristics approaching those of humans initially met with hostile skepticism because his theory entailed the principle of mosaic evolution, or the development of some characteristics in advance of others. His claim also differed sharply from the mosaicist position of Elliot Smith,

who held that hominization began with an enlarged cranial capacity. Nevertheless, Dart lived to see his theories corroborated by further discoveries of australopithecine remains at Makapansgat in South Africa in the late 1940s and by the subsequent discoveries of L.S.B. Leakey, which firmly established Africa as the site of mankind's earliest origins.

Dart studied at the University of Queensland and the University of Sydney. From 1923 to 1958 he taught on the faculty of medicine at the University of Witwatersrand, Johannesburg, where the Institute for the Study of Man in Africa was founded in his honour.

Dart, Thurston (b. Sept. 3, 1921, London, Eng.—d. March 6, 1971, London), English musicologist, harpsichordist, and conductor.

A specialist in early music, Dart studied at the Royal College of Music and University College, Exeter, and later went to Belgium where he worked with Charles van den Borren. He taught at the University of Cambridge from 1947 to 1964, after which he moved to King's College of the University of London. He also served as editor of the *Galpin Society Journal*, secretary of the series *Musica Britannica*, and artistic director of the Philomusica in London.

As a scholar and as a performer, Dart concentrated on the music of J.S. Bach and John Bull and the keyboard and consort music of the 16th to 18th century. He made more than 80 recordings, both as a soloist and in ensembles; they are of particular interest because his research in primary sources produced controversial interpretations of Bach's orchestral works.

darter (water bird): *see* snakebird.

darter, any of about 100 species of small, slender freshwater fishes constituting the subfamily Etheostominae of the family Percidae (order Perciformes; sometimes given family standing as the Etheostomidae). All the darters are native to eastern North America. They live near the bottom of clear streams, darting quickly about when feeding or when disturbed. They prey on such small aquatic animals as insects and worms.

Like other members of the family, darters possess two dorsal fins. Their size ranges from 2.5 to 23 cm (1 to 9 inches), but the majority of darters are 5–7 cm long. Some darters are among the most brightly coloured fishes in North America, the males becoming especially colourful during the spring breeding season. Spawning habits vary. Some species scatter or bury their eggs and abandon them; in other species, the males establish nests and guard the eggs until hatched.



Finescale saddled darter (*Etheostoma osburni*)
Roger W. Barbour

Numerous darter species are becoming rare, and several are listed as threatened or endangered in the Red Data Book. Most of these rare species, including the celebrated snail darter (*Percina tanasi*) of the Little Tennessee River in southeastern United States, are threatened because of loss of their natural habitats. The snail darter became the subject of a legal controversy in 1978, when its status as an endangered species delayed for two years the construction of a dam that apparently threatened its restricted habitat.

Dartford, district and borough, county of Kent, England. It lies along the south bank of the River Thames, just east of and adjoining the metropolitan area of Greater London. In ancient times it was a marketing centre. The fording of the River Darent by the London-Canterbury road gave Dartford its name. Because of its location on the main route between London and the mainland of Europe, Dartford has been associated with many events in British history. Isabella, sister of Henry III, was married by proxy there to the Holy Roman emperor Frederick II in 1235. Henry VIII, his wife Anne of Cleves, and Elizabeth I all had private residences in Dartford. During the 16th century, some of the first English experiments in papermaking were made in Dartford. This industry is still important in the district, as are local chalk-quarrying and cement works. Industry and residential development are concentrated in the north; the south of the district, near the North Downs, is still comparatively rural. Area 28 square miles (73 square km). Pop. (1981) urban area, 63,064; (1991 prelim.) district, 78,400.

Dartmoor, wild upland area in the west of the county of Devon, southwestern England. It extends for about 23 miles (37 km) north-south and 20 miles (32 km) east-west. The moorland is bleak and desolate, and heather is the chief vegetation. Isolated weathered rocks (tors) rise from the granite plateau; the highest are Yes Tor (2,030 feet [619 m]) and High Willhays (2,038 feet).

Dartmoor was a royal forest in Saxon times; since 1337 the central area has belonged to the royal duchy of Cornwall. In 1951 Dartmoor and its wooded fringes were designated a national park, covering 365 square miles (945 square km). Eight rivers, including the Dart,



Vixen Tor, a granite formation on Dartmoor, Devon
A.F. Kersting

the Teign, and the Avon, rise on the wet uplands, and much of their water is impounded to supply the towns of Devon. Grazing in the area supports wild ponies, sheep, and cattle; quarrying (granite and china clay) and tourism are other important activities. There are few settlements; the largest is Princetown, founded in 1806 to serve adjoining Dartmoor Prison, which was built to hold French captives from the Napoleonic Wars. Since 1850 it has been England's chief confinement centre for serious offenders.

Dartmoor's wild picturesqueness has made it a popular setting for English mystery fiction, notably Sir Arthur Conan Doyle's *The Hound of the Baskervilles*.

Dartmoor, breed of pony about 12 hands (48 inches, or 122 cm) tall, hardy, and semiwild in its native Dartmoor, Devon, Eng. It is one of nine horse breeds native to the British Isles, and it is exported.

The Dartmoor pony is considered to be a superior riding pony for children and an excellent foundation stock for the breeding of larger ponies as well. Dartmoors varied widely in size and coloration from early days; with the foundation of the Dartmoor Pony Society, the horse became subject to a set of standards,



Dartmoor pony
Sally Anne Thompson

and the preferred colours are brown, black, and bay.

The name is also given to a breed of long-wooled, hornless English sheep.

Dartmouth, city, Halifax county, south-central Nova Scotia, Canada. It lies on the eastern side of Halifax Harbour, opposite Halifax. The origin of the town's name is uncertain; it was named either for the town in England or for the 2nd Earl of Dartmouth. In 1784 it became the headquarters of a Quaker whaling company, and its growth was sustained by the building (1826–61) of the now-abandoned Shubenacadie Canal, 53 miles (85 km) long, from Halifax Harbour to the Bay of Fundy. It was incorporated as a town in 1873. Although partly destroyed in 1917 by an enormous explosion in the harbour, the town experienced an economic boom during World War I and again during and after World War II. The present city, an amalgamation of the town with seven neighbouring communities, was incorporated in 1961. Economic activities include petroleum refining, storage, and distribution, as well as shipbuilding, molasses production, iron founding, and such light industries as the manufacture of aircraft parts and electric components. The city is connected to Halifax by the 4,056-foot- (1,236-metre-) long Angus L. Macdonald and the 5,239-foot- (1,597-metre-) long A. Murray MacKay suspension bridges (opened in 1955 and 1970, respectively) and by ferry. A navy seaplane base and the Bedford Institute of Oceanography are nearby. Pop. (1991) 67,798.

Dartmouth, town ("parish"), South Hams district, county of Devon, England. It lies along the English Channel and the west bank of the River Dart estuary. A yachting centre, it has boatbuilding, light-engineering, and pottery industries. The castle (1481) guarded the entrance to the estuary, from which Richard I's crusaders set sail in 1190. In 1944 detachments of U.S. troops sailed from there to the Normandy beaches. The Britannia Royal Navy College is situated above the harbour. Pop. (1981) 6,211.

Dartmouth, town (township), Bristol county, southeastern Massachusetts, U.S. It lies along Buzzards Bay, adjacent to New Bedford. The site, part of a land purchase made by William Bradford and Captain Myles Standish from the Indian chief Massasoit, was settled by Quakers in the 1650s. It was incorporated in 1664 and named for Dartmouth, Eng. Nearly destroyed during the conflict between Indians and white settlers known as King Philip's War (1675–76), Dartmouth was rebuilt and prospered with the whaling and shipbuilding industries at New Bedford (then Bedford Village and part of Dartmouth until separately incorporated in 1787). Dartmouth's present economy is based on tourism, dairying, and farming. The township includes the resort villages of Nonquitt, North Dartmouth, South Dartmouth, and Apponagansett. Demarest Lloyd State Park faces Buzzards Bay. Pop. (1992 est.) 27,159.

Dartmouth (of Dartmouth), George Legge, 1st Baron (b. 1647/48—d. Oct. 25, 1691, London), British admiral and commander in chief who is best known for his service during the reigns of Charles II and James II.

Legge attended King's College, Cambridge, and volunteered his service in the navy during the Second Anglo-Dutch War (1665–67). He was a member of the household of the Duke of York (later James II), was governor of Portsmouth, and master general of the army. In 1682 Legge was created Baron Dartmouth. He was admiral of a fleet that in 1683 sailed to Tangier, dismantled the fortifications, and brought back the English troops. Under James II, who had acceded to the throne in 1685, Dartmouth was master of the horse and governor of the Tower of London.

In 1688, when an invasion by William of Orange (later William III) was expected, James II appointed Dartmouth commander in chief of his fleet. Although he was himself loyal to James, the same was not true of most of his officers, and an engagement with William was purposely avoided. Dartmouth refused to assist the king in getting James Edward, Prince of Wales, out of the country, and he even reproved the king for attempting this proceeding. When James II himself fled to France, Dartmouth left the fleet and took the oath of allegiance to William and Mary. In July 1691, however, he was arrested for treason and was charged with offering to hand over Portsmouth to France and to command a French fleet. Dartmouth protested his innocence, but he died in the Tower of London before the question was resolved.

Dartmouth, William Legge, 2nd Earl of, VISCOUNT LEWISHAM, BARON DARTMOUTH OF DARTMOUTH (b. June 20, 1731—d. July 15, 1801, Blackheath, Kent, Eng.), British statesman who played a significant role in the events leading to the American War of Independence.

Legge was educated at Westminster School and Trinity College, Oxford. In 1750 he succeeded his grandfather as Earl of Dartmouth and later entered on a political career, taking his seat in the House of Lords in May 1754. In the Marquess of Rockingham's first administration, Dartmouth was appointed president of the Board of Trade and a member of the Privy Council (July 1765). During his tenure (1765–66) he opposed the Stamp Act and worked for the act's repeal.

In 1772 Dartmouth became secretary of state for the colonies in the ministry of his stepbrother, Lord North. Faced with mounting hostility in the British North American colonies, he adopted a policy of conciliation to allow tensions to abate. When this policy was rendered ineffective by the Boston Tea Party, Dartmouth sought to reimpose strict British control over the colonies. The Intolerable Acts, which he supported, only exacerbated tensions, as did the Quebec Act (1774), which he defended from attempts at repeal. He rejected further proposals for conciliation with the colonies and in 1776 called for the use of overwhelming force to suppress the growing rebellion. Unwilling, however, to direct a war against the colonists, he resigned his offices in November 1775 but remained in the Cabinet as Lord Privy Seal until 1782 in order to support Lord North.

Dartmouth, a devout evangelical Anglican, befriended the Methodist John Wesley and the Quaker John Fothergill. This school developed into Dartmouth College of Hanover, N.H., which was named in Dartmouth's honour.

Dartmouth College, coeducational liberal arts college in Hanover, N.H., U.S.

The college has its antecedents in Moor's Indian Charity School of Lebanon, Conn., founded by the Reverend Eleazar Wheelock in 1754. The college's actual founding dates from 1769, when England's King George III approved a charter drawn up by Governor John Wentworth of the province of New Hampshire. The college was established the following year when Wheelock erected a single log hut in the New Hampshire wilderness. It took the name of the 2nd Earl of Dartmouth, president of the trustees of English funds for the school.

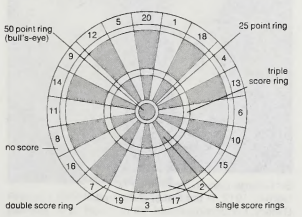
Dartmouth is regarded as one of the most innovative small liberal arts colleges in the United States. Among its areas of particular academic strength are English, chemistry, geology, history, mathematics, and languages. Special programs are devoted to Asia, black studies, the environment, native Americans, and urban affairs. The school concentrates primarily on undergraduate education with small classes, numerous seminars, and close student-teacher contact, but Dartmouth is also well known for the quality of its professional schools of medicine, engineering, and business.

Dartmouth College case, formally TRUSTEES OF DARTMOUTH COLLEGE V. WOODWARD (4 Wheat. 518 [1819]), U.S. Supreme Court case in which the court held that the charter of Dartmouth College granted in 1769 by King George III of England was a contract and, as such, could not be impaired by the New Hampshire legislature. The charter vested control of the college in a self-perpetuating board of trustees, which, as a result of a religious controversy, removed John Wheelock as college president in 1815. In response, the New Hampshire legislature passed an act amending the charter and establishing a board of overseers to replace the trustees. The trustees then sued William H. Woodward, college secretary and ally of Wheelock, but lost in the state courts.

Daniel Webster, a Dartmouth graduate and the most famous lawyer of his time, represented the trustees before the U.S. Supreme Court, which reversed the decision of the New Hampshire courts. The Supreme Court held that Section X, Article 1, of the federal Constitution prohibits states from altering the obligations of a contract, in this case, a charter. The founders of Dartmouth, the court ruled, contracted with the trustees for the perpetual application of the funds provided by the founders. The decision had far-reaching impact in its application to business charters, protecting businesses and corporations from a great deal of government regulation.

darts, indoor target game played by throwing feathered darts at a circular board with numbered spaces. The game became popular in English inns and taverns in the 19th century and increasingly so in the 20th.

The board, usually made of cork, bristle, or elmwood, is divided into 20 sectors valued at points from 1 to 20. Six rings determine the scoring: an inner bull's-eye worth 50 points, an outer bull's-eye worth 25 points, a wide single-scoring ring, a narrow triple-scoring ring, another wide single-scoring ring, and, outermost, a narrow double-scoring ring.



Dart board

Throwing is free-style, usually from one of three traditional distances: 8 feet (2.43 m), 8 feet 6 inches (2.59 m), or 9 feet (2.74 m). The centre of the board is posted 5 feet 8 inches (1.73 m) above the floor. (These and other rules may vary slightly in countries outside the British Isles.)

In the organized game, each player has three weighted and feathered darts, generally about 16 cm (6 inches) long. The player usually begins with any double score (dart thrown into the double ring). He subtracts this and subsequent scores from a previously chosen number, usually 301 or 501. The winner must reach exactly zero on his last throw. In informal pub games, players usually total up their scores from the start and declare the player who first reaches a predetermined number the winner.

Variations of the game include "cricket," a game for two teams in which the players alternate between scoring inner bull's-eyes and points; "football," a game for two players in which the first player to hit the inner bull's-eye scores as many "goals" as he can by throwing doubles until his opponent scores an inner bull's-eye; and "round the clock," a singles game for any number of players, which requires that, after a starting double, each player must throw one dart into each of the sectors, in order, from 1 to 20.

A form of darts was a training game for English archers in the Middle Ages. The game was popular with Tudor monarchs from Henry VIII. In its modern form in Britain, the game is ordinarily played in the public house, or pub (tavern), or in a club, rather than in the home. Of an estimated 7,000,000 players in the British Isles, about 1,000,000 are registered in some 7,000 clubs affiliated with the National Darts Association of Great Britain (NDA; founded 1953). The major annual championships are the Lord Lonsdale Trophy (conceived in 1938–39 and governed since 1962 by the NDA) and the *News of the World* Individual Championship (originated in 1947–48). Many other countries around the world have darts associations, linked by the World Darts Federation, headquartered in London.

Daru, Pierre-Antoine (-Noel-Mattieu-Bruno), Comte (Count) (b. Jan. 12, 1767, Montpellier, Fr.—d. Sept. 5, 1829, Meulan), French military administrator and organizer during the Napoleonic period.

Daru entered the military administration in 1784, served the revolutionary governments, and in January 1795 was called to the war ministry in Paris. His conspicuous administrative talents led to a continuous succession of advancements: secretary-general of the war ministry (1800), imperial councillor of state (1805), intendant general of the Grand Army (1806), and minister of war (1811). He apparently enjoyed the complete confidence of Napoleon, who charged him with the administration of conquered Prussian and Austrian territories in 1807. Daru retired when Bonaparte was defeated in 1814 but returned to the imperial cause during the Hundred Days.

In 1806 Daru was elected to the Institut de France in recognition of his four-volume translation of the works of Horace (1804–05). During the restoration of the Bourbons, he served in the Chamber of Peers, where he opposed the reactionary policies of the ultra-royalists, but he devoted most of his energies to his historical and literary studies. In 1819 he published the seven-volume *Histoire de la République de Venise* ("History of the Republic of Venice") and in 1826 the three-volume *Histoire de la Bretagne* ("History of Brittany").

Daruma (Buddhist monk): *see* Bodhidharma.

Darwin, capital and chief port of Northern Territory, Australia. It is situated on a low peninsula northeast of the entrance to its harbour, Port Darwin, a deep inlet of Clarence Strait of the Timor Sea. The harbour was found in 1839 by John Stokes, surveyor aboard the ship HMS *Beagle,* and it was named after the British naturalist Charles Darwin. The site was not settled until 1869 and was known as Palmerston until it was renamed after the harbour in 1911, when the territory went from South Australian to Australian Commonwealth administration.

Darwin received a stimulus from the development of air services during the 1930s and from its use as a fueling and military base in World War II. It was severely bombed by the Japanese in 1942 but was extensively rebuilt. It was gazetted a city in 1959. A cyclone in 1974 damaged or destroyed nearly all of the city; two-thirds of the residents were evacuated. With government assistance Darwin was rebuilt a second time, and it is now one of the most modern cities in Australia.

The city is a service centre for a developing pastoral and mining hinterland; its economy is also dependent on government business, tile and brickmaking, fruit canning, meat-packing, sawmilling, and the export of cattle, rice, uranium ore, and some pearl shell. Darwin is also the terminus of east- and west-coast shipping routes, of the railway to Birdum (316 road miles [509 km] southeast), of the Stuart Highway to Alice Springs (954 miles southeast), of the overland telegraph to Adelaide, S. Aus., and of a submarine cable linked to Great Britain. Pop. (1991 prelim.) 69,809.

Darwin, Charles (Robert) (b. Feb. 12, 1809, The Mount, Shrewsbury, Shropshire, Eng.—d. April 19, 1882, Down House, Downe, Kent), English naturalist, renowned for his documentation of evolution and for a theory of its operation, known as Darwinism. His evolutionary theories, propounded chiefly in two works—*On the Origin of Species by Means of Natural Selection* (1859) and *The Descent of Man, and Selection in Relation to Sex* (1871)—greatly influenced the scientific and religious tenor of his time.

A brief account of Charles Darwin follows; for a full biography, *see* MACROPAEDIA: Darwin.

Darwin was reared by his eldest sister from age eight. After an early life that showed little promise of his later prominence he developed an interest in natural history and in 1831 sailed as a naturalist on HMS *Beagle* to survey the wildlife of the west coast of South America and some Pacific islands. During this five-year voyage he became convinced of the gradual evolution of species. Upon his return to England he worked for 20 years refining his ideas before he began to write a detailed account of evolution in 1856. In 1858 Darwin received a letter from Alfred Russel Wallace, a younger naturalist, that contained a succinct and complete statement of his own ideas about evolution. That same year Darwin's friends arranged that a joint paper on the subject be read before the Linnean Society of London, and in 1859 Darwin published his discoveries in an abstract, *On the Origin of Species.*

Darwin's genius was not confined solely to the study of evolution. He explored many other natural phenomena, including the taxonomy of barnacles, the formation of atolls, the tropic responses of plants to light, and the role of earthworms in soil fertility. Later works include *Variation in Animals and Plants Under Domestication* (1868) and *The Descent of Man* . . . (1871).

Darwin, Erasmus (b. Dec. 12, 1731, Elston Hall, Nottinghamshire, Eng.—d. April 18, 1802, Derby, Derbyshire), prominent English physician, grandfather of the naturalist Charles Darwin and the biologist Francis Galton.

Educated at the universities of Cambridge (1750–54) and Edinburgh (1754–56), Darwin opened a successful medical practice in Lichfield after finding prospects in Nottingham unpromising. He soon built a reputation as



Erasmus Darwin, detail of an oil painting by Joseph Wright, 1770; in the National Portrait Gallery, London

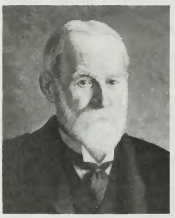
By courtesy of the National Portrait Gallery, London

a practitioner of such talent that George III offered him a position as his personal physician in London. Darwin declined to make the move, however. While in Lichfield, he made the acquaintance of many distinguished men, among them Joseph Priestley, Jean-Jacques Rousseau, and Samuel Johnson.

Following his move to Derby (1781), where he founded a philosophical society, he opened a dispensary at Lichfield (1784). A freethinker and radical, Darwin often wrote his opinions and scientific treatises in verse. The most notable of these works are *The Botanic Garden* (1794–95) and *The Temple of Nature or the Origin of Society* (1803). In *Zoonomia or the Laws of Organic Life* (1794–96) he advanced his own concepts of evolution, which were similar to those of J.-B. Lamarck. He believed that species modified themselves by adapting to their environment in a purposive way. It is as a transitional figure that Erasmus Darwin is primarily important. He embodied the attitudes and values of 18th-century materialism, but his conclusions concerning evolution were drawn from simple observation and were rejected by the more sophisticated of the 19th-century scientists, his grandson Charles foremost among them. His major works also include *A Plan for the Conduct of Female Education in Boarding Schools* (1797) and *Phytologia, or the Philosophy of Agriculture and Gardening* (1800).

Darwin, Sir George (Howard) (b. July 9, 1845, Downe, Kent, Eng.—d. Dec. 7, 1912, Cambridge, Cambridgeshire), English astronomer who championed the theory that the Moon was once part of the Earth, until it was pulled free to form a satellite.

The second son of the eminent naturalist



Sir George Darwin, portrait by M. Gertler, 1912; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Charles Darwin, he became Plumian professor of astronomy and experimental philosophy at Cambridge University in 1883. His monumental analysis of tides, published in 1884, was based on the methods developed by Pierre-Simon Laplace and Lord Kelvin. In *The Tides and Kindred Phenomena in the Solar System* (1898), he discussed the effects of tidal friction on the Earth–Moon system and theorized that the Moon was formed from matter pulled away from the still-molten Earth by solar tides, a hypothesis now considered unlikely to be true. His great achievement was that he was the first to develop a theory of evolution for the Sun–Earth–Moon system based on mathematical analysis in geophysical theory.

Darwin made extensive studies of the orbits of three rotating bodies, such as the Sun–Earth–Moon system—*i.e.,* he computed where each would be at a specific time. As part of his investigation of the origin of the Moon, he studied the shapes at which rotating masses of fluid become stable. His conclusion that a pear-shaped rotating fluid body is stable is now considered incorrect. Darwin became president of the Royal Astronomical Society in 1899 and of the British Association six years later. He was made Knight Commander of the Bath in 1905.

Darwin Rise, submarine topographic rise underlying a vast area of the western and central Pacific, corresponding in location to a large topographic rise that existed during the Mesozoic Era (65,000,000 to 225,000,000 years ago), and named in honour of Charles Darwin. The rise stretches more than 6,000 miles (10,000 km) roughly from the area just east of the Mariana Trench southeast to the Tuámotu Archipelago and is about 2,500 miles (4,000 km) wide. It is characterized by many flat-topped seamounts and coral atolls; maximum depth to the seamount tops is about 5,200 feet (1,600 m). Several ridges and troughs are oriented parallel to the rise, with transverse fracture zones cutting across the rise topography. A vast archipelagic apron characterized by floods of fluid lava covers most of the Darwin Rise. Presently, the area is seismically inactive and exhibits normal heat flow through the floor of the ocean.

That the area was formerly a rise is suggested by the ridge and trough topography, the former volcanic activity, and its position in the middle of an ocean basin. There is ample evidence for subsidence: shallow water organisms have been found on the seamount tops, and oxidized iron has been found in dredged samples, suggesting that erosion and weathering have taken place. Many volcanic cones on the Darwin Rise must have been exposed above the sea in the past. Charles Darwin recognized the area as one of subsidence from the appearance of upward-growing coral atolls, in accordance with his theory of atoll formation by ocean floor subsidence. The subsidence is believed to have occurred continuously since the Cretaceous Period. The existence of such an area of subsidence is significant in marine geology because it confirms that large vertical movements of the Earth's crust have occurred beneath the sea.

Darwinism, theory of the evolutionary mechanism propounded by Charles Darwin as an explanation of organic change. It denotes Darwin's specific view of how the process of evolution works.

Beginning in 1837, Darwin proceeded to work on the now well-understood concept that evolution is essentially brought about by the interplay of three principles: (1) variation—a liberalizing factor, which Darwin did not attempt to explain, present in all forms of life; (2) heredity—the conservative force that transmits similar organic form from one generation to another; and (3) the struggle for existence—which determines the variations that will confer advantages in a given environ-

ment, thus altering species through a selective reproductive rate.

On the basis of newer knowledge, neo-Darwinism has superseded the earlier concept and purged it of Darwin's lingering attachment to the Lamarckian theory of inheritance of acquired characters. Present knowledge of the mechanisms of inheritance are such that modern scientists can distinguish more satisfactorily than Darwin between non-inheritable bodily variation and variation of a genuinely inheritable kind.

Darwin's finch: *see* Galápagos finch.

Darwin's frog (*Rhinoderma darwinii*), a small Argentinian and Chilean frog that is one of the few species in the family Rhinodermatidae. Charles Darwin discovered the frog on his world voyage.

Darwin's frog is unique among amphibians for its brooding habits. Males pick up eggs about to hatch and carry the developing young about in their distensible vocal pouch until they are able to fend for themselves.

darwīsh (Islām): *see* dervish.

Daryā-e Nūr, largest and finest diamond in the crown jewels of Iran. A pale-pink, tablet-shaped stone weighing about 185 carats, it is from Golconda, Andhra Pradesh, India. Inscribed on a rear facet is the name of Fatḥ 'Alī Shāh and the date 1834, the year of his death. Experts from the Royal Ontario Museum have postulated that the Daryā-e Nūr (meaning "sea of light") is the major portion of the Great Table diamond, seen by the French jewel trader Jean-Baptiste Tavernier in Golconda in 1642. The other piece of the Great Table is thought to have been recut as an oval, pink, 60-carat brilliant called the Nūr ol-'Eyn (meaning "light of the eye").

Das, Chitta Ranjan (b. Nov. 5, 1870, Calcutta—d. June 16, 1925, Darjeeling, India), politician and leader of the Swaraj (Independence) Party in Bengal under British rule.

After failing the competitive entrance examination for the British-dominated Indian Civil Service, Das entered the legal profession. He defended many accused of political offenses and took an active part in nationalistic journalism.

Bitterly opposing British rule in India and rejecting all ideas of political or economic development of India along Western lines, he idealized the life of the ancient Indian village and saw a golden age in ancient Indian history. He supported the movement of non-cooperation launched against British rule by Mahatma Gandhi and in 1921 was imprisoned for six months as a political offender. In 1922 he became president of the Indian National Congress. Under his leadership the Congress abandoned its intentions to boycott colonially sponsored elections for provincial councils. It decided instead to participate in order to seek positions that would permit them to obstruct governmental business from within.

Later, when the Swarajists were returned as the largest party in Bengal, Das declined the post of chief minister, stating that his aim was to wreck the existing government, not to cooperate with it. In 1924 he was elected mayor of Calcutta and tried to improve the lot of the city's neglected Indian population. In 1925 there were some signs of a possible compromise between Das and Lord Birkenhead, the secretary of state for India, but Das died before any agreement could be reached.

Dāsa, also spelled DASYU, member of an aboriginal people in India encountered and embattled by the invading Aryans (*c.* 1500 BC). They were described by the Aryans as a dark-skinned, harsh-spoken people who worshipped the phallus. This allusion has persuaded many scholars that worship of the *liṅga,* the Hindu religious symbol, originates with them; it may, however, have referred to their sexual practices. They lived in fortified places from which they sent out armies. They may be considered the original Śūdras, or labourers, who served the three higher classes of Brahmin, Kṣatriya (warrior), and Vaiśya (mercantile), from whose ritual communion they were excluded.

Dasam Granth, collection of writings attributed to Gurū Gobind Singh, the tenth and last spiritual leader of the Sikhs, a religious group in India. *Dasam Granth* is a short title for *Dasven Pādśāh kā Graṅth* (Punjabi: "The Book of the Tenth Emperor [*i.e.*, spiritual leader]"). It is a compilation of hymns, philosophical writing, Hindu mythological tales, autobiography, and erotic fables, written in Braj Bhasa, Hindi, Persian, and Punjabi. Scholars are not in agreement as to the work's total authenticity, and it may represent a bringing together of Gurū Gobind Singh's own writings with those from other sources, such as his court poets. Though some of the hymns are used in Sikh worship and ritual, the *Dasam Granth* is not accorded the same reverence paid to the chief Sikh scripture, the *Ādi Granth.*

Dasgupta, S(urendra) N(ath) (b. October 1885, Kushtia, Bengal, India—d. Dec. 18, 1952, Lucknow), Hindu philosopher noted for his authoritative *History of Indian Philosophy* (5 vol., 1922–55). His philosophical system, developed from his studies of Eastern and Western thought, synthesized aspects of Vedantic literature, Indian Jainism (particularly its mysticism), British and U.S. Neorealism, and the theory of emergent evolution.

Dasgupta's family was well known for its tradition of Sanskrit learning and culture. His own educational interests ran towards Sanskrit and science alike. Shortly after receiving M.A. degrees in Sanskrit and philosophy from Sanskrit College in Calcutta, he became a permanent professor at Chittagong College. It was there that he started the initial work on his *History of Indian Philosophy.*

During the early 1920s Dasgupta travelled to England, where he earned a doctorate from Cambridge for his thesis on contemporary European philosophy. Upon his return, his base of teaching and research became Calcutta. He was well received within European philosophical circles, visiting the United States and Europe on several occasions throughout his career as a speaker and professor.

In his philosophy, Dasgupta interpreted the mind-knowledge complex as part of a historical, evolutionary process that emerged from the fundamental matrix of space and time through biological stages. The end of this process is a divine beatitude that the individual values as the highest form of love.

dash (race): *see* sprint.

dasheen (tropical plant): *see* taro.

Dashkova, Yekaterina Romanovna Vorontsova, Knyaginya (Princess) (b. March 28 [March 17, old style], 1743/44, St. Petersburg—d. Jan. 16 [Jan. 4, O.S.], 1810, near Moscow), associate of Empress Catherine II the Great and a prominent patroness of the literary arts in 18th-century Russia.



Princess Dashkova, detail of an oil painting by S. Ponci; in the Hermitage, Leningrad

Novosti Press Agency

A member of the influential Vorontsov family, Yekaterina Romanovna married Prince Mikhail Ivanovich Dashkov in 1759. After Catherine's husband, Peter III, succeeded Empress Elizabeth (d. Jan. 5, 1762 [Dec. 25, 1761, O.S.]), Princess Dashkova became part of a faction that sought to remove Peter from the throne. The Princess joined an intrigue to overthrow Peter III and to make Catherine the regent for her young son, Paul. Later, she participated in the coup d'etat that placed Catherine on the Russian throne.

Despite her political support, the Princess' relations with the Empress were not cordial, and Dashkova spent much of her time during the late 1760s and 1770s abroad. After returning to St. Petersburg in 1782, however, the Princess was appointed by Catherine to direct the Petersburg Academy of Arts and Sciences. In 1783 she also became the first president of the Russian Academy, which was founded at her suggestion to promote the study and use of the Russian language. Under her supervision, it produced a Russian dictionary. Dashkova also edited a monthly journal and wrote dramas. Her prominence ended in 1796 when Paul I, successor to Catherine, deprived the Princess of her offices and compelled her to leave St. Petersburg.

daśnāmī sannyāsin, Hindu Śaiva ascetic who belongs to one of the 10 orders (*daśnāmī,* "ten names") established by the philosopher Śaṅkara in the 8th century AD and still flourishing in India today. The 10 orders are Araṇya, Āśrama, Bhāratī, Giri, Parvata, Purī, Sarasvatī, Sāgara, Tīrtha, and Vana. Each order is attached to one of four monasteries (*maṭhas*), also established by Śaṅkara, in the north, south, east, and west parts of India. They are Jyoti (Joshi) Maṭha (at Badrīnāth, near Hardwār, Uttar Pradesh state); Śṛṅgeri Maṭha (Śṛṅgeri, Karnataka state); Govardhana Maṭha (Purī, Orissa state); and Śāradā Maṭha (Dwārkā, Gujarāt state). The heads of the monasteries are called *mahants* (the head of the Śṛṅgeri Maṭha is called *jagadguru,* "teacher of the world"); they continue to be consulted on points of doctrine and to be accorded the highest respect by Hindu laymen as well as by the ascetics who follow them.

Daśnāmī sannyāsins typically wear ochre-coloured robes and, if they can obtain one, carry on their shoulders a tiger or panther skin to sit on. They wear a mark (*tilaka*), ideally made with ash from a cremation fire, consisting of three horizontal bands across the forehead and on other parts of their body, and a necklace-rosary consisting of 108 *rudrākṣa* seeds. They allow their beards to grow and wear their hair loose about their shoulders or else tied in a topknot.

Some extreme *daśnāmī*s go about naked. They are called *nāgā* ("naked") *sannyāsins* and are the most militant among the ascetics. In the past the *nāgā sannyāsins* on occasion engaged in battles with Islāmic fanatics and with the naked ascetics of other Hindu sects.

Dass, Petter (b. 1647, Nord Herøy, near Alstahaug, Nor.—d. 1707, Alstahaug), Norwegian poet who, in an age of pedantry and artifice, stands out among his contemporaries for the vivid freshness, everyday language, and common appeal of his works.

The son of a Scottish merchant who had settled in Bergen, he studied at Copenhagen, was ordained in 1677, and became pastor of Alstahaug in northern Norway. He remained there the rest of his life exhorting and comforting his scattered parish of fishermen, shepherds, and farmers. His poems were circulated in

manuscript and learned by heart by his parishioners. Only the poem *Den Nordske dale-viise* (1683; "The Norwegian Song of the Valley") was published during his lifetime. His easily memorized sacred poems were collected after his death as *Aandelig tidsfordriv* ("Spiritual Pastime"). But he is best known for *Nordlands trompet* (written 1678–1700; published 1739; *The Trumpet of Nordland*), a rhyming description of Nordland (the three northernmost provinces of Norway) that depicts, with loving accuracy and homely humour, Nordland's natural features, people, and occupations. Written in an easy, swinging metre, it is addressed to the common people.

Dassault, Marcel, original name MARCEL BLOCH (b. Jan. 22, 1892, Paris, France—d. April 18, 1986, Paris), French aircraft designer and industrialist whose companies built the most successful military aircraft in Europe in the decades after World War II.

The son of a Jewish physician, Bloch obtained degrees in aeronautical design and electrical engineering and worked as an aircraft designer for France during World War I. He engaged in real estate in the 1920s but returned to aeronautics in 1930, starting his own company and building military and civilian airplanes with notable success and profitability. During World War II he refused to work for the Germans and was eventually sent to Buchenwald concentration camp.

After the war Bloch changed his last name to Dassault (a nom de guerre of one of his brothers in the Resistance) and converted to Roman Catholicism. His aircraft-manufacturing company, Générale Aéronautique Marcel Dassault, led the postwar revival of the French aircraft industry, producing Europe's first supersonic plane, the Mystère, as well as the highly successful line of delta-winged military aircraft called Mirages (from 1956). The various Mirage warplanes proved very popular among neutral and Third World nations and became some of the most widely used military aircraft in the world. In 1967 Dassault's company merged with Breguet Aviation, a manufacturer of transport aircraft, to form Avions Marcel Dassault–Breguet Aviation.

Dassault was a deputy in the National Assembly from 1951 to 1955 and from 1958 until his death.

dassie (mammal): *see* hyrax.

dassie rat: *see* rock rat.

dastgah, in the art music of Iran, a set of notes, their special characteristics, and an associated group of traditional melodies that constitute a basis for improvised performance. The *dastgah* and the Arabic *maqām* (*q.v.*) are similar systems, reflecting a period during which the Arabs ruled over Iran.

The notes basic to each *dastgah,* or melodic mode, form a seven-tone scale. Although more than 50 have been widely used, theorists usually describe 12 principal modes.

During a performance the musician uses the seven notes of the mode, three notes for changeable pitches within the mode, and several more for modulations (changes from one mode to another). He builds the performance on traditional melodic entities called *gūshehs.* From the group of *gūshehs* associated with a *dastgah,* a performer chooses which to use, the order in which to play them, and the way of playing them. The total collection of more than 200 *gūshehs* in all 12 *dastgahs* is known as the *radīf.* The Iranian *dastgah* represents evolution from the *maqām* after loss of contact with the Arabic tradition.

Dasvant (fl. 16th century, India), a leading Indian Mughal artist, cited by Abū-ul-Fazl ʿAllāmī, the historiographer of the emperor Akbar's court, as having surpassed all painters to become "the first master of the age."

Little is known of his life, though it is conjectured that he was a Hindu, probably of humble origin. He came to the attention of Akbar, who personally placed him under the tutelage of the Persian master ʿAbd-uṣ-Ṣamad. Only a few miniatures bearing his name have survived, the large majority of them illustrating the Jaipur *Razm-nāmeh* (the Persian name for the Indian epic the *Mahābhārata*), and these are works that were designed by Dasvant but painted by his associates. A miniature in the Cleveland Museum of Art's manuscript copy of the *Ṭūṭī-nāmeh* ("Parrot Book") is the only painting on which he worked alone. Even the little that has survived is sufficient to justify his reputation. Of unstable mind, he killed himself in a fit of madness.

Dasyu (Indian aborigine): *see* Dāsa.

dasyurid, any member of a family (Dasyuridae) of marsupial mammals that includes the



Marsupial mouse (*Sminthopsis*)
Hans and Judy Beste—Ardea Photographics

native cats, marsupial mice and rats, and their allies. All of the approximately 50 species occur in New Guinea, the Aru Islands, Australia, and Tasmania.

For specific dasyurids, *see* native cat; Tasmanian devil; marsupial mouse; numbat.

Daszyński, Ignacy (b. Oct. 26, 1866, Zbaraż, Galicia, Poland, Russian Empire [now Zbarazh, Ukraine]—d. Oct. 31, 1936, Bystra, near Cieszyn, Poland), Polish socialist leader and patriot who was prominent in the restoration of the Polish Republic after World War I.



Daszyński, *c.* 1929
By courtesy of the Adam Ciołkosz Archives, London

In October 1892 Daszyński was one of the organizers of the Polish Social Democratic Party in Galicia. He was elected to the Austrian Reichsrat in 1897 and was a member of it until 1918. From 1903 he took part in many congresses of the Socialist International, always insisting on the independence and reunification of all Polish lands as an integral part of the Polish socialist program. From 1912 he collaborated to this end with Józef Piłsudski, whom he then admired. Also in 1912 he became editor in chief of the Polish socialist daily newspaper *Naprzód* ("Forward") in Kraków. Daszyński was the head of the first provisional government of restored Poland, formed at Lublin on Nov. 7, 1918. Elected on Jan. 26, 1919, to the Sejm (Diet), he was reelected in 1922, 1928, and 1930. From July 1920 to January 1921 he was deputy premier in the government of national unity presided over by Wincenty Witos. From 1928 to 1930, as speaker of the Sejm, he firmly defended the parliament's prerogatives against Piłsudski's autocratic tendencies. Daszyński became ill in 1931 and retired from public life.

data compression, also called COMPRESSION, or DATA COMPACTION, the process of reducing the amount of data needed for the storage or transmission of a given piece of information, typically by the use of encoding techniques.

Numerous techniques exist for compressing the binary data used by digital computers and communications devices. The binary system represents each alphanumeric character with a string of eight binary digits (bits), each of which is either a 0 or a 1, and which together form a byte. A rudimentary data-compression system is key-word encoding, whereby frequently occurring words such as "the" are converted into a two-byte token. More advanced techniques analyze, identify, and then replace commonly occurring text patterns with single characters and symbols; for example, "ing to" in phrases such as "going to" could be converted to "$," thus significantly reducing the size of a large block of text. These techniques may also represent characters and symbols with strings of fewer than eight bits, with the characters used most often represented by the least number of bits. A requirement for successful decoding in schemes using strings of variable length is that the bits designating the ends of characters must be unambiguously identifiable. Huffman encoding is a widely used form of this technique. Run-length encoding is used for data containing repetitive characters; it stores the repeated string once and indicates the number of occurrences.

The principal benefits of data compression are: larger data-storage capacity, particularly on CD-ROM devices; more efficient transmission of information over facsimile machines and modems; and encryption, or disguising the meaning of information. A trade-off between time and speed characterizes most advanced methods of data compression. Typically, the more time a compression program (instruction set) is allowed to analyze data, the greater will be the compression, although that rule is subject to diminishing marginal returns.

data encryption, also called ENCRYPTION, or ENCIPHERMENT, the process of disguising information as "ciphertext," or data unintelligible to an unauthorized person. Conversely, decryption, or decipherment, is the process of converting ciphertext back into its original format. Manual encryption has been used since Roman times, but the term has become associated with the disguising of information via electronic computers. Encryption is a process basic to cryptology (*q.v.*).

Computers encrypt data by applying an algorithm—*i.e.,* a set of procedures or instructions for performing a specified task—to a block of data. A personal encryption key, or name, known only to the transmitter of the message and its intended receiver, is used to control the algorithm's encryption of the data, thus yielding unique ciphertext that can be decrypted only by using the key.

Since the late 1970s, two types of encryption have emerged. Conventional symmetric encryption requires the same key for both encryption and decryption. A common symmetric encryption system is the Data Encryption Standard (DES), an extremely complex algorithm approved as a standard by the U.S. National Bureau of Standards. Asymmetric encryption, or public-key cryptography, requires a pair of keys; one for encryption and one for decryption. It allows disguised data to

be transferred between allied parties at different locations without also having to transfer the (not encrypted) key. A common asymmetric encryption standard is the RSA (Rivest-Shamir-Adleman) algorithm.

Encryption keys selected at random and of sufficient length are considered almost impregnable. A key 10 characters long selected from the 256 available ASCII characters could take roughly 40 billion centuries to decode, assuming that the perpetrator was attempting 10,000 different keys per second.

database, also spelled DATA BASE, also called ELECTRONIC DATABASE, any collection of data, or information, that is specially organized for rapid search and retrieval by a computer. Databases are structured to facilitate the storage, retrieval, modification, and deletion of data in conjunction with various data-processing operations. Databases can be stored on magnetic disk or tape, optical disk, or some other secondary storage device.

A brief treatment of databases follows. For full treatment, *see* MACROPAEDIA: Computer Science; Information Processing and Information Systems.

A database consists of a file or a set of files. The information in these files may be broken down into records, each of which consists of one or more fields. Fields are the basic units of data storage, and each field typically contains information pertaining to one aspect or attribute of the entity described by the database. Using keywords and various sorting commands, users can rapidly search, rearrange, group, and select the fields in many records to retrieve or create reports on particular aggregates of data.

Database records and files must be organized to allow retrieval of the information. Early systems were arranged sequentially (*i.e.,* alphabetically, numerically, or chronologically); the development of direct-access storage devices made possible random access to data via indexes. Queries are the main way users retrieve database information. Typically, the user provides a string of characters, and the computer searches the database for a corresponding sequence and provides the source materials in which those characters appear; a user can request, for example, all records in which the contents of the field for a person's last name is the word *Smith.*

The many users of a large database must be able to manipulate the information within it quickly at any given time. Moreover, large business and other organizations tend to build up many independent files containing related and even overlapping data, and their data-processing activities often require the linking of data from several files. Several different types of database management systems have been developed to support these requirements: flat, hierarchical, network, relational, and object-oriented.

In flat databases, records are organized according to a simple list of entities; many simple databases for personal computers are flat in structure. The records in hierarchical databases are organized in a treelike structure, with each level of records branching off into a set of smaller categories. Unlike hierarchical databases, which provide single links between sets of records at different levels, network databases create multiple linkages between sets by placing links, or pointers, to one set of records in another; the speed and versatility of network databases have led to their wide use in business. Relational databases are used where associations among files or records cannot be expressed by links; a simple flat list becomes one row of a table, or "relation," and multiple relations can be mathematically associated to yield desired information. Object-oriented databases store and manipulate more complex data structures, called "objects," which are organized into hierarchical classes that may inherit properties from classes higher in the chain; this database structure is the most flexible and adaptable.

The information in many databases consists of natural-language texts of documents; number-oriented databases primarily contain information such as statistics, tables, financial data, and raw scientific and technical data. Small databases can be maintained on personal-computer systems and may be used by individuals at home. These and larger databases have become increasingly important in business life. Typical commercial applications include airline reservations, production management functions, medical records in hospitals, and legal records of insurance companies. The largest databases are usually maintained by governmental agencies, business organizations, and universities. These databases may contain texts of such materials as abstracts, reports, legal statutes, wire services, newspapers and journals, encyclopaedias, and catalogs of various kinds. Reference databases contain bibliographies or indexes that serve as guides to the location of information in books, periodicals, and other published literature. Thousands of these publicly accessible databases now exist, covering topics ranging from law, medicine, and engineering to news and current events, games, classified advertisements, and instructional courses. Professionals such as scientists, doctors, lawyers, financial analysts, stockbrokers, and researchers of all types increasingly rely on these databases for quick, selective access to large volumes of information.

date line: *see* international date line.

date palm (*Phoenix dactylifera*), tree of the palm family (Arecaceae, or Palmae), found in the Canary Islands and northern Africa, in the Middle East, Pakistan, and India, and in California, U.S. The date palm grows about 23 m



Ripening dates of the date palm (*Phoenix dactylifera*)
Grant Heilman

(75 feet) tall, and its stem, strongly marked with the pruned stubs of old leaf bases, terminates in a crown of graceful, shining, pinnate leaves about 5 m (16 feet) long. Floral spikes branch from the axils of leaves that emerged the previous year. Male and female flowers are borne on separate plants. Under cultivation the female flowers are artificially pollinated. The date is a one-seeded fruit, or berry, usually oblong, but varying much in shape, size, colour, quality, and consistency of flesh, according to the conditions of culture. More than 1,000 dates may appear on a single bunch weighing 8 kg (18 pounds) or more. The dried fruit is more than 50 percent sugar by weight and contains about 2 percent each of protein, fat, and mineral matter.

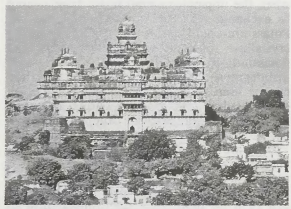
The date palm has been cultivated and prized from remotest antiquity; its fruits have been the staple food and chief source of wealth in the irrigable deserts of North Africa and the Middle East. Spanish missionaries carried the tree to the New World in the 18th and early 19th centuries.

All parts of the date palm yield products of economic value. Its trunk furnishes timber; the midribs of the leaves supply material for crates and furniture; the leaflets, for basketry; the leaf bases, for fuel; the fruitstalks, for rope and fuel; and the fibre, for cordage and packing material; the seeds are sometimes ground and used as stock feed. Syrup, alcohol, vinegar, and a strong liquor are derived from the fruit. The sap is also used as a beverage, either fresh or fermented, but, because the method of extraction seriously injures the palm, only those trees that produce little fruit are used for sap. When a palm is cut down, the tender terminal bud is eaten as a salad.

The tree is propagated either from seeds or from suckers, offshoots that arise chiefly near the base of the stem in the early years of the life of the palm. Offshoots are used for commercial plantings. When offshoots are three to six years old and have formed roots of their own, they are removed and planted. Palms begin to bear fruit in 4 to 5 years and reach full bearing at 10 to 15 years, yielding 40 to 80 kg (90 to 180 pounds) or more each. Palms are known to live as long as 150 years, but their fruit production declines, and in commercial culture they are replaced at an earlier age.

Saudi Arabia, Egypt, Iran, and Iraq are the leading date-producing and exporting countries, although fruit from Algeria and Tunisia also is well known in Europe. California is the major American producer. The date palm is grown as an ornamental tree along the Mediterranean shores of Europe, and its leaves are used for the celebration of Palm Sunday among Christians and for the celebration of the Feast of Tabernacles among Jews. Date sugar, a commercial product of India, is obtained from the sap of a closely related species, *Phoenix sylvestris.*

Datia, city, north-central Madhya Pradesh state, central India. It takes its name from Dantavakra, a mythological demon ruler of the area. The city is a major road and rail junction and conducts a heavy trade in grain and cotton goods. Sorghum, corn (maize), wheat, and legumes are the chief crops grown in the region. Surrounded by a stone wall, Datia was the capital of the former Datia princely state and contains several palaces and gardens. The 17th-century palace of Bīr Singh Deo is a



The palace of Bir Singh Deo in Datia, Madhya Pradesh, India
Christina Gascoigne

fine example of Hindu domestic architecture. Constituted a municipality in 1907, the city has several colleges affiliated with Jiwaji University. Pop. (1991 prelim.) 65,565.

dating, in geology, determining a chronology or calendar of events in the history of the Earth, using to a large degree the evi-

dence of organic evolution in the sedimentary rocks accumulated through geologic time in marine and continental environments. To date past events, processes, formations, and fossil organisms, geologists employ a variety of techniques. These include some that establish a relative chronology in which occurrences can be placed in the correct sequence relative to each other or to some known succession of events. Radiometric dating and certain other approaches are used to provide absolute chronologies in terms of years before the present. The two approaches are often complementary, such as when a sequence of occurrences in one context can be correlated with an absolute chronology elsewhere.

A brief treatment of geologic dating follows. For full treatment, *see* MACROPAEDIA: Geochronology.

In its simplest form, relative dating uses two main concepts—chronological succession and synchroneity. If a range of events or organisms, for example, can be placed in chronological succession by observing the stratigraphic order in the rocks in which they occur at a particular locality, this can provide the reference sequence with which less-complete records from elsewhere can be correlated. Where this type of correlation is based on synchronous occurrences, such as volcanic-ash layers from the same explosion or the remains of a distinct temporally restricted fossil organism, the correlation schemes developed become the framework for a relative chronology. Stratigraphic superposition and the identification of regionally or even globally synchronous events are thus crucial.

Absolute dating is achieved by recognizing the effects of some time-dependent process in the geologic record. Such processes may result from seasonal cycles or from radioactive decay. Seasonal cycles give rise to annually recurrent deposition sequences such as glacial varves that can be counted and also correlated from site to site by comparing their thickness and character.

Dating by radiometric assay is applicable on timescales ranging from days to billions of years, depending on the half-life of the radioisotope being used. The principles involved in radiometric dating and the range of materials used vary markedly. For example, carbon-14 dating (*q.v.*) is used for timescales of some 500 to 50,000 years and is applicable to the fossil remains of organisms that were in exchange with the atmospheric reservoir of carbon-14 during their life. It rests on the assumption of a roughly constant ratio of radioactive-to-nonradioactive carbon at the time when the organic material to be dated ceased to exchange with the atmospheric reservoir. Potassium-argon dating (*q.v.*) is applicable to crystalline rocks in which the radioisotope potassium-40 (half-life of 1.3 billion years) disintegrates to argon-40. This dating method can be used on some of the oldest rocks on Earth. Rubidium-strontium dating (*q.v.*) can reach even further back in time and has been used to estimate the age of the solar system.

There are several dating techniques that provide indirect, or proxy, chronologies. That is to say, once a timescale has been calibrated by, for example, a radiometric technique, it can then be used for establishing chronologies of geologic significance. The Earth's magnetic field has changed polarity many times in the geologic past. The record of such polarity changes in basalts on the ocean floor, calibrated by potassium-argon dating, has provided a timescale for seafloor spreading and long-term marine sedimentation.

Because any single dating method is subject to poorly quantified errors as well as statistical uncertainty, cross-referencing between methods for mutual consistency is important.

Datini, Francesco, in full FRANCESCO DI MARCO DA PRATO DATINI (b. *c.* 1335, Prato, near Florence [Italy]—d. Aug. 16, 1410, Prato), Italian international merchant and banker whose business and private papers, preserved in Prato, constitute one of the most important archives of the economic history of the Middle Ages.

Datini lost both parents, two brothers, and a sister in Prato to the Black Death of 1348. After a year of apprenticeship to a Florentine shopkeeper, he went in 1350 to Avignon, France, where the wealthy papal court was in exile. Remaining there for 32 years, he made his fortune by trading in armour, cloth, religious articles, paintings imported from Florence, jewelry, and other objects.

When the papacy returned to Italy in 1378, Datini followed, moving back to Prato, where he opened a cloth manufacturing and importing business. In 1386 he transferred his headquarters to Florence, continuing to maintain a branch in Avignon. He also opened a series of other offices in Italy and Spain and transacted business in Brugge (Bruges) and London. He diversified his interests, joining the silk-merchants' guild of Florence, underwriting insurance, and opening a bank.

When the Black Death again struck Florence at the end of the 14th century, Datini fled to Bologna, then returned to Prato, where he spent the rest of his life. In 1870, during alterations to the house in which he had lived, his letters, documents, and account books were discovered in a pile of sacks stuffed into a disused stairwell; included were some 150,000 letters, more than 500 account books and ledgers, 300 deeds of partnership, 400 insurance policies, and thousands of miscellaneous commercial documents.

Dato Iradier, Eduardo (b. Aug. 12, 1856, La Coruña, Spain—d. March 8, 1921, Madrid), Spanish statesman, leader of the Conservative Party from 1913 to 1921, and three times premier. He instituted certain useful reforms but proved unable to deal with unrest effectively or to heal the divisions within his party.

As undersecretary in the Home Office in 1892 and as minister in 1899, Dato sponsored a workers' compensation act and bills to regulate female employment. He was minister of justice in 1902 and mayor of Madrid in 1907. He became premier in 1913, when Antonio Maura, the party's leader, refused to form a government. Dato's assumption of leadership produced between Maura and the more moderate Dato a rift that severely weakened the Conservative Party. Dato, who governed until 1915, kept Spain neutral at the outbreak of World War I and allowed the establishment of the Mancomunidad, an organ of Catalan self-government. In office again from June to October 1917, he closed the parliament and suspended constitutional guarantees in an effort to combat strikes, unrest, and near-rebellion. Premier again in 1920, he established the ministry of labour, tried unavailingly to restore Conservative Party unity, and strove to control social upheavals in Catalonia, until he was cut down by anarchist assassins near his home.

Datong (Shansi, China): *see* Ta-t'ung.

Datta, Michael Madhusudan, Datta also spelled DUTT (b. Jan. 25, 1824, Sāgardari, Bengal, India—d. June 29, 1873, Calcutta), poet and dramatist, the first great poet of modern Bengali literature.

Datta was a dynamic, erratic personality and an original genius of a high order. He was educated at the Hindu College, Calcutta, the cultural home of the Western-educated Bengali middle class. In 1843 he became a Christian.

His early compositions were in English, but they were unsuccessful and he turned, reluctantly at first, to Bengali. His principal works, written mostly between 1858 and 1862, include prose drama, long narrative poems, and lyrics. His first play, *Sarmishtha* (1858), based on an episode of the ancient Sanskrit epic, the *Mahābhārata,* was well received. His poetical works are *Tilottamasambhab* (1860), a narrative poem on the story of Sunda and Upasunda; *Meghnadbadh* (1861), his most important composition, an epic on the *Rāmāyaṇa* theme; *Brajangana* (1861), a cycle of lyrics on the *Rādhā-Kṛṣṇa* theme; and *Birangana* (1862), a set of 21 epistolary poems on the model of Ovid's *Heroides.*

Datta experimented ceaselessly with diction and verse forms, and it was he who introduced *amitraksar* (a form of blank verse with run-on lines and varied caesuras), the Bengali sonnet—both Petrarchan and Shakespearean—and many original lyric stanzas.

Datura, genus of plants of the potato family Solanaceae (*q.v.;* order Solanales), several species of which are collected for use as drugs and others of which are cultivated for their large, trumpet-shaped, fragrant flowers.

Many are considered weeds in warm parts of the world. Of special interest are the thornapple, or jimsonweed (*q.v.; D. stramonium*), the source of stramonium, a crude drug with narcotic and hypnotic effects; and *D. innoxia* and others, which have long been used by various peoples, including Mexican Indians, in their religious ceremonies.

Daubenton, Louis-Jean-Marie, Daubenton also spelled D'AUBENTON (b. May 29, 1716, Montbard, Côte d'Or, France—d. Jan. 1, 1800, Paris), French naturalist who was a pioneer in the fields of comparative anatomy and paleontology.



Daubenton, detail of a bust by an unknown artist
Boyer—H. Roger-Viollet

Daubenton was studying medicine when, in 1742, the renowned naturalist Georges Buffon asked him to prepare anatomical descriptions for an ambitious work on natural history (*Histoire naturelle,* 1794–1804). Daubenton completed descriptions of 182 species of quadrupeds for the first section of the work before a dispute with Buffon ended the collaboration. Two years later, their friendship renewed, Daubenton was appointed Buffon's assistant as keeper and demonstrator of the department of natural history at the Jardin des Plantes, Paris. He acquired the reputation of a prolific scientist, completing many zoological descriptions and dissections and undertaking productive studies in the comparative anatomy of recent and fossil animals, plant physiology, and mineralogy. He conducted agricultural experiments and introduced Merino sheep to France. In 1775 he became lecturer of natural history at the college of medicine, then professor of zoology at the Collège de France (1778). When the Jardin des Plantes in Paris was converted to the Museum of Natural History in 1793, he became its first director.

Dauberval, Jean, Dauberval also spelled D'AUBERVAL, original name JEAN BERCHER (b. Aug. 19, 1742, Montpellier, France—d. Feb. 14, 1806, Tours), French ballet dancer,

teacher, and choreographer often credited with establishing the comic ballet as a genre.

In 1761 Dauberval made his debut at the Paris Académie (now Opéra) and became noted for his pantomimic dance ability; in 1773 he was made an assistant ballet master. In 1783 he went as a dancer to Bordeaux, where he later served as ballet master.

A leading pupil of the choreographer Jean-Georges Noverre, Dauberval did much to disseminate his teacher's ideas on the ballet d'action (ballet with a plot). Dauberval's pupils included Charles Didelot, sometimes called the "father of the Russian ballet," and Salvatore Viganò, who introduced the dance-drama into Italy.

Among the several ballets that Dauberval choreographed, the best known was *La Fille mal gardée* (1786), in which Mlle Théodore



Dauberval, with Mlle Allard, in *Sylvie*, 1766; wood engraving by Jules Huyot, 19th century, after a contemporary work by an unknown artist

By courtesy of the Victoria and Albert Museum, London

(Marie-Madeleine Crespé), Dauberval's wife and one of Noverre's favourite ballerinas, created the leading role of Lise. *La Fille mal gardée* was both one of the first comic ballets and one of the first to include realistic rather than mythological or idealistic characters. With Vincenzo Galeotti's *Whims of Cupid and the Ballet Master* (also 1786), it is one of the two oldest ballets still in the repertoire of contemporary companies; although Dauberval's original choreography was lost, there are several more recent versions based on the original scenario, notably those by Lev Ivanov and Marius Petipa (1882) and by Frederick Ashton (1960).

Daubigny, Charles-François (b. Feb. 15, 1817, Paris, France—d. Feb. 19, 1878, Paris), French painter whose landscapes introduced into the naturalism of the mid-19th century an overriding concern for the accurate analysis and depiction of natural light through the use of colour, greatly influencing the Impressionist painters of the late 19th century.

In 1836, after a year-long study of the paintings of old masters in Italy, Daubigny returned to Paris and began to paint historical and religious works. He first exhibited at the official Salon in 1838.

In his youth he had illustrated books, but his true leanings were toward landscape painting as practiced by the so-called Barbizon school, an informal association of painters who rebelled against the formulas of traditional landscape painting in favour of working out-of-doors, directly from nature. Like Jean-Baptiste-Camille Corot, he painted in the Morvan district, and in 1852, after the two had met, Daubigny's work began to depend on a strict observation of tonal values fortified by a concealed but indispensable minimum of compositional structure. Such works, though calm and unspectacular, soon gained success, one of them, "Spring," being bought by the emperor Napoleon III in 1857. Later in the 1850s, Daubigny's manner, though still restrained, began to express a more personal lyricism. He increasingly employed graduated light reflections from surfaces to give effects of space; such methods moreover were directed at conveying a momentary impression of the landscape.

Daubigny was never strictly a member of the Barbizon school; he is best seen as a link



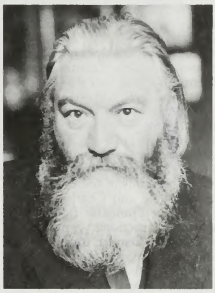
"The Banks of the Oise," oil on wood by Charles-François Daubigny, 1872; in the Musée des Beaux-Arts, Reims, Fr.

Lauros—Giraudon

between the more classically organized naturalism of Corot and the less formal visual receptiveness of his young friends Claude Monet and Alfred Sisley.

Däubler, Theodor (b. Aug. 17, 1876, Trieste, Austria-Hungary [now in Italy]—d. June 14, 1934, Sankt Blasien, Ger.), German poet whose extraordinary vitality, poetic vision, and optimism contrast sharply with the despair expressed by many writers of his time.

Däubler traveled widely in Europe, the Middle East, and Egypt and tapped many diverse sources of inspiration. His poetry owes much to classical as well as Romantic aesthetics, although he exercised his greatest influence through his early enthusiasm for Expressionist painting and sculpture, as voiced in his essays "Der neue Standpunkt" (1916; "The



Däubler

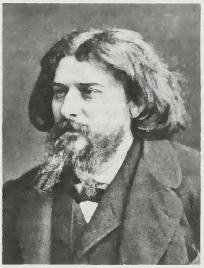
Bavaria-Verlag

New Point of View") and "Im Kampf um die moderne Kunst" (1918; "Joining the Battle for Modern Art"). His major work, *Das Nordlicht* (1910, much revised and republished in 1921; "The Northern Lights"), an epic of more than 30,000 lines, is an original cosmic myth. Daubler expresses his visionary ideas in sweeping, hyperbolic language that sometimes borders on the bizarre or grotesque. His other poetical works include *Das Sternen Kind* (1916; "The Star Child"), *Die Treppe zum Nordlicht* (1920; "The Stairs to the North Light"), *Der sternhelle Weg* (1915; "The Star-Lit Road") and *Attische Sonette* (1924; "Greek Sonnets"). He also published tales and two novels, *L'Africana* (1928; "The Africana") and *Die Göttin mit der Fackel* (1931; "The Goddess with the Torch").

Daudet, Alphonse (b. May 13, 1840, Nîmes, France—d. Dec. 16, 1897, Paris?), French short-story writer and novelist, now remembered chiefly as the author of sentimental tales of provincial life in the south of France.

Life. Daudet was the son of a silk manufacturer. In 1849 his father had to sell his factory and move to Lyon. Alphonse wrote his first poems and his first novel at age 14. In 1857 his parents lost all their money, and Daudet had to give up his hopes of matriculating. His work as an usher at a school at Alès for six unhappy months culminated in his dismissal but later furnished the theme, with embellishments and omissions, for his semi-autobiographical novel *Le Petit Chose* (1868; "The Little Thing"). At the end of the year he joined his elder brother, Ernest, in Paris.

Daudet now threw himself into writing and began to frequent literary circles, both Bohemian and fashionable. A handsome young man, he formed a liaison with a model, Marie Rieu, to whom he dedicated his only book of poems, *Les Amoureuses* (1858; "The Lovers"). His long and troubled relationship with her was to be reflected, much later, in his novel *Sapho* (1884). He also contributed articles to the newspapers, in particular to *Figaro.* In 1860 he met Frédéric Mistral, the leader of the 19th-century revival of Provençal language and literature, who awakened his enthusiasm for the life of the south of France, which was regarded as inherently passionate, artistic, and sensuous as opposed to the moral and intellectual rigour of the north. In the same year, he obtained a secretarial post under the Duke de Morny.



Alphonse Daudet

H. Roger-Viollet

His health undermined by poverty and by the venereal disease that was eventually to cost him his life, Daudet spent the winter of 1861–62 in Algeria. One of the fruits of this visit was *Chapatin le tueur de lions* (1863; "Chapatin the Killer of Lions"), whose lion-hunter

hero can be seen as the first sketch of the author's future Tartarin. Daudet's first play, *La Dernière Idole* ("The Last Idol"), made a great impact when it was produced at the Odéon Theatre in Paris in 1862. His winter in Corsica at the end of 1862 is recalled in passages of his *Lettres de mon moulin* (1869; "Letters from My Mill"). His full social life over the years 1863–65 (until Morny's death) provided him with the material that he analyzed mercilessly in *Le Nabab* (1877; "The Nabob"). In January 1867 he married Julia Allard, herself a writer of talent, with whom he was deeply in love and who gave him great help in his subsequent work. They had two sons, Léon and Lucien, and a daughter, Edmée.

In the Franco-German War, which had a profound effect on his writing (as can be judged from his second volume of short stories, *Les Contes du lundi*, 1873; "Monday Tales"), Daudet enlisted in the army, but he fled from Paris during the terrors of the Commune of 1871. His novel *Les Aventures prodigieuses de Tartarin de Tarascon* (1872; "The Prodigious Adventures of Tartarin de Tarascon") was not well received, though its adventurous hero is now celebrated as a caricature of naïveté and boastfulness. His play *L'Arlésienne* was also a failure (although its 1885 revival was acclaimed). His next novel, *Fromont jeune et Risler aîné* (1874; "Fromont the Younger and Risler the Elder"), which won an award from the French Academy, was a success, and for a few years he enjoyed prosperity and fame—though not without some hostile criticism.

In his last years Daudet suffered from an agonizing ailment of the spinal cord caused by his venereal disease. *La Doulou* (not published until 1931) represents his attempt to alleviate his pain by investigating it. With admirable self-control he continued to write books of all sorts and to entertain Parisian literary and musical society. He was a kindly patron of younger writers—for instance, of Marcel Proust. In 1895 he visited London and Venice. He died suddenly.

Assessment. Psychologically, Daudet represents a synthesis of conflicting elements, and his actual experience of life at every social level and in the course of travels helped to develop his natural gifts. A true man of the south of France, he combined an understanding of passion with a view of the world illuminated by Mediterranean sunlight and allowed himself unfettered flights of the imagination without ever relaxing his attention to the detail of human behaviour. All his life he recorded his observations of other people in little notebooks, which he used as a reservoir of inspiration: a novel, he held, should be "the history of people who will never have any history." Yet there was nothing unfeeling in his approach (he has even been accused of sentimentality), and he was free from preconceived ideas: unlike his fellow naturalists, he believed that the world in its diversity was misrepresented by novelists who concentrated only on its uglier aspects.

At the same time, his objective interest in external detail went hand in hand with the expression of an extraordinarily compassionate personality and a reverence for the mystery of things and of individuals. Everything in his world had an inner reality that he reproduced no less faithfully than he did its material phenomena. Finally, he saw passion as endowed with something like the force of destiny, and this conception, which bore fruit in many of his writings, tempers his satire with pity and brings him into kinship with Charles Dickens as well as with Guy de Maupassant.

Daudet's work as a whole reveals not so much a continuous evolution as an episodic process in which various literary tendencies found expression successively. Even so, the antiromantic irony of *Tartarin de Tarascon* gave place to a realism akin to that of the Pointillist and Impressionist painters in *Lettres de mon moulin*, which was followed by the tragic tone of *L'Arlésienne* as a corrective to his earlier mockery of southern characteristics; also there is more sympathy and anxiety than irony in *Le Petit Chose* and *Contes du lundi*. As he grew older Daudet became more and more preoccupied with the great conflicts in human relationship, as is evident in his later novels: *Jack* (1876) presents a woman torn between physical and maternal love; *Numa Roumestan* (1881), the antagonism between the northern and the southern character in man and woman; *L'Évangéliste* (1883), filial affection struggling against religious fanaticism; and *La Petite Paroisse* (1895), the contrarieties of jealousy. In *Sapho* (1884), underlying the moral issue, there is Daudet's evaluation of a whole generation of young men, together with a statement of the age-old dilemma of the lover who must choose between freedom and pity for the girl he leaves. *Le Trésor d'Arlatan* (1897), *Notes sur la vie* (1899), and *Nouvelles notes* show Daudet as a bold psychologist, anticipating Sigmund Freud in his analysis of complexes. Truth and fantasy, merciless delineation and poetry, clear-sighted seriousness and a sense of humour, irony and compassion, all the contrasting elements of which man's dignity is made up are to be found harmonized in Daudet's best work. (J.-H.B.)

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Daudet, Léon, in full ALPHONSE-MARIE-LÉON DAUDET (b. Nov. 16, 1867, Paris, France—d. July 1, 1942, Saint-Rémy-de-Provence), French journalist and novelist, the most virulent and bitterly satirical polemicist of his generation in France, whose literary reputation rests largely upon his journalistic work and his vivid memoirs.

The son of the novelist Alphonse Daudet, Léon studied medicine before turning to journalism with contributions to *Le Figaro* and *Le Gaulois*. His first novel, *L'Astre noir* (1893; "The Black Heavenly Body"), was followed by a scathing indictment of the medical profession, *Les Morticoles* (1894). His novel *Le Voyage de Shakespeare* (1896) was more successful than many that followed it.

Daudet's major journalistic achievement began in 1908, when he and Charles Maurras refashioned *L'Action Française* into a daily paper of avowedly reactionary, nationalist, and royalist opinion. Daudet had published an antirepublican satire, *Le Pays des parlementeurs*, in 1901, and his contributions to *L'Action Française* showed the same satirical and Rabelaisian flavour.

Among Daudet's other works, the most important are *L'Avant-Guerre* (1913; "Before the War"), which shows prescience as well as conservatism; *Le Monde des images* (1919; "The World of Images"), a stubbornly anti-Freudian work on psychology; and *Le Stupide XIXe Siècle* (1922; *The Stupid Nineteenth Century*), a violent condemnation of the false gods worshiped in France after 1789. Daudet's memoirs, *Souvenirs des milieux littéraires, politiques, artistiques, et médicaux* (1914–21), are informative, vivid, and partisan. He also wrote a critical work, *Mes Idées esthétiques* (1939).



Léon Daudet
BBC Hulton Picture Library

Daugava River (Europe): *see* Western Dvina River.

Daugavpils, German DÜNABURG, Russian (formerly) DVINSK, city, southeastern Latvia. It lies along the Western Dvina (Daugava) River. In the 1270s the Brothers of the Sword, a branch of the Teutonic Knights, founded the fortress of Dünaburg, 12 miles (19 km) above the modern site. The fortress and adjoining town were destroyed, and then refounded on the present location, by Ivan IV the Terrible during the Livonian wars in the 1570s. The end of the Livonian wars saw Dünaburg in Polish possession, and its fortress was rebuilt and strengthened in 1582. Although it was the centre of the province of Latgalia, the town remained of minor importance. It passed to Russia by the First Partition of Poland in 1772. Although strongly fortified in 1811, it fell to Napoleon I the following year. The construction of the St. Petersburg–Warsaw railway in 1861–62 and of the Orel-Riga railway in 1861–66 greatly stimulated the town's growth. Much damage occurred in World War I, when the front line lay on the Western Dvina, and again in World War II, when the city was in German hands.

Modern Daugavpils is a major rail and road junction, with large locomotive and rolling-stock repair shops. Its industries produce electrical instruments, bicycles, synthetic fibre, tire cord, linen, furniture, footwear, and foodstuffs. Daugavpils has a branch of the Riga Polytechnic Institute. Pop. (1991 est.) 129,000.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Daugherty, Harry Micajah (b. Jan. 26, 1860, Washington Court House, Ohio, U.S.—d. Oct. 12, 1941, Columbus, Ohio), American lawyer and political manager for Warren G. Harding who was accused of corruption during his tenure as Harding's attorney general (1921–24).

After receiving a law degree from the University of Michigan in 1881, Daugherty returned to his birthplace and set up a legal practice. He quickly gained a reputation for blending law and politics, aiding his clients through the adroit use of political connections.

Daugherty's own career in elective politics was brief. He served first as township clerk and then for two terms in the Ohio legislature (1890–94). In 1893 he moved his law practice to Columbus, became very wealthy representing large corporations, and found—after failing in bids for state attorney general (1895) and governor (1897)—that his abilities were better suited to managing other people's campaigns.

In 1902 Daugherty worked with a young candidate for lieutenant governor, Warren G. Harding. He managed Harding's subsequent campaigns, including those for the U.S. Senate in 1914 and for the presidency in 1920. It was Daugherty who predicted a deadlock at the Republican national convention that year, to be resolved, in his words, by a small group of men "in a smoke-filled room in some hotel" who would pick Harding as the nominee.

Daugherty faced bitter public opposition

when Harding named him attorney general, and he nearly faced impeachment proceedings in 1922. Rumours of corruption circulated around him during Harding's administration, and when he refused to open Justice Department files to a congressional committee investigating charges of wrongdoing by Harding's associates, he was dismissed (March 1924) by Pres. Calvin Coolidge.

In 1927 Daugherty twice went to trial on charges of graft and fraud stemming from his actions as attorney general; both trials ended in hung juries. He spent the rest of his life in law practice in Ohio, maintaining his innocence to the end and defending both himself and Harding in *The Inside Story of the Harding Tragedy,* written jointly with Thomas Dixon in 1932.

Daughters of the American Revolution (DAR), patriotic society organized Oct. 11, 1890, and chartered by Congress Dec. 2, 1895. Membership is limited to direct lineal descendants of soldiers or others of the Revolutionary period who aided the cause of independence; applicants must have reached 18 years of age and must be "personally acceptable" to the society. By the early 1980s the society's membership totalled approximately 200,000, with more than 3,000 local chapters throughout the United States and in several other countries.

The DAR, as the society is generally known, carries on a threefold program through the divisions of its national office. The historical division stresses the study of U.S. history and preservation of Americana. The educational division provides scholarships and loans, helps to support schools for underprivileged youth and for Americanization training, sponsors various prizes, and publishes appropriate manuals. The patriotic division publishes the *Daughters of the American Revolution Magazine* and *The National Defense News.*

Daughters of the Confederacy, United: *see* United Daughters of the Confederacy.

Daukantas, Simanas (b. Oct. 28, 1793, Kalviai, Lithuania—d. Dec. 6 [Nov. 24, old style], 1864, Papilė, Lithuania, Russian Empire), historian who was the first to write a history of Lithuania in Lithuanian and a pioneer of the Lithuanian national renaissance.

Daukantas studied languages and literature at the University of Vilnius (at Vilnius, former capital of Lithuania, then part of the Russian Empire; 1816–18) and then philosophy, law, and history. He received his master of law degree in 1825. After 10 years as a translator in the office of the governor general in Riga, Latvia, where he had access to the archives, he went to St. Petersburg in 1835 to take a post in the senate office and archives, where he was able to study important Lithuanian state documents. He retired because of ill health in 1850.

Daukantas' two main historical works are *Būdas senovės lietuvių, kalnėnų ir žemaičių* (1845; "The Character of the Lithuanians, Highlanders, and Samogitians") and *Istorija žemaitiška* (written before 1838 and first published in serial form in a U.S. Lithuanian newspaper, 1891–96; "History of Samogitia"). Because he was concerned with uplifting and instilling national pride in the Lithuanian people, he idealized his nation's past. The importance of his works lies in their influence on the Lithuanian national movement, as well as in the quality of his writing.

Daulat (fl. 16th and 17th centuries, India), an important Mughal painter who worked during the reigns of both the emperors Akbar and Jahāngīr and painted under Shāh Jahān as well.

Born into the imperial service, presumably the son of a painter, Daulat was an unusually skilled portraitist. He is responsible for recording his own likeness and the portraits of several other Mughal artists on the margins of an album now in the Royal Library of the Golestān Palace, Tehrān. His portrait also appears along with that of the scribe 'Abd-ur-Raḥīm in the Dyson Perrins copy of the *Khamseh Neẓāmī* of 1596 now in the British Museum, an honour paid the two by the emperor Jahāngīr. Splendid paintings were executed by him in the *Akbar-nāmeh* (in the Chester Beatty Collection) and the *Bāburnāmeh* (in the National Museum of India). He was also skillful in gold illumination, and many examples of his work can be seen in the albums assembled for Jahāngīr.

Daulatābād, also called DEVAGIRI, or DEOGIR, village and ancient city, Mahārāshtra state, western India. Founded in the late 12th century by King Bhillam of the Yādava dynasty, it was a major fortress and administrative centre in medieval times. The fortress, located in and around a large rock outcropping, was so impregnable that it was never taken by force, although it was taken by intrigue. The city was the capital of the Hindu Yādava dynasty until the early 14th century, when it came under the rule of the Muslim sultans of Delhi. It retained its importance under Delhi, the Bahmanī sultanate, and the kingdom of Ahmadnagar, but it declined in the 17th century when the Mughals established nearby Aurangābād as their administrative centre in the Deccan.

Daumier, Honoré(-Victorin) (b. Feb. 20/26, 1808, Marseille—d. Feb. 11, 1879, Valmondois, Fr.), prolific French caricaturist, painter, and sculptor especially renowned for his cartoons and drawings satirizing 19th-century French politics and society. His paintings, though hardly known during his lifetime, helped introduce techniques of Impressionism into modern art.

Background and early life. Traits of Daumier's ancestry—a violent temperament, a



"Self-Portrait," painting by Honoré Daumier; in the Musée Calvet, Avignon, Fr.
Giraudon—Art Resource

generous and rather fanciful turn of mind, and an easily aroused capacity for pity—all form part of his character. His mother's family was from a village in which samples of unique ancient sculptured reliefs—fierce primitive human heads—had been found. His grandfather and father both worked in Marseille as "glaziers"—that is to say, dealers in frames (or passe-partout pictures) and decorative tableaux that they painted themselves. His godfather was a painter. When Daumier was seven, his father abandoned his business in order to go to Paris and, like so many Provençals, seek his fortune as a poet. He was presented to the king, Louis XVIII; but his swift fall from favour—he was famous only for a fortnight—unbalanced him mentally. After apparently being confined for many years, he died in the Charenton asylum.

Daumier received a typical lower middle-class education, but he wanted to draw, and his studies did not interest him. His family therefore placed him with an old and fairly well-known artist, Alexandre Lenoir. Lenoir, a student and friend of Jacques-Louis David, a leading classicist painter, was more an aesthetician than a painter. He had a pronounced taste for Rubens, one of whose works he kept in his collection. A connoisseur of sculpture, he had saved the most beautiful medieval and contemporary sculptures from the Revolutionaries, which inspired a lasting interest in Daumier.

Daumier was then not at all the uncultured, self-taught genius that most art historians of the late 19th and early 20th centuries have depicted. He did not rise from an artistic void—he was the child of artists, however modest and unsuccessful they had been in making a name. Added to the advantage of this ancestry, he also benefitted from a more interesting artistic education than his contemporaries.

At the age of 13 his father's breakdown forced Daumier to seek paying work. He first became a messenger boy for a bailiff and, from this experience, acquired his familiarity with the world of the lawcourts. He worked next as a bookseller's clerk at the Palais-Royal. The Palais-Royal, with its arcades surrounding the garden, was one of the busiest spots in Paris, and there Daumier saw, parading before his employer's window, all the characters of the *Comédie humaine,* about whom he would later talk with his friend Balzac: not only men and women of fashion, intellectuals, and artists but also "captains of industry," or swindlers, as they were commonly called—all of whom lent themselves to caricature.

Daumier's development was thus complete at that moment when, about 1825–28, he decided to give up everything to embark on the artistic career of which he had dreamed so long. He was a young man of about 18 or 20, from a family of painters, who had had an opportunity to admire Rubens, had learned to analyze sculpture, and had been able to observe the appearance and behaviour of different classes of society.

Physically he was ugly, at least according to the taste of his time. Heavyset like Balzac, although probably smaller, he had small but lively eyes and a large nose. He always kept a pipe in his mouth, in order to mask his Provençal accent and the frequent lisp of his native region.

Daumier could not, of course, live from painting or from sculpture as he had set out to do. He therefore accepted commissions for lithographs—portraits and, at a very early age, cartoons of morals and manners (*caricatures de moeurs*), the first of these dating from 1822, when he was scarcely 15 years old and was just beginning to produce lithographs. Although some of his first works were signed, many others were not: they were portraits of celebrities that were signed by another native of Marseille, Zéphirin Belliard, Daumier's elder by 10 years and the author of a lavish *Iconographie des contemporains.* For the most part these portraits were mediocre, modelled on another artist's style, but they constituted an excellent apprenticeship for someone interested in the human physiognomy.

His life, devoted entirely to his work, was to be divided into two parts: from 1830 to 1847 he was a lithographer, cartoonist, and sculptor; and, beginning in 1848 and lasting until 1871, he was an Impressionist painter whose art was reflected in the lithographs he continued to produce. Constant work was not a burden to him; while producing 4,000 lithographs and 4,000 illustrative drawings, he sang sentimental songs whose foolishness made him laugh, and, "unconcerned with his works, he was always out drinking cheap wine with barge captains."

Satirical lithographs. In 1830 Daumier began his satirical work: his busts lampooning

certain contemporary types and his many lithographs. He enjoyed the company of grandiloquent men and mainly associated with men of the left. It was at this time that Charles Philipon, a liberal journalist who had founded the opposition journal *La Caricature,* invited him to become a contributor.

King Louis-Philippe generally tolerated jokes at his expense, but, when unduly provoked, rather than bring suit against a paper, he preferred to seize it, a procedure that meant ruin for its staff and financial backers. Only once during his reign did he deal severely with an offender—with Daumier in 1832, and then only after the second of the artist's most violent attacks. Sentenced to six months in prison, Daumier spent two of them in the state prison and four in a mental hospital, the king apparently wanting to show that one had to be mad to oppose and caricature him.

After his release in February 1833, Daumier was never again indicted, even though in his cartoons he continued to attack a regime, a form of society, and a concept of life that he scorned, while at the same time creating unforgettable characters. Daumier's types were universal: businessmen, lawyers, doctors, professors, and petits bourgeois. His treatment of his lithographs was sculptural, leading Balzac to say about him that he had a bit of Michelangelo under his skin.

Daumier's sculptures have still not been sufficiently studied. The 15 or so small busts that he modelled in clay for the window of the satirical journal for which he worked and that remained there some 30 years occupy an important place in the history of sculpture. Scarcely differing from official busts, but with the accentuation of a detail that made them caricatures, they constitute an unforgettable gallery of the politicians of the July monarchy. The complete series has not been preserved: it included a Louis-Philippe, which Daumier hid, and other pieces that were broken in moving. A few copies of the busts were cast in bronze in the 20th century, and their originality is the more striking when they are compared with similar pieces of that period.

Daumier's only close friends were sculptors, all of them romantic, poor, and ardent left-wingers. Although intimate with these few friends, Daumier did not form part of any of the many artistic or literary coteries of the time. He was not inclined to frequent salons, or even saloons. When he went to a café, it was with his neighbours on the Ile Saint-Louis, where he lived between 1833 and approximately 1850 in a studio on the quay d'Anjou. This old studio still exists, at the top of a house overlooking a world of roofs and open windows, behind which his models lived. Nor did his wife, to whom he was very attached, his dear "Didine" (Léopoldine), mix in artistic circles; she was a dressmaker.

In 1848 Daumier believed the era of social justice for which he had militantly fought for 20 years had arrived, and he took part in the official competition for the representation of the republic that was to replace the portrait of the king in all the municipal buildings of France. His rough sketch was beautiful, and, had he agreed to complete the painting, he would have received the prize.

Impressionist techniques. He did not do so, however, for he had become preoccupied with new technical studies; earlier than others, he had discovered Impressionism—faces and bodies devoured by the surrounding light and becoming one with the atmosphere. He painted a great deal, and the more so as his studies in the new technique did not interest the satirical journals to which he now submitted drawings devoid of humorous meaning. He was supported by Charles Baudelaire and by that poet's friends. The two men had met



"Les Divorceuses," plate 1 ("Citizenesses . . . rumour has it that they are about to abolish divorce. . . . Let us form a permanent body here and declare that the country is in danger!"), lithograph by Honoré Daumier, 1848

Giraudon/Art Resource

in 1845 and saw each other more frequently after 1848. Baudelaire, who "adored him," wrote in 1857 the only significant article on Daumier to appear in the painter's lifetime.

Daumier was indeed the first of the Impressionists. As early as 1848, his lithographs show contours effaced by light. Two factors, however, prevented this fact from being noticed: the lack of interest in his lithographs shown by historians of painting and the lack of research to establish the exact dates of the lithographs. These dates were not necessarily those of their appearance. It has been shown, for instance, that the Impressionist lithographs, which appeared around 1860, had been rejected by journals in 1848 as being too bold, too modern. Because of this lack of demand, Daumier's Impressionist lithographs are not very numerous, but his painting shows that he was won over to Impressionism. The paintings, also, were too few in number to assign him his true place in the history of Impressionism—before Manet and Monet, both of whom admired him greatly.

The dating of Daumier's paintings has given rise to controversy. Nineteenth-century art historians and those prior to 1938 dated them largely in relation to the paintings of his contemporaries. But it now seems more reasonable to date them from his lithographs, for it is not likely for an artist who changes styles frequently to work differently when drawing on a lithographic stone than when painting on canvas. When Daumier imagined a form, he would fashion and refashion it numerous times in his lithography. It is not likely that he would wait four to six years after he had stopped dealing with it in his lithographs to treat it in his painting. The question may be studied again, but not on the basis of documents of the period, for Daumier's notebooks were too abbreviated, and critiques by his contemporaries were rare, since he seldom showed his works, and they went largely unnoticed.

Daumier's paintings are highly original, both in their style and in the subjects they present. He created the painting of morals and manners (*la peinture de moeurs*) featuring in his work the everyday life on the Ile Saint-Louis and its quays, such as children playing in the water, one of them brought back to its parents after an accident; horses leaving a water trough; washerwomen wearily returning up the stairs from the river or fighting against the wind, their bundles in their arms; drinkers in a pub; and masons on a scaffold. He was stirred by the theatre, then by railroads, which he used as a means of showing galleries of faces as powerful in their impact as those of the "Ventre législatif" ("Legislative Belly" or "Vile Body of the Legislature"). Earlier, the Palais de Justice had provided him with the opportunity of drawing his dramatically impressive lawyers. Then he went to Valmondois, on the outskirts of Paris, and depicted rustic scenes. Much of his painting was devoted to artists' studios—not studios of a studied picturesqueness but those where artists were concerned with creating works of art.

These subjects are found again in his lithographs, together with topical subjects, such as seaside resorts, hunting, and winter scenes, all of which, having been commissioned, seemed to inspire him less. Thus he transposed into his painting what had until then belonged to the domain of the caricatures of morals and manners.

Daumier was not often inspired by religious subjects, except for the image of Christ, insulted and ridiculed, in which there appears to be personal allusion—that of a man who each day hoped to draw his last cartoon so that he could devote himself to painting. On the other hand, mythology excited him during his Rubens period under Lenoir, but in this case, obviously, the subject was only a prop for the painting.

On several occasions Daumier painted historical subjects. He painted "Camille Desmoulins," the Revolutionary leader, rousing the crowd in 1789; and his "Emigrants" of 1857 is an allusion to the authoritarian empire of Napoleon III, a painting that echoes the words of the proscribed Victor Hugo: "It is not I who am proscribed, it is liberty; it is not I who am exiled, it is France."

The types that Daumier created did not always survive him. He created a Louis-Philippe, but above all Robert Macaire (the typical businessman of Louis-Philippe's reign). His "Bons Bourgeois" probably served as a reference for

the French middle class up to the 1940s. In any case, his "Lawyers" remain up-to-date.

Following tradition, Daumier took pupils who learned their craft by copying and imitating his works. Two of them are known by name: Boulard and Gill. Their works are known—incorrectly—as *faux Daumier,* for works are only false when one is unable to see that they are the exercises of pupils.

Less solitary than he is said to have been, and admired by the new school, notably by Manet, Daumier grew old: sadly, for he would have liked to give up his lithographic work in favour of painting, but he could not do so. But he was happy in the knowledge that his lithographs preserved their force, as Hugo said in 1870 when Daumier symbolized his great satirical poem *Les Châtiments* by a crucified eagle.

In 1871, Daumier, who had discreetly refused to be decorated by the empire, became a member of the leftist Paris Commune. He was almost blind during his last years. His drawings, like those of Edgar Degas, gained a magnificent wholeness. He had one last joy, an exhibition at the Durand-Ruel Gallery in 1878. People began to say that his paintings were at least as good as his lithographs, though it was more the republican than the artist that they wished to celebrate.

As a cartoonist, Daumier enjoyed a wide reputation, although as a painter he remained unknown. His fame was not based, any more than it is today, on critical appreciations but, rather, on the smiling or laughing admiration of those who read the satirical journals.

(J.Ad.)

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Daun, Leopold Joseph, Count (Graf) **von,** Daun also spelled DHAUN (b. Sept. 24, 1705, Vienna [Austria]—d. Feb. 5, 1766, Vienna), field marshal who was the Austrian commander in chief during the Seven Years' War against Prussia (1756–63).

Daun gained field experience during Austrian operations in Sicily (1718), in Italy and on the Rhine (1734–35), against Turkey (1737–39), and during the War of the Austrian Succession (1740–48). He then began to reorganize the Austrian army, increasing troop strength, initiating better discipline and training, and founding a cadet school. As a result, Austria's army became a far more formidable opponent to Frederick the Great than the Prussian monarch had expected.

During the Seven Years' War, Daun, though often criticized for his overcautious strategy, nevertheless defeated Frederick at Kolín (June 1757) and replaced Charles of Lorraine as supreme commander after the Austrian defeat at Leuthen (December 1757). After other victories over the Prussians at Hochkirch (1758) and Maxen (1759), he was finally defeated at Torgau (1760). In 1762 he became president of the Imperial War Council (Hofkriegsrat), where he once again championed various army reforms, among them the centralization of military authority in the war council and the improvement of the cadet academy.

Daunou, Pierre-Claude-François (b. Aug. 18, 1761, Boulogne, France—d. June 20, 1840, Paris), French statesman, theorist of liberalism, and historian.

Educated at the local school of the Oratorians, Daunou became an Oratorian himself in 1777, taught in the order's convents from



Daunou, portrait by Louis-Léopold Boilly
H. Roger-Viollet

1780, and was ordained priest in 1787. During the French Revolution, he was elected to the Convention from Pas-de-Calais. He strongly opposed Louis XVI's trial, protested against the proscription of the Girondins (moderate republican party during the Revolution), was imprisoned in October 1793, but returned to the Convention in December 1794. He was the chief author of the constitution of 1795 and founder of the National Institute, which replaced the academies suppressed in 1793. After Napoleon Bonaparte's coup in 1799, he also participated in writing the constitution of the year VIII (December 1799).

Daunou was director of the national archives from 1804 to 1815. Under the Restoration he served as deputy (1819–23, 1828–34) and then as director (1830–40) of the national archives again. He wrote numerous essays and articles on French history and literature.

dauphin, title of the eldest son of a king of France, the heir apparent to the French crown, from 1350 to 1830. The title was established by the royal house of France through the purchase of lands known as the Dauphiné (*q.v.*) in 1349 by the future Charles V.

The title dauphin was derived from the personal name Dauphin that occurs in western Europe in various forms from the end of the 4th century. The first ruler of Viennois in southeastern France to bear this name was Guigues IV Dauphin in the 12th century; the name was borne so regularly by his successors that it came to be taken for a title peculiar to rulers of Viennois. By the end of the 13th century the titular use of the word was established, and the aggregate of fiefs held by the dauphins was called the delphinate, or Dauphiné. Charles of France, made dauphin of Viennois in 1349, became king of France in 1364 and granted Dauphiné to his son, the future Charles VI, in 1368, thus establishing the precedent whereby the French king's eldest son became dauphin.

The delphinate or Dauphiné d'Auvergne followed a similar development in Auvergne; it was held by the Montpensiers until 1693, when it passed to the French crown. From 1436 to 1693, in order to distinguish them, the dauphin heir to the French crown was occasionally called *le roi dauphin* ("king dauphin") and the dauphin of Auvergne "*le prince dauphin,*" as the Montpensiers were French princes of the blood.

Dauphin, town, southwestern Manitoba, Canada. It lies along the Vermilion River just west of Dauphin Lake, 201 miles (323 km) by road northwest of Winnipeg. The French trader and explorer La Vérendrye visited the lake in 1739 and named it for the dauphin of France. One of the two settlements that developed in the area after 1882 took the same name. The settlements, Dauphin and Gartmore, merged in 1896, when the Lake Manitoba Railway reached the site. The town became a service centre for a large agricultural region and the area headquarters for the Canadian National Railway, a major employer. It is also a tourist base for nearby Riding Mountain National Park (south) and Duck Mountain Provincial Park and Forest (northwest) and hosts Canada's annual National Ukrainian Festival (August). Inc. village, 1898; town, 1901. Pop. (1991) 8,453.

Dauphin Island, island in the Gulf of Mexico, at the entrance to Mobile Bay off the southwest coast of Alabama, U.S. Included in Mobile county, the island is about 15 miles (24 km) long and 5 miles (8 km) wide. It was visited in 1699 by Pierre Le Moyne d'Iberville, who had been sent by Louis XIV to establish a base for French colonization of Louisiana. Originally called Massacre Island (because of human bones found on the shore), it was renamed (1708) for Dauphin Louis, duke of Burgundy. It became a Spanish possession in 1762, when France ceded its territory east of the Mississippi River to Spain; in 1763, by the Treaty of Paris, it went to England; 20 years later it was returned to Spain. Although the United States claimed it in 1803 as part of the Louisiana Purchase, possession was not gained until 1813. Fort Gaines, begun on the island's eastern point in 1822, was captured during the American Civil War by Union forces under Admiral David G. Farragut in the Battle of Mobile Bay (1864). The island now serves as a recreational area.

Dauphiné, historic and cultural region encompassing the southeastern French *départements* of Isère, Hautes-Alpes, and Drôme and coextensive with the former province of Dauphiné.



The *gouvernement* of Dauphiné in 1789

The nucleus of the province was the countship of Viennois, the country around Vienne (on the east bank of the Rhône River), which was originally part of the kingdom of Arles and a fief of the Holy Roman Empire. In 1029 or 1030, the southern part of the countship was enfiefed to Guigues I, count of Albon, who extended his domain to include other parts of the kingdom of Arles. His great-grandson Guigues IV, count from 1133 to 1142, was the first to bear the name Dauphin, which was to distinguish his successors. The domain passed from the house of Albon to that of Burgundy in 1162 and to the La Tour du Pin family in 1282. By the end of the 13th century, the name Dauphin, now traditional in the ruling house of Viennois, had been transformed into a title, and the aggregate of fiefs held by them became known as Dauphiné.

The dauphins of the house of La Tour du Pin extended their domain and developed governmental and judiciary institutions. Having exhausted his financial resources, Humbert II (d. 1355) sold Dauphiné to the future Charles V of France in 1349.

Charles V began the practice whereby the kings of France ceded Dauphiné to their heir apparent. He was also the first to convene the provincial estates (assembly) of Dauphiné (1357). The dauphin Louis II, later Louis XI of France, established the Parlement (court) of Dauphiné in 1453. During his minority, Louis tried to exploit his territory's quasi-independent status in his quarrels with his father, Charles VII of France, who finally annexed Dauphiné to France in 1457.

The estates of Dauphiné were suspended by the French government in 1628, and local control was weakened further by the appointment of an intendant, an important royal official, over the area. A meeting at Grenoble in June 1788, followed by the unauthorized assembly of the estates at Vizille on July 21, was one of the immediate causes of the convocation of the States General, which led to the French Revolution of 1789. *See also* dauphin.

Physiographically the region comprises the westernmost outliers of the Alps and borders the highest portions of the Alps in France, just east of Grenoble. It borders the Rhône River valley on the west and Provence to the south. The traditional farmstead of the massif of Chartreuse in Isère is built of stone and features a four-sided roof covered with small boards known as *essendoles.* Chalets in the valleys of the Isère and Drôme rivers are built of stone and crowned with distinctive gables; living quarters and stalls occupy the ground floor and grain is stored in the attic. Chalets in southeastern Isère are built of rough-hewn stone and covered with slate shingles; living quarters and stalls are housed under one roof.

Dauphiné is predominantly Roman Catholic, though there are large Protestant enclaves with Waldensian roots in southern Drôme. The principal town in Dauphiné, Grenoble, is a manufacturing centre and also has an important group of universities. Other towns in Dauphiné include Briançon and Valence. The region produces grain, fruits, wines, and some cattle and sheep.

Regional cuisine relies heavily on cheese, freshwater fish, crayfish, mushrooms, potatoes, and fruit. Cheese from Saint-Marcellin in Isère is made from goat's and cow's milk. The liqueur of Chartreuse is distilled by the monks of La Grande Chartreuse, the motherhouse of the Carthusian order, near Grenoble. The liqueur is said to be made from more than 130 different plants; the formula dates from the 16th century. The patois of Dauphiné shows Provençal influence and is in decline. Italian is widely spoken in southern Isère.

Dauphiné Alps, French ALPES DU DAUPHINÉ, western spur of the Cottian Alps (*q.v.*) in southeastern France, lying between the Arc and Isère river valleys (north) and the upper Durance River valley (south). Many peaks rise to more than 10,000 feet (3,050 m), with Barre des Écrins (13,459 feet [4,102 m]) the highest. The mountains include the Massif du Pelvoux (Massif des Écrins) and the Belledonne and Grandes Rousses ranges. Skiing and mountain climbing are popular in the region.

Daur (people): *see* Daghur.

Daura, town and traditional emirate, Katsina state, northern Nigeria. The town lies in a savanna zone at the intersection of roads from Katsina town, Kano, Zango, and Zinder (Niger). An ancient settlement, the name of which means "blacksmith" in the Tuareg



The palace of the emir, Daura, Nigeria
Bruno Barbey—Magnum

language, it was founded by a queen and was ruled by women in the 9th and 10th centuries. It is the spiritual home of the Hausa people: a well-known legend of western Africa relates that Bayajida (Abuyazidu), a son of the king of Baghdad, killed Sarki, the fetish snake at the town's well, and married the reigning Daura queen. Their descendants became the seven rulers of the Hausa Bakwai (The Seven True Hausa States). Daura thus became a Hausa state that stretched across the borders of present-day Nigeria and Niger. Daura town became a caravan centre for salt and potash from the Sahara Desert and for cloth, slaves, leather, and agricultural produce from the south; but it never gained the political or military prominence of Katsina (49 miles [79 km] west) or of Kano (73 miles [117 km] south).

Little else is known of Daura state until the Fulani jihad (holy war) in 1805, when Malam Ishaku, a Fulani warrior, after a successful siege established an emirate headquarters in Daura. While Fulani emirs reigned in Daura, rival Hausa kingdoms were established nearby at Daure-Zango (Zango) and at Daure-Baure (Baure). Zango (founded in 1825) was the more prominent Hausa-Daura kingdom, and in 1903–04, after the British and French had divided the three Daura polities, the British installed Zango's king, Malam Musa, as the new emir of Daura. Part of former North-Central state after 1967, the traditional emirate was incorporated into Kaduna state in 1976. It became part of the newly created Katsina state in the late 1980s.

Local trade in Daura town is primarily in sorghum, millet, onions, peanuts (groundnuts), cotton, and hides and skins; cattle, goats, sheep, horses, and donkeys are kept by its Hausa and Fulani inhabitants. Cotton weaving and peanut collecting (for export) are significant economic activities. The town is served by a government health office and a dispensary. It is also the headquarters of a local government council. Pop. (1972 est.) town, 25,151.

Daurat, Jean: *see* Dorat, Jean.

Dausset, Jean-Baptiste-Gabriel-Joachim (b. Oct. 19, 1916, Toulouse, Fr.), French hematologist and immunologist whose studies of the genetic basis of the immunological reaction earned him a share (with George Snell and Baruj Benacerraf) of the 1980 Nobel Prize for Physiology or Medicine.

After serving with the Free French forces in World War II, Dausset resumed his interrupted medical studies and took his degree from the University of Paris in 1945. He pursued advanced studies at Harvard University and later became laboratory director of the National Blood Transfusion Centre. From 1958 to 1977 he was associate professor and then professor of immunohematology at the University of Paris, and from 1977 he was professor of experimental medicine at the Collège de France.

In investigating the immunological reactions of patients who had received many blood transfusions, Dausset correctly hypothesized that a specific genetic variation among people accounted for the different levels of reaction. He eventually demonstrated the existence of a gene complex that he designated HLA (human leucocyte A complex) and that proved to be analogous to the H-2 complex in the mouse studied by Snell; both came to be seen as types of the major histocompatability complex (MHC) characteristic of all vertebrates.

Dāvangere, town, central Karnātaka (formerly Mysore) state, southern India. A major road and rail junction, it supports a large-scale textile industry and is a trading centre for cotton and grain. The surrounding villages produce handloomed cotton and wool. Several colleges affiliated with the University of Mysore are situated at Dāvangere. Pop. (1981) 196,621.

Davao City, city, southeastern Mindanao Island, Philippines. It lies at the mouth of the Davao River near the head of Davao Gulf. It is the leading regional centre for southeastern Mindanao and encompasses about 50 small ports in its commercial sphere. Pakiputan Strait, formed by offshore Samal Island, shelters both Santa Ana, an urban port servicing small vessels, and the deepwater port facilities at Sasa, 5 miles (8 km) north. The ports handle interisland passenger traffic and shipment of copra, corn (maize), and rice. As an international port, Davao City ships large quantities of abaca, a natural fibre that is the main product grown in the adjacent agricultural hinterland.

Before World War II the city was developed as a Japanese colony, which owned extensive abaca plantations, but it was razed during World War II. The rebuilt city is an attractive blend of Spanish, American, and Moorish influences. Largely rural outside its urban core, Davao City is one of the world's largest cities in land area, sprawling among coconut groves and ricelands and encompassing 854 square miles (2,212 square km). The regional headquarters for commercial and administrative activities, Davao City is served by a major airport and highways. The city's industries include the production of abaca fibres, textiles, cement, and plywood. Davao City is the site



Pilatte Glacier, Écrins National Park, Dauphiné Alps, Fr.
Bob and Ira Spring

of the University of Mindanao (1946), the Philippine Women's College of Davao, and other colleges. Talomo Beach, the Bago Iñigo fish farm, and the pearl farm on Samal Island are nearby. Inc. city, 1936. Pop. (1984 est.) 179,521.

Davel, Jean-Abraham-Daniel (b. October 1670, Morrens, Switz.—d. April 24, 1723, Vidy), Swiss popular leader, folk hero of the canton of the Vaud, who led the Vaudois separatist movement against the rule of Bern (1723).

Annexed by Bern in 1536, the Vaud had long chafed under the administration of Bernese bailiffs when in 1723 Davel became the focus of discontent. Claiming divine inspiration and envisioning a Christian revival, he led a contingent of followers upon Lausanne, the administrative capital of the Vaud (March 31, 1723), where he urged the declaration of Vaudois independence. The city's councillors refused compliance with his demands and delivered him to the Bernese authorities.

The movement was crushed and Davel was executed. But his heroic manner on the execution block won him the admiration of many, and he became a continuing symbol of the Vaudois struggle for independence, occupying a significant place in local tradition well into the 20th century.

Davenant, Sir William, Davenant also spelled D'AVENANT (b. 1606, Oxford—d. April 7, 1668, London), English poet, playwright, and theatre manager who was made poet laureate on the strength of such successes as *The*



Davenant, engraving by William Faithorne after John Greenhill, 1672

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Witts (licensed 1634), a comedy; the masques *The Temple of Love, Britannia Triumphans,* and *Luminalia;* and a volume of poems, *Madagascar* (published 1638).

Shakespeare was apparently Davenant's godfather, and gossip held that the famous playwright may even have been his father. Davenant became a page in London in 1622 and later served a famous literary courtier, Fulke Greville, Lord Brooke. Meanwhile he was writing his early revenge tragedies, such as *Albovine* (produced *c.* 1629), and tragicomedies, such as *The Colonel.* After he had served in continental wars, his engaging, reckless personality and his plays and occasional verses attracted the patronage of Queen Henrietta Maria. Davenant was appointed to the poet laureateship in 1638, after the death of Ben Jonson the previous year.

In 1641 Davenant risked his life in a bungled army plot, and the outbreak of the Civil War in 1642 nullified a royal patent he had secured to build a theatre. A supporter of King Charles I during the Civil War, he was knighted by the king in 1643 for running supplies across the English Channel. Later, having joined the defeated and exiled Stuart court in Paris, he began his uncompleted verse epic *Gondibert* (1651), a tale of chivalry in 1,700 quatrains. After the execution of Charles I, his queen sent Davenant to aid the Royalist cause in America as lieutenant governor of Maryland. Davenant's ship was captured in the English Channel, however, and he was imprisoned in the Tower of London until 1654.

In 1656 Davenant made the first attempt to revive English drama, which had been banned under Cromwell, with *The first day's Entertainment* (produced 1656), a work disguised under the title *Declamations and Musick.* This work led to his creating the first public opera in England, *The Siege of Rhodes Made a Representation by the Art of Prospective in Scenes, And the Story sung in Recitative Musick* (produced 1656). In *The Siege* he introduced three innovations to the English public stage: an opera, painted stage sets, and a female actress-singer.

In 1660, after the Restoration, he was granted a royal patent to establish new acting companies and founded the new Duke of York's Playhouse in Lincoln's Inn Fields. As manager, director, and playwright, he continued to produce, write, and adapt plays. The charter was later transferred to Covent Garden. Together with the poet John Dryden, he adapted Shakespeare's *The Tempest* in 1667.

Davenport, city, seat (1837) of Scott county, eastern Iowa, U.S. It lies on the north bank of the Mississippi River and is the largest of the "Quad Cities" urban complex (which includes Moline, East Moline, and Rock Island, all across the river in Illinois). Credit Island, now a park, was a battlefield in the War of 1812; Fort Armstrong (restored) was established on Rock Island in 1816. Antoine LeClaire acquired the site (originally called Oskosh and later called Morgan) after the Black Hawk Treaty (1832) and sold it to a fur company headed by Colonel George Davenport. The first railroad bridge to span the Mississippi River was opened at Davenport in 1856, and the development of both river and rail transportation assured the city's growth as a trading centre. Davenport's manufactures include farm machinery, clothing, and processed foods.

The Palmer College of Chiropractic was founded in Davenport by D.D. Palmer, who initiated the chiropractic system in 1895. Davenport is also the seat of Marycrest College (1939), St. Ambrose College (1882), and Palmer Junior College (1965). The Davenport Municipal Art Gallery has a notable collection of Grant Wood paintings. Inc. town, 1839; city, 1851. Pop. (1990) city, 95,333; Davenport–Rock Island–Moline MSA, 350,861.

davenport, in modern usage, a large upholstered settee, but in the 18th century a compact desk having deep drawers on the right side and dummy drawer fronts on the left side. The sloping top of the davenport concealed a fitted well, the front of which protruded beyond the drawers and was supported by a pair of columns on a base, or plinth. The back of the writing area was normally flat and might be protected on three sides by a pierced brass gallery.



Rosewood davenport, English, early 19th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

Some versions of the early davenport were fitted with a writing slide that extended the writing area at the front or side. The first desk of this type was made by the English firm of Gillow for a Captain Davenport in the late 18th century.

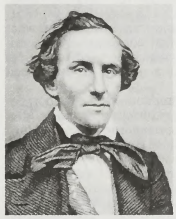
Davenport, Charles Benedict (b. June 1, 1866, Stamford, Conn., U.S.—d. Feb. 18, 1944, Cold Spring Harbor, N.Y.), American zoologist who contributed substantially to the study of eugenics (the improvement of populations through breeding) and heredity and who pioneered the use of statistical techniques in biological research.

After receiving a doctorate in zoology at Harvard University in 1892, Davenport taught there until 1899, when he left to join the faculty of the University of Chicago, where, from 1901 to 1904, he was curator of the zoological museum. He directed the department of genetics (1904–34) for the Station for Experimental Evolution at Cold Spring Harbor, N.Y., and also founded and directed the Eugenics Record Office (1910–34).

While teaching experimental morphology at Harvard, he used statistical methods in population studies. Partly as a result of breeding experiments with chickens and canaries, he was one of the first, soon after 1902, to recognize the validity of the newly discovered Mendelian theory of heredity. In *Heredity in Relation to Eugenics* (1911), he compiled evidence concerning the inheritance of human traits, on the basis of which he argued that the application of genetic principles would improve the human race.

Davenport was editor of *Genetics* (from 1916) and the *Journal of Physical Anthropology* (from 1918). Davenport's other important works include *Statistical Methods with Special Reference to Biological Variation* (1899), *Eugenics* (1910), and *Body Build and Its Inheritance* (1923).

Davenport, Edward Loomis (b. Nov. 15, 1815, Boston—d. Sept. 1, 1877, Canton, Pa., U.S.), one of the most skilled and popular American actors of the mid-19th century. Three of his finest roles were Hamlet, Brutus in *Julius Caesar,* and Sir Giles Overreach in Philip Massinger's comedy *New Way to Pay Old Debts.*



Edward Loomis Davenport, detail from an engraving, 1849, after a daguerreotype by Paine of Islington

By courtesy of the Victoria and Albert Museum, London

In spite of family opposition, Davenport went on the stage, making his debut in 1836 under the stage name Mr. E. Dee, playing

Parson Willdo in *A New Way to Pay Old Debts.* For the next 10 years he played a wide variety of roles in stock companies and on tour. During a six-year stay in England that began in 1847, he played opposite Anna Cora Mowatt in Edward Bulwer-Lytton's *Lady of Lyons,* James Sheridan Knowles's *Hunchback,* and Shakespeare's *Much Ado About Nothing* and later alternated the roles of Othello and Iago in Shakespeare's *Othello* with Gustavus Brooke, winning great critical praise. While in England he also acted the parts of Shylock and King Lear. In 1854 he returned to the United States, where for 20 years he continued to play a wide range of roles until his failing health halted his career.

Davenport, John (b. April 1597, Coventry, Warwickshire, Eng.—d. *c.* March 15, 1670, Boston, Mass.), Puritan clergyman and cofounder of the New Haven Colony (now New Haven, Conn.).

Davenport was educated at the University of Oxford and later was elected vicar of the Church of St. Stephens in London. Because Holland was more hospitable to Puritans than was England, Davenport moved there in 1633 and became co-pastor of the English Church in Amsterdam. There Davenport quarreled with Dutch religious officials, and in 1637 he departed for America with his boyhood friend Theophilus Eaton and their followers from England. In June the group arrived in Boston but decided not to remain there. In April 1638 they founded a colony at Quinnipiac (New Haven), Conn. Davenport became pastor of the New Haven church, and the freemen chose Eaton as governor of the new colony, in which church and state were closely aligned.

Davenport maintained a prominent role in New Haven's civil and ecclesiastical affairs, and in 1661 he allowed two regicide judges of Charles I (William Goffe and Edward Whalley) to take refuge within the settlement. Davenport resisted the union of New Haven with the Connecticut colony, but when his efforts failed, he accepted an invitation in 1667 to become pastor of the First Church in Boston. Davenport's appointment was vigorously opposed by several church members, partly because of his hostility to the Half-Way Covenant and its provisions on baptism. He was eventually installed as pastor in December 1668, but the congregation split; the dissidents founded the Third Church of Boston.

Davenport, Thomas (b. July 9, 1802, Williamstown, Vt., U.S.—d. July 6, 1851, Salisbury, Vt.), American inventor of what was probably the first commercially successful electric motor, which he used with great ingenuity to power a number of established inventions.

A blacksmith in Brandon, Vt., Davenport began experimenting with electromagnets after observing one in use at an ironworks in Crown Point, N.Y., in 1831. By 1834 he had constructed his first electric motor. Operated by battery power, the motor consisted of a wheel, two spokes of which were electromagnets, situated between two stationary electromagnets. The magnets on the wheel were connected to a commutator switch; when current was applied, the wheel rotated rapidly. The next year Davenport utilized an electric motor to propel a small car around a circular track, the first recorded instance of an electric railway. In 1837 he received a patent for "Improvements in propelling machinery by magnetism and electromagnetism."

Largely unsuccessful in obtaining financial backing, Davenport established a workshop in New York City and began publishing a short-lived journal of electromagnetism and mechanics; the journal was printed on a printing press operated by an electric motor that Davenport had invented.

Davenport ware, cream-coloured earthenware made by John Davenport of Longport, Staffordshire, Eng., beginning in 1793. Davenport had great success with pierced openwork-rimmed plates, either painted or transfer printed. He produced domestic bone china from 1800 and by 1810 was operating on a large scale; the business continued until 1887. Gilding, an extensive use of coloured grounds, flower-encrusted borders, brilliantly naturalistic fruit and flower decorations, and Japan patterns were favoured by Davenport on his prolific and versatile ware.

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Daventry, town and district, county of Northamptonshire, England. Daventry district's rich, undulating landscape of 257 square miles (666 square km) is predominantly rural, with more than 70 parishes. At the heart of the district is historic Daventry town. Nothing is known of Daventry town until Domesday Book (1086), the record of the land survey ordered by William I the Conqueror, although Borough Hill, east of the town, is the site of an ancient earthwork. Daventry town incorporated under a royal charter in 1606, and a new royal charter was granted in 1674. During the English Civil War, Daventry was the headquarters of Charles I before the Battle of Naseby (1645) between Royalist and Parliamentarian forces.

After 1925, Daventry became an important international radio centre, when the British Broadcasting Corporation (BBC) established a high-power, long-wave station on Borough Hill. This transmitting station was subsequently augmented with new equipment, and as early as 1932 the BBC had begun regular broadcasting services to the nations of the British Empire (later the Commonwealth of Nations) using short-wave transmitters at Daventry. These facilities were increased after World War II, and the transmitters now serve all parts of the world.

The main industries of Daventry town are boot and shoe manufacture, light engineering, and the making of roller bearings. Daventry also functions as a dormitory town for nearby Midland cities. The district attracts hunters and fishers and contains the headquarters of the Pytchley foxhunt. Pop. (1981) town, 16,193; (1986 est.) district, 61,200.

Davey, Marie Augusta: *see* Fiske, Minnie Maddern.

Davey, Norris Frank: *see* Sargeson, Frank.

David, Hebrew DAWID, name of rulers grouped below by country and indicated by the symbol •.

ISRAEL

• **David** (b. Bethlehem, Judah—d. *c.* 962 BC, Jerusalem), second of the Israelite kings (after Saul), reigning *c.* 1000 to *c.* 962 BC, who established a united kingdom over all Israel, with Jerusalem as its capital. In Jewish tradition he became the ideal king, the founder of an enduring dynasty, around whose figure and reign clustered messianic expectations of the people of Israel. Since he was a symbol of fulfillment in the future, the New Testament writers emphasized that Jesus was of the lineage of David. He was also held in high esteem in the Islāmic tradition.

Early life. The youngest son of Jesse (grandson of Boaz and Ruth), David began his career as an aide at the court of Saul, Israel's first king, and became a close friend of Saul's son and heir, Jonathan, and the husband of Saul's daughter Michal. He so distinguished himself as a warrior against the Philistines that his resultant popularity aroused Saul's jealousy, and a plot was made to kill him. He fled into southern Judah and Philistia, on the coastal plain of Palestine, where, with great sagacity and foresight, he began to lay the foundations of his career.

Beginning as an outlaw, with a price on his head, David led the life of a Robin Hood on the desert frontier of his country (Judah). He became the leader and organizer of other outlaws and refugees; and, according to the Bible, ". . . everyone who was in distress, and everyone who was in debt, and everyone who was discontented, gathered to him; and he became captain over them.' This group progressively ingratiated itself with the local population by protecting them from other bandits or, in case they had been raided, by pursuing the raiders and restoring the possessions that had been taken. Though sometimes dependent upon the Philistine kings of Gath for protection from the pursuit of King Saul, David managed to retain his status as a patriot in the eyes of his own people in Judah and, even as one who had, indeed, been an innocent and loyal servant of the demented Saul. He also won the favour of many Judaean elders by various politic gestures. Thus, by biding his time, he eventually had himself "invited" to become king, first by Judah in Hebron and later by all Israel, not as a rebel against Saul but as his true successor. This opportunity emerged when Saul and Jonathan were slain while engaged in battle against the Philistines on Mount Gilboa.

Kingship. David entered Hebron, where he was proclaimed king. He had to struggle for a few years against the contending claim and forces of Ishbaal, Saul's surviving son, who had also been crowned king, but the civil war ended with the murder of Ishbaal by his own courtiers and the anointing of David as king over all Israel (including tribes beyond Judah). He proceeded to conquer the walled city of Jerusalem, held by the alien Jebusites, which he made the capital of the new united kingdom, and to which he moved the sacred ark of the Covenant, the supreme symbol of Israelite religion. He defeated the Philistines so thoroughly that they were never again a serious threat to the Israelites' security, and he annexed the coastal region. He went on to establish an empire by becoming the overlord of many small kingdoms bordering on Israel, including Edom, Moab, and Ammon. Beginning about 1000 BCE (before the Common Era—BC), David's reign lasted for about 40 years (until 962 BCE).

David's great success as a warrior and empire builder was marred by family dissensions and political revolts, which were interrelated. To tie together the various groups that constituted his kingdom, David took wives from them and created a harem. The resultant family was an extreme departure from the family in the consanguineal context, the traditional clan structure. David's wives were mostly completely alien to one another, and his children were without the directing support of established social patterns that provided precedents for the resolution of conflict or for establishing the rights of succession. Thus, David's third son, Absalom, murdered the eldest son, Amnon, for the latter's rape of Tamar, the former's sister and the latter's half sister. After a period of exile and then of reconciliation with King David, Absalom used the favour he had gained among the people and some courtiers to launch a rebellion that sent his father fleeing across the Jordan and that made him master of Jerusalem and the royal harem for a time. Eventually, Absalom's forces were defeated, and he was killed by Joab, David's general, and it was Solomon, born of David's union with Bathsheba, who became the King's eventual heir.

The authors of the biblical accounts (in books I and II Samuel) of David's political career display a deep insight into his character. David was a man who could make an indelible personal impression in a specific situation. His doubling of the bride price set by Saul for Michal illustrates this capacity for imaginative action and dramatic publicity. Coupled with this ability to exploit the immediate situation in the service of his momentary requirements, he possessed the knack of making his conduct in particular situations serve his persistent and long-range aims. For example, the two versions of his refusal to assassinate King Saul when he had it in his power to do so (in I Samuel 24 and 26) do not simply present an inspiring example of gallantry in a moment of dramatic confrontation; they also contribute to the enduring reputation of David as a man who, even in his years as an outlaw, had a deep respect for established institutions, especially for the sacred office of the king ("the Lord's anointed"). Later, after the death of Saul and Jonathan, David again confirmed this point at a moment in which it was crucially important for him to do so for the sake of his own career. A young Amalekite who came to report Saul's death to David intimated that he had had a share in it. He thought that as the bearer of good news he would be rewarded, but his miscalculation cost him his life. David sensed that in an hour of national disaster the differences between him and Saul were of no importance. He had the Amalekite slain for having laid hands on the Lord's anointed, and with his men he performed the mourning rites for Saul and Jonathan, memorializing them in a deeply moving elegy. Somewhat later, after David had become king in Hebron, he learned that the men of Jabesh-Gilead, a town across the Jordan that had been fanatically attached to King Saul, had recovered the bodies of Saul and Jonathan to give them honourable burial. David sent the town a message commending it for its act of reverent loyalty, which had been undertaken at great risk. His action in this episode, also, was both political and sincere, and it was eminently suited to the situation in which the conciliation of all Israelites was of the greatest importance for both the career of David and the survival of the nation.

In the case of Absalom's rebellion, a poignant conflict took place between parental love and political power. When the news of his son's slaying came to him he broke down into deep grief and lamented, "O my son Absalom, my son, my son Absalom! Would I had died instead of you . . .!" But he was rebuked by his general Joab (who had ignored the King's direct order and had the young rebel killed) as showing more concern for his enemies than his supporters and risking the loss of public esteem and so of his rule. Thereupon he returned with his old energy and wile to the task of uniting and reconciling the various factions in Israel, including putting down another revolt, this time by Sheba, the son of Bichri, of the tribe of Benjamin.

Political achievement. David was Israel's first successful king. He united all of the Israelite tribes, became the effective ruler over all, and was the founder of an enduring dynasty. Thus, he succeeded where King Saul had failed and attained a unique place in Israel's history and tradition. II Samuel 9–20 and I Kings 11–22 provide the primary source for knowledge of his reign and of the succession. It is generally agreed that this "history" was written very soon after the reign of David; as such, it is perhaps the oldest piece of historiography in the Western world. Known as the "Family History of David," and also as "The Succession History," it is an especially clear mirror in which to study the problems David faced in displacing charismatic political leadership and authority with hereditary monarchy.

For centuries before David's rise to kingship, Israelites had been held together in loose tribal confederacies. The northern confederacy, with its centre at Shechem, is the best known. It was dominated by the tribe of Ephraim. A tribe was a collection of clans; and a clan was simply an expanded family. The consanguinal and familial character of Israelite society is a basic feature of Semitic tradition and is today still intact in the Arab society of the peninsula of Arabia. There the founding of the Sa'ūdī dynasty in the present century offers close and instructive parallels to David's problems and accomplishments 3,000 years ago. For example, both the revolt of Absalom, which necessitated David's exile for a time, and the grasp of the eldest surviving son, Adonijah, for the succession, in competition with the sponsors of Solomon, very nearly succeeded because they appealed to traditions of local and tribal authority, winning the support of many who were disillusioned with the swift centralization of power that had accompanied the establishment of the Davidic empire. In II Samuel 15, for example, Absalom, in his bid for support, says that he would like to exercise judgment in the premonarchic manner, as an elder in the gate. Ironically, he was attempting to displace his father by the same means by which David had so successfully risen to power; *i.e.,* appealing to local clans. Later, after Solomon's reign had ended, the united kingdom broke up when these tribalistic traditions again reasserted themselves. The relentless movement of social evolution made impossible the reestablishment of a tribal society; but the vitality of the tribal heritage was still very strong, both in David's day and later. Thus, there was a basic instability in his position; he faced the problem of winning consent for and establishing the legitimacy of his office, for it was an imported novelty in the social structures and traditions of Israel, on the model of the ancient Near Eastern kingships.

David's position in the tribal units that made up Judah was secure, for he had united them and had risen to authority over Judah through his adroit use of the indigenous social and political instruments of its clan structures. Therefore, Judah accepted his legitimacy and never disowned his dynasty. He sought to win the consent of all Israel, first, by the decisively successful war against the Philistines, which made the whole land secure; and then by establishing the city of Jerusalem as the centre both of Israel's political power and of its worship. On the political level this effort was not enough, for the kingdom was divided after the death of Solomon; but on the religious and cultic level it did eventually succeed, for Jerusalem, the "city of David," became the Holy City for all Jews, and the messiah, "the anointed one" of the house of David, a sign of the relationship between the God of Israel and his people.

Religious role and significance. In Israel's religious tradition the royal line, or "house," of David became a primary symbol of the bond between God and the nation; the king was the mediator between the deity and his people. As in many ancient traditions, the king was thought of as both divine and human. The English word messiah is derived from *hameshiach* ("the anointed one"), the title of the kings of the line of David. Thus, in later times of disaster, Israel began to wait for a messiah, a new mediator of the power of God that would redeem the people and its land. By designating Jesus as the son of David, Christianity dramatized its conviction that this hope had been fulfilled. David lived in the memory of his people in a double way: as the great founder of their political power and as the symbol of a central facet of their religious faith.

The process by which David achieved this status for himself, his house, and his city may be traced in II Samuel 5–8. When David took Jerusalem, he assumed the rule over its inhabitants and their religious institutions with the cult centred on Mt. Zion. The previous (Jebusite) ruler had been both king and high priest, and played the role of mediator between the city and its deity. There was no precedent for such a mediative and priestly role of kings in Israelite religion, nor of walled cities as the seat of government and worship. Apparently, David simply took over the Jebusite cult on Zion and adapted it to his own (and Israelite) use. Beginning with David and throughout the entire period of the monarchy, for about four centuries, Israel's worship on Zion gave a central place to the king, not simply as officiant but substantively, as the figure who in his office and person embodied the relationship between God and the nation. In contrast, the premonarchic worship of Israel, at Shechem and elsewhere, had featured a Covenant between God and the people, through their tribal heads, as the bond in the relationship. By taking over and adapting Jerusalem's ancient cult, David provided Israel with a new worship, one that featured his own status and its sacral significance.

Israel's God was named Yahweh. David made this name the supreme name for deity in Jerusalem (previously perhaps "Salem"), to indicate his conquest of the city. All former names and titles of deity became attributes or titles of Yahweh, the God of Israel, the conqueror—for example, El 'Elyon (God Most High). While the Israelite name for God displaced all others, the substance of the worship remained similar: Yahweh had created the world and ruled the nations; he had established kingship as the sign and means of his universal rule; and Zion was the seat of his chosen king, David, his anointed. Yahweh himself was enthroned on Zion, and his king sat at his right hand as his regent. David thus continued the line of king-priests that had reigned in Jerusalem from the founding of the city, and, according to a legend that may have developed in this context, the patriarch Abraham had been blessed by Melchizedek, an earlier representative of the line, when he had presented tithes to him.

Having adopted the ancient cult of Jerusalem as a means of giving sacral significance to his royal status and having renamed it the cult of Yahweh, by whose power he had conquered, David also made an important move to make the new shrine and its worship relate to the premonarchic experience of Israel. He brought the ark to Jerusalem and established it as the central object of the cult. According to tradition, it had travelled with Israel in the wilderness and led the way into the land. It was a rectangular wooden box, originally without a cover, that established and located the presence of Yahweh with the people of Israel. So close was the connection that the ark could be addressed as Yahweh. The ark was carried into battle to demonstrate that Yahweh fought for Israel; and it was carried in the wilderness, to show that he travelled with his people. In worship, it was apparently carried in procession in the pilgrimages that were features of the annual feasts. It was a sign and even the embodiment of Yahweh's presence. David could have chosen no better way of making premonarchic Israelites accept the royal cult on Zion than by incorporating the ark, with all its ancient associations, into the new ceremonial.

David's adaptation of the Zion cult, with its understanding of kingship as the substance and means of the presence of God on earth, was to have momentous consequences for the religious history of mankind, notably for the experience of the entire Western world. Because of it Jerusalem became the Holy City and David became the prototype of an awaited

messiah. As symbol of the Messiah, the return of David, or the coming of David's "son" stood for the reassertion of the divine rule and presence in history: to judge it, to redeem it, to renew it. David thus became the symbol of a fulfillment in the future, final peace.

In the apocalyptic developments in Judaism that mark the last two pre-Christian centuries, the symbolic role of David stressed his status as divine mediator. The son of David became more emphatically a heavenly figure, the son of God enthroned to rule over the nations of the world. This was the matrix for the rise of Christianity. The new faith interpreted the career of Jesus by means of the titles and functions assigned to David in the mysticism of the Zion cult, in which he served as priest-king and in which he was the mediator between God and man. (J.C.Ry.)

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SCOTLAND

• David I (b. *c.* 1082—d. May 24, 1153, Carlisle, Cumberland, Eng.), one of the most powerful Scottish kings (reigned from 1124). He admitted into Scotland an Anglo-French (Norman) aristocracy that played a major part in the later history of the kingdom. He also



David I, detail of an illuminated initial on the Kelso Abbey charter of 1159; in the National Library of Scotland

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reorganized Scottish Christianity to conform with continental European and English usages and founded many religious communities, mostly for Cistercian monks and Augustinian canons.

The youngest of the six sons of the Scottish king Malcolm III Canmore and Queen Margaret (afterward St. Margaret), David spent much of his early life at the court of his brother-in-law King Henry I of England. Through David's marriage (1113) to a daughter of Waltheof, earl of Northumbria, he acquired the English earldom of Huntingdon and obtained much land in that county and in Northamptonshire. With Anglo-Norman help, David secured from his brother Alexander I, king of Scots from 1107, the right to rule Cumbria, Strathclyde, and part of Lothian. In April 1124, on the death of Alexander, David became king of Scots.

David recognized his niece, the Holy Roman empress Matilda (died 1167), as heir to Henry I in England, and from 1136 he fought for her against King Stephen (crowned as Henry's successor in December 1135), hoping thereby to gain Northumberland for himself. A brief peace made with Stephen in 1136 resulted in the cession of Cumberland to David and the transfer of Huntingdon to his son Earl Henry. David, however, continued to switch sides. While fighting for Matilda again, he was defeated in the Battle of the Standard, near Northallerton, Yorkshire (Aug. 22, 1138). He then made peace once more with Stephen, who in 1139 granted Northumberland (as an English fief) to Earl Henry. In 1141 David reentered the war on Matilda's behalf, and in 1149 he knighted her son Henry Plantagenet (afterward King Henry II of England), who acknowledged David's right to Northumberland.

In Scotland, David created a rudimentary central administration, issued the first Scottish royal coinage, and built or rebuilt the castles around which grew the first Scottish burghs: Edinburgh, Stirling, Berwick, Roxburgh, and perhaps Perth. As ruler of Cumbria he had taken Anglo-Normans into his service, and during his kingship many others settled in Scotland, founding important families and intermarrying with the older Scottish aristocracy. Bruce, Stewart, Comyn, and Oliphant are among the noted names whose bearers went from northern France to England during the Norman Conquest in 1066 and then to Scotland in the reign of David I. To these and other French-speaking immigrants, David granted land in return for specified military service or contributions of money, as had been done in England from the time of the Conquest.

• David II (b. March 5, 1324, Dunfermline, Fife, Scot.—d. Feb. 22, 1371, Edinburgh), king of Scots from 1329, although he spent 18 years in exile or in prison. His reign was marked by costly intermittent warfare with England (a stage in the Scottish Wars of Independence), a decline in the prestige of the monarchy, and an increase in the power of the barons.

On July 17, 1328, in accordance with the Anglo-Scottish peace treaty of Northampton, the four-year-old David was married to Joanna, sister of King Edward III of England. The boy succeeded his father, Robert I the Bruce, as king of Scots on June 7, 1329. A rival claimant to the Scottish throne, Edward de Balliol, a vassal of Edward III, became de facto king after Edward's victory over Sir Archibald Douglas, regent since 1332, at Halidon Hill, Northumberland (July 19, 1333). In 1334 David went into exile in France, where he was maintained generously by King Philip VI. In 1339 and 1340 he fought in Philip's fruitless campaigns against Edward III. By 1341 he was able to return to Scotland, but he did little as king except to make futile raids into England. During the French siege of English-held Calais he attempted a diversion on behalf of Philip VI but was defeated, wounded, and captured at Neville's Cross, County Durham (Oct. 17, 1346).

Held prisoner by the English, David was released in 1357 in return for a promised ransom that proved to be more than the Scottish government could pay. In 1363 David, now on cordial terms with Edward III, proposed that a son of the English king should succeed to the throne of Scotland in return for the cancellation of the ransom. The arrangement, which made an enemy of his nephew and lawful successor, the future Robert II, was repudiated by the Scottish Parliament. In his last years David inspired further opposition by his financial extravagance.

David, capital of Chiriquí province, western Panama, on the Río David and surrounded by fruit groves. It is Panama's fourth largest city and an important commercial centre, served by the Pacific seaports of Pedregal and Puerto Armuelles on the Gulf of Chiriquí and by Enrique Malek Airport. Industries include meat-packing, food processing (sugar, coffee, and cocoa), distilling, and tanning, and the city is known for its saddles and harnesses. Founded in 1738 as a gold-prospecting camp, the modernized city retains much of its colonial tradition. Its San José church has a separate bell tower built for defense against Indian attacks. Pop. (1980) 50,621.

David, marble sculpture executed from 1501 to 1504 by the Italian Renaissance artist Michelangelo. The statue was commissioned for the cathedral of Florence, but the Florentine government decided instead to place it in front of the Palazzo Vecchio. The original is now in the Accademia, and a copy has been installed in the Piazza della Signoria.

David, SAINT, Welsh DEWI (b. *c.* 520, near St. Bride's Bay, Pembrokeshire, Wales—d. *c.* 600, Menevia; feast day March 1), patron saint of Wales.

Little is known of his life. According to the hagiography (*c.* 1090) by the Welsh scholar Rhygyfarch, he was the son of the chieftain Sant, who raped David's mother, St. Non. Educated at Henfynyw, Cardigan, he seemingly took a prominent part in the synod of Llanddewi-Brefi (in Cardigan) to suppress the heresy of Pelagius (*q.v.*) and presided at the Synod of Victory held later at Caerleon-on-Usk, Monmouthshire, which supposedly defeated the Pelagian heresy in Britain.

More certainly, he moved the seat of ecclesiastical government from Caerleon to Mynyw, which still, as St. David's (Ty-Dewi), is the cathedral city of the western see. David founded numerous churches throughout South Wales (more than 50 named for him existed in the 20th century). His shrine at St. David's became a notable place of pilgrimage. His canonization by Pope Calixtus II (*c.* 1120) is unproven.

David AP GRUFFUDD (d. October 1283, Shrewsbury, Salop. Eng.), the last native prince of Gwynedd in northern Wales; he initiated a major rebellion against the English in Wales, and upon his death Wales fell completely under English rule.

David's grandfather, Llywelyn ap Iorwerth, had made Gwynedd the centre of Welsh power. After failing to prevent his brother, Llywelyn ap Gruffudd, from becoming sole prince of Gwynedd in 1255, David continued to oppose Llywelyn during Llywelyn's wars against the English kings Henry III (ruled 1216–72) and Edward I (ruled 1272–1307). In 1277 Edward I rewarded David with lands in northeast Wales. Nevertheless, David was so angered by the oppressive administration of English officials in adjoining territories that on March 22, 1282, he attacked the English garrison at Hawarden, Clwyd, thereby precipitating the final struggle for national independence. After Llywelyn was killed by English forces in December 1282, David became prince of Gwynedd. He continued to resist the English until June 1283, when he was betrayed and captured. He was hanged, drawn, and quartered in October. David was the last native Welsh prince to claim the title prince of Wales.

David AP LLYWELYN (b. *c.* 1208—d. Feb. 25, 1246, Aber, Gwynedd, Wales), Welsh prince, ruler of the state of Gwynedd in northern Wales from 1240 to 1246.

His father, Llywelyn ap Iorwerth, had made Gwynedd the centre of Welsh power, and his mother, Joan, was the illegitimate daughter of King John of England (ruled 1199–1216). Although Llywelyn designated David as his successor, his half brother Gruffudd opposed him. While the aged Llywelyn lay ill,

David seized Gruffudd and imprisoned him (1239). Llywelyn died in April 1240, and in August 1241 David was forced by England's King Henry III to cede part of his territory and surrender Gruffudd to the English. Henry planned to turn Gruffudd loose against David should the need arise, but in 1244 Gruffudd broke his neck and died while attempting to escape from the Tower of London. Freed of the threat from his rival, David went to war against Henry, declaring himself prince of Wales—the first Welsh ruler to adopt this title. David fell ill and died while the fighting was in progress. Because he left no heirs, the sons of Gruffudd ruled Gwynedd until Wales fell to the English in 1283.

David, Eduard Heinrich (Rudolph) (b. June 11, 1863, Ediger an der Mosel, Prussian Rhine Province—d. Dec. 24, 1930, Berlin), a leader of the revisionist wing of the German Social Democratic Party and a minister in the early years of the Weimar Republic (1919–33).

As a young grammar school teacher, David founded (1893) the Socialist *Mitteldeutsche Sonntagszeitung* ("Mid-German Sunday News"); but his affiliation with the Social Democrats soon cost him his state employment. In a series of articles in August–September 1894 he criticized traditional Marxian theory as it applied to small farmers, thus somewhat anticipating the first works of his more famous revisionist colleague Eduard Bernstein. Elected to the German Reichstag (parliament) in 1903, David soon became a leading spokesman for parliamentary social democracy and subsequently played a crucial role in the formulation of his party's support of the imperial government during World War I. On the eve of the armistice he was appointed undersecretary of the foreign office (October 1918); and in the postwar Weimar Republic he served variously, during 1919 and 1920, as first president of the Weimar National Assembly, twice as minister without portfolio, and once as minister of the interior. Of David's considerable number of works on Socialism, his *Sozialismus und Landwirtschaft* (1903; "Socialism and Agriculture") is considered the most important.

David, Félicien-César (b. April 13, 1810, Cadenet, Fr.—d. Aug. 29, 1876, Saint-Germain-en-Laye), composer whose music opened the door for the Oriental exoticism that characterized much French Romantic music.

David was chapelmaster at the Saint-Sauveur Cathedral at Aix-en-Provence (1829) and in 1830 studied at the Paris Conservatoire. The following year he joined the socialist brotherhood of the Saint-Simonians, becoming their main artistic figure and composing chants for their services. During 1833–35 he preached their doctrines in the Middle East.

In his later music, David incorporated recollections of the music he had heard in Jerusalem, Cairo, and Syria. In 1844 he produced his "symphonic ode" *Le Désert.* Resembling an oratorio bordering on opera and embodying Arabian melodies, it was a highly evocative, enormously successful work. Of his five operas, *Lalla Roukh* (1862) maintained its popularity for 40 years. David also wrote other symphonic odes, songs, and chamber works. His music, admired by Berlioz and Saint-Saëns, foreshadowed the Orientalism of Bizet's *Djamileh,* Delibes' *Lakmé,* Verdi's *Aïda,* and other Romantic operas.

Dávid, Ferenc, Latin FRANCISCUS DAVIDIS (b. 1510, Kolozsvár, Transylvania—d. Nov. 15, 1579, Deva, Wallachia), Unitarian preacher, writer, and theologian influential in promoting religious toleration and the growth of anti-Trinitarian thought in Hungary.

After successively rejecting Roman Catholicism and Lutheranism, in 1566 Dávid became bishop of the Calvinist community at Kolozsvár and court preacher to the Unitarian king John Sigismund. Converted to Unitarianism by the Italian physician Georgius Blandrata before 1567, Dávid began to advocate the unity rather than the trinity of the Godhead. He transformed the Great Church at Kolozsvár into a centre of anti-Trinitarianism, introduced Unitarianism at the court, secured state toleration from the Transylvanian Diet through the Edict of Torda (1568), and won many converts.

About 1571, however, when the Catholic Stephen Báthory acceded upon the death of Sigismund and initiated persecutions of Unitarians, Dávid began to advocate the view that Christ should not be worshipped at all. This attitude conflicted with the teachings of Blandrata, who allied himself with Báthory and tried, with the Unitarian theologian Faustus Socinus, to influence Dávid to moderate his position. All reconciliation efforts failed, and Dávid's supporters separated themselves from the movement as Dávidists, or Old Unitarians, in opposition to Blandrata's New Unitarian faction.

Dávid, whose followers were also known as Nonadorantes, was charged with introducing Judaizing tendencies, partly because his refusal to accord adoration to Christ resembled the rejection by Judaism of Christ as a Messiah. In 1579 Dávid was brought to trial as a blasphemous innovator and condemned to life in prison, where he died that same year. The worship of Christ in Unitarian churches remained an established practice until the 19th century.

Among Dávid's many writings in Latin and Hungarian are sermons; catechisms; four theses opposing the invocation of Christ in prayer, *De non invocando Jesu Christo in precibus sacris*; and the important anti-Trinitarian work *De falsa et vera unius Dei Patris, Filii et Spiritus Sancti* (1567; "On the False and True Unity of God the Father, Son, and Holy Ghost").

David, Gerard (b. *c.* 1460, Oudewater, Neth.—d. Aug. 13, 1523, Bruges), painter who was the last great master of the Bruges school.

David went to Bruges, presumably from Haarlem, where he is supposed to have formed his early style under the instruction of A. van Ouwater; he joined the guild of St. Luke at Bruges in 1484 and became dean in 1501.

In his early work, such as the "Christ Nailed to the Cross" (*c.* 1480; National Gallery, London) and the "Nativity" (Museum of Fine Arts, Budapest), he followed the Haarlem tradition as represented by Ouwater and Geertgen tot Sint Jans but already gave evidence of his superior power as a colourist. In Bruges he studied masterpieces by the van Eycks, Rogier van der Weyden, and Hugo van der Goes and came under the influence of Hans Memling. To this period belong the "Madonna Triptych" (*c.* 1495–98; Louvre, Paris) and the "Enthroned Madonna with Angels" (Darmstadt, Ger.). But the works on which David's fame rests most securely are his great altarpieces—the "Judgment of Cambyses" (two panels, 1498) and the triptych of the "Baptism of Christ" (*c.* 1502–07) at Bruges; the "Virgin and Child with Saints and Donor" (*c.* 1505; National Gallery, London); the "Annunciation" on two panels (Metropolitan Museum of Art, New York City); and, above all, the documented altarpiece of the "Madonna with Angels and Saints" (1509, Musée des Beaux-Arts, Rouen). These are mature works—severe yet richly coloured, showing a masterful handling of light, volume, and space. The "Judgment" panels are especially notable for being among the earliest Flemish paintings to employ such Italian Renaissance devices as putti and garlands. In Antwerp David became impressed by the life and movement in the work of Quentin Massys, who had introduced a more intimate and more human conception of sacred themes. David's "Deposition" (*c.* 1515; National Gallery, London) and the "Crucifixion" (*c.* 1510–15; Genoa) were painted under this influence and are remarkable for their dramatic movement.

Authorities disagree about the intent of David's eclectic, deliberately archaic manner. Some feel that he drew on earlier masters in an effort, doomed by lack of imagination, to revive the fading art of Bruges. Others see David as a progressive artist who sought to base his innovations on the achievements of the founders of the Netherlandish school.

David, Jacques-Louis (b. Aug. 30, 1748, Paris—d. Dec. 29, 1825, Brussels), the most celebrated French artist of his day and a principal exponent of the late 18th-century Neoclassical reaction against the Rococo style.

David won wide acclaim with his huge canvases on classical themes (*e.g.,* "Oath of the Horatii," 1784). When the French Revolution began in 1789, he served briefly as its artistic director and painted its leaders and martyrs ("The Dead Marat," 1793) in a style that is more realistic than classical. Later he was appointed painter to Napoleon. Although primarily a painter of historical events, David was also a great portraitist (*e.g.,* "Portrait de Mme Récamier," 1800).

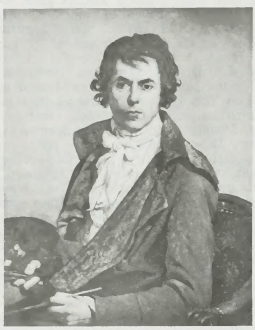
Formative years. David was born in the year when new excavations at the ash-buried ruins of Pompeii and Herculaneum were be-



"Virgin and Child with Saints and Donor," panel painting by Gerard David, *c.* 1505; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

ginning to encourage a stylistic return to antiquity (without being, as was long supposed, a principal cause of that return). His father, a small but prosperous dealer in textiles, was killed in a duel in 1757, and the boy was subsequently raised, reportedly not very tenderly,



Jacques-Louis David, self-portrait, oil painting, 1794; in the Louvre, Paris

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by two uncles. After classical literary studies and a course in drawing, he was placed in the studio of Joseph-Marie Vien, a history painter who catered to the growing Greco-Roman taste without quite abandoning the light sentiment and the eroticism that had been fashionable earlier in the century. At age 18, the obviously gifted budding artist was enrolled in the school of the Académie Royale de Peinture et de Sculpture. After four failures in the official competitions and years of discouragement that included an attempt at suicide (by the stoic method of avoiding food), he finally obtained, in 1774, the Prix de Rome, a government scholarship that not only provided a stay in Italy but practically guaranteed lucrative commissions in France. His prize-winning work, "Antiochus and Stratonice," reveals that at this point he could still be influenced slightly by the Rococo charm of the painter François Boucher, who had been a family friend.

In Italy there were many influences, including those of the dark-toned 17th-century Bolognese school, the serenely classical Nicolas Poussin, and the dramatically realistic Caravaggio. David absorbed all three, with an evident preference for the strong light and shade of the followers of Caravaggio. For a while he seemed determined to fulfill a prediction he had made on leaving France: "The art of antiquity will not seduce me, for it lacks liveliness . . . ." But he became interested in the Neoclassical doctrines that had been developed in Rome by, among others, the German painter Anton Raphael Mengs and the art historian Johann Joachim Winckelmann. In the company of Quatremère de Quincy, a young French sculptor who was a strong partisan of the return to antiquity, he visited the ruins of Herculaneum, the Doric temples at Paestum, and the Pompeian collections at Naples. In front of the ancient vases and columns, he felt, he said later, that he had just been "operated on for cataract of the eye."

Rise to fame: 1780–94. Back in Paris in 1780, he completed and successfully exhibited "Bélisaire demandant l'aumône" ("Belisarius Asking Alms"), in which he combined a nobly sentimental approach to antiquity with a pictorial technique reminiscent of Poussin. In 1782 he married the rather plain but spirited Marguerite Pécoul, whose father was a wealthy building contractor and the superintendent of construction at the Louvre—a position that carried considerable influence. From this date David prospered rapidly. The pathos and painterly skill of "Andromache Mourning Hector" brought him election to the Académie Royale in 1784; and that same year, accompanied this time by his wife and studio assistants, he returned to Rome with a commission to complete a painting that appears to have been originally inspired by a Paris performance of Pierre Corneille's *Horace.* The result, finally not based on any of the incidents in the play, was the "Oath of the Horatii." The subject is the solemn moment, charged with stoicism and simple courage, when the three Horatii brothers face their father and offer their lives to assure victory for Rome in the war with Alba; the pictorial treatment—firm contours, bare cubic space, sober colour, frieze-like composition, and clear lighting—is as austerely non-Rococo as the subject. Exhibited first in David's studio in Rome and then, following his return to France, in the official Paris Salon of 1785, the picture created a sensation; it was regarded as a manifesto for an artistic revival (the term Neoclassicism was not yet in use) that would cure Europe of the lingering addiction to dainty curves and boudoir themes. Eventually, it came to be regarded, although such was almost certainly not the first intention, as a manifesto for an end to the corruption of an effete aristocracy and for a return to the stern, patriotic morals attributed to republican Rome.

David became a culture hero; he was even referred to in some quarters as a messiah. He added to his fame by producing in 1787 the morally uplifting "Death of Socrates," in 1788 the less uplifting but archaeologically interesting "Amours de Paris et d'Hélene" ("Paris and Helen"), and in 1789 another lesson in self-sacrifice "Les Licteurs rapportent à Brutus les corps de ses fils" ("The Lictors Bringing to Brutus the Bodies of His Sons"). By the time the "Brutus" was on view, the French Revolution had begun, and this picture of the patriotic Roman consul who condemned his traitorous sons to death had an unanticipated political significance. It also had, through its presumably accurate reconstitution of the details of everyday Roman life, an effect that was perhaps equally unexpected, for with it David began the long and extensive influence he was to have on French fashions. Up-to-date homes began to display imitations of his Roman furniture; men cut their hair short in the Roman style; and women adopted the dresses and the coiffures of Brutus' daughters. Later on, even the flimsy Sabine dress, which left the breasts exposed, was adopted by the ultramodern.

In the early years of the Revolution, David was a member of the extremist Jacobin group led by Robespierre, and he became an energetic example of the politically committed artist. He was elected to the National Convention in 1792, in time to vote for the execution of Louis XVI. By 1793, as a member of the art commission, he was virtually the art dictator of France and was nicknamed "the Robespierre of the brush." He preached moral and aesthetic sermons to the Convention:

> The artist must be a philosopher. Socrates the skilled sculptor, Jean-Jacques [Rousseau] the good musician, and the immortal Poussin, tracing on the canvas the sublime lessons of philosophy, are so many proofs that an artistic genius should have no other guide except the torch of reason.

Guided supposedly by the torch of reason and perhaps also by bitter memories of his many unsuccessful attempts to win the Prix de Rome, he succeeded in abolishing the Académie Royale and with it much of the old regime's system for training artists and providing them with patronage. The Académie was replaced briefly by a body called the Commune des Arts, then by a group called the Popular and Republican Society of the Arts, and then, finally, in 1795, after David was out of power, by the beginning of the system—a combination of the Institut de France and the École des Beaux-Arts—that dominated French artistic life during most of the 19th century.

As an artist during these years of his dictatorship, David was frequently busy with revolutionary propaganda. He had commemorative medals struck, set up obelisks in the provinces, and staged national festivals and the grandiose funerals the new government gave its martyrs. Some of his projects for paintings at this time were never completely carried out: one of these is the unfinished "Joseph Bara," which is a tribute to a drummer boy shot by the royalists, and another is the sketched "Oath of the Tennis Court" (Louvre, Musée National de Versailles et des Trianons, and the Fogg Art Museum, Cambridge, Mass.), which was to commemorate the moment in 1789 when the Third Estate (the commoners) swore not to disband until a new constitution had been adopted. The "Death of Lepeletier de Saint-Fargeau," painted to honour a murdered deputy and regarded by David as one of his best pictures, was eventually destroyed. The result of all this is that the artist's Jacobin inspiration is represented principally by "The Dead Marat," painted in 1793 shortly after the murder of the revolutionary leader by Charlotte Corday. This "pietà of the Revolution," as it has been called, is generally considered David's masterpiece and an example of how, under the pressure of genuine emotion, Neoclassicism could turn into tragic Realism.

Later years: 1794–1825. In 1794, after his friend Robespierre had been sent to the guillotine, David was arrested. At his trial he is said to have defended himself badly, mumbling that in the future he intended to attach himself "to principles and not to men." He was imprisoned twice, for four months in 1794 and for two more the next year, apparently most of the time in the not uncomfortable Palais du Luxembourg in Paris. He was consoled by being allowed to paint and also by the fact that his wife, who had divorced him two years earlier for having voted for the death of the King, now loyally returned in his hour of trouble and remarried him, on this occasion for good. During his first period in prison, he painted from his window his only landscape, the "Vue du jardin du Luxembourg à Paris" ("View of the Luxembourg Gardens"). While he was held temporarily in another Paris building, he did an unfinished "Self-Portrait." At 46 he appears as a boyish young man with romantically disheveled hair, brown eyes, and a generally aggressive, if worried, look; a cheek tumour from which he suffered all of his adult life and which is said to have impeded his speech gives his face a slight twist.

Even during his imprisonment, he had retained three studios in the Louvre, and, after the amnesty of 1795, he devoted to teaching the same energy he had been devoting to revolutionary politics. Eventually, between the "Oath of the Horatii" and the Battle of Waterloo, he was responsible for the training and indoctrination of hundreds of young painters from all over Europe, among them such future masters as Baron François Gérard, Antoine-Jean Gros, and Jean-Auguste-Dominique Ingres. The indoctrination began with the premise that the basis of art was the contour, and so it can be held partly responsible for the excessive emphasis on drawing that characterized European academic painting in the 19th century. But David himself, as his works show, was not always hostile to rich chromatic effects; as late as 1860 he could be called, by no less a colourist than Eugène

Delacroix, "the father of the whole modern school."

Neoclassicism was presumably inclined to scorn portraiture, because a contemporary sitter would normally lack both the universality and the nudity of an ancient statue. David, however, had done portraits, remarkable for their psychological individuality and their look of solid flesh, since the beginning of his career: in 1782–83 his sitter had been Alphonse Leroy, a Paris medical professor; in 1784 Mme Pécoul, his mother-in-law; in 1788 the chemist Antoine-Laurent Lavoisier, with Mme Lavoisier. In 1795 the freed artist portrayed his pretty, elegant sister-in-law, Mme Sériziat, and her dandyish husband. In 1799 he produced his famous period piece, "Portrait de Mme Récamier," which he left unfinished because the sitter, then at the start of her career as a reigning Paris beauty, proved unreliable about hours for posing.

But David was not a man for the life of a mere teacher and portraitist. In 1799 he made a spectacular reentry into public notice with a new giant canvas, "Les Sabines" ("The Intervention of the Sabine Women"). The picture, often mistakenly referred to as "The Rape of the Sabines," represents the moment, a few years after the legendary abduction, when the women, now contented wives and mothers, halt a battle between their Roman husbands and the Sabine men who have come on an unwanted rescue mission; in the middle of the melee stands the lovely Sabine woman Hersilia, appealing with one arm toward the Roman Romulus and the other toward the bearded Sabine Tatius. The artist had said that his aim was to move away from the allegedly crude Roman manner of the "Oath of the Horatii" into a more graceful Greek manner, and he did win enthusiastic applause for the elegance of his figures. He also won some approval for his supposed intention to preach conciliation after 10 years of bloodletting in France. But he attracted perhaps the most attention with the nakedness of his ancient warriors; having ceased to be the Robespierre of the brush, he now became, in a popular jingle, "the Raphael of the sans-culottes" ("without breeches"; the radical Republicans).

Napoleon admired "The Intervention of the Sabine Women" and saw possibilities for self-aggrandizement in the talent displayed. Soon David, without acquiring political office, was again a government painter, first under the Consulate and then, after 1804, under the Empire. He was not, however, the only prominent Frenchman to move from the Jacobin left to the Bonapartist right, and he had evidently always been a worshiper of historical heroes. His most important Napoleonic work is the huge "Coronation" of 1805–07, sometimes called "Napoleon Crowning the Empress Josephine"; in it Neoclassicism gives way to a style that combines the official portraiture of the old French monarchy with overtones—and occasional straight imitation—of the masters of the Italian Renaissance. This picture was followed in 1810 by the large "Napoleon Distributing the Eagles" and in 1812 by "Napoleon in His Study," a sharply perceptive portrait notwithstanding its conspicuously propagandistic intention.

After the fall of Napoleon in 1815, David was exiled to Brussels. Cut off from the excitement and stimulus of the great events he had lived through, he lost much of his old energy. Toward the end of his life, he executed, probably with considerable help from a Belgian pupil, François-Joseph Navez, one more remarkably convincing portrait: "Les Trois Dames dites de Gand" ("Three Women of Ghent").

(R.McMu.)

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David, Star of, Hebrew MAGEN DAVID ("Shield of David"), Magen also spelled MOGEN, Jewish symbol composed of two overlaid equilateral triangles that form a six-pointed star. It appears on synagogues, Jewish tombstones, and the flag of the State of Israel. The symbol—which historically was not limited to use by Jews—originated in antiquity, when, side by side with the five-pointed star, it served as a magical sign or as a decoration. In the Middle Ages the Star of David appeared with greater frequency among Jews but did not assume any special religious significance; it is found as well on some medieval cathedrals. The term *Magen David*, which in Jewish liturgy signifies God as the protector (shield) of David, gained currency among medieval Jewish mystics, who attached magical powers to King David's shield just as earlier (non-Jewish) magical traditions had referred to the five-pointed star as the "seal of Solomon." Kabbalists popularized the use of the symbol as a protection against evil spirits. The Jewish community of Prague was the first to use the Star of David as its official symbol, and from the 17th century on the six-pointed star became the official seal of many Jewish communities and a general sign of Judaism, though it has no biblical or Talmudic authority. The star was almost universally adopted by Jews in the 19th-century as a striking and simple emblem of Judaism in imitation of the cross of Christianity. The yellow badge that Jews were forced to wear in Nazi-occupied Europe invested the Star of David with a symbolism indicating martyrdom and heroism.



Star of David

David, Sir T(annatt) W(illiam) Edgeworth (b. Jan. 28, 1858, St. Fagan's rectory, near Cardiff, Wales—d. Aug. 28, 1934, Sydney), geologist noted for his monumental study of the geology of Australia.

David served as assistant geologist for the government survey of New South Wales from 1882 until 1891, when he became professor of geology at the University of Sydney. A leader in the investigation of evidence on major glaciations of Australia in Upper Paleozoic time (from 225,000,000 to 345,000,000 years ago), he also constructed the first geological map of the Sydney-Newcastle Basin and studied the formation of atolls. He was the leader of the 1897 expedition to the Ellice Islands, served as scientific officer of the Shackleton Antarctic Expedition from 1907 to 1909, and led the party that first reached the southern magnetic pole on Jan. 16, 1909. He wrote *Geological Notes of the British Antarctic Expedition* (1909) and *The Geology of Australia* (1932). He was knighted in 1920.

David d'Angers, Pierre-Jean (b. March 12, 1789, Angers, Fr.—d. Jan. 4, 1856, Paris), French sculptor, who revolted against the prevailing Neoclassical style of early 19th-century French sculpture.

The son of a carver, David went to Paris at age 17 with 11 francs in his pocket to study under Philippe-Laurent Roland. After a year and a half's struggle he received a small annuity from the municipality of Angers. In 1811 he won the Prix de Rome and was sent to Italy, where he worked for some time in Antonio Canova's studio. Returning to Paris in 1816, after a short visit to London, he received many important commissions. One of his first works in Paris, the "Condé" at Versailles, showed his new tendency toward a more realistic method. In 1827 he visited England, and in 1828 and 1834 he visited Germany. Always a radical in politics, he had to leave France for a short period after the coup d'état of December 1851.

Many of the most famous men and women of his time sat for David for busts or medallions. A nearly complete collection, originals or copies, is in the Musée David at Angers. Among David's most important works are the sculptures on the pediment of the Panthéon, showing the principal personages in France since the Revolution grouped round a figure of "La Patrie"; the Gutenberg monument at Strasbourg; the monument to General Gobert in the Père-Lachaise Cemetery in Paris; the "Philopoemen" in the Louvre; and the bust of Goethe, presented by him to the poet in 1831, in the public library at Weimar.

David de Mayrena, Marie-Charles, also called MARIE I (b. Jan. 31, 1842, Toulon, Fr.—d. 1890, Tioman Island, near Singapore), eccentric French adventurer who became the self-styled king of the Sedang tribe of the northern Central Highlands in what is now southern Vietnam.

After defrauding French authorities in Saigon, David de Mayrena fled to Kontum in the Central Highlands, where he impressed the French missionaries and persuaded the members of the Sedang tribe to acknowledge him as their chief. He then negotiated with the missionaries, promising to help convert the tribesmen in return for the missionaries' assistance. Meanwhile, he had himself crowned king of the Sedangs, as Marie I.

King Marie declared Roman Catholicism to be the official tribal religion. But he did not try to force the conversion of his subjects, most of whom were Muslims; instead, he announced his own adoption of the religion of Muḥammad. He designed a national flag and an honorary insignia—the Order of Marie the First—which he had cast by goldsmiths in Hong Kong. He also sought to obtain official diplomatic recognition of his kingdom, and for this purpose he went to Hong Kong in 1889. When King Marie demanded official acknowledgment and claimed the Sedang land for himself, however, the French repudiated him. Enraged, he declared war on France and announced that he would seek the protection of Germany. He wrote to the German emperor offering the loyalty of his subjects in exchange for German backing, but the French intercepted his letter. In 1889 he returned to France, where he campaigned for funds and was forced to leave. Taking refuge in Belgium, he convinced a number of investors of his legitimacy and brought several of them back to Indochina, conferring upon them the Order of Marie the First. He assigned his backers positions as chiefs of state.

Then, imagining that French authorities had ordered his execution, he abandoned his companions and fled to Tioman Island, with the treasury of his kingdom. There, according to one account, an accomplice poisoned him; other sources say that he committed suicide, fearing reprisals from the Saigon government.

David Stefánsson (Icelandic writer): *see* Stefánsson, David.

Davidescu, Nicolae (b. 1888, Bucharest, Rom.—d. 1954), Romanian poet and novelist whose early poems, *Inscripţii* (1916), showed the influence of Charles Baudelaire. Among his prose works the novel *Zâna din fundul lacului* (1912; "The Fairy at the Bottom of the Lake") was an exercise in symbolism, and *Vioara mută* (1928; "The Muted Violin"), in social psychology. In the epic *Cântecul omului* (1928–37; "The Song of Man"), he aimed at re-creating world history.

Davidson, Bruce (b. 1933, Oak Park, Ill., U.S.), American photographer and filmmaker whose emotionally charged pictures frequently convey the loneliness and isolation of his subjects.

Davidson studied photography at the Rochester Institute of Technology, N.Y. (1951–54), and at the School of Design of Yale University (1955). He worked for *Life* magazine for a year before joining the Magnum photographic cooperative in 1958. He produced a number of outstanding photo-essays on such subjects as a circus clown, a Brooklyn teenage gang, Welsh mining towns, and London life. Davidson's most important project was *East 100th Street* (1970), a selection of 123 photographs from more than 1,000 he took with a large-format camera of the inhabitants of a single block in East Harlem in New York City over a two-year period. These pictures are distinguished by their sensitivity and dignity and by the close rapport evident between the photographer and his subjects. Davidson also provided photographs for *Subsistence U.S.A.* (1973), with text by Carol Hill. *Bruce Davidson: Photographs* was published in 1979. He also made several short films.

Davidson, John (b. April 11, 1857, Barrhead, Renfrewshire, Scot.—d. March 23, 1909, Penzance, Cornwall, Eng.), Scottish poet and playwright whose best work shows him a master of the narrative lyrical ballad.

After studying at the University of Edinburgh, Davidson became a teacher, meanwhile writing a number of blank-verse dramas that failed to win recognition. In 1890 he went to London, practiced journalism, and wrote novels and short stories to earn a living, finally establishing himself with *Fleet Street Eclogues* (1893), *Ballads and Songs* (1894), and a second series of eclogues (1896). A series of "Testaments," written toward the end of his life, were long dramatic monologues in blank verse incorporating scientific language. They expressed his idiosyncratic vision, which combined scientific materialism and romantic will in the belief that man has been created to express himself to the utmost. Davidson completed two plays (1907, 1908) of a trilogy on this theme. Exhausted by his efforts to support his family and increasingly frustrated by the public response to his work, he committed suicide by drowning. His poems vary widely in tone and execution, the best known being "Thirty Bob a Week."



John Davidson, crayon drawing by Walter Sickert; in the British Museum

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Davidson (of Lambeth), Randall Thomas Davidson, Baron (b. April 7, 1848, Edinburgh, Scot.—d. May 25, 1930, London, Eng.), Anglican archbishop of Canterbury who was prominent as a speaker in parliamentary debates on moral and national questions during his 25-year tenure.

Ordained in 1875, Davidson became resident chaplain two years later to the archbishop of Canterbury, Archibald C. Tait. He soon won the trust of Queen Victoria, whose influence obtained his appointment as dean of Windsor cathedral in 1883, bishop of Rochester in 1891, and bishop of Winchester in 1895. In 1903 he succeeded Frederick Temple as archbishop of Canterbury.



Randall Thomas Davidson, detail from a portrait by Sir Leslie Ward, 1910; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Noted as a commonsense moderate, Davidson sought to reconcile extremists in the disputes between 1902 and 1906 over religious instruction in schools and the amount of ritual appropriate for worship services. His speech in the House of Lords was decisive in persuading other Anglican bishops to support Prime Minister Herbert Asquith's effort to curb the powers of that house, finally accomplished by a bill passed in 1911. Active in the ecumenical movement, Davidson served as president of the Lambeth Conference in 1920 and encouraged closer ties with the Eastern Orthodox churches. These activities helped increase the influence of the Church of England abroad, and missionaries frequently sought Davidson's advice. Though his proposals for revision of the *Book of Common Prayer* were rejected by the House of Commons, he was instrumental as chairman of the Church Assembly set up in 1919 and helped guide it through its early years. On his retirement from Canterbury in 1928, he was created a baron; he had a childless marriage, and the barony lapsed upon his death. Among his writings are *Life of Archbishop Tait,* 2 vol. (1891), and *The Character and Call of the Church of England* (1912).

Davie, Donald Alfred (b. July 17, 1922, Barnsley, Yorkshire, Eng.—d. Sept. 18, 1995, Exeter, Devon), British poet, literary critic, and teacher who was a major conservative influence on British poetry in the 1950s.

Davie served in the Royal Navy during World War II and obtained bachelor's (1947) and doctoral (1951) degrees from the University of Cambridge. He taught at Trinity College, Dublin (1950–57), Cambridge (1958–64), the University of Essex (1964–68), and Stanford University, Stanford, Calif. (1968–78).

Davie was a principal figure in The Movement, a group of British poets in the 1950s who expressed antiromantic ideals and purposely avoided experimentation in their verse. His earliest critical works, *Purity of Diction in English Verse* (1952) and *Articulate Energy* (1955), explored the moral dimensions of poetic style. His first book of verse, *Brides of Reason* (1955), was followed by *A Winter Talent* (1957), *Essex Poems* (1969), *In the Stopping Train & Other Poems* (1977), and *To Scorch or Freeze* (1988), among other volumes. His *Collected Poems 1950–70* was published in 1972. Davie's poetry was characterized by meticulous syntax and plain diction and tended to be philosophical and quietly moralistic in tone. His later critical works included *Ezra Pound: Poet as Sculptor* (1964) and *Under Briggflatts: A History of Poetry in Great Britain, 1960–1988* (1989).

Davies, Arthur B., in full ARTHUR BOWEN DAVIES (b. Sept. 26, 1862, Utica, N.Y., U.S.—d. Oct. 24, 1928, Florence, Italy), American painter, printmaker, and tapestry designer known for his idylls of classical fantasy painted in a Romantic style but best remembered for his leadership in introducing modern European painting styles into early 20th-century America.

Trained in Utica, New York City, and Chicago, Davies at first painted atmospheric landscapes in the Romantic manner—*e.g.,* "Along the Erie Canal" (1890; Phillips Collection, Washington, D.C.). It was after 1900 that his most characteristic works were created—idyllic scenes of elegant nude figures and mythological creatures gracefully grouped in frieze compositions before stark Romantic landscapes—*e.g.,* "Crescendo" (1910; Whitney Museum of American Art, New York City).

In 1908 Davies organized an exhibit of artists who came to be known as The Eight (*q.v.*), or ultimately as the Ashcan School. As president of the Society of Independent Artists, Davies was a major figure in the organization of the sensational Armory Show (*q.v.*) of 1913, which brought the works of European and American modernists to the attention of the U.S. public. Davies himself adopted a modified Cubist style for several years and painted rhythmic patterns of geometricized fragments of natural forms and figures—*e.g.,* "Dancers" (after 1913; Detroit Institute of Arts). During the last decade of his career he returned to a representational style and devoted much of his time to etching and colour lithography.

Davies (of Llandinam), David Davies, 1st Baron (b. May 11, 1880, Llandinam, Montgomeryshire, Wales—d. June 16, 1944, Llandinam), British promoter of the League of Nations, advocate of an international policing force to prevent war.

Davies was educated at King's College, Cambridge, and was a Labour member of the House of Commons (1906–29). He fought in World War I, after which he became closely associated with the work of the League of Nations. After the failure of the Disarmament Conference in 1933, he founded and acted as treasurer of the New Commonwealth Society, which worked to produce a more effective League of Nations with a police force and an impartial tribunal, with broad jurisdiction over international disputes. He wrote many books and pamphlets on this theme, including *The Problem of the Twentieth Century* (1930).

Davies, Emily, SARAH EMILY DAVIES (b. April 22, 1830, Southampton, Hampshire, Eng.—d. July 13, 1921, Hampstead, London), English pioneer in the movement to secure university education for women and chief founder of Girton College, Cambridge. She was responsible for University College, London, admitting women to classes in 1870 for the first time.

Educated at home, Davies joined the campaign for the emancipation of women with Mme Bodichon (Barbara Leigh Smith) and Elizabeth Garrett (Mrs. Garrett Anderson). With Dorothea Beale and Frances Mary Buss, she gave evidence before the school's inquiry commission (1864–68) with the aim of getting women admitted to university examinations. Unlike her friends, she insisted that women should be admitted on the same terms as men.



Emily Davies, portrait by Rudolf Lehmann; in the collection of Girton College, Cambridge

By courtesy of Girton College, Cambridge

In 1869 Davies and her friends opened a women's college at Hitchin, which moved to Cambridge in 1873 as Girton College. She served on the London school board (1870–73), becoming mistress at Girton (1873–75). Among her books were *The Higher Education of Women* (1866) and *Thoughts on Some Questions Relating to Women, 1860–1908* (1910).

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Davies, John (grammarian): *see* Rhys, Siôn Dafydd.

Davies (of Hereford), John (b. *c.* 1565, Hereford, Herefordshire, Eng.—d. July 1618, London), English poet and writing master whose chief work was *Microcosmos* (1603), a didactic religious treatise.

Davies settled in Oxford and became known as the best penman of his day. As well as other religious verse treatises, he wrote *Wittes Pilgrimage . . .* (*c.* 1610), a collection of love sonnets; and *Humours Heav'n on Earth; with the*



John Davies, detail of an engraving, 1631

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Civile Warres of Death and Fortune (1609), a description of the plague. The epigrams of his *Scourge of Folly* (*c.* 1611) contain current notices of his eminent contemporaries, including Ben Jonson and William Shakespeare. Davies also composed a popular writing manual, *The Writing Schoole-Master* (16th ed., 1636).

Davies, Sir John (b. April 1569, Tisbury, Wiltshire, Eng.—d. Dec. 8, 1626), English poet and lawyer whose *Orchestra, or a Poem of Dancing* reveals a typically Elizabethan pleasure in the contemplation of the correspondence between the natural order and human activity.

Educated at the University of Oxford, Davies entered the Middle Temple, London, in 1588 and was called to the bar in 1595. Much of his early poetry consisted of epigrams published in various collections. *Epigrammes and Elegies by J.D. and C.M.* (1590?) contained both Davies' work and posthumous works by Christopher Marlowe and was one of the books the archbishop of Canterbury ordered burned in 1599. Davies' *Orchestra* (1596) is a poem in praise of dancing set against the background of Elizabethan cosmology and its theory of the harmony of the spheres. In *Nosce teipsum* (1599; "Know Thyself"), he gave a lucid account of his philosophy on the nature and immortality of the soul. In the same year, he published *Hymnes of Astraea in Acrosticke Verse,* a series of poems in which the initials of the first lines form the words "Elisabetha Regina." His last poetic works were two dialogues contributed to Francis Davison's *Poetical Rhapsody* (1602). He published a collected edition of his poetry in 1622.

On the death of Queen Elizabeth I in 1603, Davies was one of the messengers who carried the news to James VI of Scotland, who succeeded Elizabeth as James I. James received him with great favour, sent him to Ireland as solicitor general, and conferred a knighthood on him. In 1606 Davies was made attorney general for Ireland and created sergeant-at-law. He took an active part in the Protestant settlement of Ulster and wrote several tracts on Irish affairs. He entered the Irish Parliament and was elected speaker; on his return to England he sat in the English Parliament of 1621. He was appointed lord chief justice in 1626 but died before he took office. He was one of the founders of the Society of Antiquaries.

Davies, Peter Maxwell (b. Sept. 8, 1934, Manchester, Eng.), English composer, conductor, and teacher whose powerfully innovative music made him the most influential British composer since Benjamin Britten.

Davies studied at the Royal Manchester College of Music (1952–56) and at Manchester University (1952–57) and then in Italy (1957–59) with the composer Goffredo Petrassi. From 1959 to 1962 he taught music at the Cirencester Grammar School, where he developed teaching methods that enabled children to perform relatively complicated works of modern music. A scholarship enabled him to study with Roger Sessions at Princeton University in 1962–64. Back in England, Davies in 1967 cofounded, with the composer Harrison Birtwistle, the Pierrot Players (renamed the Fires of London in 1970), a highly skilled ensemble formed to play contemporary music. He often conducted this ensemble in Britain and abroad and wrote many works for it.

Davies' large output as a composer was marked by uncompromising innovation and a bold exploration of various musical forms. Especially striking in his early works was his borrowing of plainchant fragments and other materials from medieval and Renaissance music, which he incorporated into highly complex contrapuntal or serial compositions. The *Prolation* for orchestra (1958) and the *Second Fantasia on John Taverner's In Nomine* (1964) exemplify the compositions of this first period, in which elements of musical parody and satire came increasingly to predominate. *Revelation and Fall* (1965) and such pieces of musical theatre as *Eight Songs for a Mad King* (1969) mark his second stylistic period, in which weirdly disparate musical elements are combined to create histrionic effects of violence and emotional frenzy. The opera *Taverner* (1962–70) summarized his evolving musical vocabulary in its 16th-century themes, complex rhythms, parodic elements, and expressionist power. In the early 1970s Davies moved to the Orkney Islands, and the austere landscapes and solitary working conditions he found there came to exercise a shaping influence on his music, in which more lyrical and reflective qualities became apparent. His better known works of this third period include the *Symphony No. 1* (1976), *Symphony No. 2* (1980), and *Sinfonia Concertante* (1982).

Davies, Robertson, in full WILLIAM ROBERTSON DAVIES (b. Aug. 28, 1913, Thamesville, Ont., Can.—d. Dec. 2, 1995, Orangeville, Ont.), novelist and playwright whose works offer penetrating observations on Canadian provincialism and prudery.

Educated in England at the University of Oxford, Davies had training in acting, directing, and stage management as a member of the Old Vic Repertory Company. He edited the Peterborough *Examiner,* a newspaper owned by his family, from 1942 to 1963 and taught English at the University of Toronto from 1960 to 1981.

Davies' early reputation was based on the plays *Eros at Breakfast* (1949) and *At My Heart's Core* (1950), which are satires on Canadian standards and values. He also published collections of humorous essays, such as *The Diary of Samuel Marchbanks* (1947) and *The Table Talk of Samuel Marchbanks* (1949), in which an irascible old bachelor's opinions highlight the problems of sustaining culture in Canada. Davies' three trilogies of novels secured his reputation as Canada's foremost man of letters. The Salterton trilogy consists of *Tempest-Tost* (1951), *Leaven of Malice* (1954), and *A Mixture of Frailties* (1958), all of which are comedies of manners set in a provincial Canadian university town. Even better known are the novels of the Deptford trilogy, consisting of *Fifth Business* (1970), *The Manticore* (1972), and *World of Wonders* (1975). These books examine the intersecting lives of three men from the small Canadian town of Deptford and interweave Davies' moral concerns with bits of arcane lore and his enduring interest in Jungian psychotherapy. The Cornish trilogy consists of *The Rebel Angels* (1981), *What's Bred in the Bone* (1985), and *The Lyre of Orpheus* (1988); these novels satirize the art world, grand opera, and other aspects of high culture in Canada.

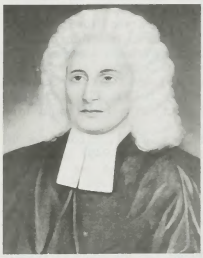
Davies was a traditional storyteller primarily concerned with the moral conflicts of characters in small Canadian towns. In the course of his narratives he wittily satirized bourgeois provincialism, explored the relation between mysticism and art, and affirmed the possibilities for self-knowledge through Jungian philosophy.

Davies, Samuel (b. Nov. 3, 1723, New Castle county, Del.—d. Feb. 4, 1761, Princeton, N.J.), Presbyterian preacher in colonial British America who defended religious dissent and helped lead the Southern phase of the religious revival known as the Great Awakening.

Davies was educated at Samuel Blair's "log college" at Fagg's Manor, Pa., and was ordained in 1747. His work during the Great Awakening centred at Hanover, Va.; in Virginia, where Presbyterians were persecuted as Nonconformists by the established church leaders, he became a chief defender of the Dissenters. He argued their cause before the Virginia general court and enlisted the support of prominent English and Scottish Dissenters. The government's preoccupations after the outbreak of the French and Indian War (1754), however, diminished concern over Davies, especially when his war sermons helped rouse Virginians to defend the frontier. Davies further enhanced his reputation as the outstanding preacher of his day by sermons given in England and Scotland during a trip with the evangelist Gilbert Tennent. Soon after his return Davies became the first moderator of the first presbytery of Virginia, Hanover, in 1755. On the same trip Davies raised funds in England for the College of New Jersey (now Princeton University) and was its fourth president from 1759 until his death.

The stress that Davies placed on religious rights and freedoms resulted (after his death)

in the lobbying of Presbyterian leaders who, during the formation of Virginia's state constitution, helped to defeat a provision for an established church. Davies, whose sermons



Samuel Davies, detail from an oil painting by James Massalon, 1874; in the Art Museum, Princeton University
By courtesy of Princeton University

were printed in some 20 editions, was also one of the first successful American hymn writers.

Davies, William Henry (b. July 3, 1871, Newport, Monmouthshire, Wales—d. Sept. 26, 1940, Nailsworth, Gloucestershire, Eng.), English poet whose lyrics have a force and simplicity uncharacteristic of the poetry of most of his Georgian contemporaries.

After serving as apprentice to a picture framer, Davies tramped through the United States, crossed the Atlantic many times on cattle boats, lost a foot while trying to jump a train headed for the Klondike region in Canada, became a peddler and street singer in England, and, after several years of this



William Henry Davies, detail of a drawing by Augustus John, 1918; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

wandering life, published his first volume, *The Soul's Destroyer, and Other Poems* (1905). He was then living in London. *The Autobiography of a Super-Tramp* (1907)—the best known of his prose works—appeared with a preface by George Bernard Shaw, followed by *Nature Poems and Others* (1908). His poetry includes *Forty New Poems* (1918), *Poems 1930–31* (1932), and *The Loneliest Mountain* (1939). The first of the collected editions appeared in 1916. Although his work achieved wide popularity, Davies lived the life of a recluse. His *Collected Poems* appeared in 1942.

Davila, Arrigo Caterino (b. Oct. 30, 1576, Sacco, Padua, Venetian republic [Italy]—d. May 26, 1631, Verona), Italian historian who was the author of a widely read history of the Wars of Religion in France.

About 1583 Davila became a page in the service of Catherine de Médicis, wife of King Henry II of France. He subsequently became a soldier and fought in the French civil wars until the peace in 1598. He then returned to Padua, where he led a studious life until, when war broke out, he entered the service of the republic of Venice. He never lost sight of his early design of writing the history of those religious wars in France in which he had borne a part. The success of the *Historia delle guerre civili di Francia* (1630; *The History of the Civil Wars in France*) was immediate and enormous. More than 200 editions followed, of which perhaps the best is one published in Paris in 1644. Davila was murdered while on his way to take over Cremona for Venice.

Dávila, Pedrarias: *see* Arias Dávila, Pedro.

Davis, city, Yolo county, central California, U.S. It lies in the Sacramento River valley, just west of Sacramento. Primarily an educational centre with some light industry (food processing, steel fabrication), it was named for Jerome C. Davis who in the 1860s owned a stock farm on the site. In 1905 the University of California acquired 778 acres (315 hectares) in the locality for a branch campus and an experimental farm-school (now the College of Agricultural and Environmental Sciences). Subsequently, schools of veterinary medicine (1948), letters and science (1951), engineering (1962), law (1966), medicine (1968), and management (1981) were established. The Davis campus of the University of California now covers 5,200 acres (2,100 hectares). The California Regional Primate Research Center (for research on nonhuman primates) was founded there in 1962 and D-Q (Deganawidah-Quetzalcoatl) University, emphasizing American Indian and Chicano cultures, in 1971. Inc. city, 1917. Pop. (1994 est.) 48,275.

Davis, Alexander Jackson (b. July 24, 1803, New York, N.Y., U.S.—d. Jan. 14, 1892, West Orange, N.J.), American architect, designer, draftsman, and illustrator who was best known for his innovative, picturesque country houses. He helped establish the familiar type of American rural house in the "carpenter Gothic" style of the mid-19th century.

Davis became a skilled architectural draftsman and came to know the architect Ithiel Town, whose partner he became in 1829. The firm of Town and Davis designed many public buildings in the Greek Revival style, including the Indiana State Capitol (1831–35) in Indianapolis, the North Carolina State Capitol (1833–40) in Raleigh, and the West Presbyterian Church (1831–32) and the Custom House (1833–42) in New York City. One of the original elements that Davis evolved at this time was a window type he later called Davisean—vertically unified, multistoried, and often recessed windows.

In 1835 Davis began his own practice. He concentrated on the design of suburban and country houses in Gothic, Italianate, bracketed, and various other styles. He was influenced by the English theory of the picturesque and collaborated with Andrew Jackson Downing, landscape gardener and architect, first by illustrating his books (*Cottage Residences,* 1842, and *The Architecture of Country Houses,* 1850) and then by designing homes for Downing's planned garden suburb, Llewellyn Park (West Orange, N.J., 1852–69). Davis became a leader of the Gothic Revival style and one of the most popular architects of picturesque country houses; more than 100 of his designs for villas, mansions, and cottages are known to have been executed. When tastes changed in the 1860s, Davis' career declined, and he retired long before his death.

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Rotch House, New Bedford, Mass., designed by Alexander Jackson Davis, 1845–47?
© Wayne Andrews/Esto

Davis, Arthur Hoey: *see* Rudd, Steele.

Davis, Benjamin Oliver, Sr. (b. July 1, 1877, Washington, D.C., U.S.—d. Nov. 26, 1970, North Chicago, Ill.), soldier who became the first black general in the U.S. Army.

After serving as a volunteer in the Spanish-American War (1898), Benjamin Davis, Sr., enlisted as a private in the 9th Cavalry of the U.S. Army. He rose to sergeant major within two years and earned a commission as a second lieutenant in 1901. In the next four decades he served in Liberia and the Philippines and taught military science at the Tuskegee Institute and at Wilberforce University. All of his duty assignments were designed to avoid a situation in which Davis might be put in command of white troops or officers. He rose slowly through the ranks, becoming the first black colonel in the army in 1930. In 1940 he was promoted to brigadier general by President Franklin D. Roosevelt. After commanding the 2nd Cavalry Division in 1941, he was assigned to the office of the inspector general of the army. During World War II he headed a special unit charged with safeguarding the status and morale of black soldiers in the army, and he served in the European theatre as a special adviser on race relations. He retired in 1948 after 50 years of service.

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Davis, Benjamin Oliver, Jr. (b. Dec. 18, 1912, Washington, D.C., U.S.), pilot, officer, and administrator who became the first black general in the U.S. Air Force.

The son of Benjamin Oliver Davis, Sr., he studied at the University of Chicago before entering the U.S. Military Academy at West Point, N.Y., in 1932. After graduating in 1936 he was commissioned in the infantry and in 1941 was among the first group of blacks admitted to the Army Air Corps and to pilot training. Upon his graduation he was swiftly promoted to lieutenant colonel, and he organized the 99th Fighter Squadron, the first all-black air unit, which flew tactical support missions in the Mediterranean theatre. In 1943 he organized and commanded the 332nd Fighter Group (the Tuskegee Airmen). By the end of the war Davis himself had flown 60 combat missions and had been promoted to colonel.

After the war he held other commands, and he helped plan the desegregation of the Air Force in 1948. He graduated from the Air War College in 1950, commanded a fighter wing in the Korean War, and was promoted to brigadier general in 1954. Davis became the first black officer to reach the rank of major general (1959) and was promoted to lieutenant general in 1965. After retiring in 1970 he was named director of civil aviation security in the U.S. Department of Transportation. In that post he devised and coordinated measures that effectively ended a wave of aircraft hijackings in the United States. Davis became an assistant secretary of transportation in 1971.

Davis, Bette, original name RUTH ELIZABETH DAVIS (b. April 5, 1908, Lowell, Mass., U.S.—d. Oct. 6, 1989, Paris, France), American motion-picture actress best known for her brilliant and intense characterizations of strong women.



Bette Davis
© Warner Bros. Inc.

Davis studied drama in New York and began her career with bit stage parts in 1926. She went to Hollywood in 1931, playing in minor roles until her characterization of Mildred, the Cockney waitress in *Of Human Bondage* (1934), established her reputation as an important actress. In 1935 she won the Academy Award for her powerful portrayal of the aging alcoholic star in *Dangerous* (1935). Other notable films of the 1930s were *The Petrified Forest* (1936), *Jezebel* (1938), for which she won her second Academy Award, *Dark Victory* (1939), and *The Private Lives of Elizabeth and Essex* (1939). Throughout this period, Davis waged bitter court battles to break her contract with Warner Brothers Studio, which had refused to relinquish control over her screen material and to consistently give her the excellent roles that she coveted.

Her films after 1940 included *The Letter* (1940), *The Great Lie* (1941), *The Little Foxes* (1941), *Now, Voyager* (1942), *The Corn Is Green* (1945), *All About Eve* (1950), and *The Virgin Queen* (1955). After some stage work during the 1950s, Davis returned to the screen as Apple Annie in *Pocketful of Miracles* (1961). During the 1960s and early '70s she starred in a series of macabre films: *Whatever Happened to Baby Jane?* (1962), *Dead Ringer* (1964), *Hush, Hush . . . Sweet Charlotte* (1964), *The Nanny* (1965), *The Anniversary* (1967), and *Watcher in the Woods* (1980). She received many awards, among them an Emmy award for her television performance in *Strangers—The Story of a Mother and Daughter* (1979) and the American Film Institute's Life Achievement Award.

Davis was married four times. She published two autobiographies, *The Lonely Life* (1962) and *This 'n That* (1987), and cowrote *Mother Goddam* (1975; with Whitney Stine).

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Davis, Charles Harold (b. Feb. 2, 1857, East Cambridge, Mass., U.S.—d. Aug. 5, 1933, Mystic, Conn.), American painter, whose romantic interpretations of the landscape excelled in their cloud effects.

A pupil of the schools of the Boston Museum of Fine Arts, Davis was sent to Paris in 1880. Having studied at the Academy Julian, he went to Barbizon and often painted in the forest of Fontainebleau. He became a full member of the National Academy of Design in 1906, and his work is represented in many of the leading museums throughout the United States.

Davis, Sir Colin, in full SIR COLIN REX DAVIS (b. Sept. 25, 1927, Weybridge, Surrey, Eng.), English conductor and the foremost modern interpreter of composer Hector Berlioz, whose complete orchestral and operatic works Davis recorded.

Davis turned to conducting after studying clarinet at the Royal College of Music in London. Appointed assistant conductor of the BBC Scottish Orchestra in 1957, he gained critical acclaim while substituting for an ill Otto Klemperer in a Festival Hall performance of *Don Giovanni* in 1959. From 1961 to 1965 Davis was musical director of Sadler's Wells Opera, and from 1967 to 1971 he served as principal conductor of the BBC Symphony Orchestra. In 1971 he succeeded Georg Solti as musical director of Covent Garden Opera. He was knighted in 1980. Davis' enthusiastic, vivid, and fresh interpretations enhanced his conducting of Berlioz, W.A. Mozart, Igor Stravinsky, and Sir Michael Tippett.

Davis, David (b. March 9, 1815, Cecil county, Md., U.S.—d. June 26, 1886, Bloomington, Ill.), American politician, a close associate of Abraham Lincoln. He was a Supreme Court justice and senator during the antebellum, American Civil War, and postwar eras.

After graduating from Kenyon College in 1832, Davis earned a law degree from Yale in 1835. He was admitted to the Illinois bar the same year and in 1836 established a practice in Bloomington. Always politically ambitious, Davis was elected to the Illinois legislature in 1844 on the Whig ticket. He attended the state constitutional convention of 1847 and the following year began a 14-year career as a circuit judge. It was as a judge that Davis became a close friend of Abraham Lincoln.

At the Republican convention of 1860 and in the presidential campaign that followed, Davis worked assiduously for Lincoln's nomination and election. In February 1861 he accompanied the president-elect to Washington, D.C., and served as an adviser until Lincoln appointed him to the Supreme Court in 1862. Davis was never a supporter of the more extreme antislavery wing of the Republican Party, and he angered much of the party with his majority opinion in the *Ex parte Milligan* case of 1866.

While still a justice, Davis in 1872 accepted the presidential nomination of the Labor Reform Convention as a stepping-stone to securing the nomination of the Liberal Republican Party. When the party instead nominated Horace Greeley, Davis withdrew as the Labor candidate. He then drifted closer to the Democrats, who expected him to cast the decisive vote for Samuel J. Tilden on the Electoral Commission of 1877. But Davis disqualified himself from the commission when he resigned from the Supreme Court in 1877 to accept election by the Illinois legislature to the U.S. Senate. He served one term in the Senate, the last two years as president pro tem. Upon his retirement in 1883, Davis returned to Bloomington.

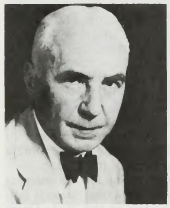
Davis, Dwight F., in full DWIGHT FILLEY DAVIS (b. July 5, 1879, St. Louis, Mo., U.S.—d. Nov. 28, 1945, Washington, D.C.), tennis player best known as the donor of the Davis Cup (properly the International Lawn Tennis Challenge Trophy) for competition among teams representing various nations. He later became a United States cabinet member.

For three consecutive years (1899–1901) Davis won the U.S. men's doubles championship (with his Harvard teammate Holcombe Ward). Early in 1900 he offered a silver bowl to the winner of the international team tournament that he envisioned. He played on the U.S. teams that won the first two competitions (1900, 1902) and served as captain of the first U.S. team.

A lawyer, he did not practice but was active as a public official in St. Louis. In his term as that city's public park commissioner (1911–15), he expanded athletic facilities, including the first municipal tennis courts in the United States. He served under President Calvin Coolidge as assistant secretary of war (1923–25) and secretary of war (1925–29) and under President Herbert Hoover as U.S. governor-general of the Philippines (1929–32).

Davis, Elmer, in full ELMER HOLMES DAVIS (b. Jan. 13, 1890, Aurora, Ind., U.S.—d. May 18, 1958, Washington, D.C.), news broadcaster and writer, director of the U.S. Office of War Information during World War II.

Davis had been a reporter and editorial writer for *The New York Times* when he joined the Columbia Broadcasting System in 1939 as a radio newscaster. He soon gained a national following. Appointed to head the Office of War Information in 1942, Davis won respect



Elmer Davis
By courtesy of the Library of Congress, Washington, D.C.

for his handling of official news and propaganda, although his liberal stance, especially his opposition to military censorship, generated controversy. In 1945 he resumed his career as a news broadcaster with the American Broadcasting Company until 1953. Davis was an outspoken critic of Senator Joseph R. McCarthy's tactics investigating alleged communist infiltration of the U.S. government.

Davis, H.L., in full HAROLD LENOIR DAVIS (b. Oct. 18, 1896, Yoncalla, Ore., U.S.—d. Oct. 31, 1960, San Antonio, Texas), American novelist and poet who wrote realistically about the West, rejecting the stereotype of the cowboy as hero.

Davis worked as a cowboy, typesetter, and surveyor and in other jobs before being recognized for his writing. He first received recognition for his poems, written as imitations of the poetry of Detlev von Liliencron, a 19th-century German poet. Later Davis was encouraged by H.L. Mencken to try prose, and the results appeared in *American Mercury.* In 1932 Davis went to Mexico on a Guggenheim Fellowship, and he stayed there to write *Honey in the Horn* (1935), which won a Pulitzer Prize in 1936. This novel secured Davis' reputation as a novelist of the West whose slow-moving books explore the magic of landscape. Plot remains secondary to the quiet overall portrait of the era when the last pioneers flooded Oregon. Davis mistrusted heroics and instead wrote realistically of the problems facing frontier men and women. His later books include *Beulah Land* (1949) and *The Distant Music* (1957).

Davis, Henry Winter (b. Aug. 16, 1817, Annapolis, Md., U.S.—d. Dec. 30, 1865, Baltimore, Md.), Maryland unionist during the

secession crisis, harsh critic of Abraham Lincoln, and coauthor of the congressional plan for Reconstruction during the American Civil War.

Davis graduated from Kenyon College and studied law at the University of Virginia. He began his practice in 1840 in Alexandria, Va., but moved to Baltimore in 1849.

Intent upon a political career, Davis joined the Whig Party and campaigned for Winfield Scott in 1852. As the Whig Party faded during the 1850s, Davis' conservatism and apparent lack of interest in the sectional crisis led him to the Know-Nothing Party. In 1854 he ran successfully on the Know-Nothing ticket for a seat in the U.S. House of Representatives.

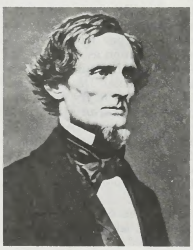
During the second half of the 1850s, Davis tried to avoid taking sides between North and South. But in 1860 he aligned himself with the House Republicans, even though he backed the Union Party in that year's presidential contest. The Union Party triumphed in Maryland, and it was largely due to Davis that Maryland did not secede. When the Union Party crumbled in the face of secession, Davis found himself without a party. On June 13, 1861, he lost his reelection race to a pro-Southerner.

As a private citizen, Davis toured the North, becoming a national figure while speaking for the Union. Increasingly, however, he took issue with Lincoln's wartime policies—especially the suspension of habeas corpus. A Republican at odds with his party's leader, he was nonetheless elected once again to the House of Representatives in 1863. He continued to criticize Lincoln and members of the cabinet, and before long he had become a highly influential member of the House.

In response to Lincoln's plan for Reconstruction, Davis formulated the congressional policy that became embodied in the Wade-Davis Bill. This bill stymied the conciliatory policy Lincoln planned toward the South by placing reconstruction in the hands of Congress. The bill required a majority of voters (not Lincoln's 10 percent) to establish a legal government in a seceded state; it disfranchised a large number of former Confederates (not just the Confederate leadership) and compelled immediate emancipation, rather than, according to the presidential plan, leaving individual states to handle emancipation on their own.

The Wade-Davis Bill passed the House and Senate, but Lincoln pocket-vetoed it, enraging Davis. Davis lost his House seat in 1864.

Davis, Jefferson (b. June 3, 1808, Christian county, Ky., U.S.—d. Dec. 6, 1889, New Orleans, La.), president of the Confederate States



Jefferson Davis

By courtesy of The Library of Congress, Washington, D.C.

of America throughout its existence during the American Civil War (1861–65). After the war, he was imprisoned for two years and indicted for treason but never tried.

Early life and career. Jefferson Davis was the 10th and last child of Samuel Emory Davis, a Georgia-born planter of Welsh ancestry. When he was three his family settled on a plantation called Rosemont at Woodville, Miss. At seven he was sent for three years to a Dominican boys' school in Kentucky, and at 13 he entered Transylvania College, Lexington, Ky. He later spent four years at the United States Military Academy at West Point, graduating in 1828.

Davis served as a lieutenant in the Wisconsin Territory and afterward in the Black Hawk War under the future president, then Colonel Zachary Taylor, whose daughter Sarah Knox he married in 1835. According to a contemporary description, Davis in his mid-20s was "handsome, witty, sportful, and altogether captivating." In 1835 Davis resigned his commission and became a planter near Vicksburg, Miss., on land given him by his rich eldest brother, Joseph. Within three months his bride died of malarial fever. Grief-stricken, Davis stayed in virtual seclusion for seven years, creating a plantation out of a wilderness and reading prodigiously in constitutional law and world literature.

In 1845 Davis was elected to the U.S. House of Representatives and, in the same year, married Varina Howell, a Natchez aristocrat who was 18 years his junior. In 1846 he resigned his seat in Congress to serve in the war with Mexico as colonel in command of the First Mississippi volunteers, and he became a national hero for winning the Battle of Buena Vista (1847) with tactics that won plaudits even in the European press. After returning, severely wounded, he entered the Senate and soon became chairman of the Military Affairs Committee. President Franklin Pierce made him secretary of war in 1853. Davis enlarged the army, strengthened coastal defenses, and directed three surveys for railroads to the Pacific.

During the period of mounting intersectional strife, Davis spoke widely in both North and South, urging harmony between the sections. When South Carolina withdrew from the Union in December 1860, Davis still opposed secession, though he believed that the Constitution gave a state the right to withdraw from the original compact of states. He was among those who believed that the newly elected president, Abraham Lincoln, would coerce the South and that the result would be disastrous.

President of the Confederacy. On Jan. 21, 1861, twelve days after Mississippi seceded, Davis made a moving farewell speech in the Senate and pleaded eloquently for peace. Before he reached his Brierfield plantation, he was commissioned major general to head Mississippi's armed forces and prepare its defense. But within two weeks the Confederate Convention in Montgomery, Ala., chose him as provisional president of the Confederacy. He was inaugurated on Feb. 18, 1861, and his first act was to send a peace commission to Washington, D.C., to prevent an armed conflict. Lincoln refused to see his emissaries and the next month decided to send armed ships to Charleston, S.C., to resupply the beleaguered Union garrison at Fort Sumter. Davis reluctantly ordered the bombardment of the fort (April 12–13), which marked the beginning of the American Civil War. Two days later Lincoln called for 75,000 volunteers, a move that brought about the secession of Virginia and three other states from the Union.

Davis faced a dire crisis. A president without precedent, he had to mold a brand-new nation in the midst of a war. With only one-fourth the white population of the Northern states, with a small fraction of the North's manufacturing capacity, and with inferior railroads, no navy, no powder mills, no shipyard, and an appalling lack of arms and equipment, the South was in poor condition to withstand invasion. Its only resources seemed to be cotton and courage. But at Bull Run (Manassas, Va.), on July 21, 1861, the Confederates routed Union forces. In the meantime, with makeshift materials, Davis created factories for producing powder, cannon, side arms, and quartermaster stores. In restored naval yards gunboats were constructed, and the South's inadequate railroads and rolling stock were patched up repeatedly. Davis sent agents to Europe to buy arms and ammunition, and he dispatched representatives to try to secure recognition from England and France.

Davis made the inspired choice of Robert E. Lee as commander of the Army of Northern Virginia in June 1862. While Davis' military judgment was occasionally at fault, he wisely gave Lee wide scope in conducting the war over the next three years. Perhaps Davis' most serious mistake as commander in chief was the excessive importance he attached to defending the Confederate capital at Richmond, Va., at the expense of operations farther west, including the defense of the key Confederate fortress at Vicksburg, Miss.

Davis had innumerable troubles during his presidency, including a squabbling Congress, a dissident vice president, and the constant opposition of extreme states'-rights advocates, who objected vigorously to the conscription law he had enacted over much opposition in 1862. But despite a gradually worsening military situation, unrelieved internal political tensions, continuing lack of manpower and armament, and skyrocketing inflation, he remained resolute in his determination to carry on the war, and Lee remained both his most valuable field commander and his most loyal personal supporter.

Capture and imprisonment. When Lee surrendered to the North without Davis' approval, Davis and his cabinet moved south, hoping to reach the trans-Mississippi area and continue the struggle until better terms could be secured from the North. At dawn on May 10, 1865, Davis was captured near Irwinville, Ga. He was imprisoned in a damp casemate at Fort Monroe, Va., and was put in leg-irons. Though outraged Northern public opinion brought about his removal to healthier quarters, Davis remained a prisoner under guard for two more years. Finally, in May 1867, he was released on bail and went to Canada to regain his shattered health. Several notable Northern lawyers offered their free services to defend him in a treason trial, which Davis longed for. The government, however, never forced the issue, many believe because it feared that such a trial might establish that the original Constitution gave the states a right to secede. The case was finally dropped on Dec. 25, 1868.

Davis made five trips to Europe in an effort to regain his health, and for a few years he served as president of an insurance company in Memphis, Tenn. In 1877 he retired to Beauvoir, a small Gulf-side estate near Biloxi, Miss., which a patriotic admirer provided for him. There he wrote his *Rise and Fall of the Confederate Government.* Though pressed to enter the U.S. Senate, he declined to "ask for amnesty," for he felt he had done nothing wrong in fighting for states' rights under the Constitution, and he never regained his citizenship. He remained the chief spokesman and apologist for the defeated South. Davis' citizenship was restored posthumously in 1978.

Though dedicated to the principles of democracy, Davis was by nature a benevolent aristocrat. He was diplomatic to a degree, but he did not possess the pliancy of the professional politician. His sensitivity to criticism stood in stark contrast to the single-minded imperturbability with which his greater counterpart, Abraham Lincoln, pursued his own war aims. Davis died in 1889 in New Orleans of a complicated bronchial ailment. At his temporary interment he was accorded the greatest funeral the South had ever known. On May 31,

1893, he was buried permanently in Hollywood Cemetery in Richmond. (Hu.S./Ed.)

BIBLIOGRAPHY. The first biography of Jefferson Davis was by one who knew and understood him, Frank H. Alfriend, *The Life of Jefferson Davis* (1868). More recent works are Hudson Strode, *Jefferson Davis,* 3 vol. (1955–64), written with access to more than 1,000 hitherto unknown holograph letters owned by Davis' grandson; William Catton and Bruce Catton, *Two Roads to Sumter* (1963, reissued 1971), tracing Lincoln's and Davis' paths to war; Clement Eaton, *Jefferson Davis* (1977); Paul D. Escott, *After Secession: Jefferson Davis and the Failure of Confederate Nationalism* (1978); Michael B. Ballard, *A Long Shadow: Jefferson Davis and the Final Days of the Confederacy* (1986), covering the years 1865 to Davis' death; and William C. Davis, *Jefferson Davis: The Man and His Hour* (1991).

Davis, Joe (b. April 15, 1901, Whitewell, Derbyshire, Eng.—d. July 10, 1978, Hampshire), English billiards and snooker player who was the world snooker champion from 1927 until his retirement in 1946.

During his career Davis scored a total of 689 century breaks and held the world record for a maximum break of 147. He also held the world billiard championship from 1928 to 1933 and the British championship thereafter. Davis confirmed his reputation as the "grand old man" of British snooker when television audiences had an opportunity to admire his finely honed skills and remarkable techniques. He was awarded the Order of the British Empire in 1963.

Davis, John, Davis also spelled DAVYS (b. *c.* 1550, Sandridge, near Dartmouth, Devon, Eng.—d. Dec. 29/30, 1605, off Bintan Island, near Singapore), English navigator who attempted to find the Northwest Passage through the Canadian Arctic to the Pacific.

Davis appears to have first proposed his plan in 1583 to Sir Francis Walsingham, principal secretary to Queen Elizabeth I; in 1585 he began his first northwestern expedition. Coming upon the icebound east shore of Greenland, he headed south, rounded Cape Farewell, and then sailed northward along the coast of western Greenland. Turning in what he thought was the direction of China, he sailed some distance up Cumberland Sound, which cuts into Baffin Island, but eventually turned back.

He attempted to find the Northwest Passage again in 1586 and 1587. On the last of these voyages he passed through the strait named for him, entered Baffin Bay, and coasted northward along western Greenland to Disko Island, about 70° N. Davis showed some imagination in his dealings with the Greenland Eskimo. He took musicians with him and had his sailors dance to the music, which helped to establish cordial relations with these sociable people. Cape Walsingham and Cumberland Sound are among the many Arctic points that he named.

Davis seems to have commanded the *Black Dog* against the Spanish Armada (1588) and sailed with Thomas Cavendish on his last voyage (1591). In seeking a passage through the Strait of Magellan, Davis discovered the Falkland Islands (Aug. 9, 1592). He sailed with Sir Walter Raleigh to Cádiz and to the Azores (1596–97) and accompanied expeditions to the East Indies in 1598 and 1601. On a third voyage to the Indies he was killed by Japanese pirates.

Davis invented a quadrant used through the 18th century and wrote a treatise on navigation, *The Seaman's Secret* (1594). His work *The World's Hydrographical Description* (1595) deals with the Northwest Passage.

Davis, John W., in full JOHN WILLIAM DAVIS (b. April 13, 1873, Clarksburg, W.Va., U.S.—d. March 24, 1955, Charleston, S.C.), conservative Democratic politician who was his party's unsuccessful candidate for the presidency of the United States in 1924.



John W. Davis

By courtesy of the Library of Congress, Washington, D.C.

Davis was admitted to the Virginia bar in 1895 but returned to his birthplace two years later. In 1899 he was elected to the West Virginia House of Delegates and in 1910 to the U.S. House of Representatives. From 1913 to 1918 he served as solicitor general of the United States, and he was one of President Woodrow Wilson's advisers at the Paris Peace Conference following World War I (1919). He also served as ambassador to Great Britain (1918–21), after which he accepted a partnership in a New York law firm.

At the Democratic National Convention of 1924, neither the supporters of New York governor Alfred E. Smith nor those of the more traditional William G. McAdoo would yield their votes in order to settle on a presidential candidate. After 102 ballots the party compromised by choosing Davis, who went down to overwhelming defeat that fall before Republican Calvin Coolidge.

Returning to private law practice, Davis appeared in many cases before the U.S. Supreme Court. The capstone of his career was his victory in 1952, when the Supreme Court ruled that President Harry S. Truman had exceeded his constitutional powers in seizing control of the nation's steel mills.

Davis, Kingsley (b. Aug. 20, 1908, Tuxedo, Texas, U.S.), American sociologist and demographer who coined the terms population explosion and zero population growth. His specific studies of American society led him to work on a general science of world society, based on empirical analysis of each society in its habitat.

Davis received his B.A. from the University of Texas (1930) and his M.A. (1933) and his Ph.D. from Harvard University (1936). He began his teaching career in sociology as an instructor at Smith College (1934–36), then was assistant professor at Clark University (1936–37). He served as associate professor and later chairman of the department at Pennsylvania State University (1937–42). It was not until his associate professorship in anthropology and sociology at Princeton University that he completed his first and key work, *Human Society* (1949). Its publication brought him an invitation to teach and direct in the Bureau of Applied Social Research at Columbia University (1949–55).

Davis' mastery of demography, demonstrated in his editing of *World Population in Transition* (1945) and afterward, became an increasingly important analytical tool. After leaving Columbia, Davis taught at the University of California at Berkeley (1955–77), where he was professor of sociology and comparative studies from 1971 to 1977. From 1977 he was professor of sociology of the University of Southern California.

Davis led a social-science team sponsored by the Carnegie Corporation to 10 countries in Africa and directed studies of societies in India, Europe, and Latin America. *The Population of India and Pakistan* (1951), *A Crowding Hemisphere: Population Change in the Americas* (1958), and *World Urbanization 1950–70,* 2 vol. (1969–72), contain his social theory for a general science of human society.

Davis, Miles, in full MILES DEWEY DAVIS III (b. May 25, 1926, Alton, Ill., U.S.—d. Sept. 28, 1991, Santa Monica, Calif.), American jazz trumpeter, bandleader, and composer who influenced jazz steadily from the late 1940s.

The son of a prosperous dental surgeon, Davis began playing the trumpet at age 13 and was soon performing with local jazz bands in St. Louis. He moved to New York City in 1944, ostensibly to study at the Institute of Musical Art (now the Juilliard School) but actually to play bebop with Charlie Parker, Dizzy Gillespie, and others. He played in Parker's bands and others from about 1944 until becoming the leader of his own band in 1948, at which time he began moving away from bebop in quest of new and more experimental styles.



Miles Davis, 1969

Votavafoto from London Daily Express—Pictorial Parade

Though his trumpet style has influenced other trumpeters, including several who went on to influence others themselves (*e.g.,* Clifford Brown and Freddie Hubbard), Davis is most significant as a bandleader who gathered key innovators during the beginnings of three separate phases in modern jazz and produced recordings that crystallized the emerging trends: composer-arranger Gil Evans, composer-arranger-saxophonist Gerry Mulligan, and saxophonist Lee Konitz for the 1949 album *Birth of the Cool;* composer-arranger-pianist Bill Evans and tenor saxophonist John Coltrane for the 1959 *Kind of Blue;* and composer-arranger-pianist Joe Zawinul and composer-saxophonist Wayne Shorter, among others, for the 1969 *Bitches Brew.* These recordings had enormous impact, providing guidelines for the West Coast "cool" style of the 1950s, the modal approaches of the 1960s, and the jazz-rock approach of the 1970s, respectively. The Davis quintet of the 1960s with Shorter, pianist Herbie Hancock, bassist Ron Carter, and drummer Tony Williams remains among the most outstanding groups in jazz history.

Though occasionally given to multinote flurries, Davis generally displayed one of the most economical and thoughtful trumpet styles in modern jazz. The deliberation, pacing, and lyricism in his improvisations are striking. Despite the low commercial stature of jazz, Davis succeeded with steady record sales for three decades. The Davis compositions most frequently performed by others include "Nardis," "Four," "Milestones," "Solar," and "So What."

Davis, Mount, highest point (3,213 feet [979 m]) in Pennsylvania, U.S., on a ridge of the Allegheny and Appalachian mountains. It is located in Somerset county, 15 miles (24 km) south-southwest of Somerset, near the Maryland border.

Davis, Richard Harding (b. April 18, 1864, Philadelphia—d. April 11, 1916, Mount Kisco,

N.Y., U.S.), U.S. author of romantic novels and short stories and the best known reporter of his generation.

Davis studied at Lehigh and Johns Hopkins universities and in 1886 became a reporter on the *Philadelphia Record.* He then worked on various newspapers in Philadelphia and New York, wrote short stories, and in 1890 became managing editor of *Harper's Weekly.* On *Harper's* assignments he toured various parts of the globe, recording his impressions of the American West, Europe, and South America in a series of books (1892–96). He was a war correspondent, reporting every war from the Greco-Turkish to World War I. He plunged into what he reported, defying rules in order to join in the battle of San Juan Hill in the Spanish–American War; he was nearly shot by the Germans as a spy in World War I. His early fiction achieved immediate success, particularly *Gallegher and Other Stories* (1891), a collection of newspaper stories, *Van Bibber*



Richard Harding Davis, 1905
By courtesy of the Library of Congress, Washington, D.C.

and Others (1892), and *Ranson's Folly* (1902). Many of his published works were illustrated by Charles Dana Gibson. He wrote seven popular novels published between 1897 and 1909. Several of his 25 plays were also very successful, notably *Ranson's Folly* (1904), *The Dictator* (1904), and *Miss Civilization* (1906).

Davis, Ruth Elizabeth (American actress): *see* Davis, Bette.

Davis, Stuart (b. Dec. 7, 1894, Philadelphia—d. June 24, 1964, New York City), U.S. abstract artist whose idiosyncratic Cubist paintings of the garish aspects of the urban landscape presaged the use of commercial and advertising art by Pop artists of the 1960s.

Davis grew up in an environment in which art was a part of daily life. His father was a graphic artist and art editor of a Philadelphia newspaper, where he worked with William Glackens, George Luks, John Sloan, and Everett Shinn, all later famous as members of the "Ashcan School" of U.S. painting. His parents encouraged his interest in art, and, at the age of 16, he quit high school to study painting in New York City under Robert Henri, leader of the group known as The Eight (later absorbed into the "Ashcan School"), whose teaching emphasized the importance of taking subject matter from common street life.

By 1913 Davis was competent enough to show five watercolours in the famous Armory Show. This was the first large exhibit in the U.S. of avant-garde European art and marked a turning point in his career. In the next few years he strove to achieve the compositional order, nonimitative colour, and the shallow picture space characteristic of the new European painting. He began to experiment with collage (a recently invented technique of making compositions from bits of paper and objects glued to a surface) and sometimes varied the usual process by making paintings of his collages, as in "Lucky Strike" (1921; Museum of Modern Art, New York City), finally arriving at a completely nonillusionistic style, which culminated in his "Egg Beater" series of 1927–30.

In 1928 Davis travelled to France, where he spent a year painting relatively realistic street scenes in Paris. Back in the U.S. during the Depression of the 1930s, he developed a new



"Colonial Cubism," oil on canvas by Stuart Davis, 1954; in the Walker Art Center, Minneapolis, Minn.
Collection Walker Art Center, Minneapolis

style based on the contrast between rhythmic interplay of geometric areas of flat colour and objects clearly defined in linear perspective.

After the mid-1940s, Davis produced many of his most important works, such as "The Mellow Pad" (1945–51; Mr. and Mrs. Milton Lowenthal Collection, New York City) and "Little Giant Still Life" (1950; Virginia Museum of Fine Arts, Richmond). These meticulously planned and executed paintings possess a wit and gaiety totally alien to the then dominant style of art, Abstract Expressionism. Davis' work was inspired by taxis, chain-store fronts, and neon signs. Its dissonant colours and lively, repetitive rhythms were visual analogues to jazz music, which he loved. "Colonial Cubism" exemplifies Davis' later work.

Consult the INDEX *first*

Davis, Thomas Osborne (b. Oct. 14, 1814, Mallow, County Cork, Ire.—d. Sept. 16, 1845, Dublin), Irish writer and politician who was the chief organizer and poet of the Young Ireland movement.

A Protestant who resented the traditional identification of Irish nationalism with Roman Catholic interests, he evolved, while at Trinity College, Dublin, an ideal of uniting all creeds and classes in a vigorous national movement. In 1842 he cofounded the weekly *Nation,* which supported Daniel O'Connell's agitation for restoring an Irish parliament and which became the organ of the writers known as the Young Irelanders. Davis wrote patriotic verses such as "A Nation Once Again"



Thomas Osborne Davis, detail of an engraving
The Mansell Collection

and "The Battle of Fontenoy"; his writings virtually became the gospel of the Sinn Féin movement. His *Essays and Poems, with a Centenary Memoir, 1845–1945* appeared in 1945.

Davis, William Morris (b. Feb. 12, 1850, Philadelphia—d. Feb. 5, 1934, Pasadena, Calif., U.S.), U.S. geographer, geologist, and meteorologist who founded the science of geomorphology, the study of landforms.

In 1870 he began three years of service as a meteorologist with the Argentine Meteorological Observatory, Córdoba. In 1876 he obtained a position with Harvard University, where he taught until 1912. His meteorological studies gave rise to *Elementary Meteorology* (1894), which was used as a college text for more than 30 years.

In the 1870s his interest turned to the study of landforms, and the publication of "The Rivers and Valleys of Pennsylvania" (1889) laid the foundation for the Davisian system of landscape analysis, perhaps his most significant contribution to physical geography. In this work, he proposed that the physical features of the land are the result of a long, continued, orderly change by means of erosion and that this sequential change through time constituted a cycle of erosion, which he thought vital in understanding present-day landscape and geological history.

After his retirement in 1912, Davis served as a visiting lecturer to many universities, devoted much time to writing and field studies, and conducted exhaustive studies of coral reefs and coral islands. The results of these studies appeared in *The Coral Reef Problem* (1928).

His more than 500 published works include *Physical Geography* (1898), *Geographical Essays* (1909), and "Origin of Limestone Caverns" (1930).

Davis Cup, trophy awarded to the winner of an annual international lawn-tennis tourna-



Davis Cup trophy
Keystone

ment originally for amateur men's teams. The official name is the International Lawn Tennis Challenge Trophy. The trophy was donated in 1900 by American Dwight F. Davis for a competition between teams from the United States and Great Britain. Davis himself played on winning U.S. teams in the first two meetings (1900 and 1902). From the start, Davis Cup rounds consisted of four singles matches and one doubles match. In 1904 Belgium and France entered the competition. Since 1912 the tournament has been under the supervision of the International Lawn Tennis Federation and has grown to truly international proportions, with the world divided into several zones and zone champions playing each other for the right to enter the finals. From 1972 the previous winner, heretofore only playing in the finals, had to play through zone competition. From 1970 professional players registered

with national associations were permitted to compete. Australia, the United States, Great Britain, and France have dominated the competition. In 1980 Czechoslovakia became the first Communist country to win the cup. For winners, *see* Sporting Record: *Tennis.*

Davis Mountains, segment of the southern Rocky Mountains, mainly in Jeff Davis County, western Texas, U.S., extending northward for 45 mi (72 km) above the town of Marfa. Many peaks exceed 7,000 ft (2,100 m), culminating at Mt. Livermore (8,382 ft; also called Mt. Baldy, or Baldy Peak), the second highest point in Texas. The village of Fort Davis (alt 5,050 ft and the highest community in Texas) is a tourist base for the scenic Davis Mountains State Park, Mt. Locke (site of McDonald Observatory, with one of the world's largest reflector telescopes), and Fort Davis National Historic Site (established in 1854 and named for Jefferson Davis, president of the Confederacy, a key defense post against Comanche and Apache raids along the Overland Trail).

Davis Strait, bay of the northern Atlantic Ocean, lying between southeastern Baffin Island (Canada) and southwestern Greenland.



Holsteinsborg, on the Davis Strait, West Greenland
Gordon N. Converse—*The Christian Science Monitor*

It separates the depths of Baffin Bay (north) from those of the Labrador Sea (south) and forms part of the Northwest Passage, a route through the Canadian Arctic Archipelago linking the Atlantic and Pacific oceans. It is approximately 400 mi (650 km) north to south and 200 to 400 mi wide. Along the shore of Greenland, the West Greenland Current carries relatively warm water northward, while the cold Labrador Current transports masses of ice southward along Baffin Island's eastern shore into the Labrador Sea and the Atlantic. Icebergs are discharged into the waters by glacial action from the vast interior Greenland icecap.

The Baffin Island coast has few permanent settlements because the main shipping routes are in the warmer waters near the Greenland coast. The navigation season for the principal Greenland ports (including Frederikshåb, Godthåb, and Holsteinsborg) extends from midsummer to late fall but with great annual variations. The strait was named for the navigator John Davis, who explored it in 1585.

Davison, William (b. *c.* 1541—d. Dec. 21, 1608, Stepney, London), secretary to Queen Elizabeth I of England, chiefly remembered in connection with the execution of Mary Queen of Scots.

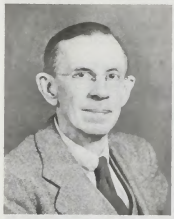
Of Scottish descent (by his own account), he went to Scotland as secretary to the English ambassador, Henry Killigrew, in 1566. He remained there for about 10 years. He was then employed as agent in the Netherlands (1576–79), on missions to Scotland (1583, 1584), and again to the Netherlands in 1585, returning to England in 1586. That year he became member of Parliament for Knaresborough, a privy councillor, and on September 30 Sir Francis Walsingham's colleague as principal secretary.

As a privy councillor, he was a member of the commission appointed to try Mary Queen of Scots, but he took no part in its proceedings. It was Davison who obtained Elizabeth's signature to the warrant for Mary's execution. On this occasion and also in subsequent interviews with her secretary, Elizabeth suggested that she would be glad to avoid the responsibility of the execution, but Mary's jailors, Sir Amias Paulet and Sir Drue Drury, refused to take the hints thrown out to them. Meanwhile, the privy council, summoned by Lord Burghley, decided to carry out the sentence at once, and Mary was beheaded on Feb. 8, 1587.

When the news of the execution reached Elizabeth, she was extremely indignant; and her wrath was chiefly directed against Davison, who, she asserted, had disobeyed her instructions not to part with the warrant. The secretary was arrested and sent to the Tower of London. Charged before the Star Chamber (March 28, 1587) with misprision and contempt, he was acquitted by many of the commissioners of evil intention but was sentenced to pay a fine of 10,000 marks and to be imprisoned during the queen's pleasure.

However, Davison was released in September 1589; he seems never to have paid the fine; his annuity as secretary, granted to him for life, was paid him until his death; and he continued to receive a secretary's share of the profits of the signet until Walsingham's death in 1590. Attempts were then made to secure his restoration to favour, but they failed, and he retired to Stepney.

Davisson, Clinton Joseph (b. Oct. 22, 1881, Bloomington, Ill., U.S.—d. Feb. 1, 1958, Charlottesville, Va.), U.S. experimental physicist who shared the Nobel Prize for Physics



Davisson, 1946
By courtesy of Bell Telephone Laboratories, Murray Hill, N.J.

in 1937 with George P. Thomson of England for discovering that electrons can be diffracted like light waves, thus verifying the thesis of Louis de Broglie that electrons behave both as waves and as particles.

Davisson received his Ph.D. from Princeton University and spent most of his career at the Bell Telephone Laboratories. He began his research there on the emissions of electrons from a metal in the presence of heat and later helped develop the electron microscope. Then, in 1927, he and Lester H. Germer found that a beam of electrons, when reflected from a metallic crystal, shows diffraction patterns similar to those of X-rays and other electromagnetic waves. This discovery led to greater understanding of the dual nature of subatomic particles and proved to be useful in the study of nuclear, atomic, and molecular structure.

Davitt, Michael (b. March 25, 1846, Straide, County Mayo, Ire.—d. May 31, 1906, Dublin), founder of the Irish Land League (1879), which organized resistance to absentee landlordism and sought to relieve the poverty of the tenant farmers by securing fixity of tenure, fair rent, and free sale of the tenant's interest.

Davitt was the son of an evicted tenant farmer. In 1856—at the age of 10—he started work in a cotton mill, where a year later he lost an arm in a machinery accident. In 1865 he joined the revolutionary Fenian brotherhood, an international secret society that sought to secure political freedom for Ireland; he became secretary of its Irish analogue, the Irish Republican Brotherhood (IRB), in 1868. Arrested in London for sending firearms to Ireland (1870), he was sentenced to 15 years in prison and there laid plans to link Charles Parnell's constitutional reform with Fenian activism to achieve political-agrarian agitation. Paroled in 1877, Davitt rejoined the IRB and went to the United States, where the Fenian movement had originated. There he was deeply influenced by Henry George's ideas about the relationship between land monopoly and poverty.

Back in Ireland, Davitt won Parnell's cooperation in organizing the Land League, which led, however, to his expulsion (1880) from the supreme council of the IRB. He was elected member of Parliament for County Meath (1882) but as a convict was disqualified. He was also imprisoned (1881–82 and 1883) for seditious speeches.

Because of his public championing of Henry George's theories of land reform, Parnell repudiated him. Davitt actively defended the Nationalists before the Parnell Commission (1887–89). When the Irish party was split in 1890 over Parnell's involvement in Capt. W.H. O'Shea's divorce case, Davitt was among the first to oppose Parnell's continuance as leader.

Davitt was elected to Parliament in 1892 and 1893 but was unseated in both cases. He was elected again, for South Mayo (1895), but resigned in 1899 in protest against the South African War. His book, *The Fall of Feudalism in Ireland* (1904), is a valuable record of his time.

Davos (German), Romansh TAVAU, town, Graubünden canton, eastern Switzerland, consisting of two villages, Davos-Platz and Davos-Dorf, in the Davos Valley, on the Landwasser River, 5,118 ft (1,560 m) above sea level. Davis is mentioned in historical documents of 1160 and 1213; it was then inhabited by Romansh-speaking people, but later in the 13th century it was settled by German-speaking people from the upper Valais. In 1436 it became the capital of the League of Ten Jurisdictions or Courts (*see* Graubünden), but it belonged to Austria from 1477 to 1649. After the 1860s it became a fashionable health resort, and in the 20th century it was developed as a winter-sports centre of international reputation; the Parsenn run from 8,700 to 5,100



Davoser See (lake) near Davos, Switz.
Beringer and Pampaluchi

ft, served by a cable car, is one of the world's finest ski runs. Davos is also the site of the Swiss Alpine College (1946). The population is mainly German-speaking and Protestant. Pop. (1983 est.) 11,423.

Davout, Louis-Nicolas, DUC (duke) D'AUERSTEDT, PRINCE D'ECKMÜHL (b. May 10, 1770, Annoux, Fr.—d. June 1, 1823, Paris), French general who was one of the most distinguished of the Napoleonic field commanders.



Davout, lithograph by Aloys Senefelder after a portrait by Trolle
H. Roger-Viollet

Despite his noble origin and his training in the best military tradition of the *ancien régime,* Davout led his regiment in a pro-Revolutionary revolt (1790). He performed with merit in the Belgian campaign of 1792–93 and gained fame for his attempt to stop the treason of Gen. Charles Dumouriez (April 1793).

Davout rose to the rank of brigadier general but was forced to resign when an edict excluding former nobles from the French armies was adopted in July 1793. He was recalled to service after the overthrow of the anti-aristocratic Jacobins. After accompanying Bonaparte to Egypt (1798–99) he was promoted to the rank of divisional general and in 1801 married Louise-Aimée Le Clerc, Pauline Bonaparte's sister-in-law.

Appointed commander of the elite Third Corps, Davout's talents had a significant impact on the victories at Austerlitz (1805), Auerstädt (1806), Jena (1806), Eylau (1807), Eckmühl (1809), and Wagram (1809). In 1808 Napoleon bestowed the ducal title, and the next year Davout was made prince d'Eckmühl.

Davout performed admirably in the unsuccessful Russian campaign (1812–13) and then recaptured Hamburg. When Bonaparte fell in 1814 Davout retired, but he returned to the imperial cause during the Hundred Days as minister of war. After the defeat at Waterloo, Davout signed the Paris Convention (July 3, 1815), which opened Paris to the victorious allies. He retained command of the remnants of the imperial army in the Loire valley until a final peace was arranged. He refused to swear allegiance to the restored Bourbons until August 1817, after which he was recognized as a peer of France and confirmed in his honours and titles.

Davy, Edward (b. June 16, 1806, Ottery, Devon, Eng.—d. Jan. 26, 1885, Malmsbury, Queensland, Australia), physician, chemist, and inventor who devised the electromagnetic repeater for relaying telegraphic signals and invented an electrochemical telegraph (1838).

Davy, who wrote an *Experimental Guide to Chemistry* (1836), emigrated in 1839 to Australia, where, in addition to practicing medicine, he worked as an editor, farmer, and factory manager. Before leaving Great Britain he sold the patent for his telegraph; the purchasers never exploited the invention commercially, and for several decades Davy's contributions were ignored. He developed the electromagnetic repeater, which consisted of a relay to pick up and magnify electrical signals, in about 1836.

Davy, Sir Humphry, BARONET (b. Dec. 17, 1778, Penzance, Cornwall, Eng.—d. May 29, 1829, Geneva), English chemist who discovered several chemical elements (including sodium and potassium) and compounds, invented the miner's safety lamp, and became one of the greatest exponents of the scientific method.

Early life. Davy was the elder son of middle-class parents, who owned an estate in Ludgvan. He was educated at the grammar school in nearby Penzance and, in 1793, at Truro. In 1795, a year after the death of his father, Robert, he was apprenticed to a surgeon and apothecary, and he hoped eventually to qualify in medicine. An exuberant, affectionate, and popular lad, of quick wit and lively imagination, he was fond of composing verses, sketching, making fireworks, fishing, shooting, and collecting minerals. He loved to wander, one pocket filled with fishing tackle and the other with rock specimens; he never lost his intense love of nature and, particularly, of mountain and water scenery.

While still a youth, ingenuous and somewhat impetuous, Davy had plans for a volume of poems, but he began the serious study of science in 1797, and these visions "fled before the voice of truth." He was befriended by Davies Giddy (later Gilbert; president of the Royal Society, 1827–30), who offered him the use of his library in Tradea and took him to a chemistry laboratory that was well equipped for that day. There he formed strongly independent views on topics of the moment, such as the nature of heat, light, and electricity and the chemical and physical doctrines of A.-L.



Sir Humphry Davy, detail of an oil painting after Sir Thomas Lawrence; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Lavoisier. In his small private laboratory, he prepared and inhaled nitrous oxide (laughing gas), in order to test a claim that it was the "principle of contagion," that is, caused diseases. On Gilbert's recommendation, he was appointed (1798) chemical superintendent of the Pneumatic Institution, founded at Clifton to inquire into the possible therapeutic uses of various gases. Davy attacked the problem with characteristic enthusiasm, evincing an outstanding talent for experimental inquiry. He investigated the composition of the oxides and acids of nitrogen, as well as ammonia, and persuaded his scientific and literary friends, including Samuel Taylor Coleridge, Robert Southey, and P.M. Roget, to report the effects of inhaling nitrous oxide. He nearly lost his own life inhaling water gas, a mixture of hydrogen and carbon monoxide sometimes used as fuel. The account of his work, published as *Researches, Chemical and Philosophical* (1800), immediately established his reputation, and he was invited to lecture at the newly founded Royal Institution of Great Britain in London, where he moved in 1801, with the promise of help from the British-American scientist Sir Benjamin Thompson (Count von Rumford), the British naturalist Sir Joseph Banks, and the English chemist and physicist Henry Cavendish in furthering his researches; *e.g.,* on voltaic cells, early forms of electric batteries. His carefully prepared and rehearsed lectures rapidly became important social functions and added greatly to the prestige of science and the institution. In 1802 he became professor of chemistry. His duties included a special study of tanning: he found catechu, the extract of a tropical plant, as effective as and cheaper than the usual oak extracts, and his published account was long used as a tanner's guide. In 1803 he was admitted a fellow of the Royal Society and an honorary member of the Dublin Society and delivered the first of an annual series of lectures before the board of agriculture. This led to his *Elements of Agricultural Chemistry* (1813), the only systematic work available for many years. For his researches on voltaic cells, tanning, and mineral analysis, he received the Copley Medal in 1805. He was elected secretary of the Royal Society in 1807.

Major discoveries. Davy early concluded that the production of electricity in simple electrolytic cells resulted from chemical action and that chemical combination occurred between substances of opposite charge. He therefore reasoned that electrolysis, the interactions of electric currents with chemical compounds, offered the most likely means of decomposing all substances to their elements. These views were explained in 1806 in his lecture "On Some Chemical Agencies of Electricity," for which, despite the fact that England and France were at war, he received the Napoleon Prize from the Institut de France (1807). This work led directly to the isolation of sodium and potassium from their compounds (1807) and of the alkaline-earth metals from theirs (1808). He also discovered boron (by heating borax with potassium), hydrogen telluride, and hydrogen phosphide (phosphine). He showed the correct relation of chlorine to hydrochloric acid and the untenability of the earlier name (oxymuriatic acid) for chlorine; this negated Lavoisier's theory that all acids contained oxygen. He explained the bleaching action of chlorine (through its liberation of oxygen from water) and discovered two of its oxides (1811 and 1815), but his views on the nature of chlorine were disputed. He was not aware that chlorine is a chemical element, and experiments designed to reveal oxygen in chlorine failed.

In 1810 and 1811 he lectured to large audiences at Dublin (on agricultural chemistry, the elements of chemical philosophy, geology) and received £1,275 in fees, as well as the honorary degree of LL.D., from Trinity College. In 1812 he was knighted by the Prince Regent (April 8), delivered a farewell lecture to members of the Royal Institution (April 9), and married Jane Apreece, a wealthy widow well known in social and literary circles in England and Scotland (April 11). He also published the first part of the *Elements of Chemical Philosophy,* which contained much of his own work; his plan was too ambitious, however, and nothing further appeared. Its completion, according to a Swedish chemist, J.J. Berzelius, would have "advanced the science of chemistry a full century."

His last important act at the Royal Institu-

tion, of which he remained honorary professor, was to interview the young Michael Faraday, later to become one of England's great scientists, who became laboratory assistant there in 1813 and accompanied the Davys on a European tour (1813–15). By permission of Napoleon, he travelled through France, meeting many prominent scientists, and was presented to the empress Marie Louise. With the aid of a small portable laboratory and of various institutions in France and Italy, he investigated the substance "X" (later called iodine), whose properties and similarity to chlorine he quickly discovered; further work on various compounds of iodine and chlorine was done before he reached Rome. He also analyzed many specimens of classical pigments and proved that diamond is a form of carbon.

Later years. Shortly after his return, he studied, for the Society for Preventing Accidents in Coal Mines, the conditions under which mixtures of firedamp and air explode. This led to the invention of the miner's safety lamp and to subsequent researches on flame, for which he received the Rumford medals (gold and silver) from the Royal Society and, from the northern mine owners, a service of plate (eventually sold to found the Davy Medal). After being created a baronet in 1818, he again went to Italy, inquiring into volcanic action and trying unsuccessfully to find a way of unrolling the papyri found at Herculaneum. In 1820 he became president of the Royal Society, a position he held until 1827. In 1823–25 he was associated with the politician and writer John Wilson Croker in founding the Athenaeum Club, of which he was an original trustee, and with the colonial governor Sir Thomas Stamford Raffles in founding the Zoological Society and in furthering the scheme for zoological gardens in Regent's Park, London (opened in 1828). During this period, he examined magnetic phenomena caused by electricity and electrochemical methods for preventing saltwater corrosion of copper sheathing on ships by means of iron and zinc plates. Though the protective principles were made clear, considerable fouling occurred, and the method's failure greatly vexed him. But he was, as he said, "burned out." His Bakerian lecture for 1826, "On the Relation of Electrical and Chemical Changes," contained his last known thoughts on electrochemistry and earned him the Royal Society's Royal Medal.

Davy's health was by then failing rapidly; in 1827 he departed for Europe and, in the summer, was forced to resign the presidency of the Royal Society, being succeeded by Davies Gilbert. Having to forgo business and field sports, Davy wrote *Salmonia: or Days of Fly Fishing* (1828), a book on fishing (after the manner of Izaak Walton) that contained engravings from his own drawings. After a last, short visit to England, he returned to Italy, settling at Rome in February 1829—"a ruin amongst ruins." Though partly paralyzed through stroke, he spent his last months writing a series of dialogues, published posthumously as *Consolations in Travel, or the Last Days of a Philosopher* (1830). (F.W.G.)

BIBLIOGRAPHY. J.A. Paris, *The Life of Sir Humphry Davy* (1831), for more than a century the standard work on Davy's life; Sir H. Hartley, *Humphry Davy* (1966), an extremely useful account of Davy's life that complements Paris' biography but with changed emphases resulting from the passage of 135 years.

Davy lamp, safety lamp (*q.v.*) devised by Sir Humphry Davy in 1815.

Davys, John: *see* Davis, John.

daw (bird): *see* jackdaw.

Dawānī, in full MUḤAMMAD IBN JALĀL AD-DĪN DAWĀNĪ (b. 1427, Dawān, in the Kāzerūn district of Iran—d. 1502/03), jurist and philosopher who was chiefly responsible for maintaining the traditions of Islāmic philosophy in the 15th century.

Dawānī's family claimed descent from Abū Bakr (the first caliph of Islām). He received a traditional Islāmic education, first at Dawān, where he studied with his father, who was a *qāḍī* (judge), and later in Shīrāz. During his career he held judicial and teaching appointments. His most important judicial appointment was as the *qāḍī* for the Fars province. He was also at various times the principal of a theological college in Shīrāz. He wrote about 75 philosophical works, which are of two kinds: commentaries on the philosophy of Suhrawardī al-Maqtūl, founder of the illuminationist school; and ethics and moral philosophy, including a revision of the ethical doctrines of Naṣīr ad-Dīn aṭ-Ṭūsī, the 13th-century Persian philosopher and mathematician. *Akhlāq-i Jalālī* (*The Practical Philosophy of the Mohammadan People,* 1839) is an account of what a just ruler should or should not do. It describes the various components of an ideal society and how that society should be administered.

Dawānī also attempted to demonstrate that there need be no conflict between the mystical and philosophical views of the world, that they could coexist but that, because a mystic reaches his conclusions through faith based on divine grace, he is superior to a philosopher, who is motivated by human knowledge and possibly doubt. After his death Dawānī was taken to his native village of Dawān for burial.

Dawes, Charles G(ates) (b. Aug. 27, 1865, Marietta, Ohio, U.S.—d. April 23, 1951, Evanston, Ill.), U.S. vice president, ambassador, and author of the "Dawes Plan" for managing Germany's reparations payments after World War I.



Charles G. Dawes, 1925

By courtesy of the Library of Congress, Washington, D.C.

Educated at Marietta College and Cincinnati Law School, Dawes practiced law in Lincoln, Neb. (1887–94), and then moved to Evanston, which he made his permanent home. He was U.S. comptroller of the currency from 1897 to 1902, when he returned to private business and organized the Central Trust Company of Illinois. During World War I Dawes was head of supply procurement for the American Expeditionary Force in France. He resigned as brigadier general in 1919. In 1921 he was appointed the first U.S. director of the budget.

In 1923, Dawes was appointed by the Allied Reparations Commission to plan a solution for the problem of Germany's inability to pay reparations for their presumed liability for World War I. Dawes presided over a committee of experts that submitted a plan (1924) providing for a reorganization of German finances with the assistance of loans from U.S. investors. This "Dawes Plan" (*q.v.*) saved Europe from economic collapse for a few years, but it proved to be only a partial solution for the dilemma of world economic disorganization.

Dawes was vice president under Pres. Calvin Coolidge (1925–29), and from 1929 to 1932 he was U.S. ambassador to Great Britain. During the Depression he returned to the U.S. (1932) to direct the Reconstruction Finance Corporation. He resigned the same year and reentered the banking business.

In 1925 Dawes was awarded the Nobel Prize for Peace jointly with Sir Austen Chamberlain. He was the author of several works including *A Journal of the Great War* (1921), *Notes as Vice President* (1935), and *A Journal of Reparations* (1939).

Dawes, Sophie: *see* Feuchères, Sophie Dawes, baronne de.

Dawes, William Rutter (b. March 19, 1799, London—d. Feb. 15, 1868, Haddenham, Buckinghamshire, Eng.), English astronomer known for his extensive measurements of double stars and for his meticulous planetary observations.

Trained as a physician, Dawes practiced at Haddenham and (from 1826) Liverpool; subsequently he became a Nonconformist clergyman. In 1829 he set up a private observatory at Ormskirk, Lancashire, where he measured more than 200 double stars before taking charge of George Bishop's Observatory at South Villa, Regent's Park, London, in 1839. He later set up private observatories at Cranbrook, Kent (1844); Wateringbury, Kent (1850); and Haddenham (1857). He was one of several independent discoverers of the "crepe ring" of Saturn (1850); he observed Jupiter's Great Red Spot (1857) several years before its existence was generally recognized; and he prepared exceptionally accurate drawings of Mars in 1864. Dawes received the Gold Medal of the Royal Astronomical Society in 1855 and was elected a fellow of the Royal Society in 1865. A crater on the Moon is named after him.

Dawes General Allotment Act, also called DAWES SEVERALTY ACT (Feb. 8, 1887), U.S. law providing for the distribution of Indian reservation land among individual tribesmen, with the aim of creating responsible farmers in the white man's image. It was sponsored in several sessions of Congress by Sen. Henry L. Dawes of Massachusetts and finally was enacted in February 1887. Under its terms, the president determined the suitability of the recipients and issued the grants, usually by a formula of 160 acres to each head of household and 80 acres to each unmarried adult, with the stipulation that no grantee could alienate his land for 25 years. The Indians who thus received land became U.S. citizens, subject to federal, state, and local laws. The original supporters of the act were genuinely interested in the welfare of the Indians, but there were not enough votes in Congress to pass it until it was amended to provide that any land remaining after the allotment to the Indians would be available for public sale. The combined influence of friends of the Indians and land speculators assured passage of the act.

Under the Dawes Act, Indian life deteriorated in a manner not anticipated by its sponsors. The social structure of the tribe was weakened; many nomadic Indians were unable to adjust to an agricultural existence; others were swindled out of their property; and life on the reservation came to be characterized by disease, filth, poverty, and despondency. The act also provided that any "surplus" land be made available to whites, who by 1932 had acquired two-thirds of the 138,000,000 acres the Indians had held in 1887.

Dawes Plan, arrangement for Germany's payment of reparations after World War I. On the initiative of the British and U.S. governments, a committee of experts, presided over by a U.S. financier, Charles G. Dawes, produced a report on the question of German

reparations for presumed liability for World War I. The report was accepted by the Allies and by Germany on Aug. 16, 1924. No attempt was made to determine the total amount of reparations to be paid, but payments were to begin at 1,000,000,000 gold marks in the first year and rise to 2,500,000,000 by 1928. The plan provided for the reorganization of the Reichsbank and for an initial loan of 800,000,000 marks to Germany. The Dawes Plan seemed to work so well that by 1929 it was believed that the stringent controls over Germany could be removed and total reparations fixed. This was done by the Young Plan (*q.v.*).

Dawḥah, ad- (Qatar): *see* Doha.

dawn horse, extinct genus (*Hyracotherium*) of ancestral horses that flourished in North America and Europe during the Early Eocene Epoch (57.8 to 52 million years ago). The North American species were formerly grouped separately in the genus *Eohippus,* but all known species of dawn horses are now recognized within the single genus *Hyracotherium.*

The dawn horse was a form close to the common ancestry of all the odd-toed hoofed mammals, the perissodactyls, that stood 30 to 60 cm (1 to 2 feet) high at the shoulder, depending on the species. It was adapted to running, with hind legs longer than the forelegs. The body was lightly constructed, with slender limbs and elongated feet. The skull varied in length in different individuals: some specimens have a relatively short face or region in front of the eyes, a primitive condition; in other specimens, the face is relatively long and more horselike in appearance. The body was raised well off the ground and supported by the toes, which were held in an almost vertical position. Even though four toes were present on the front feet and three on the hind feet, all the feet were functionally three-toed. Each



Dawn horse (*Hyracotherium*) skeleton
By courtesy of the American Museum of Natural History, New York

toe ended in a small hoof. In the dawn horse the incisor teeth were small, and the cheek teeth had exceptionally low crowns. In general the teeth were still primitive, but progressive trends are evident. It was a browsing form rather than a grazer and had probably already come to rely heavily upon running in order to escape predators. The dawn horse was succeeded by *Orohippus,* which differed from it primarily in dentition.

dawn redwood (species *Metasequoia glyptostroboides*), coniferous, nonevergreen tree and only living species of the genus *Metasequoia,* of the deciduous cypress family (Taxodiaceae), native to remote valleys of central China. In the dawn redwood, both branchlets and leaves grow out in pairs from points along the stem. The bright-green, feathery leaves turn reddish brown in autumn. The cones have long, slender stalks.

Fossils now known as *Metasequoia* were once considered to belong to the genus *Sequoia;* the genus *Metasequoia* was not delineated and named until 1941. The abundance of fossil specimens indicated widespread distribution in the northern and middle latitudes of Asia and North America during the Cretaceous and Lower Tertiary periods. Until living trees were discovered in the 1940s, *Metasequoia* was thought to be extinct. Only a few thousand trees are known to have survived in central China, at altitudes of 700 to 1,400 m (2,300 to 4,600 feet). Since these stands were discovered, seeds and cuttings have been planted throughout the world.

Dawson, formerly DAWSON CITY, city, western Yukon Territory, Canada. It lies at the confluence of the Klondike and Yukon rivers, near the Alaska, U.S., boundary, 165 miles (265 km) south of the Arctic Circle. The



Dawson City, Yukon Territory, during the gold rush
Public Archives of Canada—National Film Board of Canada Photothèque

community, named for George M. Dawson, the geologist-explorer, developed after the gold strike at nearby Bonanza Creek in 1896. During the height of the Klondike Gold Rush in 1898, Dawson's population exceeded 30,000, only to be followed by a spectacular decline resulting from the exhaustion of the most readily accessible mines. The city's position as the capital of the Yukon, gained in 1898, was lost in 1953 when the distinction was transferred to Whitehorse. Gold dredging continued on a limited scale along the Klondike until operations ceased in 1966, leaving the place to function as a tourist base and local distributing centre. The restored cabins of Jack London and Robert W. Service recall the city's past association with those colourful writers. The annual (August) Discovery Day celebrations extol the past glory of Dawson, which in 1967 was declared a national historic complex and is now part of the Klondike Gold Rush International Historic Park, a cooperative undertaking between Canada and the United States. Inc. 1906. Pop. (1991) 972.

Dawson, George Geoffrey, original name GEORGE GEOFFREY ROBINSON (b. Oct. 25, 1874, Skipton-in-Craven, Yorkshire, Eng.—d. Nov. 7, 1944, London), English journalist, editor of the *Times* from 1912 to 1919 and from 1923 until his retirement in 1941. His name was originally Robinson, but he changed it by deed poll in 1917, following an inheritance.

Educated at Eton and at Magdalen College, Oxford, and elected a fellow of All Souls College, Oxford, in 1898, he entered the civil service and went to South Africa (1901) as private secretary to Lord Milner, then high commissioner. He became a journalist almost by accident, when Milner persuaded the owners of the *Johannesburg Star* to appoint him editor, to ensure continued support for the Milner policy after Milner's return to England. Dawson became Johannesburg correspondent of the *Times* and by his dispatches attracted the personal interest of Lord Northcliffe, who in 1912 made him editor. By 1919, however, Northcliffe's increasing determination to run the paper as an instrument of his personal policy led to a break, and Dawson agreed to go. He was succeeded by Henry Wickham Steed, but in 1923, after Northcliffe's death (1922), when John Jacob Astor (later Lord Astor) became chief proprietor, Dawson was invited to return, on terms that gave him authority over editorial policy.

As editor of the *Times* Dawson exercised great influence on affairs for more than a quarter of a century. Although he had quarreled with Northcliffe for doing the same thing, he made the *Times* the instrument of his personal policy. A close intimate in turn of Stanley Baldwin and Neville Chamberlain, he was a leader in the group connected with the quarterly magazine *Round Table,* which sought to influence national policies by intimate and private exchanges with leading statesmen; he saw himself as the "secretary-general of the Establishment." A firm believer in appeasement, he became, both through the *Times* and in personal relations with ministers, one of the chief instruments of the policy that reached its climax with the Munich Agreement (1938), which gave in to Adolf Hitler's demands for the Sudetenland region of Czechoslovakia.

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Dawson, Sir John William (b. Oct. 30, 1820, Pictou, Nova Scotia [now in Canada]—d. Nov. 20, 1899, Montreal, Que., Can.), Canadian geologist who made numerous contributions to paleobotany and extended the knowledge of Canadian geology.

During his term as superintendent of education for Nova Scotia (1850–53), Dawson studied the geology of all parts of the province, making a special investigation of the fossil forests of the coal-bearing strata. In the same year that he published the results of his studies in *Acadian Geology* (1855), he became professor of geology and principal of McGill University, Montreal. During the following 38 years he transformed McGill from an understaffed, insignificant school into a progressive university with a worldwide reputation. In addition, he maintained a rapid pace of scientific writing, averaging more than 10 papers a year, and he helped found the Montreal Normal School, serving as its principal for 13 years.

In 1859 he announced his discovery of the then-earliest-known land plant, *Psilophyton,* which he found in Devonian strata (dating from 408 to 360 million years ago). In *Air Breathers of the Coal Period* (1863) he described newly discovered fossil animals. Dawson was knighted in 1884.

Dawson Creek, city, northeastern British Columbia, Canada. The city lies along Dawson Creek near the Alberta border. It has the Mile "Zero" post marking the beginning of the Alaska Highway and is a terminus of the British Columbia Railway from Vancouver (741 miles [1,193 km] south-southwest) and the Northern Alberta Railway from Edmonton (360 miles [580 km] southeast). The economy depends largely on agriculture (especially grain and forage crop seed), livestock raising, lumbering, tourism (hunting and fishing), trucking, and oil refining. Laid out about 1919, it was incorporated as a village in 1936 and developed after the completion of the Alaska Highway to Fairbanks during World War II. Inc. city, 1958. Pop. (1991) 10,981.

Dawson River, river in eastern Queensland, Australia. It rises in the Carnarvon Range and flows southeast, northeast, and north for about 400 miles (640 km) through a 50-mile-wide valley to join the Fitzroy River near Duaringa. The Dawson Valley Irrigation Project (inaugurated 1923) comprises several weirs and mainly serves cotton and dairy farms. Explored in 1844 by Friedrich Ludwig Leichhardt, the river was named for Robert Dawson, one of the expedition's backers.

dawsonite, a carbonate mineral, $NaAlCO_3(OH)_2$, that is probably formed by the decomposition of aluminous silicates. Of low-temperature, hydrothermal origin, it occurs in

Montreal, where it was first discovered; near Monte Amiata, Tuscany, Italy; and in Algiers. In the oil shale near Green River, Wyo., U.S., it occurs as extensive beds that constitute a source of aluminum. For detailed physical properties, *see* carbonate mineral (table).

Dax, town, Landes *département,* Aquitaine *région,* southwestern France. It lies on the left bank of the Adour River, 88 miles (142 km) southwest of Bordeaux and 50 miles (80 km) north of the Pyrenees frontier with Spain. The town is a spa resort whose thermal springs and mud baths have been noted for the cure of rheumatism since Roman times, when it was known as Aquae Tarbellicae. Situated on the edge of the Landes Forest, it is also a tourist centre. The remains of its Gallo-Roman walls have been made into a promenade. At the Place de la Fontaine Chaude, near the Roman wall, there are hot springs, the waters of which gush out at a temperature of 147° F (64° C). Near the river is a park with a bull ring. Small-scale woodworking and leatherworking are local industries. Pop. (1990) 20,119.

Daxue Shan (China): *see* Ta-hsüeh Mountains.

day, time required for a celestial body to turn once on its axis; especially the period of the Earth's rotation. The sidereal day is the time required for the Earth to rotate once relative to the background of the stars—*i.e.,* the time between two observed passages of a star over the same meridian of longitude. The apparent solar day is the time between two successive transits of the Sun over the same meridian. Because the orbital motion of the Earth makes the Sun seem to move slightly eastward each day relative to the stars, the solar day is about four minutes longer than the sidereal day; *i.e.,* the mean solar day is 24 hours 3 minutes 56.555 seconds of mean sidereal time; more usually the sidereal day is expressed in terms of solar time, being 23 hours 56 minutes 4 seconds of mean solar time long. The mean solar day is the average value of the solar day, which changes slightly in length during the year as Earth's speed in its orbit varies.

The solar day is the fundamental unit of time in both astronomical practice and civil life. It begins at midnight and runs through 24 hours, until the next midnight. A day is commonly divided into two sets of 12 hours for ordinary timekeeping purposes; those hours from midnight to noon are designated AM (ante meridiem, "before noon"), and those from noon to midnight are designated PM (post meridiem, "after noon"). In law the word day, unless qualified, means the 24 hours between midnight and midnight, rather than the daylight hours between sunrise and sunset.

Day, Benjamin Henry (b. April 10, 1810, West Springfield, Mass., U.S.—d. Dec. 21, 1889, New York, N.Y.), American printer and journalist who founded the *New York Sun,* the first of the "penny" newspapers in the United States.

Starting in 1824 as a printer's apprentice of the *Springfield* (Mass.) *Republican,* Day moved to New York City and opened his own printing business in 1831. He launched the *Sun* partly to create business for his shop. By 1839 the paper's circulation had climbed to 50,000. To build circulation, Day emphasized the human side of the news, stressing crime and sensation but including elements of pathos and humour. He hired reporter George Wisner to write a column of brief "Police Office" items. Wisner became the United States' first police reporter.

In 1840, having sold the *Sun,* Day launched the *True Sun,* another penny paper. In 1842 he started *Brother Jonathan,* a magazine that reprinted old British novels. He was succeeded as publisher by his son Benjamin, Jr., who invented the Ben Day process for producing a halftone image of printing plates. Another son was the father of Clarence Day, noted for his autobiography, *Life With Father.*

Day, Clarence (Shepard) (b. Nov. 18, 1874, New York, N.Y., U.S.—d. Dec. 28, 1935, New York), American writer whose greatest popular success was his autobiographical *Life with Father.*

Educated at St. Paul's School, Concord, N.H., and at Yale University (A.B., 1896),



Clarence Day, 1916
By courtesy of the Library of Congress, Washington, D.C.

Day became a member of the New York Stock Exchange in 1897 and joined his father's brokerage firm as a partner. He enlisted in the U.S. Navy the following year but was stricken by arthritis, a disease that left him an invalid.

In 1920 his first book, *This Simian World,* a collection of humorous essays and illustrations, appeared. This was followed by *The Crow's Nest* (1921) and *Thoughts Without Words* (1928). He achieved great success with *God and My Father* (1932), *Life with Father* (1935), and *Life with Mother* (1936). Drawn from his own family experiences, these were pleasant and gently satirical portraits of a late Victorian household dominated by a gruff, opinionated father and a warm, charming mother. Day was a frequent contributor to *The New Yorker* magazine. *Life with Father* was dramatized by Howard Lindsay and Russel Crouse in 1939 and had a decade of success on the American stage.

Day, Doris, original name DORIS VON KAPPELHOFF (b. April 3, 1924, Cincinnati, Ohio, U.S.), American singer and motion-picture actress whose performances in movie musicals of the 1950s and sex comedies of the early '60s made her a leading Hollywood star.

While still a teenager, she changed her last name to Day when she began singing on radio. She worked as a vocalist in the bands of Barney Rapp and Bob Crosby before joining Les Brown's band in 1940 and making several popular recordings, among them "Sentimental Journey." Day went solo in 1947 and achieved great success as a recording artist. Her singing was distinguished by crystal-clear tone and the ability to convey great emotion without histrionics.

Day's first major film role was in *Romance on the High Seas* (1948). From there she made a long series of musicals, including *Calamity Jane* (1953), *Young at Heart* (1955), *Love Me or Leave Me* (1955), and *The Pajama Game* (1957). Her screen persona, that of an intelligent, wholesome woman of unfailing optimism and understated strength of character, came to epitomize the ideal American woman of the 1950s. Day went on to star in a string of sophisticated sex comedies, notably *Teacher's Pet* (1958), *Pillow Talk* (1959), *Lover Come Back* (1962), *That Touch of Mink* (1962), *The Thrill of It All* (1963), and *Send Me No Flowers* (1964). These comedies made her Hollywood's leading box-office attraction. From 1968 to 1973 she starred in *The Doris Day Show,* a weekly television series.

Day, John (b. 1574, Cawston, Norfolk, Eng.—d. 1640?), Elizabethan dramatist whose verse allegory *The Parliament of Bees* shows unusual ingenuity and delicacy of imagination.

About 1598 Day became a playwright for the theatre proprietor and manager Philip Henslowe. In this capacity Day collaborated with Thomas Dekker, Henry Chettle, and some lesser-known writers. His first extant play is *The Blind Beggar of Bethnal Green* (1600), cowritten with Chettle. Among his other plays are *The Ile of Guls* (1606) and *Humour Out of Breath* (1608). Day's reputation rests mainly on *The Parliament of Bees,* which is traditionally dated 1607, though no edition earlier than that of 1641 exists. This exquisite masque, which is actually a series of pastoral eclogues, is about "the doings, the births, the wars, the wooings" of bees. The bees hold a parliament under Prorex, the Master Bee, and grievances are presented against the bumblebee, the wasp, the drone, and other insects whom the author uses to represent various human types. The satirical allegory ends with a royal progress of the fairy king Oberon, who dispenses justice among the bees.

Day, Stephen, Day also spelled DAYE (b. *c.* 1594, London, Eng.—d. Dec. 22, 1668, Cambridge, Mass.), founder of the first printing press in England's North American colonies.

Day himself does not seem to have been a printer. He was a locksmith in Cambridge, Eng., and, in 1638, contracted with the Reverend Jose Glover, a wealthy dissenting clergyman, to set up the first printing press in the colonies. Although Glover died on the sea voyage, Day and Glover's widow set up the press in Cambridge, Mass., and by March 1639 it was in full operation. The first printed piece from the press was *The Freeman's Oath* (January 1639); the second, an *Almanack* by William Pierce, a mariner (1639); the third, *The Whole Booke of Psalmes,* now known as the *Bay Psalm Book* (1640). Stephen Day's name does not appear on any of his publications. The name of his son Matthew, who was next in charge and apparently did the typesetting, appears on the title page of a later volume of the *Almanack* (1647). When Glover's widow married Henry Dunster, president of Harvard College, Day's press became the forerunner of Harvard University Press.

Day, William R., in full WILLIAM RUFUS DAY (b. April 17, 1849, Ravenna, Ohio, U.S.—d. July 9, 1923, Mackinac Island, Mich.), statesman and justice of the U.S. Supreme Court (1903–22).

After graduation from the University of Michigan, Ann Arbor, (1870), and admission to the bar, Day began to practice law in Canton, Ohio. He was made a judge of the Court of Common Pleas (1886) but was prevented by illness from assuming a subsequent appointment to the U.S. District Court.

In 1897 Day was appointed assistant secretary of state by President William McKinley, and, with the outbreak of the Spanish-American War (1898), he became U.S. secretary of state. Opposed to the imperialist sentiment engendered by the war, Day argued against outright seizure of the Philippines and for fair purchase of the islands. He resigned his cabinet office after five months in order to lead the U.S. delegation in negotiating the peace treaty with Spain.

After serving on the U.S. Court of Appeals (1899–1903), he was appointed to the Supreme Court by President Theodore Roosevelt. A swing member of the court, Day generally voted with liberals in dissolving trusts and upholding the right of states to pass laws promoting health and safety but sided with conservatives in barring the federal government from imposing such reforms on the states.

day-care centre: *see* day nursery.

Day-Lewis, C(ecil) (b. April 27, 1904, Ballintubbert, County Leix, Ire.—d. May 22, 1972, Hadley Wood, Hertfordshire, Eng.), one of the leading British poets of the 1930s; he then turned from poetry of left-wing political statement to an individual lyricism expressed in more traditional forms.

The son of a clergyman, Day-Lewis was educated at the University of Oxford and taught school until 1935. His *Transitional Poem* (1929) had already attracted attention, and in the 1930s he was closely associated with W.H. Auden (whose style influenced his own) and other poets who sought a left-wing political solution to the ills of the day. Typical of his views at that time is the verse sequence *The Magnetic Mountain* (1933) and the critical study *A Hope for Poetry* (1934).

Day-Lewis was Clark lecturer at the University of Cambridge in 1946; his lectures there were published as *The Poetic Image* (1947). In 1952 he published his verse translation of Virgil's *Aeneid*, which was commissioned by the BBC. He also translated Virgil's *Georgics* (1940) and *Eclogues* (1963). He was professor of poetry at Oxford from 1951 to 1956. *The Buried Day* (1960), his autobiography, discusses his acceptance and later rejection of communism. *Collected Poems* appeared in 1954. Later volumes of verse include *The Room and Other Poems* (1965) and *The Whispering Roots* (1970).

At his death he was poet laureate, having succeeded John Masefield in 1968. Under the pseudonym of Nicholas Blake he also wrote detective novels, including *Minute for Murder* (1948) and *Whisper in the Gloom* (1954).

day lily, any plant of the genus *Hemerocallis* of the family Liliaceae, consisting of about 15 species of perennial herbs distributed from central Europe to eastern Asia. Members of the genus have long-stalked clusters of funnel- or bell-shaped flowers that range in colour from yellow to red and are each short-lived (hence "day" lily). Day lilies also have fleshy roots and narrow, sword-shaped leaves that are grouped at the base of the plant.



Day lily (*Hemerocallis*)
Franklin K. Anderson

The day lily fruit is a capsule. Some species of *Hemerocallis* are cultivated as ornamentals or for their edible flowers and buds.

day nursery, also called DAY-CARE CENTRE, NURSERY SCHOOL, or CRÈCHE (French: "crib"), institution for the daytime care of infants and young children. Such institutions appeared in France about 1840, and the Société des Crèches was recognized by the French government in 1869. Day nurseries were established in most European cities and industrial centres during the second half of the 19th century; the first in Great Britain, for example, was established in 1860. In the United States, the terms day nursery, day- or child-care centre, and nursery school are often used interchangeably to identify various types of day care for children and for preschool educational programs.

Services to young children and their families have a longer history in European and Asian countries than in the United States, where day-care centres are generally private and of uneven quality. In many countries day-care facilities are associated with the mother's place of work. Infant care and preschool education are a normal provision in most socialist countries, and in some countries, such as France and Italy, they are included in the regular public-school system.

Dayak, also spelled DYAK, Dutch DAJAK, the non-Muslim indigenous peoples of southern and western Borneo (modern Kalimantan). Most of them live along the banks of the



Dayak tribesman performing a ceremonial war dance in Borneo
Harrison Forman

larger rivers. Dayak is a generic term that has no precise ethnic or tribal significance and that is applied to any of the (non-Muslim) indigenous peoples of the interior of Borneo (as opposed to the largely Malay population of the coastal areas).

Various subgroups of the Dayak have been distinguished, although lines of demarcation are difficult to establish. Among the most important of the major groupings are the Bahau tribes (including the Kayan and Kenyah) of central and eastern Borneo, the Ngaju tribes of southern Borneo, the Land Dayak of southwestern Borneo and Sarawak, and the Iban, or Sea Dayak, of Sarawak. In the late 20th century the Dayak population of Borneo was estimated at 2,000,000 to 2,200,000.

These riverine peoples live in longhouse communities, seldom with more than a few hundred members, and trace their descent through both the male and female lines. The family is the basic unit, and children remain with their parents until married. A boy usually seeks his bride outside his own village and goes to live in her community. There is, however, little tribal unity between communities closely related in language, custom, and marriage. Among the Iban and Land Dayak, class distinction is absent. The Kayan and Kenyah recognize three strata of society; the upper consists of the family and near relatives of the village chiefs, the middle consists of common villagers, and the lower is made up of captives of war and other persons looked down upon for various reasons.

In general, their subsistence economies rest on the shifting cultivation of hill rice, with fishing and hunting as subsidiary activities. Their tools are of iron, and their principal weapons are the sword, the spear, and the blowpipe. Their languages all belong to the Indonesian branch of the Austronesian (Malayo-Polynesian) family. Their religious beliefs are animistic and polytheistic, highly developed and complex. Formerly, intertribal warfare was rife, with headhunting a major feature.

The name Sea Dayak, though still in official use, is a misnomer, for the Iban, to whom it refers, are primarily a riverine and hill people whose economy is based on rice cultivation.

Dayan, Moshe (b. May 20, 1915, Deganya, Palestine [now in Israel]—d. Oct. 16, 1981, Tel Aviv, Israel), soldier and statesman who led Israel to dramatic victories over its Arab neighbours and became a symbol of security to his countrymen.

Dayan was born on Israel's first kibbutz and was raised on the country's first successful cooperative farm settlement (*moshav*), Nahalal. He began his military career in 1937, when he learned guerrilla warfare from the British officer Captain Orde Wingate in the special night squadrons. These were organized to fight Arab rebel bands in Palestine, and they formed the nucleus of a Jewish army. Convinced that the Jews would have to fight for their independence, Dayan joined the Haganah, an illegal Jewish defense force, and was arrested and imprisoned (1939–41) by British authorities. After his release he led Palestinian Jewish forces against the Vichy French in Syria, where he lost his left eye in action, thereafter wearing the black patch that became his hallmark.

In Israel's war of independence in 1948, Dayan was commander of the Jerusalem area, and in 1949 he participated in armistice negotiations between Jordan and Israel. While chief of staff of the Israeli armed forces (1953–58), he planned and led the 1956 invasion of the Sinai Peninsula. That conflict with Egypt established his reputation as a military commander. His memoirs of the action, *Diary of the Sinai Campaign,* were published in 1966.

In 1959 Dayan was elected to the Knesset (Parliament) as a member of Mapai, a party within the Israel Labour Party coalition, and was appointed minister of agriculture by his long-time mentor, Prime Minister David Ben-Gurion. He served until 1964, when he resigned during a political conflict between factions led by Ben-Gurion and by the new prime minister, Levi Eshkol.

Dayan was again elected to the Knesset in 1965 as a member of Ben-Gurion's new splinter party, Rafi (Alliance of Israel's Workers). On June 1, 1967, when war with Israel's Arab



Dayan
Gamma Liaison

neighbours was imminent, Dayan was appointed minister of defense. Together with the chief of staff, Yitzhaq Rabin, he directed operations during the Six-Day War (June 5–10, 1967), and he later administered the territories occupied by Israel. Dayan gained increasing influence over Israel's conduct of foreign affairs in the early 1970s, but when Egypt and Syria unexpectedly attacked Israel on Oct. 6, 1973 (Yom Kippur), Dayan was pilloried for the country's lack of preparedness. When Rabin succeeded Golda Meir as prime minister

in June 1974, he dropped Dayan from the Cabinet. Four years later, as foreign minister under Menachem Begin, Dayan became one of the chief architects of the Camp David Accords. Then, angered by Begin's plan to assert Israeli sovereignty over the occupied West Bank area which was legally still part of Jordan, he resigned in October 1979. In 1981 he formed a new party, Telem, which advocated unilateral Israeli disengagement from the territories occupied in the 1967 wars. Dayan's autobiography, *The Story of My Life,* was published in 1976.

After Dayan's death, controversy arose over his extensive private collection of antiquities, part of which he had accumulated through unauthorized and unscientific digs. The collection was eventually sold by his second wife to the Israel Museum.

Dayananda Sarasvati, original name MULA SANKARA (b. 1824, Tankāra, Gujarāt, India—d. Oct. 30, 1883, Ajmer, Rājputāna), Hindu ascetic and social reformer who was the founder (1875) of the Arya Samaj, a Hindu reform movement advocating a return to the temporal and spiritual authority of the Vedas, the earliest scriptures of India.

Dayananda received the early education appropriate to a young Brahman of a well-to-do family. At the age of 14 he accompanied his father on an all-night vigil at a Śiva temple. While his father and some others fell asleep, mice, attracted by the offerings placed before the image of the deity, ran over the image, polluting it. The experience set off a profound revulsion in the young boy against what he considered to be senseless idol worship. His religious doubts were further intensified five years later by the death of a beloved uncle. In a search for a way to overcome the limits of mortality, he was directed first toward Yoga (a system of mental and physical disciplines). Faced with the prospect of a marriage being arranged for him, he left home and joined the Sarasvati order of ascetics.

For the next 15 years (1845–60) he traveled throughout India in search of a religious truth and finally became a disciple of Swami Birajananda. His guru, in lieu of the usual teacher's fees, extracted a promise from Dayananda (the name taken by him at the time of his initiation as an ascetic) to spend his life working toward a reinstatement of the Vedic Hinduism that had existed in pre-Buddhist India.

Dayananda first attracted wide public attention for his views when he engaged in a public debate with orthodox Hindu scholars in Benares (Vārānasi) presided over by the maharaja of Benares. The first meeting establishing the Arya Samaj (Society of Aryans [Nobles]) was held in Bombay on April 10, 1875. Although some of Dayananda's claims to the unassailable authority of the Vedas seem extravagant (for example, modern technological achievements such as the use of electricity he claimed to have found described in the Vedas), he furthered many important social reforms. He opposed child marriage, advocated the remarriage of widows, opened Vedic study to members of all castes, and founded many educational and charitable institutions. The Arya Samaj also contributed greatly to the reawakening of a spirit of Indian nationalism in pre-Independence days.

Dayananda died after vigorous public criticism of a princely ruler, under circumstances suggesting that he might have been poisoned by one of the maharaja's supporters; but the accusation was never proved in court.

Daye (China): *see* Ta-yeh.

dayflower, any member of the genus *Commelina* (family Commelinaceae), which includes about 100 species of weak-stemmed herbs of wide distribution, only a few of which are of horticultural interest. *Commelina coelestis, C. diffusa,* and *C. erecta* are often grown as ground covers because of their sprawling habit and their small blue flowers. Especially in moist shady places, they spread easily by cuttings and seed and by rooting of their prostrate stems. As the common name implies, the flowers fade quickly.

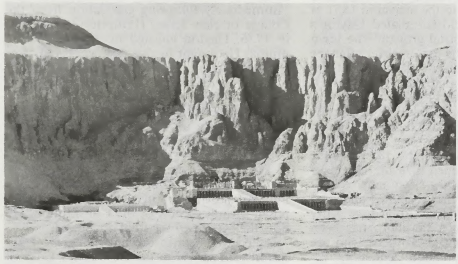
daylight saving time, also called SUMMER TIME, system for uniformly advancing clocks, especially in summer, so as to extend daylight hours during conventional waking time. In the Northern Hemisphere, clocks are usually set ahead one hour in late March or in April and are set back one hour in late September or in October.

The practice was first suggested in a whimsical essay by Benjamin Franklin in 1784. In 1907 an Englishman, William Willett, campaigned for setting the clock ahead by 80 minutes in four moves of 20 minutes each during the spring and summer months. In 1908 the House of Commons rejected a bill to advance the clock by one hour in the spring and return to Greenwich Mean (standard) Time in the autumn.

Several countries, including Australia, Great Britain, Germany, and the United States, adopted summer daylight saving time during World War I to conserve fuel by reducing the need for artificial light. During World War II, clocks were kept continuously advanced by an hour in some nations—*e.g.,* in the United States from Feb. 9, 1942, to Sept. 30, 1945; and England used "double summer time" during part of the year, advancing clocks two hours from the standard time during the summer and one hour during the winter months.

In the United States, daylight saving time formerly began on the last Sunday in April and ended on the last Sunday in October. In 1986 the U.S. Congress passed a law moving up the start of daylight saving time to the first Sunday in April, while keeping its end date the same. In most of the countries of western Europe, daylight saving time starts on the last Sunday in March and ends on the last Sunday in September. In Britain and many other countries worldwide, it lasts from March 30 to October 26.

Dayr al-Baḥrī, also spelled DAIR AL-BAḤRĪ, or DEIR EL BAHRI, Egyptian archaeological site in the necropolis of Thebes. Comprising a bay in the cliffs, it lies on the west bank of the Nile, east of the Valley of the Kings; its name (Arabic for "northern monastery") refers to a monastery built there in the 7th century AD. Of the three ancient Egyptian structures on the site, one, the funerary temple of King Mentuhotep II (built *c.* 1970 BC) has lost much of its superstructure. The second, the terraced temple of Queen Hatshepsut (built *c.* 1470 BC), was uncovered (1894–96) beneath the monastery ruins and subsequently underwent partial restoration. A fuller restoration of the third terrace, sanctuary, and retaining wall was started in 1968 by a Polish archaeological mission, which also found a third temple built by Thutmose III, in about 1435 BC, above and between the two earlier temples. It had been destroyed by a rockfall in about 1160 BC. All three temples were linked by long causeways to valley temples with docking facilities. Situated against one of the cliffs, Hatshepsut's temple is a famous example of creative architectural exploitation of a site.



Temples of Mentuhotep II (left) and Queen Hatshepsut (right) at Dayr al-Baḥrī
Hirmer Fotoarchiv, Munchen

Dayr al-Madīnah, ancient site on the west bank of the Nile, at Thebes in Upper Egypt. It is known primarily as the location of a settlement for craftsmen who laboured on the royal tombs, especially those in the nearby Valley of the Kings (Bībān al-Mulūk). The village, the best-preserved of its type, has provided modern scholars with helpful insights into the living conditions of the state labourers. The settlement has also yielded thousands of inscribed papyri and ostraca fragments; these fragments have been an invaluable source of information not only about the literary and religious aspects of the workers' daily lives but also (especially regarding the 20th dynasty, 1190–1075 BC) about the economic and, less directly, the political fortunes of the time. Dayr al-Madīnah is also the location of numerous tombs of the artisans who lived in the New Kingdom village, private tombs from the 19th and 20th dynasties, and three temples erected for the workers' use.

Dayr az-Zawr, also spelled DEIR EZ-ZOR, town, eastern Syria. The town is situated on the right bank of the Euphrates River; its name, meaning "monastery of the grove" (*zawr,* "tamarisk"), is probably derived from the ancient city of Auzara, or Azuara, situated nearby. The Ottomans built the present town in 1867 to curb the nomads of the Euphrates area. Under the Ottomans it was the capital of an administrative region, the seat of the governor, and the site of outposts policing the surrounding country. Occupied by the British after the Ottoman retreat in 1918, Dayr az-Zawr was then taken by Faysal I (son of Ḥusayn ibn 'Alī, king of Hejaz) for a short time before the French occupation began in 1921. In 1941 it was captured by a British force to prevent Syria and Lebanon from falling to Axis troops, and in 1946 the town became part of the Republic of Syria.

Dayr az-Zawr is the principal trade centre of the Aleppo–Mosul and Damascus–Mosul roads and is also on several cross-desert routes. Dayr az-Zawr has a university (1977), a cultural centre for painting, sculpture, dramatic art, and folk dancing, and a museum (housed in a shopping mall until a museum building could be completed in the 1980s) that contains objects from such nearby excavations as Tall Birāk, Buqrus, Tall Leilān, and Ashara. The major tourist attraction along the

corniche (road along the river) is the suspension bridge across the Euphrates built by the French in 1924. The town serves as a supply and recreation centre for oil exploration teams working in the area. Extensive new residential construction features single-family houses built in the local stone, with individual gardens. Pop. (1985 est.) 103,890.

Dayton, city, seat (1803) of Montgomery county, southwestern Ohio, U.S., 54 miles (87 km) northeast of Cincinnati, on a low floodplain of the Great Miami River, at the confluence of the Stillwater and Mad rivers and of Wolf Creek. It is the heart of a metropolitan area that includes the cities of Kettering, Miamisburg, Xenia, Fairborn, Oakwood, and Vandalia.



Dayton Art Institute, Dayton, Ohio
Milt and Joan Mann—CAMERAMANN INTERNATIONAL, LTD.

Following the peace treaty with the Shawnee Indians, signed at Greenville (1795), the area was opened to white settlement. The town was laid out by a group of Revolutionary War veterans, including Jonathan Dayton from New Jersey, for whom it was named. It developed as a river port for the shipment of agricultural produce, mainly to New Orleans. The opening of the Miami and Erie Canal, from Dayton to Cincinnati, in 1829, and the arrival in 1851 of a railroad to Springfield stimulated Dayton's commercial and industrial growth. The town became the home of the cash register after the mechanical money drawer was invented there by James Ritty and perfected by John H. Patterson in the 1880s. The automobile selfstarter was also developed there by Charles F. Kettering, who, along with Edward A. Deeds, also produced ignition systems and electric light equipment for farms. In 1892 Wilbur and Orville Wright opened their bicycle repair shop in Dayton, where they conducted experiments that led to the first sustained and controlled flight of a powered airplane, at Kitty Hawk, N.C., in 1903; a monolith has been erected in memory of the brothers, who are buried in the city's Woodland Cemetery.

In 1913 the most disastrous of a series of floods occurred in the area. After this, the Miami Conservancy District, a comprehensive flood-control project, was created. Dayton is now the heart of a large diversified urban complex and a market and distribution centre for a fertile agricultural region. It is also a national aviation centre, stemming from the establishment of experimental aviation laboratories during World Wars I and II and Wright–Patterson Air Force Base (1946), with its modern aviation complex, Air Force Institute of Technology (1947), and museum (1971). Manufactures include auto parts and equipment, machine tools, refrigerators, air conditioners, computers, accounting machines, paper, rubber, putty, and mastics. Magazine printing is also important.

Within the metropolitan area are the University of Dayton (Roman Catholic; 1850), Wright State University (1967), the United Theological Seminary (United Methodist; 1871), Sinclair Community College (1887), and Miami–Jacobs Junior College of Business (1860). Dayton has an art institute, a museum of natural history, and a symphony orchestra. The Dayton home of black poet Paul Laurence Dunbar (1872–1906) is preserved as a state memorial and museum. Recreational facilities include Carillon Park, noted for concerts and historical exhibits (including a replica of the Wright Brothers bicycle shop). Inc. town, 1805; city, 1841. Pop. (1990) city, 182,044; Dayton-Springfield MSA, 951,270.

Dayton, city, seat (1890) of Rhea county, southeastern Tennessee, U.S., on Richland Creek near the Tennessee River, 36 miles (58 km) northeast of Chattanooga. Originally called Smith's Crossroads (*c.* 1820), it was renamed for Dayton, Ohio, by Cincinnati Southern Railroad engineers who constructed a bridge over the creek. The Rhea County Courthouse in Dayton was the scene of the so-called Monkey Trial (July 10–21, 1925), in which John T. Scopes, a biology teacher, was found guilty of teaching evolution. The trial pitted William Jennings Bryan for the prosecution against Clarence Darrow for the defense. Bryan College (1930) was built on a hill overlooking the city as a memorial to the silver-tongued orator and lawyer-politician, who died in Dayton five days after the trial ended. The city's economy is based on small manufactures, chiefly synthetic yarns, textiles, gas heating equipment, and electrical appliances. Inc. 1895. Pop. (1990) 5,671.

To make the best use of the Britannica, consult the INDEX *first*

Dayton, Jonathan (b. Oct. 16, 1760, Elizabeth, N.J.—d. Oct. 9, 1824, Elizabeth-Town, N.J., U.S.), youngest member of the U.S. Constitutional Convention, speaker of the U.S. House of Representatives, and developer of large tracts in what later became the state of Ohio. The city of Dayton, Ohio, is named for him.

Immediately following graduation from the College of New Jersey (Princeton University) in 1776, Dayton enlisted in the New Jersey militia. He fought in the New York and New Jersey campaigns, rose to the rank of captain, was at Yorktown in 1781, and returned to civilian life two years later.

Dayton then studied law and was admitted to the bar, but his future lay more in public service than in private law practice. He served in the New Jersey Assembly, 1786–87, then—at age 27—became the youngest delegate at the Constitutional Convention. Dayton was a frequent participant in the debates and opposed several aspects of the Constitution. He nonetheless signed the final document.

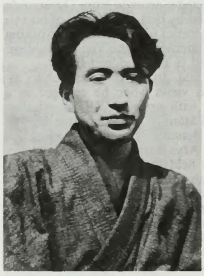
Elected to a seat in the first Congress, Dayton instead served in the New Jersey Council (1789) and Assembly (1790). But when elected once again to the U.S. House in 1790, he joined that body and remained there through the end of the decade. As a congressman he backed Hamilton's financial program, pressed for suppression of the Whiskey Rebellion (1794; a challenge of Pennsylvania farmers to federal authority), and supported the Jay Treaty with Great Britain (1794). During his last two terms he was speaker of the House.

Dayton was elected to the Senate, where he served for the term of 1799–1805. He opposed Jefferson's administration by voting against the repeal of the Judiciary Act of 1801, against the Twelfth Amendment, and for the acquittal of Supreme Court Justice Samuel Chase. But he favoured the Louisiana Purchase of 1803.

After Dayton left the Senate in 1805, he held public office just once more in his life—a term in the New Jersey legislature (1814–15). Most of his time he devoted to developing his large landholdings (250,000 acres [101,175 hectares]) in Ohio. He apparently played some role in Aaron Burr's western conspiracy of 1807 but—though indicted for high treason—was never prosecuted.

Daytona Beach, city, Volusia county, northeastern Florida, U.S., on the Atlantic Ocean and Halifax River (a tidewater lagoon, part of the Atlantic Intracoastal Waterway), 91 miles (146 km) south of Jacksonville. The original city, Daytona, was founded by Mathias Day of Ohio in 1870 and named after him when it was incorporated in 1876. In 1926 the cities of Seabreeze, Daytona, and Daytona Beach were incorporated as Daytona Beach. It is a noted year-round resort with varied light manufacturing. The world famous Ormond-Daytona beach of hard, white sand, 23 miles (37 km) long and 500 feet (150 m) wide at low tide, has been used for automobile speed trials since 1903. In 1935 Sir Malcolm Campbell drove his *Bluebird* over the course at 276.82 miles per hour. The city is known for the Daytona International Speedway (site of the Daytona 500 [February] and the Firecracker Stock Car 400 [July]) and its greyhound racing track. Educational institutions include Bethune-Cookman College (1872), Daytona Beach Community College (1958), and Embry Riddle Aeronautical University (1926). Pop. (1990) city, 61,921; Daytona Beach MSA, 370,712.

Dazai Osamu, pseudonym of TSUSHIMA SHŪJI (b. June 19, 1909, Kanagi, Aomori Prefecture, Japan—d. June 13, 1948, Tokyo), novelist who emerged at the end of World War II as the literary voice of his time. His dark, wry tone perfectly captured the confusion of postwar Japan, when traditional values were discredited and the younger generation nihilistically rejected all of the past.



Dazai Osamu
By courtesy of the International Society for Educational Information, Tokyo

Born in northern Japan, the sixth son of a wealthy landowner and politician, Dazai often reverted to his background as material for his fiction. Although the dominant mood of much of his writing was gloom, he was also famed for his humour, which sometimes approached farce. Dazai's first collection of short stories, *Bannen* (1936; "The Twilight Years"), showed him to be potentially a versatile writer of many styles and topics, but he tended toward the *shishōsetsu* ("I," or personal fiction) form, and the persona of the author was thenceforth to be seen in most of his fictional characters. Dazai was deeply concerned with his craft, and his stories were far from being mere confessional documents; nevertheless, his artistry

was often obscured by the wide publicity given to his dissipation, a source of continued attraction, especially to youthful readers. Almost alone among Japanese writers, Dazai continued to produce works of real literary merit during the war years (1941–45). *Otogi zōshi* (1945; "Fairy Tales"), new versions of traditional tales, represented a triumph of his style and wit. *Tsugaru* (1944), perhaps his best work, was a deeply sympathetic memorial to his place of birth. The tone of his postwar works—*Shayō* (1947; *The Setting Sun,* 1956), *Biyon no Tsuma* (1947; *Villon's Wife,* 1956), and *Ningen Shikkaku* (1948; *No Longer Human,* 1958), all translated by Donald Keene—becomes increasingly despairing, reflecting the emotional crisis of the author. After several unsuccessful attempts earlier in his life, Dazai committed suicide in 1948, leaving uncompleted a novel ominously entitled *Goodbye.*

dazhuan (script): *see* ta-chuan.

dB (unit): *see* decibel.

D.B.E., dame commander of the British Empire, member of the second highest class of a British order of knighthood. *See* British Empire, The Most Excellent Order of the.

Dbus-Gtsang, one of three regions into which the area of Central Asia inhabited by Tibetans is traditionally divided. Dbus and Gtsang were provinces in the days of the early kings of central Tibet, *c.* 7th century. The area of Dbus encompassed the Skyid-chu valley system in which Lhasa is located, as well as the Yar-klungs and 'Phyong-rgyas valleys on the south side of the Brahmaputra River (now in India), which together were the ancient regions of the Tibetan royal court. West of Dbus was the province of Gtsang. Its area embraced several river valleys that converge with that of the Brahmaputra. Chief among these is the Nyang-Chu valley, which runs from the northwest to the southeast for over 150 mi (240 km) before it enters the Brahmaputra. The Nyang Chu flows past the fortress town of Gyangtse and past Zhikatse, the former administrative headquarters of Gtsang. During the 7th to the 9th centuries, the Tibetan kingdom was extended until it reached the Tarim Basin on the north, China on the east, India and Nepal on the south, and Kashmir on the west. The newly added dominions to the west were called Mnga'-ris and those to the east and northeast, Mdo-khams. This vast area marked the limits of the Tibetan empire before its collapse in the 9th century. Today the traditional region of Dbus-Gtsang is considered to stretch from Mnga'-ris skir-gsum at the border of Jammu and Kashmir to Sog-la skya-bo near the town of Sog (So-hsien), encompassing most of the Tibetan Autonomous Region (*tzu-chih-ch'ü*) of China.

dc (electricity): *see* direct current.

DC (Italian political party): *see* Christian Democracy.

DC-3, also called DOUGLAS DC-3, SKYTRAIN, C-47 (U.S. Army), R4D (U.S. Navy), or DAKOTA (Royal Air Force), transport aircraft, the world's first successful commercial airliner, readily adapted to military use during World War II. The DC-3, first flown in 1936, was a low-wing twin-engine monoplane that in various conformations could seat 21 or 28 passengers or carry 6,000 pounds (2,725 kilograms) of cargo. It was over 64 feet (19.5 metres) long, with a wingspan of 95 ft.

The DC-3 served, indeed dominated, the infant airline business from its first appearance. In the mid-1940s, all but 25 of the 300 airline planes operating in the United States were DC-3s. Its wartime adaptations were simple and effective. It was used to transport passengers (28), fully armed paratroopers (28), wounded troops (18 stretchers and a medical crew of three), military cargo (*e.g.,* two light trucks), and anything else that could fit through its cargo doors and weighed not much more than three tons. A version that carried only troops was called the C-53. The airplane was also used to tow gliders and was even converted to an efficient, high-speed glider by simply removing its engines (and fairing over their empty cowls) and other nonessential weight. As a glider, it could carry 40 fully armed troops at a top towing speed of 290 miles per hour (464 kilometres per hour)—90 mph faster than any previous transport glider and 26 percent faster than its own top speed as a transport airplane.

In civilian service, the DC-3 was operated by a two-man crew, usually with a cabin attendant. The military version used larger engines and a flight crew of three. The DC-3's main landing gear was retractable, its steerable tail-wheel was not.

Pilots, both military and civilian, loved the DC-3. It took off easily, cruised comfortably at 185 mph at 10,000 ft, had a ceiling of 23,200 ft, and a low stalling speed (67 mph). Pilots said it landed itself, and it had a cruising range of 1,500–2,100 miles. When production of the DC-3 ended in 1945, 10,926 of them had been built—10,123 for military service. The DC-3's ease of handling and maintenance, its facility at taking off and landing on short runways, and its remarkable reliability combined to keep it flying in most regions of the world.

D.C.B., dame commander of the Bath, member of the second highest rank of knightly class in a British order of knighthood. *See* Bath, The Most Honourable Order of the.

D.C.M.G., dame commander of St. Michael and St. George, member of the second highest rank of a British order of knighthood. *See* Saint Michael and Saint George, The Most Distinguished Order of.

D.C.V.O., dame commander of the Royal Victorian Order, member of the second highest rank of a British order of knighthood. *See* Royal Victorian Order.

DDT, abbreviation of DICHLORODIPHENYLTRICHLOROETHANE, also called 1,1,1-TRICHLORO-2,2-BIS(*p*-CHLOROPHENYL)ETHANE, a synthetic insecticide belonging to the family of organic halogen compounds, highly toxic toward a wide variety of insects as a contact poison that apparently exerts its effect by disorganizing the nervous system.

DDT, prepared by the reaction of chloral with chlorobenzene in the presence of sulfuric acid, was first made in 1874; its insecticidal properties were discovered in 1939 by a Swiss chemist, Paul Hermann Müller (*q.v.*). During and after World War II, DDT was found to be effective against lice, fleas, and mosquitoes (the carriers of typhus, of plague, and of malaria and yellow fever, respectively) as well as the Colorado potato beetle, the gypsy moth, and other insects that attack valuable crops.

Many species of insects rapidly develop populations resistant to DDT; the high stability of the compound leads to its accumulation in insects that constitute the diet of other animals, with toxic effects on them, especially certain birds and fishes. These two disadvantages had severely decreased the value of DDT as an insecticide by the 1960s, and severe restrictions were imposed on its use in the U.S. in 1972.

Pure DDT is a colourless, crystalline solid that melts at 109° C (228° F); the commercial product, which is usually 65 to 80 percent active compound, along with related substances, is an amorphous powder that has a lower melting point. DDT is applied as a dust or by spraying its aqueous suspension.

de (in proper names): *see* below and *see also* names spelled with no space after "de" (*e.g.,* deMille, Cecil B.). For most continental European names, *see under* the substantive part of the name (*e.g.*, Gaulle, Charles de).

De Amicis, Edmondo (b. Oct. 31, 1846, Oneglia, Kingdom of Sardinia—d. March 11, 1908, Bordighera, Italy), novelist, short-story writer, poet, and author of popular travel books and children's stories.

Educated at the military academy at Modena, De Amicis was commissioned in the artillery. He wrote many sketches of military life for the army journal *L'Italia militare* and became its editor in 1867; his stories were collected in *La vita militare* (1868; *Military Life in Italy,* 1882), followed by *Novelle* (1872; "Short Stories"), which some critics have thought his best work. He also wrote poetry (collected in *Poesie,* 1880), novels, travelogues, and essays. But his most important work is the sentimental children's story *Cuore* (1886; 1st Eng. trans., 1887; best trans., *The Heart of a Boy,* 1960), written in the form of a schoolboy's diary. It was translated into more than 25 languages.

De Bakey, Michael Ellis (b. Sept. 7, 1908, Lake Charles, La., U.S.), surgeon and pioneer in surgical procedures for treatment of defects and diseases of the circulatory system.

In 1932 he devised the "roller pump," a component of subsequent heart–lung machines used in open-heart surgery. He also developed an efficient method of correcting aortic aneurysms by grafting frozen blood vessels to replace diseased vessels. By 1956 De Bakey had developed a technique of using plastic tubing instead of grafts. In 1963 he reported the successful implantation of a mechanical device into a human chest to assist the heart action. Although the patient died four days after the operation, the pump improved the heart action.

De Bakey received his M.D. (1932) and M.S. (1935) degrees from Tulane University School of Medicine, New Orleans. In 1948 he became professor of surgery and chairman of the department of surgery at Baylor University School of Medicine, Waco, Texas. De Bakey received numerous awards, including the Albert Lasker Award for Clinical Research (1963; co-recipient), the Eleanor Roosevelt Humanities Award (1969), and the U.S.S.R. Academy of Sciences 50th Anniversary Jubilee Medal (1973). He edited the *Yearbook of Surgery* (1958–70); among his other publications is *The Living Heart* (1977; co-authored with Antonio Gotto).

de Beer, Sir Gavin (Rylands) (b. Nov. 1, 1899, London—d. June 21, 1972, Alfriston, Sussex, Eng.), English zoologist and morphologist known for his contributions to experimental embryology, anatomy, and evolution.

Concerned with analyzing developmental processes, de Beer published *Introduction to Experimental Embryology* (1926), in which he noted that certain structures (such as some cartilage and odontoblasts of dermal bones), previously thought to be derived from mesoderm according to the germ-layer theory, were formed instead from ectoderm (neural crest). Of substantial importance is his *Development of the Vertebrate Skull* (1935).

In *Embryos and Ancestors* (1940) he developed the concept of paedomorphosis, the retention in the adult of juvenile or infantile characteristics of ancestors, in opposition to phylogenetic recapitulation, the theory that an organism during embryonic development repeats the adult stages of its ancestors. He then suggested "clandestine evolution" to account for the absence in the fossil record of preliminary stages, because they occurred in the soft tissues of young ancestors. He discovered the sternum in the fossil *Archaeopteryx,* the reptilian and avian features of which led him to propose mosaic evolution, whereby piece-by-piece change marks the evolution of

one type of animal to the next. He also did fundamental research on the pituitary gland.

His antiquarian interests are shown by his application of biology to such historical problems as tracing the route of Hannibal's march across the Alps (by pollen analysis, glaciology, and other techniques) and tracing the origin of the Etruscans in Asia Minor by blood group data.

De Beer taught at the University of Oxford (1926–38), and University College, London (1945–50). He was director of the British Museum of Natural History (1950–60). He was knighted in 1954 and received many honours, including the Darwin Medal of the Royal Society (1958) and the Linnaean Society Gold Medal (1958). He also published *Embryology and Evolution* (1930), *Vertebrate Zoology: an Introduction to the Comparative Anatomy, Embryology and Evolution of Chordate Animals* (1962), *The Elements of Experimental Embryology* (with Sir J.S. Huxley; 1963), and *Atlas of Evolution* (1964).

De Beers Consolidated Mines, Ltd., world's largest producer and distributor of diamonds. De Beers is a unit of the Anglo-American Corporation of South Africa, a large holding company with major interests in gold and coal mining. Headquarters are in Kimberley, S.Af.

Diamonds were first discovered in southern Africa in the mid-1860s on the farm of Nicolaas and Diederick de Beer, near what is now the city of Kimberley. Two diamond mines dug on the farm, the Kimberley and the De Beers, were at one time the world's most productive, though they are no longer in operation.

In 1873 the English adventurer and entrepreneur Cecil Rhodes bought a claim to the De Beers mine, and with this as a financial base eventually bought up most of the diamond mines in southern Africa. In 1888 he incorporated the De Beers Mining Company. To keep prices high and demand steady, Rhodes also moved to take control of world diamond distribution. By the middle of the 1890s he had formed the Diamond Syndicate, forerunner of today's Central Selling Organization, a group of financial and marketing organizations that controls much of the world diamond trade.

After Rhodes's death in 1902, Ernest Oppenheimer was sent to Africa to represent the Syndicate. Finding himself unwelcome at De Beers, Oppenheimer turned to gold mining to make his fortune and in 1917 formed the Anglo-American Corporation. After World War I, Oppenheimer moved back into the diamond trade, buying up diamond fields in South West Africa (now Namibia) and then purchasing a controlling interest in De Beers. After being named chairman of De Beers, Oppenheimer strengthened the diamond marketing monopoly begun by Rhodes.

The Central Selling Organization now controls nearly 80 percent of the world diamond trade. The De Beers company also has interests in explosive and chemical industries; gold, coal, and copper mines; and synthetic diamonds.

Consult the INDEX *first*

De Bono, Emilio (b. March 19, 1866, Cassano d'Adda, Italy—d. Jan. 11, 1944, Verona), Italian general, an early convert to Fascism who helped the party's founder and chief, Benito Mussolini, gain power.

Entering the army in 1884 as a second lieutenant, he rose to a place on the general staff in the Italo-Turkish War (1911). In World War I he distinguished himself against



De Bono

the Austrians at Gorizia (1916) and Grappa (October 1918). He was discharged with the rank of major general in 1920.

He helped organize the Fascist party, and in 1922 he participated with Mussolini in the famous March on Rome, which signalled the beginning of the Fascist regime. After serving as chief of police and commander of the Fascist militia, he was appointed governor of Tripolitania. Named commander in chief when Italy invaded Ethiopia in 1935, he was quickly replaced by the more talented Gen. Pietro Badoglio, though he was rewarded with the rank of field marshal.

Appointed minister of state in 1942, he participated in the historic meeting of the Fascist Grand Council (July 24/25, 1943) and was among those who voted against Mussolini, thus causing the leader's downfall. When Mussolini regained power in northern Italy with German help, he had De Bono arrested, tried for treason, and executed by a firing squad.

de Broglie wave, also called MATTER WAVE, any aspect of the behaviour or properties of a material object that varies in time or space in conformity with the mathematical equations that describe waves. By analogy with the wave and particle behaviour of light that had already been established experimentally, the French physicist Louis de Broglie suggested (1924) that particles might have wave properties in addition to particle properties. Three years later the wave nature of electrons was detected experimentally. Objects of everyday experience, however, have a computed wavelength much smaller than that of electrons, so their wave properties have never been detected; familiar objects show only particle behaviour. De Broglie waves play an appreciable role, therefore, only in the realm of subatomic particles.

De Broglie waves account for the appearance of subatomic particles at conventionally unexpected sites because their waves penetrate barriers much as sound passes through walls. Thus a heavy atomic nucleus occasionally can eject a piece of itself in a process called alpha decay. The piece of nucleus (alpha particle) has insufficient energy as a particle to overcome the force barrier surrounding the nucleus; but as a wave it can leak through the barrier—that is, it has a finite probability of being found outside the nucleus.

De Broglie waves around a closed loop, such as would be associated with electrons circling nuclei in atoms, can persist only if the undulations fit evenly around the loop; otherwise they cancel themselves out. This requirement causes the electrons in atoms to select only particular configurations, or states, among the many that would otherwise be available.

The response of the wave properties of a particle to an external force follows a basic law of quantum mechanics that, in its mathematical form, is known as the Schrödinger equation.

De Busne, Antoine (composer): *see* Busnois, Antoine.

de Cabeçon, Antonio, also called ANTONIO DE CABEZÓN (Spanish composer): *see* Cabezón, Antonio de.

De Camp, Maria Theresa, also called MARIE-THÉRÈSE DE CAMP: *see* Kemble, Maria Theresa.

de Chirico, Giorgio (b. July 10, 1888, Vólos, Greece—d. Nov. 19, 1978, Rome), Italian painter who, with Carlo Carrà and Giorgio Morandi, founded the *pittura metafisica* style of painting (*see* Metaphysical painting).

In 1906 de Chirico entered the Munich Academy of Fine Arts. His early style was influenced by the painting of Arnold Böcklin, which juxtaposed the fantastic with the commonplace. In Florence he painted such works as "The Enigma of an Autumn Afternoon" (1910; private collection, Italy), in which long, sinister shadows contrast starkly with bright, clear light rendered in dull, flat colours. Moving to Paris in 1911, he gained the admiration of Picasso and Guillaume Apollinaire with his ambiguously ominous scenes of deserted piazzas with classical statues, dark arcades, and small, isolated figures overpowered by their



"The Soothsayer's Recompense," oil on canvas by Giorgio de Chirico, 1913; in the Philadelphia Museum of Art

By courtesy of the Philadelphia Museum of Art: the Louise and Walter Arensberg Collection

own shadows and by severe, oppressive architecture. Such works are exemplified by "The Soothsayer's Recompense" (1913; Philadelphia Museum of Art) and "The Mystery and Melancholy of a Street" (1914; Stanley R. Resor Collection, New Canaan, Conn.).

At Ferrara, in 1915, de Chirico practiced a modification of his earlier manner, marked by a generally denser and more arbitrary arrangement of forms. In paintings of this period, such as the "Grand Metaphysical Interior" of 1917 and "The Seer" of 1915 (both in the J.T. Soby Collection, New Canaan, Conn.), the colours are brighter; dressmakers' mannequins, biscuits, and paintings on easels were among the images added to his repertory. By the mid-1920s he adopted a more realistic and romantic style that was less widely admired.

De Forest, Lee (b. Aug. 26, 1873, Council Bluffs, Iowa, U.S.—d. June 30, 1961, Hol-



De Forest, 1907

Culver Pictures

lywood). American inventor of the Audion vacuum tube, which made possible live radio broadcasting and became the key component of all radio, telephone, radar, television, and computer systems before the invention of the transistor in 1947.

Life. De Forest was the son of a Congregational minister. His father moved the family to Alabama and there assumed the presidency of the nearly bankrupt Talladega College for Negroes. Ostracized by citizens of the white community who resented his father's efforts to educate blacks, Lee made his friends from among the black children of the town and, together with his brother and sister, spent a happy although sternly disciplined childhood in this rural community.

As a child he was fascinated with machinery and was often excited when hearing of the many technological advances during the late 19th century. By the age of 13 he was an enthusiastic inventor of mechanical gadgets such as a miniature blast furnace and locomotive, and a working silverplating apparatus.

His father had planned for him a career in the clergy, but Lee insisted on science and, in 1893, enrolled at the Sheffield Scientific School of Yale University, one of the few institutions in the United States then offering a first-class scientific education. Frugal and hardworking, he supplemented his scholarship and the slim allowance provided by his parents by working at menial jobs during his college years, and, despite a not too distinguished undergraduate career, he went on to earn the Ph.D. in physics in 1899.

By this time he had become interested in electricity, particularly the study of electromagnetic wave propagation, then being pioneered chiefly by the German Heinrich Rudolf Hertz and the Italian Guglielmo Marconi. De Forest's doctoral dissertation on the "Reflection of Hertzian Waves from the Ends of Parallel Wires" was possibly the first doctoral thesis in the United States on the subject that was later to become known as radio.

His first job was with the Western Electric Company in Chicago, where, beginning in the dynamo department, he worked his way up to the telephone section and then to the experimental laboratory. While working afterhours on his own, he developed an electrolytic detector of Hertzian waves. The device was modestly successful, as was an alternating-current transmitter that he designed. In 1902 he and his financial backers founded the De Forest Wireless Telegraph Company. In order to dramatize the potential of this new medium of communication, he began, as early as 1902, to give public demonstrations of wireless telegraphy for businessmen, the press, and the military.

Invention of the Audion tube. A poor businessman and a poorer judge of men, De Forest was defrauded twice by his own business partners. By 1906 his first company was insolvent, and he had been squeezed out of its operation. But in 1907 he patented a much more promising detector (developed in 1906) which he called the "Audion"; it was capable of more sensitive reception of wireless signals than were the electrolytic and Carborundum types then in use. It was a thermionic grid-triode vacuum tube—a three-element electronic "valve" similar to a two-element device patented by the Englishman Sir John Ambrose Fleming in 1905. The same year De Forest was able to broadcast experimentally both speech and music to the general public in the New York City area.

A second company, the De Forest Radio Telephone Company, began to collapse in 1909, again because of some of his partners. In the succeeding legal confusion, De Forest was indicted in 1912 but later acquitted of federal charges of using the mails to defraud by seeking to promote a "worthless device"—the Audion tube.

In 1910 he broadcast a live performance by Enrico Caruso at the Metropolitan Opera in order to further popularize the new medium. In 1912 De Forest conceived the idea of "cascading" a series of Audion tubes so as to amplify high-frequency radio signals far beyond what could be accomplished by merely increasing the voltage on a single tube. He fed the output from the plate of one tube, through a transformer to the grid of a second, and the output of the second tube's plate to the grid of a third, and so forth, thereby allowing for an enormous amplification of a signal that was originally very weak. This was an essential development for both radio and telephonic long-distance communication. He also discovered in 1912 that by feeding part of the output of his triode vacuum tube back into its grid, he could cause a self-regenerating oscillation in the circuit. The signal from this circuit, when fed to an antenna system, was far more powerful and effective than that of the crude transmitters then generally employed and, when properly modulated, was capable of transmitting speech and music. When appropriately modified, this single invention was capable of either transmitting, receiving, or amplifying radio signals.

Throughout De Forest's lifetime the originality of his more important inventions was hotly contested, by both scientists and patent attorneys. In time, realizing that he could not succeed in business or manufacturing, he reluctantly sold his patents to major communications firms for commercial development. Some of the most important of these sales were made at very low prices to the American Telephone & Telegraph Company, which used the Audion as an essential amplification component for long-distance repeater circuits.

Other inventions. In 1920 he began to work on a practical system for recording and reproducing sound motion pictures. He developed a sound-on-film optical-recording system called Phonofilm and demonstrated it in theatres between 1923 and 1927. Although basically correct in principle, its operating quality was poor, and he found himself unable to interest film producers in its possibilities. Ironically, within a few years' time the motion-picture industry converted to talking pictures by using a sound-on-film process similar to that of De Forest.

During the 1930s De Forest developed Audion-diathermy machines for medical applications and, during World War II, conducted military research for Bell Telephone Laboratories. Although bitter over the financial exploitation of his inventions by others, he was widely honoured as the "father of radio" and the "grandfather of television." He was supported strongly but unsuccessfully for the Nobel Prize for Physics.

Although he worked for many organizations during his lifetime, De Forest was fundamentally an individualist and produced most of his inventions as a free-lance worker. A complex and private man, De Forest was assailed by self-doubts, indecision, and egocentricity. Divorced twice, his third marriage, to Marie Mosquini, was a happy one and endured from 1930 until his death. (R.E.Fi.)

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De Gasperi, Alcide (b. April 3, 1881, Pieve Tesino, near Trento, Tyrol, Austria-Hungary [now in Italy]—d. Aug. 19, 1954, Sella di Valsugana, Italy), politician and prime minister of Italy (1945–53) who contributed to the material and moral reconstruction of his nation after World War II.

From the age of 24 De Gasperi directed the journal *Il Nuovo Trentino,* in which he defended Italian culture and the economic interests of his own region. In 1911 he was elected to the Austrian parliament as an Italian representative, joining other Italian deputies who sought the annexation of the Trentino by



De Gasperi, 1952
EB Inc

Italy. When the annexation of the Trentino was effected (1919), De Gasperi was elected deputy to the Italian parliament in 1921 as one of the founders of the Italian Popular Party (Partito Popolare Italiano; PPI), which represented the liberal Christian Democratic tradition. Hostile to the fascists, in 1927 he was arrested and sentenced to four years imprisonment; he was released, after serving 16 months, through Pope Pius XI's intervention and, in 1929, became a librarian in the Vatican.

Active in the resistance during World War II, he succeeded in reorganizing the PPI in the Christian Democrat Party. Upon the fall of the fascist regime (1943) he returned to the forefront of Italian politics. He became secretary of the Christian Democrat Party and was appointed minister without portfolio in Ivanoe Bonomi's first cabinet (June 1944). Minister of foreign affairs in the two succeeding cabinets, De Gasperi formed his own cabinet on Dec. 10, 1945. He was to remain in office for more than seven years.

De Gasperi, who signed the peace treaty with the Allies, had Parliament ratify it (September 1947) and then enacted a new constitution (January 1948). He instituted a long-term land reform program in southern and central Italy and sought to increase utilization of Italy's natural resources by constructing new power plants fueled by natural gas or natural steam of volcanic origin.

In foreign affairs he strove to restore an influential role in international politics for Italy. Seeking closer ties with the West, Italy entered the North Atlantic Treaty Organization (NATO) in 1951 and began rearming shortly thereafter. A leading proponent of the formation of a federation of democratic European states, he helped organize the Council of Europe and the European Coal and Steel Community (1951).

After the fall of his government in 1953, he became secretary general of the Christian Democrat Party, which named him its president in May 1954.

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De gata ga (Cherokee chief): *see* Watie, Stand.

de Gaulle, Charles: *see* Gaulle, Charles (-André-Marie-Joseph) de.

De Geer, Gerhard (Jakob), Friherre (Baron) (b. Oct. 2, 1858, Stockholm, Swed.—d. July 23, 1943, Saltsjöbaden), Swedish geologist, originator of the varve-counting method used in geochronology.

De Geer was appointed to the Swedish Geological Survey in 1878 and received a master's degree in geology from Uppsala University in 1879. He studied the glaciers of Spitsbergen in a series of expeditions. He became a professor at the University of Stockholm in 1897, serving as president from 1902 to 1910. After retiring in 1924, he headed the Institute of Geochronology at the university.

De Geer observed that lake beds consist of couplets of laminated sediments (varves), light-coloured silt layers alternating with strata of darker clay. These represent annual accumulations and thus provide a means for dating the sediments simply by counting the number of varves present. De Geer also attempted to match or correlate varve sequences in widely separated glacial lake sites, but the validity of his conclusions about these sequences has been questioned by some authorities. He presented his varve method at the International Geological Congress at Stockholm (1910).

De Grey River, river in northwestern Western Australia. It rises as the Oakover River in the Robertson Range, 150 miles (240 km) southeast of Marble Bar, and flows north. Midway in its 190-mile (306-kilometre) course, it turns northwest to join the Nullagine River and becomes the De Grey. The seasonally intermittent stream, the principal tributaries of which are the Shaw and Coorgan rivers, enters the Indian Ocean at Breaker Inlet, 40 miles (70 km) northeast of Port Hedland.

The Australian explorer Francis Gregory visited the river in 1861 and named it after the 3rd Earl de Grey (later 1st Marquess of Ripon). In 1888 the rich Pilbara goldfield attracted many settlers to the river's valley, where there arose boomtowns. Lying at the limits of occupation, with the Great Sandy Desert to the north, the river valley supports grazing of sheep, cattle, and horses. Australia's Great Northern Highway crosses the river at the village of De Grey, a few miles from the ocean.

de Hartog, Jan: *see* Hartog, Jan de.

De Havilland, Sir Geoffrey (b. July 27, 1882, Haslemere, Surrey, Eng.—d. May 21, 1965, Watford, Hertfordshire), English aircraft designer, manufacturer, and pioneer in long-distance jet flying. He was one of the first to make jet-propelled aircraft, producing the Vampire and Venom jet fighters.

In 1910 he successfully built and flew an airplane with a 50-horsepower engine. De Havilland then joined the army balloon factory and originated the British Experimental (B.E.) series of tractor biplanes. During World War I he worked as chief designer and test pilot for the Aircraft Manufacturing Company and produced a number of successful fighters and light bombers. In September 1920 he formed the De Havilland Aircraft Company. The success of the Moth, a light two-seater, made the company financially successful and started the flying club movement in Great Britain. In World War II the company's most successful product was the twin-engined Mosquito, a high-speed, all-purpose aircraft of plywood construction. After the war, he pioneered the Comet airliner and D.H. "Ghost" jet engines. De Havilland was knighted in 1944.

de Havilland, Olivia (Mary) (b. July 1, 1916, Tokyo, Japan), American motion-picture actress.

The daughter of a British patent attorney, de Havilland and her younger sister, Joan Fontaine, were brought to California in 1919 by their mother, an actress. While attending school, de Havilland was chosen from the cast of a local California production of *A Midsummer Night's Dream* to play Hermia in a 1935 Warner Brothers film version of that play. As the sweet-tempered beauty to Errol Flynn's gallant swain, she appeared in many costume adventure movies of the 1930s and '40s, including *Captain Blood* (1935), *The Charge of the Light Brigade* (1936), *The Adventures of Robin Hood* (1938), and *They Died with Their Boots On* (1941). She also played romantic leading roles in *Strawberry Blonde* (1941), *Hold Back the Dawn* (1941), and *The Male Animal* (1942) and was Melanie Wilkes in *Gone With the Wind* (1939).

In 1945 de Havilland won a precedent-setting case against Warner Brothers, which released her from a six-month penalty obligation appended by the studio to her seven-year contract. Free to take more challenging roles, she gave Academy Award-winning performances in *To Each His Own* (1946) and *The Heiress* (1949) and was nominated for *The Snake Pit* (1948). She moved to France in 1955 and worked infrequently in films after that, most memorably in *The Light in the Piazza* (1962), *Lady in a Cage* (1964), and *Hush . . . Hush, Sweet Charlotte* (1964). She also appeared in a number of television plays.

De Kalb, city, De Kalb county, north-central Illinois, U.S., on the Kishwaukee River. Founded in 1838, it was called Buena Vista until 1856, when it was renamed for Johann Kalb, an American Revolutionary War general. Its early growth was attributed to the barbed-wire industry established there by Joseph F. Glidden, who in 1874 invented a practical machine for its manufacture. The economy is now based on agriculture (notably hybrid seed corn [maize]), truck gardening, and manufacturing, including electrical and precision equipment. De Kalb is the site of Northern Illinois University (founded in 1895 as a state normal school). Kishwaukee College (1967) is in Malta, a few miles west. Inc. town, 1856; city, 1877. Pop. (1991 est.) 35,268.

de Klerk, F.W., in full FREDERIK WILLEM DE KLERK (b. March 18, 1936, Johannesburg, S.Af.), politician who as president of South Africa (1989–94) brought the apartheid system of racial segregation to an end and negotiated a transition to majority rule in his country. He and Nelson Mandela jointly received the 1993 Nobel Peace Prize for their collaboration in efforts to establish nonracial democracy in South Africa.



De Klerk, 1990
A. Tannenbaum/Sygma

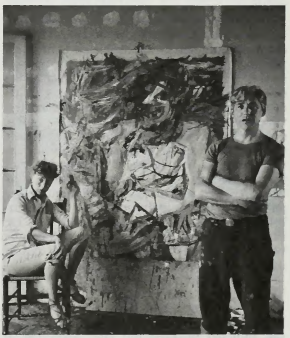
De Klerk was the son of a leading politician. He received a law degree (with honours) from Potchefstroom University in 1958. Soon afterward he began to establish a successful law firm in Vereeniging, becoming active in civic and business affairs there. Although he was appointed professor of administrative law at Potchefstroom in 1972, he was elected to Parliament for the National Party in the same year and never took up the teaching position. His legal talents and the respect in which he was held won him a number of key ministerial portfolios, including mines and energy affairs (1979–82), internal affairs (1982–85), and national education and planning (1984–89). He was elected leader of the House of Assembly in 1986.

After President P.W. Botha fell ill in January 1989, de Klerk was elected leader of the National Party and successfully opposed Botha's resumption of office after his recovery. De Klerk was formally elected president by South Africa's tricameral Parliament on September 14. He owed his political success to the power base he had built up in the Transvaal, where he had been chairman of the provincial National Party from 1982.

As president, de Klerk committed himself to speeding up the reform process begun by his predecessor and to initiating talks about a new postapartheid constitution with representative leaders of the country's four ethnic communities (white, black, Coloured, and Indian). Though faced with a strengthened right-wing opposition in Parliament in the form of the Conservative Party, de Klerk quickly moved to release all important political prisoners, including Nelson Mandela (in 1990), and to lift the ban on the African National Congress (ANC) and the Pan-African Congress. Thereafter, he frequently met with black leaders, and in 1991 his government passed legislation that repealed racially discriminatory laws affecting residence, education, public amenities, and health care in South Africa. In 1992 he called a referendum in which almost 69 percent of the country's white voters endorsed his reform policies. That same year, de Klerk undertook serious negotiations with Mandela and other black leaders over a proposed new constitution that would enfranchise the black majority and lead to all-race national elections. In the meantime his government continued to systematically dismantle the legislative basis for the apartheid system.

Under de Klerk's leadership, the governing National Party reached agreement with the ANC in the summer of 1993 on a transition to majority rule. De Klerk led his party's campaign in South Africa's first all-race elections in April 1994, in which the ANC obtained a majority of seats in the new National Assembly. De Klerk subsequently joined a government of national unity formed by Mandela, taking the post of second deputy president.

de Kooning, Willem (b. April 24, 1904, Rotterdam, Neth.), Dutch-born American painter who was one of the leading exponents of Abstract Expressionism, particularly the form known as Action painting. During the 1930s and '40s de Kooning worked simultaneously in figurative and abstract modes, but by about 1945 these two tendencies seemed to fuse. The series "Woman I–VI" caused a sensation with its violent imagery and impulsive, energetic



De Kooning and his wife, Elaine, photograph by Hans Namuth, 1952
Hans Namuth

technique. His later work showed an increasing preoccupation with landscape.

Early life and work. De Kooning's parents, Leendert de Kooning and Cornelia Nobel, were divorced when he was about five years old, and he was raised by his mother and a stepfather. In 1916 he was apprenticed to a firm of commercial artists and decorators, and, about the same time, he enrolled in night classes at the Rotterdam Academy of Fine Arts and Techniques, where he studied for eight years. In 1920 he went to work for the art director of a large department store.

In 1926 de Kooning entered the United States as a stowaway and eventually settled in Hoboken, N.J., where he supported himself as a house painter. In 1927 he moved to a studio in Manhattan and came under the influence of the artist, connoisseur, and art critic John Graham and the painter Arshile Gorky. Gorky became one of de Kooning's closest friends.

From about 1928 de Kooning began to paint still-life and figure compositions reflecting school of Paris and Mexican influences. By the early 1930s he was exploring abstraction, using biomorphic shapes and simple geometric compositions—an opposition of disparate formal elements that prevails in his work throughout his career. These early works had strong affinities with those of his friends Graham and Gorky and reflected the impact on these young artists of Pablo Picasso and the Surrealist Joan Miró, both of whom achieved powerfully expressive compositions through biomorphic forms.

In October 1935 de Kooning began to work on the WPA (Works Progress Administration) Federal Art Project. He was employed by this work-relief program until July 1937, when he was forced to resign because of his alien status. This period of about two years provided the artist, who had been supporting himself during the early Depression by commercial jobs, with his first opportunity to devote full time to creative work. He worked on both the easel-painting and mural divisions of the project (the several murals he designed were never executed).

In 1938, probably under the influence of Gorky, de Kooning embarked on a series of sad, staring male figures, such as "Two Men Standing," "Man," and "Seated Figure (Classic Male)." Parallel with these works he also created lyrically coloured abstractions, such as "Pink Landscape" and "Elegy." This coincidence of figures and abstractions continued well into the 1940s with his representational but somewhat geometricized "Woman" and "Standing Man," along with numerous untitled abstractions whose biomorphic forms increasingly suggest the presence of figures. By about 1945 the two tendencies seemed to fuse perfectly in "Pink Angels." In 1946, too poor to buy artists' pigments, he turned to black and white household enamels to paint a series of large abstractions; of these works, "Light in August" (*c.* 1946) and "Black Friday" (1948) are essentially black with white elements, whereas "Zurich" (1947) and "Mailbox" (1947–48) are white with black. Developing out of these works in the period after his first show are complex, agitated abstractions like "Asheville" (1948–49), "Attic" (1949), and "Excavation" (1950; Art Institute, Chicago), which reintroduce colour and seem to sum up with taut decisiveness the problems of free-associative composition he had struggled with for many years.

In 1938 de Kooning met Elaine Fried, whom he married in 1943. She also became a significant artist. During the 1940s and thereafter he became increasingly identified with the Abstract Expressionist movement and was recognized as one of its leaders in the mid-1950s. He had his first one-man show, which consisted of his black-and-white enamel compositions, at the Charles Egan Gallery in New York in 1948 and taught at Black Mountain College in North Carolina in 1948 and at the Yale School of Art in 1950–51.

Mature works. While de Kooning had painted women regularly in the early 1940s and again from 1947 to 1949, and while the biomorphic shapes of his early abstractions can be interpreted as female symbols, it was not until 1950 that he began to explore the subject of women exclusively. In the summer of that year he began "Woman I" (Museum of Modern Art, New York City), which went through innumerable metamorphoses before it was finished in 1952. During this period he also created other paintings of women. These works were shown at the Sidney Janis Gallery in 1953 and caused a sensation, chiefly because they were figurative when most of his fellow Abstract Expressionists were painting abstractly and because of their blatant technique and imagery. The savagely applied pigment and the use of colours that seem vomited on his canvas combine to reveal a woman all too congruent with some of modern man's most widely held sexual fears. The toothy snarls, overripe, pendulous breasts, vacuous eyes, and blasted extremities imaged the darkest Freudian insights. The "Woman" paintings II through VI (1952–53) are all variants on this theme, as are "Woman and Bicycle" (1953; Whitney Museum of American Art, New York) and "Two Women in the Country" (1954). The deliberate vulgarity of these paintings contrasts with the French painter Jean Dubuffet's no less harsh "Corps de dame" series of 1950, in which the female, formed with a rich topography of earth colours, relates more directly to universal symbols.

By 1955, however, de Kooning seems to have turned to this symbolic aspect of woman, as suggested by the title of his "Woman as Landscape," in which the vertical figure seems almost absorbed into the abstract background. There followed a series of landscapes such as "Police Gazette," "Gotham News," "Backyard on Tenth Street," "Parc Rosenberg," "Suburb in Havana," "Door to the River," and "Rosy-Fingered Dawn at Louse Point," which display an evolution from compositional and colouristic complexity to a broadly painted simplicity.

About 1963, the year he moved permanently to East Hampton, Long Island, de Kooning returned to depicting women in such paintings as "Pastorale" and "Clam Diggers." The theme is reexplored over the next years in "Woman Acabonic" (1966), "Woman and Child" (1967), and "The Visit" (1967). These paintings, as controversial as his earlier women, are satiric attacks on the female anatomy, painted with a flamboyant lubricity in keeping with the uninhibited subject matter. His later works, such as ". . . Whose Name Was Writ in Water" and "Untitled III," are lyrical, lush, and shimmering with light and reflections on water. He turned more and more during his late years to the production of clay sculpture. (F.V.O'C.)

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De Koven, Reginald, in full HENRY LOUIS REGINALD DE KOVEN (b. April 3, 1859, Middletown, Conn., U.S.—d. Jan. 16, 1920, Chicago, Ill.), American composer, conductor, and critic who helped establish the style of American light opera.

De Koven graduated from the University of Oxford (1879) and studied composition in Germany, Austria, and France. On his return to the United States he contributed music criticism to *Harper's Weekly,* the New York *World,* and other publications. Between 1887 and 1913 he composed 20 light operas, of which the most successful was *Robin Hood* (1890). Partly derived from the style of Gilbert and Sullivan and containing the songs "O Promise Me" and "Brown October Ale," it received more than 3,000 performances. His other works included *Rob Roy* (1894), *The Highwayman* (1897), and *Maid Marian* (1901) and two grand operas, *The Canterbury Pilgrims* (1917) and *Rip Van Winkle* (1920).

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

De la Gardie, Jacob Pontusson, Count (Greve) (b. June 20, 1583, Reval, Swedish Estonia [now Tallinn, Estonia]—d. Aug. 16, 1652, Stockholm, Sweden), Swedish statesman and soldier who was mainly responsible for introducing advanced Dutch military methods into Sweden. He commanded the Swedish forces in Russia and against Poland and later served as one of the five regents jointly ruling Sweden during the minority of Queen Christina.



Jacob De la Gardie, detail from an oil painting by an unknown artist, 1606; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

From 1606 to 1608 De la Gardie served under the Dutch military leader Maurice of Nassau, prince of Orange, and on his return acquainted the Swedish army with Maurice's progressive military concepts. Commissioned by King Charles IX to command his country's forces in Russia (1608–13), De la Gardie captured Moscow (1610) and large areas in northwestern Russia but was disastrously defeated at Klushino in 1610 and failed in his efforts to place Charles IX's son Gustavus Adolphus (later king of Sweden as Gustav II Adolf) on the Russian throne. De la Gardie overcame these setbacks as the chief Swedish negotiator in the Peace of Stolbova with Russia. He gained for Sweden a continuous territorial base extending from Finland to Estonia, which protected the Finnish frontier and blocked Russia from access to the Baltic Sea.

De la Gardie fought against Polish forces in Livonia (now in Estonia and Latvia) after 1621, but he was recalled after serving as commander in chief (1626–28). Long an advocate of peace with Poland, he acted as one of the Swedish commissioners at the Truce of Stuhmsdorf with Poland (1635) by which Sweden withdrew from Royal (Polish) Prussia and sacrificed the tolls it had levied in Prussian harbours since 1627.

A member of the state council from 1613, De la Gardie became marshal (1620) and one of

the five regents ruling Sweden during Queen Christina's minority (1632–44). Although he supported the policies of the chancellor Axel Oxenstierna, his pacifist and pro-French attitudes antagonized Oxenstierna, who directed Sweden's forces in the Thirty Years' War (1618–48) after the death of Gustav II Adolf (1632). The two leaders became reconciled after Oxenstierna's return to Sweden in 1636. Although the marshal's office came under criticism that year, De la Gardie continued to operate effectively, making large profits from leasing royal revenues and from loans to the crown.

De la Gardie, Magnus Gabriel, Greve (Count) (b. Oct. 15, 1622, Reval, Swedish Estonia—d. April 26, 1686, Venngarn, Swed.),



Magnus De la Gardie, detail from an oil painting by Hendrik Münnichhofen after a portrait attributed to David Beck; in Gripsholm Castle, Sweden
By courtesy of the Svenska Portrattarkivet, Stockholm

Swedish statesman, head of Charles XI's administration from 1660 to 1680. During the youth of Charles XI, he headed the Council of Regency; when Charles became of age (1672), he was his chief minister. War with Denmark and Brandenburg in 1675 discredited De la Gardie's foreign policy, however, and the poor condition of the army brought financial disorders to light. Hence, he was replaced as minister. Later, an inquiry into the administration of the regency led to his being fined, and he died impoverished.

de la Mare, Walter (John) (b. April 25, 1873, Charlton, Kent, Eng.—d. June 22, 1956, Twickenham, Middlesex), British poet and novelist with an unusual power to evoke the ghostly, evanescent moments in life.

De la Mare was educated at St. Paul's School, London, and from 1890 to 1908 worked in



De la Mare, photograph by Mark Gerson
Camera Press

the London office of the Anglo-American Oil Company. From 1902, however, when his *Songs of Childhood* appeared under the pseudonym Walter Ramal, he devoted himself increasingly to writing. His first novel, *Henry Brocken*, was published in 1904 and his *Poems* in 1906. As the years passed his books continued to appear: poems and short stories for adults and children; novels, of which *Memoirs of a Midget* (1921) reached the greatest poetic fantasy; a fairy play, *Crossings* (1921); and essays and literary studies. His anthology *Come Hither* (1923) is often held to be one of the best and most original in the language. He was made a Companion of Honour in 1948 and received the Order of Merit in 1953.

Collected Poems appeared in 1920, 1935, and 1942; *Collected Rhymes and Verses* in 1944; and *Collected Stories for Children* in 1947. Later poetry includes *The Burning Glass* (1945), *The Traveller* (1946), *Inward Companion* (1950), and *O Lovely England* (1953).

de la Mare, William (philosopher): *see* William de la Mare.

De La Ramée, Maria Louise: *see* Ouida.

De la Rey, Jacobus Hercules, De la Rey also spelled DELAREY (b. 1847, near Winburg, Orange River Sovereignty—d. Sept. 15, 1914, Johannesburg), a talented and popular Boer leader in the South African War.

De la Rey gained military experience against the Bantu tribes and represented Lichtenburg in the Volksraad (parliament), opposing Pres. Paul Kruger. On the outbreak of the South African War in 1899, De la Rey became a general and fought in the western campaign. On July 1, 1900, he assumed full charge of operations in the western Transvaal and was conspicuously successful in guerrilla operations.

After the conclusion of peace in 1902, he visited Europe with other Boer generals to raise funds for reconstruction. In the postwar years De la Rey supported Louis Botha, the



De la Rey, drawing by Orens
H. Roger-Viollet

head of the political party Het Volk (The People). In the period of responsible government (1907–10) he represented Ventersdorp in the Transvaal legislative assembly and in 1908 was chosen as a delegate to the national convention that preceded the formation of the Union of South Africa. From 1910 to 1914 he sat in the union's first Senate.

On the outbreak of World War I he laid plans for an uprising in the western Transvaal, believing that a God-given opportunity to restore republican independence was at hand. On Sept. 15, 1914, while travelling to Potchefstroom to start the rising, he was shot dead in Johannesburg by a police patrol. The uprising did not take place, but the ill feeling and suspicion aroused by his death helped foment the rebellion that broke out in October.

de la Roche, Mazo (b. Jan. 15, 1879, Newmarket, Ont., Can.—d. July 12, 1961, Toronto), Canadian author whose series of novels about the Whiteoak family of Jalna (the name of their estate) made her one of the most popular "family saga" novelists of the period between 1925 and 1950.

De la Roche's first success, *Jalna* (1927),



Mazo de la Roche, 1949
A.D. Skilling

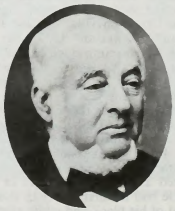
ended with the 100th birthday of Grandmother Adeline Whiteoak, a lusty character later celebrated in a long-run play, *Whiteoaks* (1936), and a film, *Jalna* (1935). Though not written in chronological order, the saga continues with 15 other books, covering 100 years of Whiteoak family history. Although the locale of Jalna is Ontario, the story was more popular in the United States and Europe than in Canada. Many Canadian readers, hoping for a faithful account of life in Canada, were disappointed, for the Whiteoaks really dwell in the timeless realm of romance. De la Roche's other works included children's stories, travel books, drama, and an autobiography, *Ringing the Changes* (1957).

De la Rue, Warren (b. Jan. 15, 1815, Guernsey, Channel Islands—d. April 19, 1889, London), English pioneer in astronomical photography, the method by which nearly all modern astronomical observations are made.

Educated at the Collège Sainte-Barbe in Paris, De la Rue entered his father's printing business, and in 1851 he invented the first envelope-making machine. From 1852 his interest centred on the application of photography to astronomy. At Kew, Surrey, with a telescope of a special design, he carried out the proposal of the British astronomer Sir John Herschel to photograph the Sun daily. His stereoscopic pictures (formed by combining two photographs taken in succession) of the Sun and the Moon created a sensation at the International Exhibition of 1862 in London. In 1860 he directed an eclipse expedition in Spain and made observations proving that the prominences observed during total solar eclipses are connected with the Sun and not with the Moon.

De la Rue also contributed much to knowledge of chemistry and electricity, particularly through his experiments with batteries—he invented the silver chloride cell—and his studies of platinum-filament light bulbs and electrical discharge in gases.

Elected a fellow of the Royal Society of London in 1850, De la Rue was awarded its Royal Medal in 1864. He was also a member of the Royal Astronomical Society, receiving the Gold Medal in 1862, and of the French Académie des Sciences. Among his works is *Researches on Solar Physics* (1865–68).



De la Rue
By courtesy of the Burndy Library, Norwalk, Conn

De La Warr, Thomas West, 12th Baron, De La Warr also spelled DELAWARE (b. July 9, 1577—d. June 7, 1618, at sea off the coast of Virginia or New England), one of the English founders of Virginia, for whom Delaware Bay, the Delaware River, and the state of Delaware were named.

The son of Thomas West, the 11th Baron (*c.* 1556–1602), the younger West fought in the Netherlands and in Ireland under Robert Devereux, 2nd Earl of Essex. He was imprisoned for complicity in Essex's revolt against Elizabeth I (1601) but was soon released.

He became a member of the council of the Virginia Company and was appointed (1610) governor and captain general of Virginia for life. Sailing in March 1610 with three ships, 150 settlers, and supplies, he arrived at Jamestown on June 10, in time to intercept the colonists who had embarked for England and were abandoning the enterprise. De La Warr constructed two forts near the mouth of the James River, rebuilt Jamestown, and in general brought order out of chaos.

He returned to London in 1611, where he published, at the request of the company's council, his *Relation* (1611, reprinted 1858) of the condition of affairs in Virginia. He remained in England until 1618, when the news of the tyrannical rule of the deputy, Samuel Argall, led him to start again for Virginia. He embarked in May but died en route and was buried at sea.

De Leon, Daniel (b. Dec. 14, 1852, Curaçao, Netherlands Antilles—d. May 11, 1914, New York, N.Y., U.S.), American socialist, one of the founders of the Industrial Workers of the World (IWW). He was one of the chief propagandists for socialism in the early American labour movement, but his uncompromising tactics were often divisive.

De Leon arrived in the United States in 1874. In 1890 he joined the Socialist Labor Party. Within a few years he became one of the leading figures in the party, editing its newspaper and helping to transform it into a disciplined national organization. He excoriated the labour union leadership of the day as insufficiently radical and in 1895 led a faction that seceded from the Knights of Labor, subsequently forming the Socialist Trade and Labor Alliance (STLA).

At a convention in Chicago in 1905, De Leon helped found the IWW, with which the STLA promptly merged. But he was refused a seat at the IWW's 1908 convention by extremists who rejected political activity of the sort that he advocated and who favoured more violent tactics. He then created another schismatic body, the Workers' International Industrial Union, which failed.

De Long, George Washington (b. Aug. 22, 1844, New York, N.Y., U.S.—d. Oct. 30, 1881, Siberia [Russia]), American explorer whose disastrous Arctic expedition gave evidence of a continuous ocean current across the polar regions.

De Long conceived of a plan for reaching the North Pole while serving with a polar expedition that sailed around Greenland in 1873. Setting sail from San Francisco in July 1879, he took the *Jeanette* through the Bering Strait and headed for Wrangel Island, off the northeast coast of Siberia. At the time many believed that Wrangel was a large landmass stretching far to the north, and De Long hoped to sail as far as possible along its coast and then to sledge to the Pole. On September 5, however, the ship became trapped in the pack ice near Herald Island (now Gerald Island), east of Wrangel. While drifting northwestward for 21 months, De Long discovered the limited extent of Wrangel.

At 77° 15′ N, 155° E, northeast of the New Siberian Islands, the *Jeanette* was crushed by ice (June 12, 1881) and sank the following day. The crew, including De Long, escaped with most of their provisions and three small boats. Their destination, the Siberian coast, lay some 600 miles (1,000 km) away. They endured extreme hardships for the next two months as they crossed the ice. After reaching open water, one of the boats and the men aboard were lost. The remaining boats became separated; De Long's reached the eastern side of the Lena River delta, and his engineer, George Melville, reached the western side. Melville's party was rescued, but De Long and his men died of exposure and starvation.

De Long's journal, in which he made regular entries until shortly before his death, was found a year later and published as *The Voyage of the Jeanette* (1883). Three years after the *Jeanette* was sunk, wreckage from it was found on an ice floe on the southwest coast of Greenland, a discovery that gave new support to the theory of trans-Arctic drift.

de los Ángeles, Victoria (singer): *see* Ángeles, Victoria de los.

de Mille, Agnes, in full AGNES GEORGE DE MILLE, de Mille also spelled DEMILLE (b. Sept. 18, 1905, New York, N.Y., U.S.—d. Oct. 7, 1993, New York), American dancer and choreographer who further developed the narrative aspect of dance and made innovative use of American themes, folk dances, and gestures in her choreography of musical plays and ballets.



Agnes de Mille and Yurek Lazowski performing in *Three Virgins and a Devil*, 1955
Fred Fehl

Her father was the playwright William Churchill DeMille, her mother the daughter of the economist Henry George, and her uncle the film director Cecil B. DeMille. She spent her youth (from 1914) in Hollywood, Calif., and earned a B.A. degree in English from the University of California at Los Angeles. She also learned dance. After moving to New York City, she toured the United States and Europe (1929–40), giving concerts of her own character sketches in mime-dance. She created her first major roles in ballet with the Ballet Rambert, performing in works by Antony Tudor, and later studied modern dance.

Rodeo (1942), one of her most important ballets, was created for the Ballet Russe de Monte Carlo. The first ballet to include tap dancing, it used characteristically American gestures—bronco-riding and steer-roping movements. Most of de Mille's other ballets were choreographed for New York City's Ballet Theatre, which she joined in 1940. Her works for that company include *Fall River Legend* (1948), *The Harvest According* (1952), and *Three Virgins and a Devil* (1941).

De Mille's equally outstanding career as a choreographer of musicals began in 1929 with *The Black Crook*. In 1943 she choreographed the dances for *Oklahoma!*. In that Broadway musical, dance not only added to the dramatic atmosphere but also, for the first time in American theatrical history, was instrumental in advancing the plot. Among the other musicals for which she staged the dances were *One Touch of Venus* (1943), *Carousel* (1945), *Brigadoon* (1947), *Gentlemen Prefer Blondes* (1949), *Paint Your Wagon* (1951), *The Girl in Pink Tights* (1954), and *110 in the Shade* (1963). She also arranged dances for the films *Romeo and Juliet* (1936) and *Oklahoma!* (1955), directed plays, and choreographed television programs.

Her extensive writings include *To a Young Dancer* (1962), *The Book of the Dance* (1963), *Lizzie Borden* (1968), *Russian Journals* (1970), and *America Dances* (1980), as well as several volumes of autobiography and a biography of her fellow dancer-choreographer Martha Graham (*Martha: The Life and Work of Martha Graham*, 1991).

De Mille, James (b. Aug. 23, 1836, Saint John, N.B. [Canada]—d. Jan. 28, 1880, Halifax, Nova Scotia), Canadian author of more than 30 novels with a wide range of appeal, particularly noted for his wit and humour.

While a student at Acadia College (now Acadia University, Wolfville, Nova Scotia), De Mille traveled extensively in Europe, and scenes of Italy became settings for many of his novels. After an unsuccessful venture as a bookseller, De Mille became a professor of classics at Acadia College (1860–64) and then of English at Dalhousie University in Halifax (1864–80). De Mille's popular fiction for adults included thrillers, such as *The Cryptogram* (1871); comic novels of adventure, such as *The Dodge Club; or, Italy in 1859* (1860); and historical romances, such as *A Tale of Rome in the First Century* (1867). Writings for young readers included the "B.O.W.C." ("Brethren of the White Cross") series, the first popular boys' adventure stories produced in Canada. De Mille's imagination ranged furthest in *A Strange Manuscript Found in a Copper Cylinder* (1888), a story set in a future time when humanity, devoid of inspiring ideas, lapses into conformity.

De Morgan, Augustus (b. June 27, 1806, Madura, India—d. March 18, 1871, London, Eng.), English mathematician and logician whose major contributions to the study of logic include the formulation of De Morgan's laws and work leading to the development of the theory of relations and the rise of modern symbolic, or mathematical, logic.

De Morgan was educated at Trinity College, Cambridge. In 1828 he became professor of mathematics at the newly established University College in London, where, except for a period of five years (1831–36), he taught until 1866, when he helped found and became the first president of the London Mathematical Society. One of his earliest works, *Elements of Arithmetic* (1830), was distinguished by a simple yet thorough philosophical treatment of the ideas of number and magnitude. In 1838 he introduced and defined the term mathematical induction to describe the process that until then had been used with little clarity in mathematical proofs.

De Morgan was among the Cambridge mathematicians who recognized the purely symbolic nature of algebra, and he was aware of the possibility of algebras that differ from ordinary algebra. In his *Trigonometry and Double Algebra* (1849) he gave a geometric interpretation of the properties of complex numbers (numbers involving a term with a factor of the square root of minus one) that suggested the idea of quaternions. He made a useful contribution to mathematical symbolism by proposing the use of the solidus (oblique stroke) for the printing of fractions.

The laws that bear De Morgan's name are a pair of dually related theorems that make possible the transformation of statements and formulas into alternate, and often more convenient, forms. Known verbally by William of Ockham in the 14th century, the laws were investigated thoroughly and expressed mathematically by De Morgan. The laws are:

(1) the negation (or contradictory) of a disjunction is equal to the conjunction of the negation of the alternates—that is, not (p or q) equals not p and not q, or symbolically $\sim(p \vee q) \equiv \sim p \cdot \sim q$; and (2) the negation of a conjunction is equal to the disjunction of the negation of the original conjuncts—that is, not (p and q) equals not p or not q, or symbolically $\sim(p \cdot q) \equiv \sim p \vee \sim q$.

Asserting that logic as it had come down from Aristotle was unnecessarily restricted in scope, De Morgan made his greatest contributions as a reformer of logic. The renaissance of logic studies, which began in the first half of the 19th century, came about almost entirely because of the writings of De Morgan and another British mathematician, George Boole. Alternate forms and generalizations of De Morgan laws exist in various branches of mathematics.

De Niro, Robert (b. Aug. 17, 1943, New York, N.Y., U.S.), American motion-picture actor noted for his strong characterizations.

De Niro appeared in his first film, *Greetings,* in 1968. He had starring or supporting roles in several minor films before winning critical acclaim with his performance in *Bang the Drum Slowly* (1973). That year he began a long collaboration with director Martin Scorsese, starring in *Mean Streets.* Other films by Scorsese in which De Niro appeared include *Taxi Driver* (1976), *Raging Bull* (1980), *The King of Comedy* (1983), *GoodFellas* (1990), and *Cape Fear* (1991). In these films De Niro typically played an intense, engaging, but emotionally imbalanced man whose obsessions overcome him. De Niro played more restrained characters in a number of other films, including *The Godfather, Part II* (1974), *1900* (1976), *The Deer Hunter* (1978), *True Confessions* (1981), *The Mission* (1986), *Midnight Run* (1988), and *Stanley and Iris* (1989). He received Academy Awards for best supporting actor in *The Godfather, Part II* and best actor in *Raging Bull.*

De Palma, Brian (Russell) (b. Sept. 11, 1940, Newark, N.J., U.S.), American motion-picture director and screenwriter best noted for his usually stylish, often graphic horror-suspense films that draw heavily on the work of director Alfred Hitchcock.

De Palma became obsessed by movies during college, and, receiving his B.A. from Columbia University in New York City (1962), accepted a theatre fellowship at Sarah Lawrence College, Bronxville, N.Y. (M.A., 1964). While there he completed his first feature-length film, *The Wedding Party* (1964; released 1969). His first commercially successful film was the thriller *Carrie* (1976). De Palma followed that film with other successful movies, including the suspense films *Dressed to Kill* (1980), *Blow Out* (1981), and *Body Double* (1984), each of which makes strong references to Hitchcock. His other films include the gangster movies *Scarface* (1983) and *The Untouchables* (1987) and the action film *Casualties of War* (1989).

De Palma, Ralph (b. Jan. 23, 1884, Italy—d. March 31, 1956, South Pasadena, Calif., U.S.), American automobile-racing driver, one of the most popular and successful competitors in the early days of the sport.

A U.S. resident from 1892, De Palma raced bicycles and motorcycles before turning to auto racing. He was the national champion driver in 1912 and 1914 and won the 1915 Indianapolis 500. On Feb. 12, 1919, at Daytona Beach, Fla., he set a world speed record for one mile: 149.875 miles (241.15 km) per hour. He retired in 1934. In 1916 he founded the De Palma Manufacturing Company, Detroit, to build racing cars and engines for automobiles and aircraft. Earlier he had helped design the Liberty aircraft engine, which was widely used in World War I.

de Quervain's thyroiditis: *see* granulomatous thyroiditis.

De Quincey, Thomas (b. Aug. 15, 1785, Manchester, Lancashire, Eng.—d. Dec. 8, 1859, Edinburgh, Scot.), English essayist and critic, best known for his *Confessions of an English Opium-Eater.*

As a child De Quincey was alienated from his solid, prosperous mercantile family by his sensitivity and precocity. At the age of 17 he ran away to Wales and then lived incognito in London (1802–03). There he formed a friendship with a young prostitute named Ann, who made a lasting impression on him. Reconciled to his family in 1803, he entered Worcester College, Oxford, where he conceived the ambition of becoming "the intellectual benefactor of mankind." He became widely read in many subjects and eventually would write essays on such subjects as history, biography, economics, psychology, and German metaphysics. While still at college in 1804, he took his first opium to relieve the pain of facial neuralgia. By 1813 he had become "a regular and confirmed opium-eater" (i.e., an opium addict), keeping a decanter of laudanum (tincture of opium) by his elbow and steadily increasing the dose; he remained an addict for the rest of his life.

De Quincey was an early admirer of Lyrical Ballads, and in 1807 he became a close associate of its authors, William Wordsworth and Samuel Taylor Coleridge. He rented Wordsworth's former home, Dove Cottage at Grasmere, on and off from 1809 to 1833. In 1817 De Quincey married Margaret Simpson, who had already borne him a son. Though he wrote voluminously, he published almost nothing. His financial position as head of a large family went from bad to worse until the appearance of *Confessions* (1821) in *London Magazine* made him famous. It was reprinted as a book in 1822.

The avowed purpose of the first version of the *Confessions* is to warn the reader of the dangers of opium, and it combines the interest of a journalistic exposé of a social evil, told from an insider's point of view, with a somewhat contradictory picture of the subjective pleasures of drug addiction. The book begins with an autobiographical account of the author's addiction, describes in detail the euphoric and highly symbolic reveries that he experienced under the drug's influence, and recounts the horrible nightmares that continued use of the drug eventually produced. The highly poetic and imaginative prose of the *Confessions* makes it one of the enduring stylistic masterpieces of English literature.

In 1856 he seized the opportunity provided by the publication of his collected works to rewrite the book that had made him famous. He added some descriptions of opium-inspired dreams that had appeared about 1845 in *Blackwood's Magazine* under the title *Suspiria de Profundis* ("Sighs from the Depths"). But by this time he had lost most of the accounts he had kept of his early opium visions, so he expanded the rather short original version of the *Confessions* in other ways, adding much autobiographical material on his childhood and his experiences as a youth in London. His literary style in the revised version of the *Confessions,* however, tends to be difficult, involved, and even verbose.

Among De Quincey's other autobiographical writings, the so-called *Lake Reminiscences* (first printed in *Tait's Magazine,* 1834–40), which deeply offended Wordsworth and the other Lake poets, remains of great interest, although it is highly subjective, not without malice, and unreliable in matters of detail. As a literary critic De Quincey is best known for his essay "On the Knocking at the Gate in *Macbeth*" (first printed in the *London Magazine,* October 1823), a brilliant piece of psychological insight and a classic of Shakespearean criticism.

De Quincey became increasingly solitary and eccentric, especially after his wife's death in 1837, and he often retreated for long periods into opium dreams. Of the more than 14 volumes of his work, only the original *Confessions* is a definitive literary expression.

De Sanctis, Francesco (b. March 28, 1817, Morra Irpina, Kingdom of Naples [now in Italy]—d. Dec. 29, 1883, Naples, Italy), Italian literary critic whose work contributed significantly to the understanding of Italian literature and civilization.

De Sanctis, a liberal patriot, took part in the Neapolitan revolution of 1848 and for some years was a prisoner of the Bourbons. He then lived in exile in Turin (then in the Kingdom of Sardinia) and Zürich, Switz., where he became known as a teacher and lecturer. He returned to Italy in 1860 and began working on educational reform, serving as minister of education in 1861–62, 1878, and 1879–80. In 1871–77 he was professor of comparative literature at the University of Naples.

A scholar of literature and history, De Sanctis brought to his criticism a knowledge of philosophy, particularly Hegelian aesthetics. His essays on the Italian poets (*Saggi critici,* 1866; *Nuovi saggi critici,* 1873) relate these poets to the society of their times. His masterpiece, *Storia della letteratura italiana* (1870–71; *History of Italian Literature*), is an illuminating account not only of Italian literature but of the development of Italian society from the 13th to the 19th century.

De Sica, Vittorio (b. July 7, 1901, Sora, Italy—d. Nov. 13, 1974, Paris, France), Italian motion-picture director who, along with Roberto Rossellini, dealt compassionately with the problems of people in post-World War II Italy in some of the most outstanding films of the Neorealist movement.

De Sica, the son of an Italian businessman, prepared for a career in banking or government. Financial difficulties interfered, and in 1923 he joined an acting company, becoming a matinee idol and singer. His first motion-picture role, in Mario Camerini's *Gli uomini, che mascalzoni!* (1932; "The Men, What Rascals!"), established him as a leading film star, and *Due dozzine di rose scarlatte* (1940; "Two Dozen Red Roses") brought him box-office success as a director. De Sica turned to the Neorealistic mode of directing, with its characteristic emotional compression, social themes, and faith in the essential brotherhood of man. He gradually developed into a director of great humanistic films in the period after 1945. In his motion pictures, stories of people outside so-called respectable society take on tragic poignancy. *Sciuscià* (1946; *Shoeshine*) is the tale of poor Italian children. *Ladri di biciclette* (1948; *The Bicycle Thief*) deals with an impoverished postwar family whose livelihood is threatened by the theft of a bicycle. *Miracolo a Milano* (1950; *Miracle in Milan*) combines social satire with fantasy. *Umberto D.* (1952) is the story of a lonely pensioner whose only companion, his dog, dies at the film's end.

Four of De Sica's films—*Sciuscià, Ladri di biciclette, Ieri, oggi, domani* (1963; *Yesterday, Today and Tomorrow*), and *Il giardino dei Finzi-Contini* (1970; *The Garden of the Finzi-Continis*)—received Academy Awards for best foreign film. His later films, however, usually are not considered to be of the same stature as his Neorealist works. The last two were *Una breve vacanza* (1974; *A Brief Vacation*) and *Il viaggio* (1974; *The Voyage,* or *The Journey*), which was having its premiere in Paris at the time of his death.

De Tham, also called HOANG HOA THAM (b. *c.* 1860, Yen The, northern Vietnam—d. Jan. 10, 1913, near Yen The), Vietnamese

resistance fighter and enemy of French colonialism during the first two decades of French rule in Indochina.

Hoang Hoa Tham's family name was originally Truong; his parents were opponents of the Nguyen rulers of Vietnam. His mother was executed, and his father committed suicide after an antiroyalist plot in which they were involved failed. With a paternal uncle, Hoang Hoa Tham fled to the mountainous area around Yen The in northern Vietnam, where the entire family adopted the Hoang name. Later, under the name De Tham, he joined local insurgent pirate bands and became renowned for his bravery and cunning tactics. He organized anti-French guerrilla forces and became a formidable threat to the European colonialists, who spread exaggerated stories about his ferocity and ruthlessness. Among his own people De Tham became an almost legendary figure. In 1885 he was joined by the maternal great-uncle of the future Vietnamese leader Ho Chi Minh.

In 1894 De Tham reached temporary accord with the French whereby he secured the area around Yen The as his own private autonomous domain. Trouble continued, however, as De Tham strove to expand his holdings; but the French ignored his threats. In 1908 De Tham collaborated with other nationalists in an abortive attempt to kill French guests at a banquet. Thereafter he was a hunted man with a price on his head. He was finally assassinated by three Chinese who were among his followers.

De Tham became a legend among the French, who romanticized his exploits in many popular books.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

de Tirtoff, Romain (designer): *see* Erté.

de Toni–Fanconi syndrome, a metabolic disorder affecting kidney transport, characterized by the failure of the kidney tubules to reabsorb water, phosphate, potassium, glucose, amino acids, and other substances. When the disorder is accompanied by cystinosis (*q.v.*), a deposition of cystine crystals, it is called Fanconi's syndrome; there is some variation, however, in the designation of these symptoms.

The de Toni–Fanconi syndrome results from injury to kidney tubular function, the primary injury being either hereditary or acquired (e.g., by repeated exposure to toxins). Treatment attempts to eliminate the primary cause; phosphate and potassium supplements and adequate fluid intake also can help offset the disturbance in kidney transport, which may otherwise give rise to a softening of the bones, muscle weakness, and dehydration.

de Valera, Eamon, original name EDWARD DE VALERA (b. Oct. 14, 1882, New York, N.Y., U.S.—d. Aug. 29, 1975, Dublin, Ire.), Irish politician and patriot, prime minister (1932–48, 1951–54, 1957–59), and president (1959–73). An active revolutionary from 1913, he became president of Sinn Féin in 1918 and founded the Fianna Fáil Party in 1924. In 1937 he took the Irish Free State out of the British Commonwealth and made his country a "sovereign" state, renamed Ireland, or Éire. His academic attainments also inspired wide respect; he became chancellor of the National University of Ireland in 1921.

Early life. De Valera's father, who was Spanish, died when the boy was two. He was then sent to his mother's family in County Limerick, Ireland, and studied at the local



De Valera, *c.* 1965

By courtesy of the Irish Embassy; photograph, Lensmen Ltd. Press Photo Agency, Dublin

national school and at Blackrock College, Dublin; he graduated from the Royal University, Dublin, and became a teacher of mathematics and an ardent supporter of the Irish-language revival. In 1913 he joined the Irish Volunteers, which had been organized to resist opposition to Home Rule for Ireland. In the anti-British Easter Rising in Dublin (1916), he commanded an occupied building and was the last commander to surrender. Because of his American birth, he escaped execution by the British but was sentenced to penal servitude.

Released in 1917 but arrested again and deported to England in May 1918, de Valera was acclaimed by the Irish as the chief survivor of the uprising and was elected president of the revolutionist Sinn Féin ("We Ourselves") Party, which won three-quarters of all the Irish constituencies in December 1918. After a dramatic escape from Lincoln Jail in February 1919, he went in disguise to the United States, where he collected funds. He returned to Ireland before military repression ended with the truce of 1921 and appointed plenipotentiaries to negotiate in London. He repudiated the treaty that they signed to form the Irish Free State, however, because it accepted the exclusion of Northern Ireland and imposed an oath of allegiance to the British crown.

Rise to power. When Dáil Éireann (the assembly of Ireland) ratified the treaty by a small majority (1922), de Valera supported the republican resistance in the ensuing civil war. William Thomas Cosgrave's Irish Free State ministry imprisoned him; but he was released in 1924 and then organized a Republican opposition party that would not sit in the Dáil. In 1927, however, he persuaded his followers to sign the oath of allegiance as "an empty political formula," and his new Fianna Fáil ("Warriors of Ireland") Party then entered the Dáil, demanding abolition of the oath of allegiance, of the governor-general, of the Seanad (senate) as then constituted, and of land-purchase annuities payable to Great Britain. The Cosgrave ministry was defeated by Fianna Fáil in 1932, and de Valera, as head of the new ministry, embarked quickly on severing connections with Great Britain. He withheld payment of the land annuities, and an economic war resulted. Increasing retaliation by both sides enabled de Valera to develop his program of austere national self-sufficiency in an Irish-speaking Ireland, while building up industries behind protective tariffs. In 1937 the Free State declared itself a sovereign state, as Ireland, or Éire, conceding voluntary allegiance to the British crown.

De Valera's prestige was enhanced by his success as president of the Council of the League of Nations in 1932 and of its assembly in 1938. The menace of war in Europe induced British prime minister Neville Chamberlain, in 1938, to conclude the "economic war" with mutual concessions. Britain relinquished the naval bases of Cobh, Berehaven, and Lough Swilly. In September 1939 de Valera proclaimed at once that Ireland would remain neutral and resist attack from any quarter. Besides avoiding the burdens and destruction of war, he had brought temporary prosperity, and he retained office in subsequent elections.

In 1948 a reaction against the long monopoly of power and patronage held by de Valera's party enabled the opposition, with the help of smaller parties, to form an interparty government under John A. Costello. But this precarious coalition collapsed within three years, ironically, after declaring Ireland a republic by formal law, an act de Valera had avoided. De Valera resumed office until 1954, when he appealed unsuccessfully for a fresh mandate, and Costello formed his second interparty ministry. No clearly defined difference now existed between the opposing parties in face of rising prices, continued emigration, and a backward agriculture. De Valera claimed, however, that a strong single-party government was indispensable and that all coalitions must be weak and insecure. On this plea he obtained, in March 1957, the overall majority that he demanded. In 1959 de Valera agreed to stand as a candidate for the presidency. He resigned his position as *taoiseach* (head of government) and leader of the Fianna Fáil Party. In June he was elected president and was reelected in 1966. He retired to a nursing home near Dublin in 1973 and died there in 1975.

Summary. De Valera's career spanned the dramatic period of Ireland's modern cultural and national resurgence. As an anticolonial leader, a skillful constitutionalist, and a symbol of national liberation, de Valera dominated Ireland in the half century following the country's independence. (D.R.G.)

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de Valois, Dame Ninette, original name EDRIS STANNUS (b. June 6, 1898, Blessington, County Wicklow, Ire.), Irish dancer, choreographer, and founder of the company that in October 1956 became the Royal Ballet.

After study with Enrico Cecchetti and varied experience as a dancer in pantomime, revues, and opera, de Valois joined Sergey Diaghilev's Ballets Russes in 1923 as a soloist. In 1926 she became guest artist for Diaghilev and founded her own school, the Academy of Choreographic Art, in London. She also produced dances for Lennox Robinson at the Abbey Theatre in Dublin and for Terence Gray at the Festival Theatre in Cambridge.

The success of her ballet *Job* for the Camargo Society in 1931, followed by her association with Lilian Baylis, director of the Old Vic



Dame Ninette de Valois

Mike Davis

Theatre, led to the founding in 1931 of the Vic-Wells Ballet Company and the Sadler's Wells School. De Valois traced the history of the company, from its founding until it became the Royal Ballet in 1956, in *Invitation to the Ballet* (1937) and *Come Dance with Me* (1957). Besides directing the company that she created, she choreographed numerous ballets, including *Checkmate* (1937) and *Don Quixote* (1950). By drawing from English tradition for her choreographic material, as in *The Rake's Progress* (1935), inspired by William Hogarth's series of engravings, and *The Prospect Before Us* (1940), modeled on Thomas Rowlandson's caricature of the same name, she created a uniquely national ballet company. Her narrative ballets included prominent roles for male dancers, giving them artistic opportunities often neglected by other choreographers. She was created a Dame of the British Empire in 1951 and retired as director of the Royal Ballet in 1963, although she remained head of the school until 1972.

De Vinne, Theodore L., in full THEODORE LOW DE VINNE (b. Dec. 25, 1828, Stamford, Conn., U.S.—d. Feb. 16, 1914, New York, N.Y.), American author of many scholarly books on the history of typography.

De Vinne entered the employ of Francis Hart, one of the leading printers in New York City, in 1849 and in 1859 became a member of the firm. About 1864 he began to write on printing, at first on the economic aspects of the business, but later on the aspects of typographic style and the history of the craft.

In 1873 the firm began to print *St. Nicholas* and soon after took on the *Century,* the illustrations for which set new printing standards. In 1883 the name of the firm was changed to Theodore L. De Vinne and Company, and it earned a reputation as the most outstanding printing plant in the nation. De Vinne was a founder of the Grolier Club and one of its most active members, printing most of the early books issued by Grolier and writing or editing a number of them. De Vinne's most important contributions to typographic literature were *The Practice of Typography* (1900–04), a series of four manuals; *The Invention of Printing* (1876); *Christopher Plantin and the Plantin-Moretus Museum at Antwerp* (1888); and *Notable Printers of Italy During the Fifteenth Century* (1910).

De Vio, Tommaso: *see* Cajetan.

De Voto, Bernard (Augustine) (b. Jan. 11, 1897, Ogden, Utah, U.S.—d. Nov. 13, 1955, New York, N.Y.), American novelist, journalist, historian, and critic, best known for his works on American literature and the history of the Western frontier.

After attending the University of Utah and Harvard University (B.A., 1920), De Voto taught at Northwestern University (1922–27) and Harvard (1929–36) before becoming editor of the *Saturday Review of Literature.* After two years he resigned and returned to Cambridge, Mass., where he lived for the rest of his life. Although he wrote many novels, De Voto probably found his largest audience through his essays in the "Easy Chair" department for *Harper's Magazine.* His combination of sound scholarship and a vigorous, outspoken style made him one of the most widely read critics and historians of his day. His strong opinions and admitted prejudices for American life and materials put him at the centre of many critical controversies. Among the works he wrote or edited are *Mark Twain's America* (1932); (ed.) *Mark Twain in Eruption* (1940); *Mark Twain at Work* (1942); *Across the Wide Missouri* (Pulitzer Prize, 1948); *The World of Fiction* (1950); *The Hour* (1951); *The Course of Empire* (1952); and (ed.) *The Journals of Lewis and Clark* (1953). His novels include *The Crooked Mile* (1924) and *Mountain Time* (1947). A selection of *Letters* was published in 1975.

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De Vries, Peter (b. Feb. 27, 1910, Chicago, Ill., U.S.—d. Sept. 28, 1993, Norwalk, Conn.), American editor and novelist widely known as a satirist, linguist, and comic visionary.

De Vries was the son of Dutch immigrants to the United States and was reared in a Calvinist environment on Chicago's South Side. He graduated (1931) from Calvin College in Grand Rapids, Mich. After several years (1938–44) as an editor for *Poetry* magazine in Chicago, he joined the editorial staff of *The New Yorker* and thereafter made his home in Connecticut.

Although De Vries' first novel, *But Who Wakes the Bugler?* (1940), was most notable for having been illustrated by the cartoonist Charles Addams, and although his next two novels were hardly noticed at all, his first book of short stories, *No But I Saw the Movie* (1952), won critical acclaim, and his subsequent novel, *The Tunnel of Love* (1954), became a best-seller and was successfully adapted both as a play and as a motion picture. Noted for being light on plot and filled with wit, puns, and sardonic humor, De Vries' novels were appreciated for their imaginative wordplay and ironic vision. His later works include, among others, *Comfort Me with Apples* (1956), *The Tents of Wickedness* (1959), *Reuben, Reuben* (1964), *Madder Music* (1977), and *Slouching Towards Kalamazoo* (1983).

De Wint, Peter (b. Jan. 21, 1784, Stone, Staffordshire, Eng.—d. Jan. 30, 1849, London), English landscape and architectural painter who was one of the chief English watercolourists of the early 19th century.

From 1802 to 1806 De Wint studied under the engraver John Raphael Smith. Thereafter he made his living chiefly as a teacher. In 1811 he became a member of the Society of Watercolour Painters. He preferred the English countryside to foreign landscapes and only took one trip abroad. One of the most renowned English watercolourists, De Wint exercised a freedom in colour range and brushstroke that was rare among his contemporaries.

de Wolfe, Elsie, in full ELLA ANDERSON DE WOLFE, married name LADY MENDL (b. Dec. 20, 1865, New York, N.Y., U.S.—d. July 12, 1950, Versailles, France), interior designer, hostess, and actress, best known for her innovative and anti-Victorian interiors.

After attending school in Edinburgh, de Wolfe was launched on a social career in New York City, where she became involved in amateur theatricals for fund-raising. From about 1890 to 1905 she worked as a professional actress, specializing in supporting roles. She abandoned acting in 1905, taking up a career in interior design at the suggestion of Elisabeth Marbury, a longtime companion, and Sara Cooper Hewitt. Her first commission was the Stanford White-designed Colony Club in New York City. There she demonstrated her foremost design principles: simplicity, airiness (utilizing mirrors and light hues of paint and fabric), and visual (rather than stylistic) unity. With these principles she helped change the fashion of interior design. In 1913 her book *The House in Good Taste* was published. She was a noted hostess and spent much of her life in France, remaining there during World War I to nurse soldiers, for which service she received the Croix de Guerre. In 1926 she married Sir Charles Mendl.

De Zong (Chinese emperor): *see* Te tsung.

deacon (from Greek *diakonos,* "helper"), a member of the lowest rank of the threefold Christian ministry (below the presbyter-priest and bishop) or, in various Protestant churches, a lay official, usually ordained, who shares in the ministry and sometimes in the governance of a congregation. In churches in which the diaconate exists there is a general continuity, at least in principle, with the early Christian pattern of deacons as a basic but subservient ministerial order and as helpers responsible for the practical and charitable functions of the Christian community. In the Orthodox, the Anglican, and (until the 1960s) the Roman Catholic churches, the diaconate in practice almost entirely lost its original independent status as one of the major orders and became in effect a transitional probationership for ordination to the priesthood, customarily lasting for a year.

Interest in the permanent diaconate revived in the Roman Catholic church in the 20th century, and in 1957 Pope Pius XII referred to the possibility of an independent lay order of the diaconate. The subsequent second Vatican Council restored the permanent diaconate, partly to alleviate the shortage of priests and partly to reinforce the traditional threefold hierarchy of orders. Unlike the old diaconate, which functioned as a preparation for the priesthood, the newly revived diaconate became an ordained ministry in which married men could serve as well as single men. Permanent deacons exercise various responsibilities in parishes and dioceses, including administering the sacrament of Baptism, distributing the elements at Eucharist (Holy Communion), preaching, blessing marriages, and officiating at funerals and burial services.

Though they were "charged" rather than ordained, women known as deaconesses performed functions similar to those of deacons until about the 11th century; until the 19th century and the birth of the modern deaconess movement, the office was far more usual in the Eastern churches than in the West. Deaconesses exist in many Protestant denominations, including Episcopalian, Presbyterian, Lutheran, and Baptist churches. The Church of England first ordained women as deacons (*i.e.,* with sacerdotal authority) in 1987.

In Protestant bodies the diaconate takes several forms. In congregational (independent) churches the diaconate is usually an elective body of lay officers in a local congregation responsible for financial and administrative affairs and the distribution of the elements at Communion. Such deacons are, in effect, the ruling elders of the churches. In Presbyterianism provision is made for boards of deacons who may serve Communion, visit the sick, and distribute benevolences. On the continent of Europe, especially in Germany and Scandinavia, special diaconal institutes, first founded in 1833, train deacons for social service and youth work in the parishes. In certain cases these deacons have wider responsibilities; in Sweden, for example, after additional homiletical training, a *pastorsdiakon* is permitted to preach in the congregations of remote districts where the number of pastors may be insufficient.

Dead, Book of the (Egypt): *see* Book of the Dead.

dead reckoning, the determination without the aid of celestial observations of the position of a ship or aircraft from the record of the courses sailed or flown, the distance made (which can be estimated from velocity), the known starting point, and the known or estimated drift. Virtually every navigation system uses dead reckoning.

Some marine navigators differentiate between the dead-reckoning position, for which they use the course steered and their estimated speed through the water, from the estimated position, which is the dead-reckoning position corrected for effects of current, wind, and other factors. Because the uncertainty of dead reckoning increases over time and maybe over

distance, celestial navigation is used now and then to determine a reliable position (called a fix), and a new dead reckoning is begun from that point.

A number of devices used for the determination of dead reckoning—such as a plotter (a protractor attached to a straightedge) and computing charts, now chiefly used by operators of smaller vehicles—have been replaced in most larger aircraft and military vessels by one or more dead-reckoning computers, which input direction and speed (wind velocity can be manually inserted). Some of these increasingly sophisticated computers use Doppler or inertial sensing units, and some can be programmed to pick up signals from electronic or optical sensing units. The use of more than one such device tends to increase reliability.

Dead Sea, Arabic AL-BAḤR AL-MAYYIT, Hebrew YAM HA-MELAḤ ("Salt Sea"), landlocked salt lake between Israel and Jordan, the lowest body of water on Earth, which averages about 1,312 feet (400 m) below sea level. Its northern half belongs to Jordan; its southern half is divided between Jordan and Israel. After the 1967 Arab-Israeli War, however, the Israeli army remained in occupation of the entire western shore.

The Dead Sea lies between the hills of Judaea to the west and the Transjordanian plateaus to the east. The Jordan River flows from the north into the Dead Sea, which is 50 miles (80 km) long and attains a width of 11 miles (18 km). Its surface area is about 394 square miles (1,020 square km). The peninsula of Al-Lisān (the "tongue") divides the lake on its eastern side into two unequal basins; the northern basin encompasses about three-fourths of the lake's total surface area and reaches a depth of 1,300 feet (400 m); the southern basin is smaller and shallower (less than 10 feet [3 m] on the average). During biblical times and up to the 8th century AD, only the area around the northern basin was inhabited, and the lake was about 115 feet (35 m) below its level of the late 20th century. It rose to its highest level (1,275 feet [389 m] below sea level) in 1896 but receded again after 1935.

The name Dead Sea can be traced back at least to the Hellenistic epoch (323 to 30 BC). It has been associated with biblical history since the time of Abraham (progenitor of the Hebrews) and the destruction of Sodom and Gomorrah (the two cities, according to the Old Testament, that were destroyed by fire from heaven because of their wickedness; the city sites are now possibly submerged in the southern part of the Dead Sea). The desolate rivers of the lake offered refuge to David (king of Israel) and later to Herod I the Great, king of Judaea, who at the time of the siege of Jerusalem by the Parthians in 40 BC barricaded himself in a fortress at Masada. Masada was the scene of a three-year siege that culminated in the mass suicide of its Jewish Zealot defenders and the destruction of the fortress by the Romans in AD 73. The Jewish sect that left the biblical manuscripts known as the Dead Sea Scrolls took shelter in caves to the northwest of the lake.

The Dead Sea occupies the lowest part of the Jordan–Dead Sea trench (350 miles [560 km] long), which is a northern extension of the East African Rift Valley. It is a sunken block confined by two parallel geologic faults. The eastern fault, along the edge of the Moab Plateau, is more readily visible from the lake than is the western fault, which marks the gentler Judaean upfold.

In the Jurassic and Cretaceous periods (208 to 66.4 million years ago), before the creation of the trench, an extended Mediterranean Sea covered Syria and Palestine. During the Miocene Epoch (23.7 to 5.3 million years ago), upheaval of the seabed produced the upfolded structures of the Transjordanian highlands and the central range of Palestine, causing the fractures that formed the Dead Sea depression. At that time, the Dead Sea was probably about the size that it is in modern times. During the Pleistocene Epoch (1,600,000 to 10,000 years ago), it rose to a height of about 700 feet (about 215 m) above its modern level, forming a vast inland sea that stretched some 200 miles (320 km) from the Huleh Valley area in the north to 40 miles (64 km) beyond its present southern limits.

About 2.5 million years ago or later, heavy stream flow into the lake deposited thick sediments of shale, clay, sandstone, rock salt, and gypsum. Later strata of clay, marl, soft chalk, and gypsum were dropped upon layers of sand and gravel. With the water evaporating faster than it was replenished by precipitation over the last 10,000 years, the lake gradually shrank to its present form. In so doing, it bared deposits that cover the Dead Sea valley to a thickness of 1 to 4 miles (1.6 to 6.4 km).

The peninsula of Al-Lisān and Mount Sedom (historically Mount Sodom) are formations that resulted from movements of the Earth's crust. Mount Sedom's steep cliffs rise up from the southwestern shore. Al-Lisān is formed of strata of clay, marl, soft chalk, and gypsum interbedded with sand and gravel. Both Al-Lisān and beds made of similar material on the western side of the Dead Sea valley dip to the east. It is assumed that the uplifting of Mount Sedom and Al-Lisān formed a southern escarpment for the Dead Sea. Later, the sea broke through the western half of this escarpment to flood what is now the shallow southern end of the Dead Sea.

The Dead Sea lies in a desert. Rainfall is scanty and irregular. Al-Lisān has about 2.5 inches (65 mm) of rain a year, and the town of Sedom (near historical Sodom) only about 2 inches. Owing to the lake's low elevation and sheltered location, winter temperatures are mild, averaging 63° F (17° C) in January at the southern end at Sedom and 58° F (14° C) at the northern end; freezing temperatures are unheard-of. Summer is very hot, averaging 93° F (34° C) in August at Sedom, with a recorded maximum of 124° F (51° C). Evaporation of the lake's waters—estimated at about 55 inches (1,400 mm) a year—often creates a thick mist above the lake. On the rivers the atmospheric humidity varies from 45 percent in May to 62 percent in October. Lake and land breezes, which are relatively common, blow off the lake in all directions in the daytime and then reverse direction to blow toward the centre of the lake at night.

The inflow from the Jordan River, whose high waters occur in winter and spring, averages 19,000,000,000 cubic feet (540,000,000 cubic m) per year. Four modest but perennial streams descend from Jordan on the east through deep gorges: the Wadis Al-ʿUẓaymī, Zarqāʾ Māʿin, Al-Mawjib, and Al-Ḥasā. Down numerous other wadis, streams flow spasmodically and briefly from the neighbouring heights as well as from the depression of Wadi Al-ʿArabah. Thermal sulfur springs also feed the rivers. Evaporation in summer and the intake of water, especially in winter and spring, cause seasonal variations in the level of the lake of from 12 to 24 inches (30 to 60 cm).

The waters of the Dead Sea are extremely saline, and the concentration of salt increases toward the bottom. In effect, two different masses of water exist in the lake. Down to a depth of 130 feet (40 m), the temperature varies from 66° to 98° F (19° to 37° C), the salinity is slightly less than 300 parts per thousand, and the water is particularly rich in sulfates and in bicarbonates. After a zone of transition located between 130 and 330 feet (40 and 100 m), the lower waters have a uniform temperature of about 72° F (22° C) and a higher degree of salinity (approximately 332 parts per thousand); they contain hydrogen sulfide and strong concentrations of magnesium, potassium, chlorine, and bromine. The deep waters are saturated with sodium chloride, which is precipitated to the bottom. The lower waters are fossilized (*i.e.,* being very salty and dense, they remain permanently on the bottom); the upper waters date from a few centuries after biblical times.

The saline water has a high density. Bathers float on it easily. The fresh water of the Jordan stays on the surface; in the spring its muddy colour can be traced across the lake as far as 30 miles (50 km) south of the point where the river empties into the Dead Sea.

The extreme salinity excludes any animal or vegetable life except bacteria. Fish carried in by the Jordan or by smaller streams when in flood die instantly. Apart from the vegetation along the rivers, the only plant life is discontinuous and consists mainly of halophytes (plants that grow in salty or alkaline soil).

The Dead Sea constitutes an enormous salt reserve. In particular, salt deposits occur in the structures of Mount Sedom along the southwestern shore. The salt has been exploited on a small scale since antiquity. In 1929 a potash factory was opened near the mouth of the Jordan at Kāliyā. Subsidiary installations were later built at Sedom. During the 1948–49 Arab-Israeli War, the factory at Kāliyā was destroyed. A factory producing potash, magnesium, and calcium chloride was opened in Sedom in 1955. Another plant produces bromine and other chemical products.

Because of its location on the contested Jordan-Israeli frontier, the Dead Sea has not been used to a great extent for navigation. Its shores are deserted, and permanent establishments are rare. Exceptions are the factory at Sedom, a few hotels and spas at Kāliyā, and, in the west, a kibbutz (an Israeli agricultural community) in the region of the ʿEn Gedi oasis. Small cultivated plots are also occasionally found on the lakeshore.

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Dead Sea Scrolls, ancient manuscripts (of leather, papyrus, and copper) discovered in desert caves and ancient ruins in the wilderness of Judaea. They are among the more important discoveries in the history of modern archaeology. Their recovery has enabled scholars to push back the date of a stabilized Hebrew Bible to no later than AD 70, to reconstruct the history of Palestine from the 4th century BC to AD 135, and to cast new light on the emergence of Christianity and of rabbinic Judaism and on the relationship between early Christianity and Jewish religious traditions.

Documents were recovered in the Judaean wilderness from five principal sites: Khirbat Qumrān, Wadi Al-Murabbaʿah, Naḥal Ḥever (Wadi Khabrah) and Naḥal Ẓeʾelim (Wadi Seiyal), Wadi Daliyeh, and Masada. The first manuscripts, accidentally discovered by a young Bedouin shepherd (1947) in a cave at Khirbat Qumrān on the northwest shore of the Dead Sea, were almost immediately labeled Dead Sea Scrolls. Later finds (especially in the 1950s to mid-1960s) in neighbouring areas were similarly designated.

Eleven caves near Qumrān yielded numerous documents, all long presumed part of a library belonging to a fundamentalist Jewish religious sect (Essenes) that flourished at Qumrān from the mid-2nd century BC to AD 68. Some scholars have suggested that the scrolls were not the work of Essene monks but rather a collected

library of important Jewish works that was hidden for protection during the Roman invasion of AD 67 to 73. Though the documents themselves date from the mid-3rd century BC to AD 68, the majority were composed during the 1st century BC and 1st century AD. The oldest manuscripts are biblical.

The best-preserved documents are those found in Cave I at Qumrān, including an Isaiah Scroll; the *Rule of the Community* (also called the *Manual of Discipline*); *The War of the Sons of Light Against the Sons of Darkness*, or War Scroll; a scroll of thanksgiving hymns; and a commentary on the Book of Habakkuk.

Cave II contained only fragments. Cave III yielded the Copper Scroll, a list of Temple treasures and their hiding places. Cave IV sheltered the main deposit of the allegedly Essene library. Of the approximately 400 manuscripts, generally in poor condition, most were sectarian writings. About 100 are biblical and represent the entire Hebrew Old Testament, excepting the Book of Esther.

Several well-preserved documents also were recovered from Cave XI, including a large scroll with canonical, apocryphal, and unknown psalms. There was also a copy of Leviticus (dated to the 3rd century BC). The Temple Scroll, purchased in 1967 from Bedouins, was probably removed from Cave XI more than a decade earlier. Its 66 preserved columns give details for the construction of the ideal Temple of Jerusalem.

Wadi Al-Murabba'ah, a second site 11 miles (18 km) south of Qumrān, contained documents left by fugitives from the armies of Bar Kokhba (who led the Jews in a suicidal revolt against Rome in AD 132–135). Besides two letters of Bar Kokhba, legal documents in Hebrew, Aramaic, and Greek, and fragmentary biblical works of the 1st and 2nd centuries AD, archaeologists recovered a remarkably well-preserved scroll of the 12 minor prophets that is virtually identical with the traditional biblical text.

When shepherds reported a third site in 1952, this one south of 'En Gedi, they presented as evidence a lost Greek translation (1st century AD) of the minor prophets, a letter of Bar Kokhba, biblical fragments, and legal documents of the Bar Kokhba era in Aramaic, Greek, and Nabataean. Excavations at Naḥal Ze'elim, in the "Cave of Scrolls," uncovered clear evidence of the Bar Kokhba era and, in the "Cave of Letters," 15 papyri of Bar Kokhba with a psalms fragment. Later diggings produced additional letters of Bar Kokhba and a large body of Nabataean, Aramaic, and Greek documents. At Naḥal Ḥever, in the "Cave of Horrors" (containing skeletal remains), there were bits of a Greek recension of the minor prophets.

A fourth site, 8.5 miles (13.6 km) north of ancient Jericho, yielded about 40 badly damaged documents deposited in a cave by Samarians who were massacred there by soldiers of Alexander the Great in 331 BC. These legal documents are all in Aramaic except for seals in Paleo-Hebrew. As the earliest (375–335 BC) extensive group of papyri ever found in Palestine, they are of immense value to historians.

A fifth site, at Masada, produced a Hebrew manuscript of Ecclesiasticus (*c.* 75 BC) and fragments of Psalms, Leviticus, and Genesis. Found also was a *Scroll of the Songs of the Sabbath Sacrifice*, possibly of Essene authorship. A similar manuscript was found in Cave IV at Qumrān.

All the manuscripts were placed under the control of a small committee of scholars. Most of the longer, more complete scrolls were published soon after their discovery. The majority of the scrolls, however, consist of tiny, brittle fragments. These fragments were published at a pace considered by many to be excessively slow, and access to the unpublished documents was severely limited by the editorial committee. In September 1991 researchers at Hebrew Union College, Cincinnati, Ohio, announced that they had created a computer program that used a previously published concordance to the scrolls to reconstruct one of the unpublished texts. Later that month, officials at the Huntington Library, San Marino, Calif., announced that they would allow researchers unrestricted access to the library's complete set of photographs of the scrolls. With their de facto monopoly of the scrolls broken, the official scholars of the Israeli Antiquities Authority agreed to lift their long-standing restrictions on the use of the scrolls.

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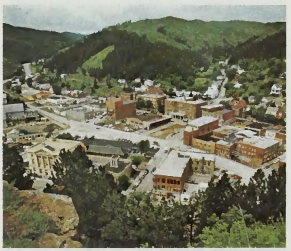
deadly sin, also called CARDINAL SIN, any of the sins, usually numbering seven, dating back to the early history of Christian monasticism; they were grouped together as early as the 6th century by St. Gregory the Great. A sin was classified as deadly not merely because it was a serious offense morally but because "it gives rise to others, especially in the manner of a final cause" or motivation (St. Thomas Aquinas). The traditional catalog of the seven deadly sins is: (1) vainglory, or pride; (2) covetousness; (3) lust, understood as inordinate or illicit sexual desire; (4) envy; (5) gluttony, which usually included drunkenness; (6) anger; and (7) sloth. The classical discussion of the subject is in the *Summa Theologica*, by the 13th-century theologian St. Thomas Aquinas. The deadly sins were a popular theme in the morality plays and art of the European Middle Ages.

Deadwood, city, seat of Lawrence county, western South Dakota, U.S. It is situated in a canyon formed by a branch of the Belle Fourche River of the northern Black Hills, 4,533 feet (1,382 m) above sea level. Built on the steep, wooded inclines of Deadwood Gulch, the city was founded during the 1876 gold rush, when about 25,000 miners swarmed the surrounding hills. Its turbulent reputation as a lawless outpost of frontier violence was magnified by the "Deadwood Dick" series of dime novels. Wild Bill Hickok, soldier, scout, and marshal, was killed in a Deadwood saloon Aug. 2, 1876, by Jack McCall; he is buried in Mount Moriah Cemetery near Calamity Jane, Preacher Smith, Seth Bullock, and other



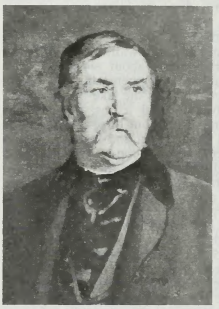
Deadwood, S.D.
B. Bolstad—Photo Researchers

celebrated frontier characters who died in the vicinity. The city was almost completely abandoned at the news of another gold strike at Lead, a few miles to the southwest.

Deadwood's economy is now dependent upon tourism, legalized gambling, mining, and forestry. It is also influenced by the large Homestake gold mine at Lead. The Terry Peak ski area is nearby. Inc. city, 1881. Pop. (1990) 1,830.

deafness, partial or total inability to hear. The two principal types of deafness are conduction deafness and nerve deafness. In conduction deafness, there is interruption of the sound vibrations in their passage from the outer world to the nerve cells in the inner ear. The obstacle may be earwax that blocks the external auditory channel, or stapes fixation, which prevents the stapes (one of the minute bones in the middle ear) from transmitting sound vibrations to the inner ear. In nerve deafness, some defect in the sensory cells of the inner ear (*e.g.*, their injury by excessive noise) or in the vestibulocochlear nerve prevents transmission of sound impulses from the inner ear to the auditory centre in the brain. Deafness at birth is nearly always of the nerve type and cannot be improved by medical means.

Deák, Ferenc, byname THE SAGE OF THE COUNTRY, Hungarian A HAZA BÖLCSE (b. Oct. 17, 1803, Söjtör, Hung., Austrian Empire [now in Hungary]—d. Jan. 28/29, 1876, Budapest), Hungarian statesman whose negotiations led to the establishment of the dual monarchy of Austria-Hungary in 1867.



Deák, detail of an oil painting by Bertalan Székely; in the Hungarian National Museum, Budapest
By courtesy of the Hungarian National Museum, Budapest

Deák was the son of a wealthy Hungarian landowner. After graduating in law, he entered the administrative service of his county of Zala, which in 1833 sent him to represent it in the Hungarian Diet, in place of his brother, who had resigned his mandate. At that Diet and those of 1839 and 1841, Deák made his mark as a leader of the growing reform movement for the political emancipation and internal regeneration of Hungary. Reelected in 1843, he declined his mandate in protest against the scandalous manner in which the election had been conducted, but by this time his unimpeachable integrity, unvarying good sense, and encyclopaedic knowledge of the law had made him the most generally respected figure in his camp. It was he who, in 1847, drafted for the "national opposition" its program of reform for the Diet of 1847. Ill health prevented him from seeking election to that body, but when, in March 1848, the crown sanctioned the establishment of an independent Hungarian ministry, the new minister president, Count Lajos Batthyány, insisted on his taking the portfolio of justice.

As minister of justice, Deák was mainly responsible for the drafting of the reforming "April Laws" sanctioned by the monarch on April 11, 1848. During the next months, he took part in most of the negotiations between the Hungarian government and its opponents. He ceased to be minister when Batthyány

resigned on September 28, and he refused reappointment, but in January 1849 he was a member of another mission that sought to intervene with Alfred, Fürst zu Windischgrätz, commander of the Austrian armies that had occupied Buda. Prevented from rejoining the Diet, he retired to his family estates, where he lived quietly for some years, unmolested by the Austrian authorities, who had decided that his activities had not been treasonable, but refusing all invitations to collaborate with a regime that he condemned as illegal. In 1854 he sold his estates—donating the bulk of the proceeds to his sister—and moved to Pest, taking up quarters in the Hotel Angol Királynė, which remained his home until his last illness.

In Pest, Deák became the oracle of all those who sought a practical and honourable way out of Hungary's political impasse. Because Deák adamantly refused to recognize any regime that did not grant the legal validity of the April Laws, a Diet convoked in 1861 was dissolved and absolutist monarchy reimposed. As his international difficulties gradually convinced Emperor Francis Joseph of the need for reconciliation with Hungary, Deák, in both private conversations and public utterances, notably his famous "Easter Article" of April 16, 1865, put forward Hungary's conditions in terms that presently led to the Compromise (*Ausgleich*) of 1867, by which the dual monarchy was established.

Deák was beyond question the originator of the Compromise. The machinery that it embodied was not all of his devising, but it was his faith that a constitutionally satisfied Hungary and a strong monarchy could and must coexist that made the agreement possible; nor could agreement have been reached without his sagacity, resolution, and integrity and the faith that these qualities inspired in both camps.

His adherents during the negotiations had styled themselves the "Deák Party." He helped to complete the legislation deriving from the Compromise and defended it in Parliament when necessary. His health began to fail; his last public speech was made in November 1873.

The Compromise was the crowning achievement of Deák's life work, but there was hardly a field of public life in which he did not exercise his influence, and always on the side of humanity, reasoned reform, and good sense. He was a foremost fighter for the reform of the conditions of the Hungarian peasantry, setting the example on his own estates.

(C.A.M./Ed.)

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Deak, Nicholas L(ouis) (b. Oct. 8, 1905, Transylvania, Hung.—d. Nov. 18, 1985, New York, N.Y., U.S.), banker and founder of an internationally renowned retail currency-exchange service and dealer in precious metals.

Deak received a Ph.D. in economics from the University of Neuchâtel, Switz., in 1929. He worked with the Hungarian Trade Institute (1930–35) and with the British Overseas Bank (1935–37) as manager of Hungarian and Romanian subsidiaries. For two years Deak worked in the economics department of the League of Nations. In 1939 he founded Deak & Company, but he closed the operation in 1942, when he joined the U.S. Army. He became a U.S. citizen in 1943 and eventually a senior intelligence officer in the Office of Strategic Services (OSS), the forerunner of the Central Intelligence Agency (CIA).

He resumed his business in 1946 and formed a partnership with the Perera group, a foreign-exchange dealer. Over the years Deak's business expanded rapidly; at its height the parent company, Deak & Company, included three banks and some 70 international companies providing a variety of monetary services. In the late 1970s and early '80s the company was shaken by a series of scandals involving the "laundering" of money; Deak & Company and two of its subsidiaries entered bankruptcy proceedings in 1984. In 1985 a mentally unbalanced woman murdered Deak in his office.

Deakin, Alfred (b. Aug. 3, 1856, Melbourne, Vic., Australia—d. Oct. 7, 1919, Melbourne), prime minister of Australia (1903–04, 1905–



Alfred Deakin
By courtesy of the Australian Information Service

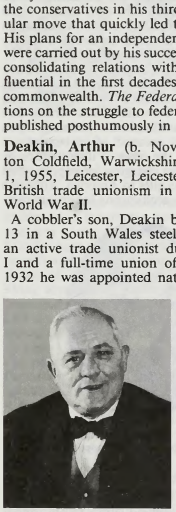
08, 1909–10), who shaped many of the policies of the new commonwealth, especially those dealing with restriction of nonwhite immigration, social welfare, and protection of domestic industry.

In 1880 Deakin entered the legislative assembly in Victoria, where he served for the next 20 years. He sponsored an important irrigation bill in 1886 and acts protecting factory workers in 1885 and 1896. A leader in the federation movement, he attended the conferences of 1891 and 1897–98 that drafted the constitution bill making Australia a commonwealth. He then went to England in 1900 to guide the bill through Parliament.

Deakin became prime minister in 1903, after serving as attorney general under Sir Edmund Barton (1901–03). A leader of the Liberal Party, he formed a coalition with the Labor Party in his first two terms but joined with the conservatives in his third term, an unpopular move that quickly led to electoral defeat. His plans for an independent Australian navy were carried out by his successors. His ideas on consolidating relations with Britain were influential in the first decades of the Australian commonwealth. *The Federal Story,* his reflections on the struggle to federate Australia, was published posthumously in 1944.

Deakin, Arthur (b. Nov. 11, 1890, Sutton Coldfield, Warwickshire, Eng.—d. May 1, 1955, Leicester, Leicestershire), leader of British trade unionism in the decade after World War II.

A cobbler's son, Deakin began work at age 13 in a South Wales steel plant, becoming an active trade unionist during World War I and a full-time union official in 1919. In 1932 he was appointed national secretary of



Arthur Deakin
Camera Press

the General Workers' group of the Transport and General Workers' Union, the largest in Britain. In 1940 he succeeded Ernest Bevin in the general secretaryship when Bevin joined the War Cabinet. From 1945 until his death Deakin's dominance of British trade unionism was perhaps even greater than Bevin's had been in the 1930s.

Deakin was an astute wage negotiator, but he supported the Labour government's policy of wage restraint. A firm anticommunist, in 1948 he led the noncommunist unions out of the World Federation of Trade Unions (of which he was president) and helped form a rival organization, the International Confederation of Free Trade Unions. After the fall of the Labour government in 1951, his opposition to Aneurin Bevan's left-wing group within the Labour Party helped to maintain both Clement Attlee's party leadership and the adherence of Labour to a pro-U.S. policy. In 1954 Deakin was made a privy councillor.

Deal, town, Dover district, county of Kent, England, on the English Channel. The town has a natural roadstead harbour, The Downs, enclosed by the North and South Forelands and the perilous Goodwin Sands.

It is claimed that Julius Caesar landed there in 55 BC. In 1539 Henry VIII built Deal, Sandown, and Walmer castles, all within the modern town. Walmer, official residence of the lord warden of the Cinque Ports (*q.v.*), and Deal are still extant; Sandown was destroyed by the sea. The presence of these castles, and the siltation of the town's rival, Sandwich, led to a considerable growth in Deal's mercantile trade. The Downs was the scene of naval battles between the Spanish and Dutch (1639) and the English and Dutch (1666). In 1682 William Penn sailed from Deal on his first voyage to America.

During the 19th century the town became a popular holiday resort. Although still predominantly maritime in character, with important fishing and boatbuilding activities, the town also lies near Betteshanger, the largest of the Kent collieries, and has attracted light industries. Pop. (1981) 26,548.

dealfish, any of several slender marine fishes that belong to the genus *Trachipterus* (family Trachipteridae, order Lampridiformes), a subgroup of the ribbonfish. The dealfish inhabits the middle waters, probably not below 400 m (1,300 feet), and is characterized by a long, laterally compressed body, short head, narrow mouth, and feeble dentition. The dorsal fin extends the length of the back, with the anal fin absent and the caudal (tail) fin, when present, much-reduced; the pectoral fins are small. In the young dealfish some of the fin rays (hornlike projections of the fin skeleton) are prolonged in an extraordinary way.

Dealfishes, which may reach a length of 2.5 m (8.2 feet), are distributed worldwide. All the specimens found at the surface of the sea have been more or less mutilated by the release from the enormous pressure under which they customarily live. The most common species is the northern dealfish, *T. arcticus.*

Dean, Dizzy, byname of JAY HANNA DEAN (b. Jan. 16, 1911, Lucas, Ark., U.S.—d. July 17, 1974, Reno, Nev.), American professional baseball player who had a brief but spectacular pitching career with the St. Louis Cardinals in the National League. He was one of the most colourful athletes in the history of organized sports.

In five outstanding seasons (1932–36), Dean, a right-hander, won 120 games, leading the league four times in complete games and four times in strikeouts. Before the 1934 season he predicted that he would win 30 games and that his brother Paul Dee Dean, also a pitcher

for the Cardinals, would win 15. That year Dizzy won exactly 30 and Paul 19. Dizzy then announced: "Who won the pennant? Me and Paul. Who's going to win the [World] Series? Me and Paul." Each brother defeated the Detroit Tigers twice to give the Cardinals the World Series championship. He retired at age 30, with 150 victories and 83 defeats.

The career of Paul Dean also ended prematurely because of an arm injury suffered in 1936. In 1953 Dizzy was elected to the Baseball Hall of Fame. As a baseball broadcaster, Dean had a disregard for the niceties of grammar ("He slud into third") exceeded only by his knowledgeable comment.

Dean, Forest of, ancient royal forest of oak and beech in western Gloucestershire, England, covering an area of about 26,000 ac (10,500 ha) between the Rivers Severn and Wye. It became a National Forest Park administered by the Forestry Commission in 1938. Forest residents ("commoners") retain their ancient feudal rights of sheep pasturage and hold their verderers' court, a judicial anachronism, at Speech House; miners operate small private coal pits. Lydney, Coleford, and Cinderford have small industries. Roman antiquities include a road, villa, and ironworkings.

Dean, James (Byron) (b. Feb. 8, 1931, Marion, Ind., U.S.—d. Sept. 30, 1955, Paso Robles, Calif.), U.S. motion-picture actor enshrined as a symbol of the confused, restless, and idealistic youth of the 1950s.



James Dean in *Giant* (1956)

© 1966 Giant Productions, courtesy of Warner Bros.; photograph, Culver Pictures

Raised on a farm by an aunt and uncle, Dean studied theatre for two years and then began a professional stage career in New York. His portrayal of the blackmailing Arab in the play *The Immoralist* (New York City, 1954) showed promise, and he was offered a Hollywood contract. He gave a sensitive interpretation of the brooding, restless son in the film *East of Eden* (1955), based on the novel by John Steinbeck, then starred in *Rebel Without a Cause* (1955), a film dealing with the explosive social relationships among misunderstood teenagers. In *Giant* (1956), from the novel by Edna Ferber, Dean was featured as a rough, nonconformist ranch hand. These three films established Dean as the personification of youthful frustration and made him the object of a cult of young Americans. His violent death in an automobile crash before the release of *Giant* caused nationwide mourning among them and contributed to his further idolization.

Dean, John Wesley, III (b. Oct. 14, 1938, Akron, Ohio, U.S.), U.S. lawyer who served as White House counsel during the Nixon administration (1970–73) and whose revelation of official participation in the Watergate Scandal ultimately led to the resignation of the president and the imprisonment of Dean himself and other top aides.

Dean was graduated from the College of Wooster (Ohio) in 1961 and received a law degree from Georgetown University (Washington, D.C.) in 1965. From 1966 to 1967, he served as chief minority counsel to the House Judiciary Committee. A two-year tenure as associate director of the National Commission on Reform of Federal Criminal Laws preceded his accepting appointment in the Nixon administration as an associate deputy attorney general. In 1970 the president selected Dean as White House counsel.

Dean first came to national attention in 1972, when Nixon named him to head a special investigation into possible involvement of White House personnel in the Watergate case. As was later revealed, he refused to issue a proposed fictitious report denying a cover-up, and when implications of White House involvement became stronger, Dean began telling federal investigators what he knew.

Nixon fired Dean on April 30, 1973. Two months later Dean testified publicly before the Senate Select Committee on Presidential Campaign Activities, explaining in great detail how White House officials—including the president—had obstructed justice in order to mask their participation in the events following the June 17, 1972, break-in at the Watergate headquarters of the Democratic National Committee.

The former White House counsel was later imprisoned for his role in Watergate, a role that he recounted in his book *Blind Ambition* (1976).

Deane, Silas (b. Dec. 24, 1737, Groton, Conn.—d. Sept. 23, 1789, at sea near Deal, Kent, Eng.), first U.S. diplomat sent abroad (1776), who helped secure much-needed French aid for the American Revolutionary cause.

Admitted to the bar in 1761, Deane served as a delegate from Connecticut to the Continental Congress in Philadelphia (1774–76). Congress then sent him to France as a secret agent to obtain financial and military assistance and to investigate the possibility of an alliance. He obtained and sent arms valued at more than 6,000,000 livres to America, an important contribution to the decisive victory over the British at Saratoga (October 1777). In November 1777 Congress recalled Deane, but before leaving Paris he signed the treaties of commerce and alliance (Feb. 6, 1778) that he and two other commissioners, Arthur Lee and Benjamin Franklin, had negotiated. Upon his return he was accused of embezzlement and disloyalty on the basis of insinuations by Lee that Deane was charging for supplies that France intended as gifts to America. Although never proved, the accusations led to his ruin.



Silas Deane, portrait miniature by Charles Willson Peale; in the collection of the Connecticut Historical Society

By courtesy of the Connecticut Historical Society

Deane returned to France in 1780 as a private citizen and prepared letters to old friends in America attacking the French alliance and recommending a reconciliation with England. When the letters were published in *The Royal Gazette*, a Tory paper in New York (1781), he was denounced as a traitor. He began an exile, first in Ghent and then in London, where in 1784 he published his defense in *An Address to the Free and Independent Citizens of the United States*. Five years later Deane set sail for America but died on board under mysterious circumstances. He never admitted doing wrong and in 1842 was finally exonerated by Congress.

Dearborn, city, Wayne county, southeastern Michigan, U.S., adjacent to Detroit (north and east), on the River Rouge. The birthplace of Henry Ford, it is the headquarters of research, engineering, and manufacturing of the Ford Motor Company. Settled in 1795, it originated as a stagecoach stop (called Ten Eyck and later Bucklin) on the Sauk Trail between Detroit and Chicago. A community known as Pekin developed there and was laid out in 1833 as Dearbornville (named for U.S. Revolutionary War hero Gen. Henry Dearborn), which was incorporated as the village of Dearborn in 1893. Industrial development began with the building of the Ford Motor Company River Rouge Assembly Plant in 1917 and continued with related automotive industries. The City of Fordson, adjacent to the plant, consolidated with Dearborn in 1928. Henry Ford Community College (1938) and the Dearborn campus (on the site of Fairlane, the former Ford estate) of the University of Michigan (1959) are located there. Greenfield Village and the Henry Ford Museum feature exhibits of Americana; the Dearborn Historical Museum is housed in the former quarters of the commandant of the Detroit Arsenal (built 1833–37). Inc. city, 1927. Pop. (1990) 89,286.

Dearborn, Fort, blockhouse and stockade, built in 1803 because of Indian unrest, at a narrow bend in the Chicago River, northeastern Illinois, U.S., and named for Henry Dearborn, Revolutionary War hero. The fort was evacuated in 1812, but the garrison party was massacred by Potawatomi Indians just south along the Lake Michigan shore. The fort was burned but was rebuilt in 1816; it was abandoned in 1836. The site, marked by a plaque, is at the south end of the Michigan Avenue Bridge in Chicago.

Dearborn, Henry (b. Feb. 23, 1751, Hampton, N.H.—d. June 6, 1829, Roxbury, Mass., U.S.), U.S. army officer, congressman, and secretary of war for whom Ft. Dearborn—the site of which is located in what is now the heart of Chicago—was named. He abandoned the practice of medicine to fight in the American Revolution and kept a journal that gives a valuable account of the principal campaigns of the war. On the organization of the U.S. government, he was appointed marshal for the District of Maine (1789–93). He represented Massachusetts in Congress (1793–97), was secretary of war under Pres. Thomas Jefferson (1801–09), and served as U.S. minister to Portugal (1822–24). As secretary of war he issued an order in 1803 "for erecting barracks and a strong stockade" at "Chikago with a view to the establishment of a Post."

When the War of 1812 began, Dearborn, then senior major general of the U.S. Army, attempted to invade Canada at several points. After a long succession of delays and reverses, however, he was removed from command by Pres. James Madison on July 6, 1813.

Dearg, Loch (Ireland): *see* Derg, Lough.

Déat, Marcel (b. March 7, 1894, Guèrigny, Fr.—d. Jan. 5, 1955, Turin, Italy), French politician who was a leading collaborator with Nazi Germany.

A brilliant student, Deat was graduated from the École Normale and taught philosophy in Reims. In 1926 he was elected to the Chamber

of Deputies as a Socialist but broke with the party in 1932 in opposition to Léon Blum's leadership. During the 1930s, Déat steadily



Déat, c. 1940
H. Roger-Viollet—Harlingue

moved to the political right. Adopting the slogan "Order, Authority, and Nation," he helped form the Parti Socialiste de France (July 1933) as an alternative to Blum's Socialist policies. After a brief term as air minister (1936) he lost his seat in the Chamber.

An outspoken admirer of Hitler's National Socialism, in April 1939 Déat caused a national controversy with his article "Mourir pour Dantzig?" ("Why Die for Danzig?"), which held that France had no interest in defending Poland against Hitler. When France fell to Germany (June 1940), he remained in the occupied zone and founded the collaborationist Rassemblement National Populaire. In March 1944, he joined Pierre Laval's government as minister of work and social affairs. After the collapse of Germany, Déat disappeared. In June 1945 he was condemned to death, in absentia, for treason. It was later discovered that a religious order in northern Italy had taken him in and concealed him until his death. During his last years he wrote his memoirs (unpublished).

death, the total cessation of life processes that eventually occurs in all living organisms. The state of death has always been obscured by mystery and superstition. The precise definition of human death remains controversial and differs according to culture and legal system.

A brief treatment of death follows. For full treatment of the biological aspects of death, focusing particularly on the modern concept of brainstem death and its historical antecedents, *see* MACROPAEDIA: Death. For treatment of cultural and religious aspects, *see* Rites and Ceremonies: *Death rites and customs.*

The usual criteria of life, such as respiration, reduplication, and transportation of substrates and ions, are not themselves necessary for potential life at any given time. For example, bacteria, which are the smallest integrated cellular units that contain the normal components of a cell, including a membrane and nuclear and cytoplasmic material, may be completely dehydrated at low temperatures to a dry powder. Later, in the proper environment, they may be brought back to a state in which they are able to perform their normal functions. Only when an irreversible rearrangement of the structural molecules has taken place, *i.e.,* one that forever prevents cell duplication, may it be said that death has occurred.

The diagnosis of death in the mammalian organism was long based on the following easily established early criteria: the absence of peripheral pulse and heartbeat, the absence of respiration, the lack of corneal reflex, and the presence of a bluish colour (cyanosis) that results from a lack of oxygen in the blood. The discoloration is seen most easily in the mucous membranes of the mouth and lips and in the nail beds.

In view of the increase in medical transplantations and in the use of so-called life-support systems, interest has been focused on these criteria as regards human death. It is within medical means to revive persons who no longer breathe, react to certain stimuli, or evidence heartbeat. Further, it is possible by artificial means to sustain the vital functions far beyond the body's own ability to do so. New guidelines are required, therefore, to judge the occurrence of death, especially in the cases of individuals thus supported and of persons who might donate their healthy organs to others. Most prominent among the new criteria for human death are the absence of a functioning brainstem (that portion of the brain whose activities are essential to the capacity for consciousness) and the irreversible cessation of unassisted breathing.

Many belief systems have tried to distinguish between physical and spiritual being. Despite the decomposition of the human body following death, the idea has persisted that something of the individual person continues to survive the experience of dying. This belief occurs in virtually all religions, past and present, and decisively conditions their evaluations of man and his place in the universe.

Death, Angel of: *see* Mengele, Josef.

death, dance of, also called DANSE MACABRE, medieval allegorical concept of the all-



"The Peddler," woodcut designed by Hans Holbein the Younger for the "Dance of Death" series, 1523–26; in the British Museum
Reproduced by courtesy of the trustees of the British Museum, photograph, J.R. Freeman & Co. Ltd.

conquering and equalizing power of death, expressed in the drama, poetry, music, and visual arts of western Europe mainly in the late Middle Ages. Strictly speaking, it is a literary or pictorial representation of a procession or dance of both living and dead figures, the living arranged in order of their rank, from pope and emperor to child, clerk, and hermit, and the dead leading them to the grave. The dance of death had its origins in late 13th- or early 14th-century poems that combined the essential ideas of the inevitability and the impartiality of death. The concept probably gained momentum in the late Middle Ages as a result of the obsession with death inspired by an epidemic of the Black Death in the mid-14th century and the devastation of the Hundred Years' War (1337–1453) between France and England. The mime dance and the morality play undoubtedly contributed to the development of its form.

The earliest known example of the fully developed dance of death concept is a series of paintings (1424–25) formerly in the Cimetière des Innocents in Paris. In this series the whole hierarchy of church and state formed a stately dance, the living alternating with skeletons or corpses escorting them to their destination. The work was a stern reminder of the imminence of death and a summons to repentance. The Paris *danse macabre* was destroyed in 1699, but a reproduction or free rendering can be seen in the woodcuts of the Paris printer Guy Marchant (1485), and the explanatory verses have been preserved.

All other picture cycles on the theme were derived directly or indirectly from that of the Innocents. The dance of death frequently appears in friezes decorating the cloisters of monasteries (the open courtyards of which usually contained cemeteries) and the naves of churches. There are also numerous German woodcut versions. In 1523–26 the German artist Hans Holbein the Younger made a series of drawings of the subject, perhaps the culminating point in the pictorial evolution of the dance of death, which were engraved by the German Hans Lützelburger and published at Lyon in 1538. Holbein's procession is divided into separate scenes depicting the skeletal figure of death surprising his victims in the midst of their daily life. Apart from a few isolated mural paintings in northern Italy, the theme did not become popular south of the Alps.

The proliferation of literary versions of the dance of death included a Spanish masterpiece, the poem "La danza general de la muerte," which was inspired by the verses at the Innocents and by several German poems. Late Renaissance literature contains references to the theme in varied contexts.

In music the dance of death was performed frequently in compositions associated with death. Mimed representations were performed in Germany, France, Flanders, and the Netherlands, and the music of one German *Totentanz* ("dance of death") has survived from the early 16th century.

The concept of the dance of death lost its awesome hold in the Renaissance, but the universality of the theme inspired its revival in French 19th-century Romantic literature and in 19th- and 20th-century music. In 1956 it was effectively used as the visual climax of Ingmar Bergman's motion picture *The Seventh Seal.*

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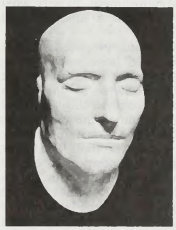
death mask, a wax or plaster cast of a mold taken from a dead face. Death masks are true portraits, although changes are occasionally made in the eyes of the mask to make it appear as though the subject were alive. From the time of ancient Egypt they have served as



Death mask of Napoleon
By courtesy of Madame Tussaud's Ltd.

aids to portrait sculptors, and for the last few centuries they have been kept as mementos of the dead.

Since the 13th century, death masks have aided the sculptors of tomb effigies, but in medieval France and England actual death masks were used for the royal funeral effigies that lay in state. Only English examples exist, however; those in France were destroyed during the French Revolution. The mask of Henry VII is probably the finest in existence, and that of Edward III is the earliest European example; the latter records the facial distortion due to his fatal stroke. Other well-known masks are those of Isaac Newton, Ludwig van Beethoven, and Napoleon Bonaparte.

In contrast to death masks, life masks are made from molds taken from living faces. The features of such persons as Henry Clay and James Madison have been preserved in life masks.

Death of God movement, radical Christian theological school, mainly Protestant, that arose in the United States during the 1960s, evoking prolonged attention, response, and controversy. Though thinkers of many varied viewpoints have been grouped in this school, basic to practically all of them is the idea that belief in God is impossible or meaningless in the modern world, and that fulfillment is to be found in secular life.

Thomas J.J. Altizer, best known of the Death of God theologians, asserted that the traditional Judeo-Christian God had actually died in the Crucifixion of Jesus of Nazareth and henceforth entered into the processes of the secular, historical world. Paul Van Buren contended that talk about God is linguistic nonsense, because it purports to deal with a transcendent reality, about which meaningful talk is no longer possible. William Hamilton held that the absence or death of God made it possible for people to assume full responsibility and activity in the work and love of this world, freed from dependence on a providential Father in heaven; he also centred on Jesus as the model person and still Lord for all Christians. Gabriel Vahanian, actually a neo-Calvinist rather than a radical theologian, held that the Death of God was both a religious and cultural event, occurring because the (essentially pagan) mythological terms in which the Christian faith had traditionally been expressed became obsolete in a modern scientific society. He looked forward to the reappearance of faith in a truly transcendent God—not the false image of cultural Christianity. Although the term Death of God fell into disuse within a decade, its essential drives and concerns continued in small circles of self-styled "radical theologians."

death-qualified jury, in American law, a trial jury pronounced fit to decide a case involving the death penalty. The special fitness of jurors in death-punishable cases pertains to views on capital punishment. Exactly what views disqualify a juror is a much-debated problem.

Under the long-standing practice of death qualification, a potential juror who—during the preliminary questioning to assure against bias—stated any opposition to the death penalty was excused from serving. In 1969 the United States doctrine on the subject was changed by the Supreme Court in *Witherspoon* v. *Illinois,* a murder trial. The court held that philosophical opposition to capital punishment did not disqualify a juror, that a person might oppose capital punishment yet believe in his duty to uphold the laws as they are until changed, and that he might perform his sworn duty as a juror to judge the case according to those laws.

The court reasoned that a jury deciding between life imprisonment and execution is expressing the conscience of the community, and that no jury could do this impartially if persons opposing the death penalty were systematically excluded. The court's decision left unchanged the rule that persons indicating their absolute refusal to impose the death penalty at all are to be excluded from juries. Those who indicate that their views on capital punishment would keep them from rendering an impartial verdict on the defendant's guilt or innocence (*i.e.,* whether he actually did the criminal act, rather than what punishment he should receive) were also left excluded.

Death qualification of juries is obviously closely tied to the practice of capital punishment itself. The disappearance of capital punishment has eliminated death qualification in many countries.

death rate, frequency of deaths within a given population, conventionally calculated as the annual number of deaths per 1,000 inhabitants. *See* vital rates.

death tax, a levy imposed on the estate left by a decedent or on the inheritance of a beneficiary. Like the gift tax, it is a levy imposed on gratuitous transfers of property—*i.e.,* transfers made without compensation.

A brief treatment of death taxes follows. For full treatment, *see* MACROPAEDIA: Taxation.

Death in most countries is considered a taxable event. Death taxes can be supported on both legal and social grounds. Legally, the tax may be considered a fee for the privilege of passing property on after death. Socially, the tax tends to reduce inequalities in the distribution of wealth and provides an opportunity to break up large estates. The main argument against large death taxes rests on their possible negative effects on incentives. An economic limit to the usefulness of death taxes may be said to exist when the accumulation of wealth is discouraged to the point of hampering economic growth. Death taxes are of greater symbolic than practical significance. They are among the taxes least productive of revenue, and their relative importance has dwindled with the growth of income, sales, and excise taxes. The U.S. federal estate tax produces less than 2 percent of federal tax revenues. A similar percentage is produced in most nations with advanced tax systems.

The main effect of death taxes is to encourage estate planning and the employment of legal services to minimize taxes. The effect on consumption in the economy as a whole is trivial. Death taxes do tend to achieve a more equal distribution of wealth, but the magnitude of the effect is small in most countries. A significant, but often overlooked effect is that on business structure and practices, which stems from the need to set a valuation on the estate for tax purposes and from the problem of liquidity that may arise when the estate consists of a small business or farm.

Death taxes generally appear to be highly progressive, with rates in some countries that approach 100 percent in the highest brackets. In fact, most people do not incur any death taxes at all, and, for those who are subject, efforts at avoidance are highly successful and present a serious problem of equity. Tax avoidance tactics include various trusteeship arrangements, giving one's property away before death, or making gifts to charitable, religious, and educational institutions (which are generally exempt from death and gift taxes). The existing exemption and rate structure is an expression of social policy toward institutions that are to be favoured. Exemptions or low rates on gifts and bequests to a spouse and children or to charitable institutions represent a social policy in favour of the family unit or private support of charity.

Death Valley, structural depression in Inyo county, southeastern California, U.S., that is the lowest, hottest, driest portion of the North American continent. Death Valley is about 140 miles (225 km) long, trends roughly north-south, and is from 5 to 15 miles (8 to 24 km) wide. The valley is bounded on the west by the Panamint Range and on the east by the Black, Funeral, and Grapevine mountains of the Amargosa Range. Geologically, Death Valley forms part of the southwestern portion of the Great Basin—a physiographic subdivision of the western United States. It is similar to other structural basins of the region but is unique in its depth.

Portions of the great salt pan that forms part of the floor of the valley are the lowest land areas of the Americas. About 550 square miles (1,425 square km) of the valley's floor lies below sea level. A point about 4.75 miles (7.64 km) west of Badwater is, at 282 feet (86 m) below sea level, the single lowest area in the Western Hemisphere. Death Valley was formerly an obstacle to movements of pioneer settlers (whence its name was derived) and later was a centre of borax exploitation; its extreme environment now attracts tourists and scientists. The area was declared a national monument in 1933 and was made a national park in 1994.

The physical environment. For several decades after its christening in 1849 by a hapless party of emigrants who endured intense suffering while crossing it, Death Valley was little known except to the Indians of the area and to prospectors searching the surrounding mountains. The first scientific notice of the valley seems to have been a brief note published in 1868 by a California state geologist. The area remained seldom visited until the 1870s, when gold was discovered in the surrounding mountains, and borax deposits were found in the valley. Borax production during the 1880s gave rise to the famous 20-mule team wagons, which hauled the product to Mojave, Calif.

The geologic history of Death Valley is extremely complex and involves different types of fault activity at various periods, in addition to crustal sinking and even some volcanic activity. Essentially, Death Valley is a graben, or rift valley, formed by the sinking of a tremendous expanse of rock lying between parallel uplifted, tilted-block mountain ranges to the east and west. A type of fault activity called block faulting, in which the movement is dominantly vertical, began to form the valley in the middle Tertiary Period (about 30 million years ago). The sinking of crustal blocks to form the great trough of the valley and the uplift of other blocks to form the adjacent mountain ranges progressed gradually through the rest of the Cenozoic Era. As the valley sank, it was filled by sediments that were eroded from the surrounding hills; in the central part of the valley the bedrock floor is buried beneath as much as 9,000 feet (2,745 m) of sediment. Tilting and sinking of the valley floor have continued to the present time.

The floor of Death Valley is noted for its extremes of temperature and aridity. A record North American high shaded air temperature of 134° F (57° C) was recorded in 1913, and summer temperatures often exceed 120° F (49° C). Ground temperatures as high as 190° F (88° C) have been reported. The high temperatures and low humidity contribute to an exceptionally high evaporation rate.

Winter minimum temperatures rarely fall to the freezing point. Most rainfall is blocked by the mountains to the west, so that the valley is extremely arid. For a 50-year period in the 20th century, the average annual rainfall at Furnace Creek was only 1.66 inches (42.2 mm); the maximum annual rainfall was 4.5 inches (114.3 mm), and two years passed with no measurable rainfall.

Most of the surface water in Death Valley is in the saline ponds and marshes around the

salt pan. The Amargosa River brings some water into the southern end of the valley from desert areas to the east, but most of its flow is underground. Salt Creek, draining the northern arm of the valley, also has only short stretches of perennial surface flow.

At times in the past much more water reached Death Valley. During the Wisconsin Glacial Age of the Pleistocene Epoch, perhaps about 50,000 years ago, a body of water (Lake Manly) filled the valley to a depth of as much as 600 ft. More recently, perhaps 2,000 to 5,000 years ago, a shallow lake occupied the floor of the valley, its evaporation producing the present salt pan.

Plant and animal life. Lack of water makes Death Valley a desert, but it is by no means devoid of life. Plant life above the microscopic level is absent from the salt pan, but salt-tolerant pickleweed, saltgrass, and rushes grow around the springs and marshes at its edges. Introduced tamarisks provide welcome shade around some of the springs and in the inhabited areas at Furnace Creek. Mesquite flourishes where less saline water is available. Creosote bush dominates the gravel fan surfaces around most of the valley, giving way to desert holly at the lowest elevations. Cactus is rare in the lowest part of the valley but abundant on the fans farther north. Spring rains bring out a great variety of desert wildflowers.

Animal life is varied, although nocturnal habits conceal many of the animals from visitors to the valley. Rabbits and several types of rodents, including antelope squirrels, kangaroo rats, and desert wood rats, are present and are preyed upon by coyotes, kit foxes, and bobcats. The largest native mammal in the area, and perhaps the best studied member of the fauna, is the desert bighorn sheep. Small herds of sheep are most commonly found in the mountains surrounding Death Valley but at least occasionally visit the valley floor. Wild burros, descendants of animals lost or abandoned by prospectors and miners, have become so numerous as to threaten, through overgrazing, the natural vegetation and other animals dependent upon it.

Visitors may gain the impression that the only birds present are the raucous and numerous ravens, but the first biological survey of the valley, in the 1890s, reported 78 species of birds, and nearly three times that number are now known to inhabit or visit the area. Lizards are numerous, snakes comparatively rare. Even native fish are to be found in Death Valley—several forms of desert pupfish of the genus *Cyprinodon* live in Salt Creek and other permanent bodies of water.

deathwatch beetle (*Xestobium refuvillosum*), an anobiid, or borer insect, of the family



Deathwatch beetle (*Xestobium refuvillosum*)
G. E. Hyde from The Natural History Photographic Agency—EB Inc.

Anobiidae (order Coleoptera). These beetles tend to be small (1 to 9 millimetres, or less than ½ inch) and cylindrical. When disturbed they usually pull in their legs and play dead.

The deathwatch beetle makes a ticking or clicking sound by bumping its head or jaws against the sides of the tunnels as it bores in old furniture and wood. According to superstition, the sound, actually a mating call, has been believed to forecast an approaching death.

Deauville, seaside resort, northern France, Calvados *département,* Basse-Normandie region, at the mouth of the Touques River, opposite Trouville, across the Seine Estuary from Le Havre. It is 55 mi (89 km) west of Rouen by road and 128 mi from Paris. The construction of the Paris-Normandie motorway and of a runway at Deauville airport to take jetliners has facilitated increased travel to the area. Founded by the Duc de Morny in 1860, it is a fashionable resort in summer. In winter it is an educational centre. There is a casino. Pop. (1982) 4,682.

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Deba Habe, also called DEBA, DEBBA HABE, or DEBE HABE, town, Bauchi State, northeastern Nigeria, on the road from Gombe to Numan. It was captured about 1810 by Buba Yero, the first Fulani emir of Gombe, and is still one of the largest towns in the Gombe area. A collecting point for peanuts (groundnuts) and cotton, it also serves as a trade centre (sorghum, millet, cowpeas, cattle, goats, sheep, donkeys) for Fulani, Hausa, Tera, and Tangale peoples. Pop. (1972 est.) 25,788.

debate, formal, oral confrontation between two individuals, teams, or groups who present arguments to support opposing sides of a question, generally according to a set form or procedure.

In the House of Commons each bill presented is given three readings, each of which provides the opportunity and the occasion for a debate of the principle involved or of specific clauses. In the U.S. Congress a similar procedure is followed with a specific time limit set in the House for debating legislation. The Senate has no time limit and the general practice is to debate a measure until everyone has expressed a view before a vote is taken.

Formal debates, as held in schools, societies, or on radio or television, generally conform to the following procedures: the topic is stated as a positive resolution—for example, "Resolved: Strikes Should be Outlawed"; two teams, usually of two members each, argue for and against the resolution; each team receives equal time, a first period—usually 10 to 15 minutes for each speaker—to present its side and then a shorter period to rebut the opposing side; the order of speakers alternates by team, with the affirmative side initiating the argument and, as a rule, the negative side initiating the rebuttal; arguments take the form of contentions supported by evidence, and in the rebuttal, though new evidence may be introduced, no new contentions may be raised; a neutral moderator acts as chairman of the debate.

Because of limited time, formal debate does not allow thorough exploration of complex problems; rather, it is conceived as an exercise that may serve to sharpen forensic abilities and, like a chess match, provide intellectual entertainment for nonparticipants. Usually, in a well-conducted debate, speakers are either emotionally uncommitted or can preserve sufficient detachment to maintain a coolly academic approach.

Debbora (Old Testament): *see* Deborah.

debenture stock, loan contract issued by a company or public body specifying an obligation to return borrowed funds and pay interest, secured by all or part of the company's property. Certificates specifying the amount of stock, with coupons for interest attached, are usually issued to the lenders. The interests of the stockholders may be protected by a trust deed naming a trustee who acts on behalf of the stockholders and against whom they actually have claim. In case of default, the debenture holder may appoint a receiver to seize and realize assets and repay the money secured. *Compare* bond.

Debestēvs (Baltic deity): *see* Dievs.

Debije, Petrus Josephus Wilhelmus: *see* Debye, Peter (Joseph William).

Debir (ancient Palestine): *see* Kiriath-sepher.

déblé, wooden figure carved in the form of a woman by the Senufo people of West Africa and used as a "rhythm pounder" in certain rituals performed to promote the fertility of the soil. Initiates of the Poro (or Lo) male secret society, performing their fertility dance, held the figures by the upper arms and pounded



Senufo *déblé,* wood, Ivory Coast; in the Museum Rietberg, Zürich
Holle Bildarchiv, Baden-Baden

their heavy bases on the ground in unison to mark the rhythm. They also placed *déblés* in the fields during digging contests.

Dêbo, Lac, English LAKE DEBO, situated in central Mali on a section of the Niger River between Mopti, located 50 mi (80 km) to the south, and Timbuktu, 150 mi to the northeast. In this region the Niger is joined by many lakes, creeks, and backwaters; at high water, Lac Dêbo becomes part of a general inundation.

Deborah, also spelled DEBBORA, prophet and heroine in the Old Testament (Judg. 4 and 5), who inspired the Israelites to a mighty victory over their Canaanite oppressors (the people who lived in the Promised Land, later Palestine, that Moses spoke of before its conquest by the Israelites); the "Song of Deborah" (Judg. 5), putatively composed by her, is perhaps the oldest section of the Bible and is of great importance for providing a contemporary glimpse of Israelite civilization in the 12th century BC. According to rabbinic tradition, she was a keeper of tabernacle lamps.

The two narratives of her exploit, the prose account in Judg. 4 (evidently written after Judg. 5) and the martial poem comprising Judg. 5 (a lyric outburst showing a high standard of poetic skill in ancient Israel), differ in some important details. The most obvious discrepancy is in the identity of the chief foe of the Israelites. Judg. 4 makes the chief enemy

Jabin, king of Hazor (present Tell el-Qedah, about three miles southwest of Hula Basin), though a prominent part is played by his commander in chief, Sisera of Harosheth-ha-goiim (possibly Tell el-'Amr, approximately 12 miles [19 kilometres] northwest of Megiddo). In the poem Jabin does not appear, and Sisera is an independent king of Canaan. Other important contradictions include the action sites (Mt. Tabor in Judg. 4 is not found in Judg. 5, for example); which Israelite tribes joined Deborah and her chief commander, the Naphtalite Barak (only Zebulun and Naphtali in Judg. 4, additional tribes in Judg. 5); and the manner of Sisera's death (in Judg. 4 he is murdered in his sleep, in Judg. 5 he is struck down from behind while drinking a bowl of milk).

Assuming that the account preserved in Judg. 5 is the older (probably written in 1125 BC), the reader can reconstruct the actual history of the events. Israel holds the wilder parts of the country, the hills and the forests, but the Israelite settlements in the central range are cut off from those in the northern hills by a chain of Canaanite (or possibly Egyptian) fortresses down the Plain of Esdraelon (between Galilee and Samaria). At the instigation of Deborah, a charismatic counsellor (or judge) and prophet (she predicts that the glory of war will fall to a woman, which it does—to Jael), Barak gathers the tribes of Ephraim, Benjamin, Machir (Manasseh), Zebulun, Issachar, and his own tribe of Naphtali. Asher, Dan, Gilead (Gad), and Reuben remain aloof. Judah and Simeon are not mentioned (attesting to the antiquity of the poem). The Israelite clans fall on the enemy at Taanach; a thunderstorm, in which Israel sees the coming of God from Mt. Sinai, strikes terror into the Canaanites; their fabled 900 chariots of iron are useless on the sodden ground; and the Kishon River, swollen by torrential rains, sweeps away the fugitives. Sisera escapes on foot, pursued by Barak, taking refuge in the tent of Heber the Kenite (the Kenites, a nomadic tribe, were supposedly at peace with Canaan); he is offered protection by Heber's wife, Jael; as he drinks a bowl of milk, she pierces his head with a tent peg and kills him (thus fulfilling Deborah's prophecy).

Deborin, Abram Moiseyevich, pseudonym of ABRAM MOISEYEVICH IOFFE (b. June 16 [June 4, old style], 1881, Upyna, Lithuania, Russian Empire—d. March 8, 1963, Moscow), Russian Marxist philosopher who advocated Hegelian dialectics.

Born into a petit bourgeois family, he joined the Leninist Bolshevik movement (1903) before Georgy Plekhanov influenced his becoming a Menshevik (1907) at the University of Bern, from which he graduated in 1908. In 1917 Deborin returned to Lenin and was appointed to the Sverdlov University (1921), where he gained prominence as a teacher and editor of Soviet philosophy and where his theories of materialism gained approval. By 1929, however, his ideas had been denounced by the Stalin regime for "underestimating" Leninism and for "separating" philosophy from practice, and he was stripped of all key educational and editorial positions except for a minor role at the Academy of Sciences (1931–53). After Stalin's death, he resumed writing on social thought with *Sotsialno-politicheskye ucheniya novogo i noveyshego vremeni*, vol. 1 (1958; "Sociopolitical Doctrines of Modern Times") and *Filosofiya i politika* (1961; "Philosophy and Politics"). Earlier important works include *Lenin i krizis noveyshey fiziki* (1930; "Lenin and the Crisis of Modern Physics") and *Filosofiya i marksizm* (1930; "Philosophy and Marxism").

DeBrazza's monkey (*Cercopithecus neglectus*), large, brightly coloured guenon widely distributed through eastern and central Africa,



DeBrazza's monkey (*Cercopithecus neglectus*)
Robert C. Hermes—The National Audubon Society Collection/Photo Researchers

particularly in forests near rivers and swamps. DeBrazza's monkey is a white-bearded animal with speckled, yellow-gray fur, a white stripe along each thigh, and black hands, feet, and tail. On the forehead a browband of white-tipped, red hairs is surmounted by another, black band; the cheek fur is grizzled black and yellow. DeBrazza's monkey is rather heavy set and has a less lively nature than some of the other guenons. *See also* guenon.

Debré, Michel (-Jean-Pierre) (b. Jan. 15, 1912, Paris), French political leader, a close aide of Pres. Charles de Gaulle; after playing a prominent part in the writing of the constitution of the Fifth Republic, he served as its first premier.

Holder of a doctorate of laws, as well as a diploma from the École Libre des Sciences Politiques, Debré entered the civil service, in which he advanced steadily. In 1939, with the outbreak of World War II, he was mobilized. Captured and imprisoned by the Germans in May 1940, he managed to escape. After joining the Résistance at Rabat, Mor., he returned to German-occupied France to work in the underground.

In August 1944, as the newly appointed commissioner for the Angers region after the liberation, Debré first met General de Gaulle. The following year, in de Gaulle's provisional government, he was entrusted with planning public administration reforms. Appointed head of the German and Austrian desk in the Foreign Ministry in 1947, he played a major role in devising a new status for the Saar territory. He was elected to the Senate in 1948 as a member of de Gaulle's Rassemblement du Peuple Français and was reelected as a Social Republican (the party's new name) in 1955. With de Gaulle's accession as premier in June 1958, Debré became minister of justice and the principal author of the new constitution that inaugurated the Fifth Republic. After his assumption of the presidency in January 1959, de Gaulle appointed Debré premier. As a result both of constitutional provisions and of his personal relationship to de Gaulle, he tended to act more as the chief minister to the president than as head of the government. Although he favoured retention of Algeria, he loyally supported de Gaulle's policy of disengagement. His previous commitments to a French Algeria, however, created increasing embarrassment, and in April 1962 he was replaced by Georges Pompidou.

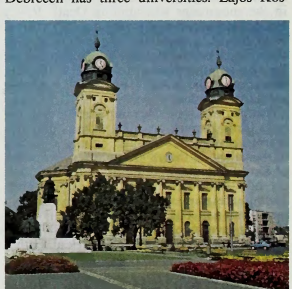
Elected to the assembly in May 1963, Debré returned to the government in January 1966 as minister of economics and finance, committed to expansionary policies. He became foreign minister in May 1968 and in June 1969 moved to the Defense Ministry under Pompidou's presidency, where he remained until 1973. In 1976 he was a leader in the Rassemblement pour la Republique (RPR), the newly reorganized Gaullist movement founded by Jacques Chirac. He was an unsuccessful candidate for the presidency in 1981, running against the RPR candidate Chirac as an orthodox Gaullist.

He is the author of a number of political works.

Debrecen, one of five Hungarian cities having county status and also, since 1876, the seat of Hajdú-Bihar *megye* (county). One of the most important cities in eastern Hungary, it is on the southwestern extremity of the sandy plain of the Nyírség region, and the eastern end of the Hortobágy *puszta* (steppe). It has a long history as a market centre, and as a religious, political, and cultural arena. Chartered in the 14th century, it became prominent during and after the Turkish period of occupation.

The Debrecen fairs, noted for horses and livestock, were a famous feature of the Middle Ages, and the city became one of the richest and most influential Hungarian cities. It was long known as "the Calvinist Rome" because of its importance to the reformed creeds in east central Europe. It houses Hungary's oldest printing press, which has been operating since 1561. The independence of Hungary from the Habsburgs was proclaimed in the city by Lajos Kossuth, leader of the revolutionary government, in 1849; that revolt was subsequently quelled and the city itself captured by interventionist Russian troops. During World War II, as German troops retreated westward before the Soviet armies in 1944–45, Debrecen became briefly the seat of the interim Hungarian government.

The city moats were filled in the 19th century, and the curving side streets on the old town perimeter recall the fortification lines. On the former marketplace, now Kossuth Square, stands the impressive Református Nagytemplom (Great Reformed Church). This parklike square is dominated by Kossuth's statue. In the city there is also the Frigyes Déri Múzeum, the Mihály Csokonai Theatre, and some interesting old residences, in addition to several churches and a large bathing establishment. Debrecen has three universities: Lajos Kossuth University (1912), originally a Protestant college founded in 1550; Debrecen University of Medicine (1951); and the Debrecen University of Agrarian Sciences (1868). The railway station was rebuilt in 1962. The city's airport and the many roads and railroads converging on Debrecen have supported trade and industrial development in pharmaceuticals, furniture, and ball-bearing manufacture. Local craftsmanship continues in pottery, bootmaking, and handmade coats (*szűrs*). Pop. (1983 est.) 198,000.



The 19th-century Református Nagytemplom (or Great Reformed Church) in Debrecen, Hung.
Paul Almasy

Debrett's Peerage, in full DEBRETT'S PEERAGE AND BARONETAGE WITH HER MAJESTY'S ROYAL WARRANT HOLDERS, guide to the British peerage, first published in London in 1802 by John Debrett as *Peerage of England, Scotland, and Ireland. Debrett's Peerage* contains information about the royal family, the peerage privy counsellors, Scottish Lords of Session, baronets, and chiefs of names and

clans in Scotland. Although the revised 1990 edition contained a 1,336-page peerage and a 968-page baronetage, both illustrated, it gave only living collateral branches and did not supply full lineage, as does *Burke's Peerage (q.v.)*. Newly included were the names of adopted children, of illegitimate children, and of deceased issue of a surviving parent. Also listed were peerages and baronetcies that had become extinct, dormant, abeyant, or disclaimed.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

Debreu, Gerard (b. July 4, 1921, Calais, France), French-born American economist whose fundamental contribution to economic theory won him the Nobel Prize for Economics in 1983.

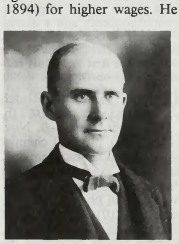
Debreu received his doctorate in economics from the University of Paris in 1946. In 1950 he joined the Chicago-based Cowles Foundation for Research in Economics, moving with the foundation to Yale University in New Haven, Conn., in 1955. His classic monograph, *Theory of Values: An Axiomatic Analysis of Economic Equilibrium,* was published in 1959. In it Debreu provided the mathematical underpinnings for the phenomenon of equilibrium in supply and demand that was first articulated (as the "invisible hand" that leads self-seeking men unwittingly to aid society) by Adam Smith in 1776.

Debreu also developed methods by which to analyze the factors that influence equilibrium. He became professor of economics and mathematics at the University of California at Berkeley in 1962 and a U.S. citizen in 1975.

Debs, Eugene V., in full EUGENE VICTOR DEBS (b. Nov. 5, 1855, Terre Haute, Ind., U.S.—d. Oct. 20, 1926, Elmhurst, Ill.), labour organizer and Socialist Party candidate for U.S. president five times between 1900 and 1920.

Leaving home at age 14 to work in the railroad shops, Debs later became a locomotive fireman. In 1875 he helped organize a local lodge of the Brotherhood of Locomotive Firemen, of which he was elected national secretary and treasurer in 1880. He also served as city clerk of Terre Haute (1879–83) and as a member of the Indiana legislature (1885).

From his earliest days, Debs was a confirmed advocate of labour organization by industry rather than by craft. After trying unsuccessfully to federate the various existing railroad brotherhoods, he became president (1893) of the newly established American Railway Union. Debs's union won national prominence when it conducted a successful strike against the Great Northern Railroad (April 1894) for higher wages. He was further projected into the limelight when sentenced to six months in jail (May–November 1895) after a federal injunction halted the Chicago Pullman Palace Car Company strike, which he was helping to direct. (*See* Pullman Strike.)



Debs

By courtesy of the Library of Congress, Washington, D.C.

During his prison term at Woodstock, Ill., Debs was deeply influenced by his broad reading—including the works of Karl Marx—and subsequently became increasingly critical of traditional political and economic concepts, especially capitalism. Sympathetic toward Populist doctrines, he campaigned for the Democratic-Populist presidential candidate William Jennings Bryan in 1896. The following year he announced his conversion to socialism and in 1898 led in establishing the Socialist Party of America, though the name was not adopted until 1901. Debs was the party's presidential candidate in 1900 but polled only 96,000 votes, a total he raised to 400,000 in 1904. In 1905 he helped found the Industrial Workers of the World (IWW), but he soon withdrew because of its radicalism.

Debs was again the Socialist candidate for president in 1908 and 1912 but refused the nomination in 1916. His highest popular vote (about 915,000) was cast in 1920—even though he was then in prison for criticizing the government's prosecution of persons charged with sedition in violation of the 1917 Espionage Act. He was released from prison by presidential order in 1921. His citizenship, which he lost when he was convicted of sedition in 1918, was not restored until 1976.

Neither an intellectual nor a hardheaded politician, Debs won support through his personal warmth, integrity, and sincerity. He was extremely effective as a public speaker and made his living primarily as a lecturer and contributor-editor to various periodicals. Among his best-known writings are a pamphlet, *Unionism and Socialism* (1904), and a book, *Walls and Bars* (1927).

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debt, public: *see* public debt.

debtor and creditor, relationship existing between two persons in which one, the debtor, can be compelled to furnish services, money, or goods to the other, the creditor. This relationship may be created by the failure of the debtor to pay damages to the injured party or to pay a fine to the community; however, the relationship usually implies that the debtor has received something from the creditor, in return for which the debtor has promised to make repayment at a later time.

If the debtor fails to make repayment by the deadline or within a commercially feasible time limit and if routine efforts at debt collection prove fruitless, then an attorney may commence a formal collection process. Sometimes it is possible to attach the debtor's property, wages, or bank account as a means of forcing payments (*see* garnishment). It is also possible to secure a lien against the debtor's property, which will permit a local official or law-enforcement officer to seize the property, sell it at public auction, and use the proceeds to discharge the debt (*see* liquidation). Imprisonment of the debtor is a practice no longer followed.

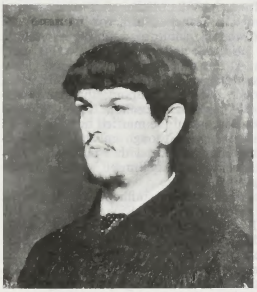
The process of debt collection may be impeded by exemption laws, which provide that certain property of the debtor may not be seized and sold in order to discharge a debt. These exemptions include sums of money, life insurance, and parcels of land.

Deburau, Jean-Gaspard, in full JEAN-BAPTISTE-GASPARD DEBURAU, Deburau also spelled DEBUREAU, original name JAN KAŠPAR DVOŘÁK (b. July 31, 1796, Kolín, Bohemia [now in Czech Republic]—d. June 17, 1846, Paris, France), Bohemian-born French pantomime actor, who transformed the character of Pierrot in the traditional harlequinade.

Born into a family of acrobats, Deburau from an early age performed with them on European tour and at age 15 joined the Théâtre des Funambules, a company of tightrope walkers, jugglers, and other circuslike performers in Paris. He performed with the Funambules for the rest of his life.

Gradually Deburau changed the robust simpleton of the commedia dell'arte figure Pierrot to the poignant character, dressed in baggy white costume, whose childlike manner, often as the optimistic but disappointed lover, charmed audiences and critics alike. The character influenced the Co-optimist concert party revue popular in Great Britain during the 1920s, as well as Marcel Marceau's Bip. In his biographical play *Deburau* (1918), the French actor-dramatist Sacha Guitry dwelt on Deburau's offstage relationship with Marie Duplessis, herself the model for Alexandre Dumas's tragic heroine in *The Lady of the Camellias* (1848). After Deburau's death his son Charles continued the Pierrot character at the Funambules.

Debussy, Claude, in full ACHILLE-CLAUDE DEBUSSY (b. Aug. 22, 1862, Saint-Germain-en-Laye, France—d. March 25, 1918, Paris), French composer whose works have been a seminal force in the music of the 20th century. He developed a highly original system of harmony and musical structure that expressed in many respects the ideals to which the Impressionist and Symbolist painters and writers of his time aspired. His major works include *Clair de lune* ("Moonlight," in *Suite bergamasque,* 1890–1905), *Prélude à l'après-midi d'un faune* (1894; *Prelude to the Afternoon of a Faun*), the opera *Pelléas et Mélisande* (1902), and *La Mer* (1905; "The Sea").



Debussy, painting by Marcel Baschet, 1884; in the Musée de Versailles

Giraudon—Art Resource

Early period. Debussy showed a gift as a pianist by the age of nine. He was encouraged by Madame Mauté de Fleurville, who was associated with the Polish composer Frédéric Chopin, and in 1873 he entered the Paris Conservatory, where he studied the piano and composition, eventually winning in 1884 the Grand Prix de Rome with his cantata *L'Enfant prodigue* (*The Prodigal Child*).

Debussy's youth was spent in circumstances of great turbulence. He was almost overwhelmed by situations of great extremes, both material and emotional. While living with his parents in a poverty-stricken suburb of Paris, he unexpectedly came under the patronage of a Russian millionairess, Nadezhda Filaretovna von Meck, who engaged him to play duets with her and her children. He traveled with her to her palatial residences throughout

Europe during the long summer vacations at the Conservatory. In Paris during this time he fell in love with a singer, Blanche Vasnier, the beautiful young wife of an architect; she inspired many of his early works. It is clear that he was torn by influences from many directions; these stormy years, however, contributed to the sensitivity of his early style.

This early style is well illustrated in one of Debussy's best-known compositions, *Clair de lune.* The title refers to a folk song that was the conventional accompaniment of scenes of the love-sick Pierrot in the French pantomime; and indeed the many Pierrot-like associations in Debussy's later music, notably in the orchestral work *Images* (1912) and the *Sonata for Cello and Piano* (1915; originally titled *Pierrot fâché avec la lune* ["Pierrot Vexed by the Moon"]), show his connections with the circus spirit that also appeared in works by other composers, notably the ballet *Petrushka* (1911) by Igor Stravinsky and *Pierrot Lunaire* by Arnold Schoenberg.

Middle period. As a holder of the Grand Prix de Rome, Debussy was given a three-year stay at the Villa Medici, in Rome, where, under what were supposed to be ideal conditions, he was to pursue his creative work. Most composers who were granted this state scholarship, however, found life in this magnificent Renaissance palace irksome and longed to return to simpler and more familiar surroundings. Debussy himself eventually fled from the Villa Medici after two years and returned to Blanche Vasnier in Paris. Several other women, some of doubtful reputation, were also associated with him in his early years. At this time Debussy lived a life of extreme indulgence. Once one of his mistresses, Gabrielle ("Gaby") Dupont, threatened suicide. His first wife, Rosalie ("Lily") Texier, a dressmaker, whom he married in 1899, did in fact shoot herself, though not fatally, and, as is sometimes the case with artists of passionate intensity, Debussy himself was haunted by thoughts of suicide.

The main musical influence in Debussy's work was the work of Richard Wagner and the Russian composers Aleksandr Borodin and Modest Mussorgsky. Wagner fulfilled the sensuous ambitions not only of composers but also of the Symbolist poets and the Impressionist painters. Wagner's conception of *Gesamtkunstwerk* ("total art work") encouraged artists to refine upon their emotional responses and to exteriorize their hidden dream states, often in a shadowy, incomplete form; hence the more tenuous nature of the work of Wagner's French disciples. It was in this spirit that Debussy wrote the symphonic poem *Prélude à l'après-midi d'un faune* (1894). Other early works by Debussy show his affinity with the English Pre-Raphaelite painters; the most notable of these works is *La Damoiselle élue* (1888), based on "The Blessed Damozel" (1850), a poem by the English poet and painter Dante Gabriel Rossetti. In the course of his career, however, which covered only 25 years, Debussy was constantly breaking new ground. Explorations, he maintained, were the essence of music; they were his musical bread and wine. His single completed opera, *Pelléas et Mélisande* (1st perf. 1902), demonstrates how the Wagnerian technique could be adapted to portray subjects like the dreamy nightmarish figures of this opera who were doomed to self-destruction. Debussy and his librettist, Maurice Maeterlinck, declared that they were haunted in this work by the terrifying nightmare tale of Edgar Allan Poe, "The Fall of the House of Usher." The style of *Pelléas* was to be replaced by a bolder, more highly coloured manner. In his seascape *La Mer* (1905) he was inspired by the ideas of the English painter J.M.W. Turner and the French painter Claude Monet. In his work, as in his personal life, he was anxious to gather experience from every region that the imaginative mind could explore.

Late period. In 1905 Debussy's illegitimate daughter, Claude-Emma, was born. He had divorced Lily Texier in 1904 and subsequently married his daughter's mother, Emma Bardac. Repelled by the gossip and scandal arising from this situation, he sought refuge for a time at Eastbourne, on the south coast of England. For his daughter, nicknamed Chouchou, he wrote the piano suite *Children's Corner* (1908). Debussy's spontaneity and the sensitive nature of his perception facilitated his acute insight into the child mind, an insight noticeable particularly in *Children's Corner,* a French counterpart to Mussorgsky's song cycle *The Nursery;* in the *Douze Préludes,* 2 books (1910, 1913; "Twelve Preludes"), for piano; and in the ballet *La Boîte à joujoux* (1st perf. 1919; *The Box of Toys*).

In his later years, it is the pursuit of illusion that marks Debussy's instrumental writing, especially the strange, other-worldly *Cello Sonata.* This noble bass instrument takes on, in chameleon fashion, the character of a violin, a flute, and even a mandolin. Debussy was developing in this work ideas of an earlier period, those expressed in a youthful play he had written, *Frères en art* ("Brothers in Art"), where his challenging, indeed anarchical, ideas are discussed among musicians, painters, and poets. (He had in fact published in one of the anarchist journals poems that he had written and that he later set to music in the song cycle *Proses lyriques* [1893].)

Evolution of his work. Debussy's music marks the first of a series of attacks on the traditional language of the 19th century. He did not believe in the stereotyped harmonic procedures of the 19th century, and indeed it becomes clear from a study of mid-20th-century music that the earlier harmonic methods were being followed in an arbitrary, academic manner. Hence his formulation of the "21-note scale" designed to "drown" the sense of tonality, though this system was never adhered to in the inflexible manner of the 12-note system of Schoenberg. Debussy's inquiring mind similarly challenged the traditional orchestral usage of instruments. He rejected the traditional dictum that string instruments should be predominantly lyrical. The pizzicato scherzo from his *String Quartet* (1893) and the symbolic writing for the violins in *La Mer,* conveying the rising storm waves, show a new conception of string colour. Similarly, he saw that woodwinds need not be employed for fireworks displays; they provide, like the human voice, wide varieties of colour. Debussy also used the brass in original colour transformations. In fact, in his music, the conventional orchestral construction, with its rigid woodwind, brass, and string departments, finds itself undermined or split up in the manner of the Impressionist painters. Ultimately, each instrument becomes almost a soloist, as in a vast chamber-music ensemble. Finally, Debussy applied an exploratory approach to the piano, the evocative instrument par excellence since notes struck at the keyboard are, by the nature of the piano mechanism, neither eighth notes, quarter notes, nor half notes, but merely illusions of these notes.

During the latter part of his life Debussy created an alter ego, "Monsieur Croche," with whom he carried on imaginary conversations on the nature of art and music. "What is the use of your almost incomprehensible art?" Monsieur Croche asks. "Is it not more profitable to see the sun rise than to listen to the Pastoral Symphony of Beethoven?" Elsewhere Monsieur Croche supports the cause of the musical explorer: "I am less interested in what I possess than in what I shall need tomorrow."

In his last works, the piano pieces *En blanc et noir* (1915; *In Black and White*) and in the *Douze Études* (1915; "Twelve Études"), Debussy had branched out into modes of composition later to be developed in the styles of Stravinsky and the Hungarian composer Béla Bartók. It is certain that he would have taken part in the leading movements in composition of the years following World War I had his life not been so tragically cut short by cancer.

Wagner, said Debussy, was a wonderful sunset that had been mistaken for a dawn. As one looks back on the music of the last century this seems a remarkably shrewd observation. It was true of Wagner, of course, but it is now seen to be more true of Debussy himself. The fact is that there comes a time when the peak, the zenith of a civilization is reached. Critics have frequently noted this evolutionary stage in the music of Wagner, Debussy, or in one of their followers. A quintessential spirit is presented by these composers; and it seemed at the time that they could never be surpassed. But of course it is at this very stage that a decline in musical values sets in. Hence the paradoxical element in Debussy's stature. Undoubtedly, he was aware of this duality in his achievement, as may be gathered from his searching, hesitant letters. Sensitive to sham in every sphere and also a child of his environment, he not only perceived this dual aspect of his work but also realized the extent to which he himself was caught up in this vast evolutionary transformation.

Debussy's work cannot be judged on the musical level alone. "One must seek the poetry in his work," said his friend the French composer Paul Dukas. There is not only poetry in his music; there is often an inspiration from painting. "I love painting [*les images,* a generic term that might apply to the whole of Debussy's work] almost as much as music itself," he told the Franco-American composer Edgard Varèse. This association of the arts is a theme that runs through the whole of the 19th century—it originated with the theories of the German short-story writer E.T.A. Hoffmann—but for Debussy it was a theory more sensitively expressed in the tales of Edgar Allan Poe. Throughout his life Debussy planned to set "The Fall of the House of Usher" in the form of an opera—the shadow of the tale never having been realized in *Pelléas et Mélisande*—and actually signed a contract for the production of this work at the Metropolitan Opera in New York City, but it was never completed. The fact is that the hero of the tale, Roderick Usher, was a hypersensitive being like Debussy himself—a poet, a painter, and a musician. Moreover, the reputation of Poe was, during Debussy's life and after, almost entirely a French reputation. The French poets translated his works, and the French painters appreciated his genius; and it was therefore only natural that a French musician should similarly have reflected the nature of his appeal. (E.L.)

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Debye, Peter (Joseph William), Dutch PETRUS JOSEPHUS WILHELMUS DEBIJE (b. March 24, 1884, Maastricht, Neth.—d. Nov. 2, 1966, Ithaca, N.Y., U.S.), physical chemist whose investigations of dipole moments, X rays, and light scattering in gases brought him the 1936 Nobel Prize for Chemistry.

After receiving his Ph.D. in physics from the University of Munich (1910), Debye taught physics at the universities of Zürich, Utrecht, Göttingen, and Leipzig before becoming director of the Kaiser Wilhelm Institute for Theoretical Physics at Berlin (1935). Two months before the German invasion of his na-

tive country (1940), he went to Ithaca, N.Y., to deliver a lecture at Cornell University and remained there until he retired as chemistry department chairman in 1950.

Debye's first important research, his dipole moment studies, advanced knowledge of the arrangement of atoms in molecules and of the distances between the atoms. In 1916 he showed that solid substances could be used in powdered form for X-ray study of their crystal structures, thus eliminating the difficult step of first preparing good crystals.

One of his most significant achievements came in 1923 when he and Erich Hückel extended Svante Arrhenius' theory of the dissociation of the positively and negatively charged atoms (ions) of salts in solution, proving that the ionization is complete, not partial.

Debye-Hückel equation, a mathematical expression derived to elucidate certain properties of solutions of electrolytes, that is, substances present in the solutions in the form of charged particles (ions). Such solutions often behave as if the number of dissolved particles were greater or less than the number actually present; the Debye-Hückel equation takes into account the interactions between the various ions, which are the principal cause of the discrepancies between the properties of dilute solutions of electrolytes and those of so-called ideal solutions.

Decadent, French DÉCADENT, any of several poets of the end of the 19th century, including the French Symbolist poets in particular and their contemporaries in England, the later generation of the Aesthetic movement. Both groups aspired to set literature and art free from the materialistic preoccupations of industrialized society, and, in both, the freedom of some members' morals helped to enlarge the connotation of the term, which is almost equivalent to *fin de siècle.*

In France it was Paul Verlaine who gladly accepted the descriptive epithet *décadent,* which had been used in a collection of parodies, *Les Déliquescences d'Adoré Floupette* (1885; "The Corruption of Adoré Floupette"), by Gabriel Vicaire and Henri Beauclair. From 1886 to 1889 appeared a review, *Le Décadent,* founded by Anatole Baju, with Verlaine among its contributors. The Decadents claimed Charles Baudelaire (d. 1867) as their inspiration and counted Arthur Rimbaud, Stéphane Mallarmé, and Tristan Corbière among themselves. Another significant figure was the novelist Joris-Karl Huysmans, who developed interest in the esoteric and whose *À rebours* (1884; *Against the Grain*) was called by Arthur Symons "the breviary of the Decadence."

In England the Decadents were the poets of the 1890s—Arthur Symons ("the blond angel"), Oscar Wilde, Ernest Dowson, and Lionel Johnson, who were members of the Rhymers' Club or contributors to *The Yellow Book.*

Decadentism, Italian DECADENTISMO, Italian artistic movement that derived its name but not all its characteristics from the French and English Decadents, who flourished in the last 10 years of the 19th century. Writers of the Italian movement, which did not have the cohesion usual in such cases, generally reacted to positivism with individual stresses on instinct, the irrational, the subconscious, and the individual as opposed to scientific rationalism and the importance of man en masse.

The writers of the movement—Antonio Fogazzaro, Giovanni Pascoli, Gabriele D'Annunzio, and Italo Svevo—differed greatly from each other in style and philosophical approach, but they all sought a highly subjective picture of society and the world.

The critic Benedetto Croce attacked the movement early in the 20th century. Its reputation was somewhat restored by Walter Binni after World War II, only to fall again under the attack of the Marxist critic Carlo Salinari in the 1960s.

decal, also called DECALCOMANIA, design that is printed on specially prepared paper to form a film that can be transferred to any surface. Such films are widely used for decorating and labeling any objects that cannot be run through a press.

Decals are made in a variety of ways, depending upon the need to be served. The regular decal, applied to such items as typewriters and trucks, for example, begins with a sheet of porous paper coated with a solution of starch, albumin, and glycerin. The design that will be seen is printed on this paper backing. The printed paper is then covered with several coats of opaque white ink that will not be seen after application. The decal is finished with a coat of water-soluble glue called stickative. When the decal is moistened and applied to the object to which it adheres, the moistened backing paper is removed, and the design becomes permanently affixed.

Decals intended to be applied to windows are printed in reverse order. The layers of opaque white ink are printed first and the design is printed last in order to be seen when in contact with the glass. Decals for china and kitchen ranges are printed with mineral colours and are fired to resist heat.

The term decalcomania had a specific application in mid-20th-century art. Paper was covered with gouache, an opaque watercolour paint. It was then pressed against canvas or another piece of paper and then removed, yielding exotic designs reminiscent of fungi or colonies of sponge. The Surrealist Max Ernst used this technique in his paintings.

Decalogue (biblical precepts): *see* Ten Commandments.

Decamps, Alexandre (-Gabriel) (b. March 3, 1803, Paris, Fr.—d. Aug. 22, 1860, Barbizon), one of the first French painters of the 19th century to turn from Neoclassicism to Romanticism.

In his youth Decamps traveled in the Middle East and painted Oriental life and scenery with a bold fidelity to nature, using a technique that was marked by dramatic contrasts of colour and of light and shade and that made his works the puzzle of conventional critics. His powers, however, soon came to be recognized, and he was ranked at the time along with Eugène Delacroix and Joseph Vernet as one of the leaders of French painting. Most of his life was passed in the neighbourhood of Paris. He was passionately fond of animals, especially dogs, and indulged in all kinds of field sports. He died in consequence of being thrown from a horse while hunting at Fontainebleau.

His subjects embraced an unusually wide range. As a result of his travels in the Middle East, he was perhaps one of the first European painters to represent biblical scenes with a natural local background. Of this class were his "Joseph Sold by his Brethren," "Moses Taken from the Nile," and his scenes from the life of Samson, nine vigorous sketches in charcoal and white. Perhaps the most impressive of his historical pictures is his "Defeat of the Cimbri." Decamps also produced a number of genre pictures, chiefly of scenes from French and Algerian domestic life, done with humour. Similarly, in various paintings and sketches he depicted such animals as dogs, horses, and monkeys with a marvelous humour; probably the best known of all his works is "The Monkey Connoisseurs," a clever satire of the jury of the French Academy of Painting, which had rejected several of his earlier works because of their divergence from any known standard.

decapod (order Decapoda), any of more than 8,000 species of crustaceans that include shrimp, lobsters, crayfish, hermit crabs, and crabs.

The presence of five pairs of thoracic legs (pereiopods) is the basis for the name decapod. Members of the order exhibit great diversity in size and structure. The macrurous (shrimplike) species, which can be as small as 1 cm (0.5 inch), have elongated bodies with long abdomens, well-developed fan tails, and often long, slender legs. The brachyurous (crablike) types, which in the case of spider crabs can have spans of almost 4 m (12 feet) between their outstretched claws, have bodies that are flattened and laterally expanded, frequently with stout, short legs and reduced tail fans.

Decapods are primarily marine animals and are most abundant in shallow waters with warm, tropical environments, but they are exploited commercially throughout the world. Some shrimp, for example, live in the open ocean and possess light organs, or photophores, which are thought to aid in feeding or species recognition. Approximately 10 percent of the known decapods occur in freshwater or terrestrial habitats. Survival in fresh water is dependent upon the ability of an organism to keep its blood concentration at a level higher than the medium and to reduce the permeability of its body surface. Those decapods that have colonized terrestrial environments, such as some species of hermit and fiddler crab, have evolved mechanisms to protect against desiccation and overheating while regulating the internal concentrations of their body fluids. Vascularization of the gill surfaces has made respiration possible on land for some species of decapods. Terrestrial decapods must usually return to the sea to spawn, while most freshwater decapods spend their entire life cycle in fresh water, commonly hatching their young as miniature adults.

Decapods exist in a variety of relationships with other organisms. The hermit crab, for example, can carry anemones or bryozoan colonies on its shell in a commensal relationship (one in which the colonies do not feed on the host tissue). The pea crab *Pinnotheres ostreum,* on the other hand, parasitically feeds on the American oyster, causing gill damage. Some shrimp have symbiotic relationships with fish, in which they remove parasites from the mouths and gills of the fish.

Decapods are capable of a variety of behavioral responses. Hermit and brachyuran crabs seek out empty shells to use as a protective covering, selecting successively larger ones to accommodate their growth. The two basic types of locomotion are swimming and crawling, though the macruran decapods are able to move swiftly backward by flexing their abdomens. Burrowing is accomplished by beating the leaflike swimmerets, or pleopods, or by digging with the thoracic legs.

There is generally a separation between the sexes, although there are some examples of hermaphroditism (*i.e.,* individuals with both male and female reproductive organs). In most groups fertilization is external, although in some species it is internal. Variations in patterns of mating activity are believed to be linked to the molting cycle. Male decapods can copulate only when their exoskeleton is fully hardened, while some females are capable of copulation only after a molt when their shells are soft. In most decapods the eggs are carried cemented to the abdominal appendages until they are hatched. After hatching they can be classified as one of four basic larval types, partly by their mode of locomotion: nauplius, protozoea, zoea, and postlarva. Most larvae hatch in the zoea stage.

Decapods have three distinct body regions, each made up of segments, or somites: the head, thorax, and abdomen. The head and the thorax are fused and are often referred to as the cephalothorax. A pair of appendages is attached to each somite. The first two pairs,

the first and second antennae, consist of a segmented stalk and flagella, and serve such sensory functions as olfaction, touch, and balance. The remaining three head appendages are either the crushing and chewing mandibles or the flattened, multilobed food manipulators. The anterior thoracic appendages serve as mouthparts, while the posterior pairs are the walking legs, or pereiopods. The remaining appendages may be modified for swimming, sperm transfer, pinching claws, or even forming a tail fan with the telson.

A head shield, or carapace, covers the cephalothorax and extends over the gills, which are attached to the body wall of the thorax. The heart is located to the rear of the carapace above the gut, which is basically a straight tube consisting of the stomodeum, or foregut, the mesenteron, or midgut, and the proctodeum, or hindgut. The primary excretory organ is a gland that opens at the base of the antennae. The central nervous system consists of a supraesophageal ganglion with lateral connections to a subesophageal ganglion. The eyes, which may be absent in some deep-sea species, are usually well-developed with a pigmented, multifaceted cornea.

Decapolis, league of 10 ancient Greek cities in eastern Palestine that was formed after the Roman conquest of Palestine in 63 BC. The name Decapolis also denotes the roughly contiguous territory formed by these cities, all but one of which lay east of the Jordan River. The 10 cities of the league were Scythopolis (modern Bet She'an, Israel), Hippos, Gadara, Raphana, Dion (or Dium), Pella, Gerasa, Philadelphia (modern Amman, Jordan), Canatha, and Damascus (now the capital of Syria). Damascus lay the farthest north, while Philadelphia lay the farthest south. The cities participated in the Decapolis as a means of mutual protection and security against their Semitic neighbours. The league was subject to the Roman governor of Syria, though his authority was somewhat tenuous in eastern Palestine. The cities of the Decapolis created a rich Hellenistic culture that produced the philosopher-satirist Menippus, among other figures. The league survived until the 2nd century AD.

decathlon, athletic competition lasting two consecutive days in which contestants take part in 10 track-and-field events. It was introduced as a three-day event at the Olympic Games in 1912. Decathlon events are: (first day) 100-metre dash, running long (broad) jump, shot put, high jump, and 400-metre run; (second day) 110-metre hurdles, discus throw, pole vault, javelin throw, and 1,500-metre run. Competitors are scored for their performance in each event according to a table established by the International Amateur Athletic Federation (IAAF). The table has been changed periodically to keep pace with improvements in world records. The first one was used from 1912 to 1936, while the decathlon was still a three-day event; a second from 1936 to 1950 (with minor revisions in 1952); and a third from 1952 to 1964. All emphasized excellent performances in the individual events. A fourth table in use from 1964 to 1985 and a fifth introduced in 1985 favoured the athlete who could score evenly in all 10 events.

Akilles Järvinen of Finland, James Bausch of the United States, and Hans Sievert of Germany were leading competitors under the first table, with Sievert setting the final record of 8,790.46 points in 1934.

Glenn Morris of the United States, with a world record of 7,900 points in 1936, and Robert Mathias of the United States, with two Olympic titles and a record of 8,042 points in 1950, excelled under the second table. Mathias also set the first record of 7,887 under the third table in 1952, but this was later broken several times, by Rafer Johnson of the United States, Vasily Kuznetsov of the Soviet Union, and Yang Chuan-kwang of Taiwan, who set the final record of 9,121 points in 1963. Outstanding performers under the fourth table included Bruce Jenner of the United States and Daley Thompson of Great Britain. For Olympic champions, *see* Olympic Games.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Decatur, city, seat (1891) of Morgan county, northern Alabama, U.S. It lies along the Tennessee River. Incorporated in 1820 as Rhodes Ferry, it was chartered in 1826 and renamed to honour Stephen Decatur, the American naval hero of the War of 1812. In 1832 it became the terminal for Alabama's first railroad from Tuscumbia. Occupied by both sides and practically destroyed during the American Civil War, the city was gradually rebuilt during the Reconstruction period. The present city was formed by the consolidation in 1927 of Decatur and Albany (formerly New Decatur, founded 1886). The city's growth was stimulated by the Tennessee Valley Authority, and its river location has led to growing port traffic, diversified manufacturing, and recreational development. Decatur is the site of the Tennessee Valley College (1941) and John C. Calhoun State Community College (1969). Pop. (1990) city, 48,761; Decatur MSA, 131,-556.

Decatur, city, seat (1823) of De Kalb county, Georgia, U.S. It is an eastern suburb of Atlanta. Named for Stephen Decatur, the American naval hero, it was originally a trading centre for small farmers. Rock quarrying was an early activity in the surrounding area, and nearby Stone Mountain, which rises to more than 800 feet (245 m) in a memorial state park, constitutes the largest mass of exposed granite in North America. The likenesses of the American Civil War Confederate generals Robert E. Lee and Stonewall Jackson and of the Confederate president, Jefferson Davis (dedicated 1970), are carved on the side of the mountain.

With the decline of local agriculture, the city experienced residential growth, and industry assumed some importance in zoned areas. Agnes Scott College for women (1889) and Columbia Theological Seminary (1828; Presbyterian) are in the city. Inc. town, 1823; city, 1922. Pop. (1990) 17,336.

Decatur, city, Macon county, central Illinois, U.S.. It lies along a bend in the Sangamon River (there dammed to form Lake Decatur).

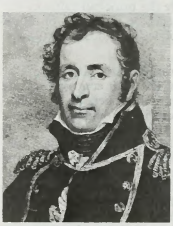


Liberal Arts Hall, Millikin University, Decatur, Ill.
By courtesy of the Illinois Department of Business and Economic Development

Founded in 1829 as the county seat, it was named for the American naval hero Stephen Decatur. The Lincoln family, migrating from Indiana, lived for a year (1830–31) near the city; a replica of their cabin is on the original site within Lincoln Trail Homestead State Park, 7 miles (11 km) southwest. The restored log courthouse, where Abraham Lincoln often transacted business, is preserved in the city's Fairview Park. Lincoln's first political speech was delivered in what is now downtown Lincoln Square, and at a nearby spot known as Wigwam he was formally endorsed as a presidential candidate by the Republican state convention (May 9, 1860). The first post of the Grand Army of the Republic (an American Civil War veterans' organization) was established in Decatur (April 6, 1866).

The modern city of Decatur is an important communications and distribution centre, with large corn (maize) and soybean processing plants and varied industries, including the manufacture of tractors and motor-driven graders, tires, and gas- and water-main equipment. Decatur is also the seat of Millikin University (1901) and Richland Community College (1971). Inc. village, 1836; city, 1855. Pop. (1990) city, 83,885; Decatur MSA, 117,-206.

Decatur, Stephen (b. Jan. 5, 1779, Sinepuxent, Md., U.S.—d. March 22, 1820, Bladensburg, Md.), U.S. naval officer who held important commands in the War of 1812. Replying



Decatur, detail from an engraving by Henry Meyer after a portrait by John Wesley Jarvis
By courtesy of the U.S. Navy

to a toast after returning from successful engagements abroad (1815), he replied with the famous words: "Our country! In her intercourse with foreign nations may she always be in the right; but our country, right or wrong."

Decatur entered the navy in 1798 and saw service in the quasi-war with France (1798–1800). In 1804 he led an expedition into the harbour of Tripoli to burn the U.S. frigate *Philadelphia,* which had fallen into Tripolitan hands. He succeeded in this objective and made his escape under fire with only one man wounded. This exploit earned him his captain's commission and a sword of honour from Congress.

In the War of 1812, his ship, the *United States,* captured the British vessel HMS *Macedonian.* In 1813 he was appointed commodore to command a squadron in New York Harbor, which was soon blockaded by the British. In an attempt to break out (January 1815), his flagship, the *President,* was forced to surrender to a superior force. Subsequently, he commanded in the Mediterranean area against the corsairs of Algiers, Tunis, and Tripoli with great success. He was made a navy commissioner in November, 1815—an office he held until killed in a duel.

decay (plant disease): *see* rot.

decay constant, proportionality between the size of a population of radioactive atoms and the rate at which the population decays, as expressed in the equation $dN/dt = -\lambda N$, in which dN is the decrement of the population, dt is the time increment, λ is the decay constant, and N is the population of radioactive isotope at any time. Integration of the decay equation yields $N = N_0e^{-\lambda t}$, which shows that an original population of radioactive atoms,

N_0, decays exponentially at a rate dependent upon the decay constant. The time required for half of the original population of radioactive atoms to decay is called the half-life. The relationship between the half-life, $T_{1/2}$, and the decay constant is given by $T_{1/2} = 0.693/\lambda$.

Decazes, Élie, Duke (duc), DUKE (Hertug) AF GLÜCKSBERG (b. Sept. 28, 1780, Sainte-Martin-de-Laye, France—d. Oct. 24, 1860, Decazeville), French political figure and leader of the moderate constitutional monarchists during the Bourbon Restoration.



Decazes, lithograph by François Le Villain, early 19th century
By courtesy of the Bibliotheque Nationale, Paris

A lawyer by profession, Decazes had previously served as a local magistrate (1806), a councillor to Louis Bonaparte in Holland (1807), and judge of the Parisian appeals court (1811).

When the Bourbons were restored after the fall of Napoleon I, Decazes was appointed prefect of police in Paris (July 1815) and shortly thereafter was made director of national police affairs. He was an intimate adviser to King Louis XVIII and, because of his opposition to the White Terror (an outburst of revenge-seeking Roman Catholic loyalists in the south), emerged as a leader of the moderate constitutionalist forces. In August 1816 he engineered the dissolution of the Chambre Introuvable (an extreme royalist Chamber of Deputies) and the subsequent electoral victory of the moderates. In December 1818 he assumed the post of minister of interior and was clearly the strong man in the government of Jean Dessolles.

Decazes favoured liberalization of censorship and electoral laws and a revision of the French fiscal system, but all his plans attracted the ferocious opposition of the ultraroyalists, who had since regained control of the Chamber of Deputies. In the wake of a crisis over the exclusion of the former revolutionary Abbé Henri Grégoire from the Chamber, Decazes formally assumed the post of premier. His term was short, for the assassination of the Duke de Berry (Feb. 13, 1820), which provoked renewed ultraroyalist fury, forced Louis XVIII into accepting his resignation (Feb. 19, 1820). The grateful monarch then bestowed upon his favourite the ducal title and sent him to England as ambassador.

In February 1821 Decazes returned to take his seat in the Chamber of Peers, where he continued as an outspoken critic of the reactionary policies of Charles X. In 1830 he supported the Orléanist revolution.

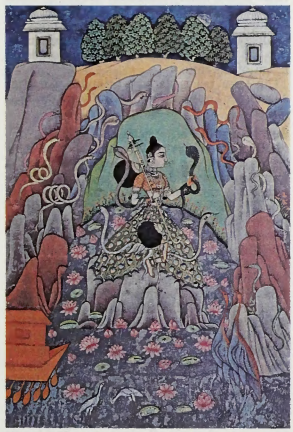
In addition, Decazes was instrumental in the organization of coal and steel production in the Aveyron region. The central town, Decazeville, was named in his honour in 1829.

Deccan, the entire southern peninsula of India south of the Narmada River, marked centrally by a high triangular tableland. The name derives from the Sanskrit *dakṣiṇa* ("south"). The plateau is bounded on the east and west by the Ghāts (*q.v.*), escarpments that meet at the plateau's southern tip. Its northern extremity is the Sātpura Mountain Range. The Deccan's average elevation is about 2,000 feet (600 m), sloping generally eastward; its principal rivers, the Godāvari, Krishna, and Cauvery, flow from the Western Ghāts eastward to the Bay of Bengal. The plateau's climate is drier than that on the coasts and is arid in places.

The Deccan's early history is obscure. There is evidence of prehistoric human habitation; low rainfall must have made farming difficult until the introduction of irrigation. The plateau's mineral wealth led many lowland rulers, including those of the Mauryan (4th–2nd century BC) and Gupta (4th–6th century AD) dynasties, to fight over it. From the 6th to the 13th century, the Cālukya, Rāṣṭrakūṭa, Later Cālukya, Hoysaḷa, and Yādava families successively established regional kingdoms in the Deccan, but they were continually in conflict with neighbouring states and recalcitrant feudatories. The later kingdoms also were subject to looting raids by the Muslim Delhi sultanate, which eventually gained control of the area.

In 1347 the Muslim Bahmanī dynasty established an independent kingdom in the Deccan. The five Muslim states that succeeded the Bahmanī and divided its territory joined forces in 1565 at the Battle of Tālikota to defeat Vijayanagar, the Hindu empire to the south. For most of their reigns, however, the five successor states formed shifting patterns of alliances in an effort to keep any one state from dominating the area and, from 1656, to fend off incursions by the Mughal empire to the north. During the Mughal decline in the 18th century, the Marāṭhās, the Niẓām of Ḥyderābād, and the Arcot Nawāb vied for control of the Deccan. Their rivalries, as well as conflicts over succession, led to the gradual absorption of the Deccan by the British. When India became independent in 1947, the princely state of Ḥyderābād resisted initially but joined the Indian Union in 1948.

Deccani painting, style of miniature painting that flourished from the late 16th century among the Deccani sultanates in peninsular India. The style is a sensitive, highly integrated blend of indigenous and foreign art forms. The elongated figures are seemingly related to Vijayanagar wall paintings, while the floral-sprigged backgrounds, high horizons, and general use of landscape show Persian influence. Deccani colours are rich and luminous, and much use is made of gold and white.



The musical mode *āsāvari*, Deccani-school painting, Ḥyderābād, India, mid-18th century; in a private collection
P. Chandra

The earliest dated manuscript, the *Nujūm-ul-'ulūm* of 1570 ("The Stars of the Sciences"; now in the Chester Beatty Library, Dublin), appears to be a product of Bījāpur, which continued to be one of the principal centres of the style. There, painting, as well as the other arts, was greatly stimulated by the patronage of Ibrāhīm 'Ādil Shāh II (1580–1627), who was passionately fond of music and the arts and of whom several splendid contemporary portraits exist. Other important centres were Ahmadnagar, Golconda, and—during the 18th century—Aurangābād and Ḥyderābād.

From the 17th century onward, the Mughal schools of the north and the Deccani schools had a certain amount of influence on one another. Deccani art also had its effect on the development of miniature painting in the Hindu courts of Rājasthān and central India.

Decebalus (d. 106), king of the Dacians, a people who lived in the territory known presently as Romania.

Decebalus unified the various Dacian tribes into one nation and led them in wars against the Roman emperors Domitian and Trajan. When Decebalus came to power in 85, he immediately organized an army and attacked the Roman province of Moesia (southeastern Balkans), killing its governor. In 86 or 87 Decebalus annihilated a Roman army under Cornelius Fuscus, but he was severely defeated by Tettius Julianus in 88. Fortunately for Decebalus, a pretender rebelled against Domitian and the German tribes in the West chose this moment to revolt against Rome. The new danger caused Domitian to come to terms quickly with Decebalus (89) and to provide the Dacians with a subsidy and loan of engineers in exchange for recognition of Roman overlordship.

In 101 Trajan led an invasion of Dacia (First Dacian War). The capital of Sarmizegethusa (in modern Romania) was captured, and Decebalus was forced in 102 to accept Roman occupation garrisons. In 105 Decebalus defeated the occupation forces and invaded Moesia (Second Dacian War). But, after Trajan seized Sarmizegethusa a second time (106), the defeated king committed suicide, and in 107 Dacia became a Roman province.

deceleration injury, impact injury to a body within or upon a rapidly moving object caused by the forces exerted when the object is brought to a sudden halt. Deceleration injury can occur in high-speed vehicles when they stop or slow down abruptly or when the occupants of the vehicle are propelled from it while it is moving. Most experiments in deceleration have been done in connection with air travel, in which the acceleration factor is usually much greater than in land vehicles.

Acceleration and deceleration forces can be measured in terms of gravitational acceleration (g). A force of three g, for example, is equivalent to an acceleration three times that of a body falling near the Earth. Factors that influence the effects of deceleration are the initial rate of speed, the distance covered and time consumed in deceleration, the direction of forces, and the area of distribution.

The best position for tolerance of deceleration seems to be for the pilot to have his back facing the line of acceleration, and with support from a firm metal seat lined with an energy-absorbing material such as a 0.5-inch (1.3-centimetre) cushion of felt. When deceleration occurs with the pilot in this position, the body is pressed against the seat and supported by the metal structure. When seated facing the line of acceleration, the pilot is pressed against the seat during acceleration but thrown forward upon deceleration.

Exposures to deceleration forces lasting longer than 0.2 second can cause fluid displace-

ment or tissue deformation. If the duration of deceleration in a position facing forward is less than 0.2 second, the maximum endurable deceleration force is 30 *g*. This causes a drop in blood pressure, rise in pulse rate, weakness, and pallor of the skin. In the backward-seated position, forces up to 35 *g* can be tolerated with few apparent difficulties.

Windblast and wind drag can also cause injuries during deceleration. Deceleration from air resistance often causes more damage than mechanical deceleration, for it takes longer to stop by wind drag than by mechanical braking methods, and the pilot must endure the exposure in different body positions.

Injuries encountered in deceleration can range from shock, concussions, abrasions, sprains, skin tears, and internal-organ ruptures to fractured bones, respiratory and circulatory arrest, hemorrhages, and organ damage.

December, 12th month of the Gregorian calendar. *See* month.

Decembrist, Russian DEKABRIST, any of the Russian revolutionaries who led an unsuccessful uprising on Dec. 14 (Dec. 26, New Style), 1825, and through their martyrdom provided a source of inspiration to succeeding generations of Russian dissidents. The Decembrists were primarily members of the upper classes who had military backgrounds; some had participated in the Russian occupation of France after the Napoleonic Wars or served elsewhere in western Europe; a few had been Freemasons, and some were members of the secret patriotic (and, later, revolutionary) societies in Russia—the Union of Salvation (1816), the Union of Welfare (1818), the Northern Society (1821), and the Southern Society (1821).

The Northern Society, taking advantage of the brief but confusing interregnum following the death of Tsar Alexander I, staged an uprising, convincing some of the troops in St. Petersburg to refuse to take a loyalty oath to Nicholas I and to demand instead the accession of his brother Constantine. The rebellion, however, was poorly organized and easily suppressed; Colonel Prince Sergey Trubetskoy, who was to be the provisional dictator, fled immediately.

Another insurrection by the Chernigov regiment in the south was also quickly defeated. An extensive investigation in which Nicholas personally participated ensued; it resulted in the trial of 289 Decembrists, the execution of 5 of them (Pavel Pestel, Sergey Muravyov-Apostol, Pyotr Kakhovsky, Mikhail Bestuzhev-Ryumin, and Kondraty Ryleyev), the imprisonment of 31, and the banishment of the rest to Siberia.

decemviri (Latin: "ten men"), in ancient Rome, any official commission of 10. The designation is most often used in reference to *decemviri legibus scribundis,* a temporary legislative commission that supplanted the regular magistracy from 451 to 449 BC. It was directed to construct a code of laws that would resolve the power struggle between the patricians and the plebeians. The first board of decemvirs ruled with moderation and prepared 10 tables of law in 451 BC. A second board completed the laws of the Twelve Tables with two laws less favourable to the plebeians. In 449 BC, when they became tyrannical, the decemvirs were forced to abdicate.

Deception Bay, bay and resort town, southeastern Queensland, Australia. In 1823 the explorer John Oxley named the local stream the Deception River (now called the Caboolture River), because of the numerous shoals at its mouth. The river gave its name to the bay into which it flows, which in turn gave its name to the community. The town of Deception Bay offers safe swimming areas, fishing, boating, and aquatic sports. It lies about 9 miles (14 km) southeast of Caboolture and 25 miles (40 km) north of Brisbane. The city of Redcliffe is located on the peninsula (Redcliffe Peninsula) that forms the southern limits of the bay. Pop. (1986) 5,773.

Deception Island, one of the South Shetland Islands, in the Drake Passage, off the Antarctic Peninsula. It is a sunken volcano, the crater of which, about 10 miles (16 km) in diameter, forms one of the best anchorages in the Antarctic. The harbour, known as Port Foster, has been the central port of entry for British claims in the Antarctic since 1910. The island has also served as a whaling and sealhunting station from 1906 to 1931 and, during World War II, as a British military base. Argentina, Chile, and the United Kingdom, each of which claims the island, all have operated stations there. Volcanic eruptions and earthquakes disturbed the island in 1967 and thereafter.

Déchelette, Joseph (b. Jan. 8, 1862, Roanne, France—d. Oct. 8, 1914, Aisne), French archaeologist and author of an important work covering the entire field of the prehistory of France, *Le Manuel d'archéologie préhistorique, celtique et gallo-romaine* (1908–14; "Textbook of Prehistoric, Celtic, and Gallo-Roman Archaeology").

With his uncle, J.-G. Bulliot, Déchelette excavated Gallic ruins at Mont Beuvray and described his findings in *L'Oppidum de Bibracte* (1903; "The Town of Bibracte"). He published 120 books and articles, but his reputation rests on his *Manuel,* an ambitious work, particularly valuable for its bibliography. It was completed by Albert Grenier after Déchelette's death early in World War I.

decibel (dB), unit for expressing the ratio between two amounts of electric or acoustic power or for measuring the relative loudness of sounds. One decibel (0.1 bel) equals 10 times the common logarithm of the power ratio—*i.e.,* doubling the intensity of a sound means an increase of a little more than three dB. In ordinary usage, specification of the intensity of a sound implies a comparison of the intensity of the sound with that of a sound just perceptible to the human ear. For example, a 90-dB, or 9-bel, sound is nine powers of 10 (*i.e.,* 10^9, or 1,000,000,000) times more intense than a barely detectable sound. Decibels are also used to express the ratio of the magnitudes of two electric voltages or currents (or analogous acoustic quantities); in this usage one dB equals 20 times the common logarithm of the ratio.

The term bel is derived from the name of Alexander Graham Bell, inventor of the telephone.

deciduous forest, vegetation composed primarily of broad-leaved trees that shed all their leaves during one season. Deciduous forest is found in three middle-latitude regions with a temperate climate characterized by a winter season and year-round precipitation: eastern North America, western Eurasia, and northeastern Asia. Deciduous forest also extends into more arid regions along stream banks and around bodies of water. For the deciduous forest of tropical regions, *see* monsoon forest.

Oaks, beeches, birches, chestnuts, aspens, elms, maples, and basswoods (or lindens) are the dominant trees in mid-latitude deciduous forests. They vary in shape and height and form dense growths that admit relatively little light through the leafy canopy. Shrubs are found primarily near clearings and forest edges, where more light is available, and herbaceous flowering plants are abundant within the forest in the spring, before the trees come into full leaf.

The soils upon which deciduous forests thrive are gray-brown and brown podzols. They are slightly acidic and have a granular humus layer known as mull, which is a porous mixture of organic material and mineral soil. Mull humus harbours many bacteria and invertebrate animals such as earthworms.

Snails, slugs, insects, and spiders are common inhabitants of the deciduous forest, and many cold-blooded vertebrates, such as snakes, frogs, salamanders, and turtles, are also present. Birds are represented by warblers, flycatchers, vireos, thrushes, woodpeckers, hawks, and owls. Prominent mammals include mice, moles, chipmunks, rabbits, weasels, foxes, bears, and deer.

Differences in temperature, moisture, and elevation may cause the formation of distinct plant associations within the deciduous-forest pattern. The dominance of beeches and maples in the northern part of the eastern North American deciduous forest and that of oaks and hickories along the southern extension of this vegetation are typical examples.

decimal number system, also called HINDU-ARABIC, OR ARABIC, NUMBER SYSTEM, in mathematics, positional numeral system employing 10 as the base and requiring 10 different numerals, the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and a dot (decimal point). In this scheme, the numerals used in denoting a number take different place values depending upon position. In a base-10 system the number 543.21 represents the sum $(5 \times 10^2) + (4 \times 10^1) + (3 \times 10^0) + (2 \times 10^{-1}) + (1 \times 10^{-2})$. *See* number system.

Decimus (ancient Roman personal name, or praenomen): *see under* gens or family name or honorific (*e.g.,* under Albinus for Decimus Clodius Septimius Albinus).

Děčín, German TETSCHEN, city, Severočeský *kraj* (region), Czech Republic, in the gorge of the Elbe (Labe) River and near the German border. Dominated by its 18th-century castle on a 165-foot (50-metre) crag, it is the economic and cultural centre of a scenic tourist region noted for its deep valleys and rock formations. Founded in the 12th century, Děčín was strongly German until World War II. It is an active river port, once the headquarters of the Elbe boatmen's syndicate. Industries include metalworking and the manufacture of paper, textiles, and chemicals. Pop. (1991 prelim.) 55,112.

decision problem, for a class of questions in mathematics and formal logic, the problem of finding, after choosing any question of the class, an algorithm or repetitive procedure that will yield a definite answer, "yes" or "no," to that question. The method consists of performing successively a finite number of steps determined by preassigned rules. In particular, the term is used for such procedures for finding whether—in a particular logistic system, logical calculus, or formal mathematical system—some given "well-formed formula" (generated in accordance with established formation rules) is or is not provable as a theorem of the system.

decision theory, in statistics, the theory and method of approach in formulating and solving the general decision problem. Such a problem is specified by a set of possible states of the environment or possible initial conditions; a set of available experiments and a set of possible outcomes for each experiment, giving information about the state of affairs preparatory to making a decision; a set of available acts depending on the experiments made and their consequences; and a set of possible consequences of the acts, in which each possible act assigns to each possible initial state some particular consequence. The problem is dealt with by assessing probabilities of consequences conditional upon different choices of experiments and acts and by assigning a utility function to the set of consequences according to some scheme of value or preference of the

decision maker. An optimal solution of the problem consists of choices of an optimal decision function, which assigns to each possible experiment an optimal act that maximizes the utility, or value, and a choice of an optimal experiment.

Decius, Gaius Messius Quintus Trajanus (b. *c.* 201, Budalia, Pannonia Inferior [near Sremska Mitrovica, Serbia, Yugos.]—d. 251), Roman emperor in 249–251, who fought the Gothic invasion of Moesia and instituted the first organized persecution of Christians throughout the empire.

Although Decius' origins are not known, it is certain that he was a senator and a consul before acceding to the throne. About 245 the emperor Philip the Arabian entrusted him with a command on the Danube; there, in 249, Decius was proclaimed emperor, allegedly against his will. After killing Philip in battle near Verona, Decius took the field against the Goths, who had crossed the Danube and overrun Moesia and Thrace. The final engagement in this campaign, which took place on swampy ground in the Dobruja, June 251, ended in the defeat and death of Decius and his son. Evidently, while absent from Rome, Decius had selected the future emperor Valerian to direct the government, but Gallus (251–253) was his immediate successor.

Before Decius' reign, persecution of the Christians in the empire had been sporadic and local, but about the beginning of January 250 he issued an edict ordering all citizens to perform a religious sacrifice in the presence of commissioners. A large number of Christians defied the government, for which the bishops of Rome, Jerusalem, and Antioch lost their lives and many others were arrested.

The suppression strengthened rather than weakened the Christian movement, for public opinion condemned the government's violence and applauded the passive resistance of the martyrs. Early in 251, a few months before Decius' death, the persecution of Christians ceased.

Decken, Karl Klaus von der (b. Aug. 8, 1833, Kotzen, Brandenburg [Germany]—d. Oct. 2, 1865, near Bardera, Somalia), German explorer in eastern Africa and the first European to attempt to scale Mount Kilimanjaro.

Decken explored in the region of Lake Nyasa on his first expedition in 1860. The following year, together with a geologist, he visited the Kilimanjaro massif. Returning in 1862, he ascended Kilimanjaro to about 13,780 feet (4,200 m), observed its permanent snowcap,



Decken, detail from an engraving
Bavaria-Verlag

established its height at about 20,000 feet (6,100 m), and mapped the area. His next expedition (1863) took him to Madagascar and the Mascarene Islands farther east. Venturing into Somalia (1865), he sailed up the Juba River in the small steamship *Welf*, which foundered in the rapids above Bardera. There, he and three other Europeans were murdered by the Somalis.

Declaration of ——— : *see under* substantive word or words (*e.g.*, Independence, Declaration of; Rights of Man and of the Citizen, Declaration of the), except as below.

Declaration of Human Rights (1948): *see* Universal Declaration of Human Rights.

Declaration of Sports (England, 1618): *see* Sports, Book of.

Declaratory Act (1766), declaration by the British Parliament that accompanied the repeal of the Stamp Act. It stated that the British Parliament's taxing authority was the same in America as in Great Britain. Parliament had directly taxed the colonies for revenue in the Sugar Act (1764) and the Stamp Act (1765). Parliament mollified the recalcitrant colonists by repealing the distasteful Stamp Act, but it actually hardened its principle in the Declaratory Act by asserting its complete authority to make binding laws on the American colonies "in all cases whatsoever." This crisis focused attention on the unresolved question of Parliament's relationship to a growing empire. The act particularly illustrated British insensitivity to the political maturity that had developed in the American provinces during the 18th century. Parliamentary suspension of the New York Assembly (1767) increased colonial alarm, and each new regulatory act added to the colonists' fear of the parliamentary threat to well-established colonial institutions of self-government.

declaratory judgment, in law, a judicial opinion intended merely to fix or elucidate a question or questions of law or the rights of litigants that were previously uncertain or doubtful. A declaratory judgment is binding but is distinguished from other judgments or court opinions in that it lacks an executory process. It simply declares or defines rights to be observed or wrongs to be eschewed by a plaintiff, a defendant, or both, or expresses the court's view of a contested question of law, without ordering that anything be done. Although a declaratory judgment must deal with a real dispute, as opposed to a hypothetical dispute, it is not necessary that an actual wrong, giving rise either to criminal liability or to a claim for civil damages, have been done or even threatened or contemplated. Declaratory judgment was established in U.S. law by a federal statute, the Declaratory Judgment Act (1934).

declination, in astronomy, the angular distance of a body north or south of the celestial equator. Declination and right ascension, an east-west coordinate, together define the position of an object in the sky. North declination is considered positive and south, negative. Thus, +90° declination marks the north celestial pole, 0° the celestial equator, and −90° the south celestial pole. The usual symbol for declination is the lowercase Greek letter δ (delta).

decompression chamber (medical device): *see* hyperbaric chamber.

decompression sickness, also called BENDS, or CAISSON DISEASE, physiological effects of the formation of gas bubbles in the body because of rapid transition from a high-pressure environment to one of lower pressure. Pilots of unpressurized aircraft, underwater divers, and caisson workers are highly susceptible to the sickness because their activities subject them to pressures different from the normal atmospheric pressure experienced on land.

At atmospheric pressure the body tissues contain, in solution, small amounts of the gases that are present in the air. When a pilot ascends to a higher altitude, the external pressures upon his body decrease, and these dissolved gases come out of solution. If the ascent is slow enough, the gases have time to diffuse from the tissues into the bloodstream; the gases then pass to the respiratory tract and are exhaled from the body.

Underwater divers breathing compressed air are also faced with the possibility of a form of decompression sickness known as the bends. As they descend into the water, the external pressure increases proportionally to the depth. The compressed air that is breathed is equal in pressure to that of the surrounding water. The longer a diver stays down and the deeper the dive, the more compressed gas that is absorbed by the body. When the diver ascends, time must be allowed for the additional gases to be expelled slowly or they will form bubbles in the tissues.

The major component of air that causes decompression maladies is nitrogen. The oxygen breathed is used up by the cells of the body and the waste product carbon dioxide is continuously exhaled. Nitrogen, on the other hand, merely accumulates in the body until the tissue becomes saturated at the ambient pressure. When the pressure decreases, the excess nitrogen is released.

Nitrogen is much more soluble in fatty tissue than in other types; therefore, tissues with a high fat content (lipids) tend to absorb more nitrogen than do other tissues. The nervous system is composed of about 60 percent lipids. Bubbles forming in the brain, spinal cord, or peripheral nerves can cause paralysis and convulsions (divers' palsy), difficulties with muscle coordination and sensory abnormalities (divers' staggers), numbness, nausea, speech defects, and personality changes. When bubbles accumulate in the joints, pain is usually severe and mobility is restricted. The term bends is derived from this affliction, as the affected person commonly is unable to straighten joints.

Small nitrogen bubbles trapped under the skin may cause a red rash and an itching sensation known as divers' itches. Usually these symptoms pass in 10 to 20 minutes. Excessive coughing and difficulty in breathing, known as the chokes, indicate nitrogen bubbles in the respiratory system. Other symptoms include chest pain, a burning sensation while breathing, and severe shock.

Relief from decompression sickness usually can be achieved only by recompression in a hyperbaric chamber followed by gradual decompression, but this process is not always able to reverse damage to tissues.

decongestant drug, any compound used to relieve the edema of the nasal mucosa accompanying such conditions as colds and hay fever. When administered in nasal sprays or drops, or in devices for inhalation, such drugs shrink the mucous membranes lining the nasal cavity by contracting the muscles of blood vessel walls, thus reducing blood flow to the inflamed areas. The constricting action chiefly affects the smallest arteries, the arterioles, although capillaries, veins, and larger arteries respond to some degree.

Decongestant drugs are sympathomimetic agents; that is, they mimic the effects of stimulation of the sympathetic division of the autonomic nervous system. One of the chief drugs of the group is epinephrine, a hormone of the adrenal gland and the chemical effector substance released at sympathetic nerve endings when the nerves are stimulated. The effect of its decongestant action resembles the blanching of the skin that occurs with anger or fright, in which epinephrine released from the adrenal gland constricts the blood vessels of the skin.

The effectiveness of the other decongestant drugs results from their chemical similarity to epinephrine. Oldest and most important is ephedrine, an alkaloid originally obtained from the leaves of *ma huang*, any of several species of shrubs of the genus *Ephedra*, which has been used in Chinese medicine for more

than 5,000 years. Ephedrine and other decongestant drugs are made by chemical synthesis. They include phenylephrine hydrochloride, amphetamine and several derivatives, and naphazoline hydrochloride. Because none of them has a sustained effect, they must be used repeatedly; too frequent use, however, results in absorption into the bloodstream, causing nervousness, insomnia, dizziness, headache, or palpitations of the heart.

deconstruction, school or movement of literary criticism initiated by Jacques Derrida in France, who, in a series of books published beginning in the late 1960s, launched a major critique of traditional Western metaphysics. Deconstruction may be thought of as an examination of methodology. Like Sigmund Freud's psychological theories and Karl Marx's political theories, Derrida's deconstructive strategies, which take off from Ferdinand de Saussure's insistence on the arbitrariness of the verbal sign, have subsequently established themselves as an important part of postmodernism, especially in poststructural literary theory and text analysis. Though the deconstructive principles of Derrida and later critics are well established, they remain somewhat controversial.

The deconstruction of philosophy involves the questioning of the many hierarchical oppositions—such as cause and effect, presence and absence, speech ("phonocentrism") and writing—in order to expose the bias (the privileged terms) of those tacit assumptions on which Western metaphysics rest. Deconstruction takes apart the logic of language in which authors make their claims, a process that reveals how all texts undermine themselves because every text includes unconscious "traces" of other positions exactly opposite to that which it sets out to uphold. Deconstruction undermines "logocentrism" (literally, a focus on the word, the original and originating word in relation to which other concepts such as truth, identity, and certainty can be validated; but understood more generally as a belief in reason and rationality, the belief that meaning inheres in the world independently of any human attempt to represent it in words). It follows from this view that the "meaning" of a text bears only accidental relationship to the author's conscious intentions. One of the effects of deconstructive criticism has been a loosening of language from concepts and referents.

To many American scholars deconstruction seemed a logical step beyond New Criticism (with its strong emphasis on text), and it was readily accepted and enlarged upon at Yale University by such individuals as Paul de Man and J. Hillis Miller. Some of the other figures who, to a greater or lesser degree, have associated themselves with the deconstructionist position are Geoffrey Hartman, Catherine Belsey, Harold Bloom, Eugenio Donato, Shoshana Felman, Michel Foucault, Barbara Johnson, Edward Said, Jonathan Culler, and Gayatri Spivak.

décor simultané (theatre): *see* multiple setting.

decorative art, any of those arts that are concerned chiefly with the design and decoration of objects that are chiefly prized for their utility, rather than for their purely aesthetic qualities. Ceramics, glassware, basketry, jewelry, metalware, furniture, textiles, clothing, and other such goods are the objects most commonly associated with the decorative arts. Many decorative arts, such as basketry or pottery, are also commonly considered to be in the craft category, but the definitions of both terms are arbitrary and no sharp distinction can be made. It should also be noted that the separation of decorative from fine arts is a modern distinction.

The decorative arts are treated in several articles in the MACROPAEDIA. For treatments of interior design, furnishings, and such subjects as pottery, glass, metalwork, mosaic, and stained glass, *see* Decorative Arts and Furnishings. For a discussion of clothing and accessories, *see* Dress and Adornment. For treatments of decorative arts in non-Western cultures, *see* the appropriate sections of such articles as African Arts; American Peoples, Arts of Native; Central Asian Arts; East Asian Arts; Egyptian Arts and Architecture, Ancient; Folk Arts; Islāmic Arts; Oceanic Arts; South Asian Arts; and Southeast Asian Arts.

For a description of the place of decorative arts in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Six, Division II.

decoupage, also spelled DÉCOUPAGE (French: "cutting out"), the art of cutting and pasting cutouts to simulate painting on a wood, metal, or glass surface. There are many variations in technique, but the four basic steps of decoupage generally are cutting out the pictures, arranging them to depict a scene or tell a story, pasting them on a surface, and applying several (sometimes up to 12) thin coats of varnish or lacquer to the pictures.

Influenced by a tradition of cut work that includes the paper cutting of the ancient Chinese, the felt appliqués found among the Siberian peoples, and the Polish folk art of paper cutting, decoupage originated in France in the 17th century as a means of decorating bookcases, cabinets, and other pieces of furniture. It spread throughout Europe and in the 18th century became a fashionable pastime, especially at the Italian, French, and English courts. Graceful, charming, and colourful designs, cut from pictures printed expressly for this purpose, were applied to fans, screens, and



Decoupage decoration on the cabinet of a secretary, Venice, *c.* 1740; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, Fletcher Fund, 1925

toilet articles. In the 19th century, peep shows, miniature vistas viewed through a small opening, were constructed of decoupage.

The French Art Deco designer Jean-Michel Frank used decoupage on some of his earliest Parsons tables in Paris in the 1920s. Decoupage was revived in the United States in the 1960s, as a popular decoration for boxes, trays, wastebaskets, lampshades, chests, and screens.

Decoux, Jean (b. 1884, Bordeaux, Fr.—d. Oct. 21, 1963, Paris), governor-general of French Indochina for the provisional (Vichy) French government during World War II (1940–45). His reforms, which were designed to undermine Japanese influence in the area, unwittingly helped lay the groundwork for Vietnamese nationalist resistance to French rule after the war.

Decoux was promoted to rear admiral in 1935 and became vice admiral and commander in chief of French naval forces in East Asia in 1939. He became governor-general of Indochina on July 20, 1940, soon after France's capitulation to Germany. Within two weeks he received demands from the Japanese for permission to send troops through Tonkin (now northern Vietnam) in order to block Allied supply routes to China and for use of Indochinese air bases to facilitate Japan's conquest of China. Loyal to France and resolved to preserve its colonial prestige, Decoux cabled for assistance to Vichy. The government there advised him to submit to the Japanese demands, and on September 20 he concluded a treaty that opened the harbour of Haiphong to the Japanese and gave them the right to station their troops in Tonkin.

Although the Japanese allowed Decoux and his French administration to remain in nominal control of the mundane affairs of state, he was not permitted to do anything that conflicted with their interests. In the face of Japanese threats of invasion, he mobilized Indochina's natural resources and manpower for the Japanese war effort late in 1941. Meanwhile, he worked to promote understanding and to improve social relations between the Indochinese people and the French colonists. He set up youth groups and other organizations that later opposed the reimposition of the French colonial regime.

Decoux installed Vietnamese in civil-service posts, with salaries equal to those of Frenchmen, and established an advisory Franco-Vietnamese grand federal council, with twice as many Vietnamese nationals as Frenchmen represented. The council had little real power, but many of its Vietnamese officials later attained administrative posts under the Viet Minh's independent government.

Initially a strict Vichy supporter, Decoux switched his loyalties to the Free French under General Charles de Gaulle toward the end of the war and sought to undermine Japanese occupation forces. He was arrested by the Japanese on March 9, 1945, after their invasion of Indochina.

After the war he was imprisoned by the French for two years for collaborating with the discredited Vichy government and abetting the Japanese war effort. In 1949 he published his memoirs, *A la barre de l'Indochine: histoire de mon gouvernement générale—1940–1945* ("At the Helm of Indochina: My History as Governor-General—1940–1945").

decree, interlocutory (law): *see* interlocutory decree.

decretal, a reply in writing by the pope to a particular question of church discipline that has been referred to him. In modern usage, such a document is referred to as a rescript (reply). Decretals issued in response to particular questions were authentic decisions for the case in question only and did not have the force of general law. This is true of rescripts in modern church law. Nevertheless, the decretals exercised enormous influence on the development and interpretation of church law because of their frequent application to the solution of analogous situations. At the same time, some decretals became general church law by decree of a pope.

The name decretalist was applied to commentators on the law of decretals as well as to students of the decretals. The title was first used at the University of Bologna, where the decretals served as the text in the study of canon law. Among the most famous and influential of the decretalists were Tancred (d. *c.* 1234), archdeacon of Bologna, best known for his work on church marriage law and his manual of ecclesiastical procedural law; Henry of Susa (d. 1271), cardinal bishop of Ostia, known as the "king of law" and author of a "Golden Summary" (*Summa Aurea*) of the titles of the decretals; St. Raymond

of Peñafort (d. 1275), a Spanish Dominican who compiled the *Decretals* of Gregory IX at Gregory's direction; and Joannes Andreae (d. 1348), a married lay professor of the decretals at the University of Bologna, who is regarded as the father of the history of canon law.

Decretum Gratiani (12th-century church law): *see* Gratian's Decretum.

Decroly, Ovide (b. July 23, 1871, Ronse, Belg.—d. Sept. 10, 1932, Brussels), Belgian pioneer in the education of handicapped and normal children. He was a physician who became involved in a school for abnormal children and consequently became interested in education. One outcome of this interest was his establishment in 1901 of the Institute for Abnormal Children in Uccle, Belg., a school that provided a homelike atmosphere in which Decroly obtained better and more consistent learning results than many schools for normal children were able to achieve. His success prompted Decroly in 1907 to open the École de l'Ermitage, a school for normal children in which he further applied his methods.

Viewing the classroom as a workshop, Decroly based his curriculum on an analysis of children's needs organized within the four categories of food, shelter, defense, and work. One's needs formed the centre of a year's study, and, within the framework of their needs, children were encouraged to develop their individual interests. His program became known as the Decroly method.

decubitus ulcer: *see* bedsore.

decurio, plural DECURIONES, in ancient Rome, the head of a group of 10. The title had two applications, one civil, the other military. In the first usage *decurio* was applied to a member of the local council or senate of a *colonia* (a community established by Roman citizens and having full citizenship rights) or a municipium (a corporation and community established by non-Romans but granted certain rights of citizenship). Qualifications were numerous, and the position was regarded as an honour. The *decuriones* had wide powers in local administration, finance, and judiciary proceedings. Later in the empire, when prosperity declined and the demands of the central government increased, responsibility for tax collection and liability for deficits gradually made their position difficult. It became a hereditary and compulsory service for the class that became known as *curiales*.

In the army a *decurio* was an officer in command of a squadron of cavalry. He was also the officer in charge of headquarters troops.

Dedekind, (Julius Wilhelm) Richard (b. Oct. 6, 1831, Braunschweig, duchy of Braunschweig [Germany]—d. Feb. 12, 1916, Braunschweig), German mathematician who developed a major redefinition of irrational numbers in terms of arithmetic concepts. Although not fully recognized in his lifetime, his treatment of the ideas of the infinite and of what constitutes a real number continues to influence modern mathematics.



Dedekind

By courtesy of the Library of the Swiss Federal Institute of Technology, Zurich

Dedekind was the son of a lawyer. While attending the Gymnasium Martino-Catharineum in 1838–47 in Braunschweig, he was at first interested primarily in chemistry and physics. At the Caroline College in 1848–50, however, he turned to calculus, algebra, and analytic geometry, which helped qualify him to study advanced mathematics at the University of Göttingen under the mathematician Carl Friedrich Gauss.

After two years of independent study of algebra, geometry, and elliptic functions, Dedekind served as *Privatdozent* ("unsalaried lecturer") in 1854–58 at the University of Göttingen, where, in his lectures, he introduced, probably for the first time, the Galois theory of equations and attended the lectures of the mathematician Peter Gustav Lejeune Dirichlet. These experiences led Dedekind to see the need for a redefinition of irrational numbers in terms of arithmetic properties. The geometric approach had led Eudoxus in the 4th century BC to define them as approximations by rational numbers (*e.g.*, a series of nonrepeating decimals, as $\sqrt{2} = 1.414213\ldots$).

In 1858 Dedekind joined the faculty of the Zürich Polytechnic, where he remained for five years. In 1862 he accepted a position in the Technical High School in Braunschweig, where he remained in comparative isolation for the rest of his life.

While teaching there, Dedekind developed the idea that both rational and irrational numbers could form a continuum (with no gaps) of real numbers, provided that the real numbers have a one-to-one relationship with points on a line. He said that an irrational number would then be that boundary value that separates two especially constructed collections of rational numbers.

Dedekind perceived that the character of the continuum need not depend on the quantity of points on a line segment (or continuum) but rather on how the line submits to being divided. His method, now called the Dedekind cut, consisted in separating all the real numbers in a series into two parts such that each real number in one part is less than every real number in the other. Such a cut, which corresponds to a given value, defines an irrational number if no largest or no smallest is present in either part; whereas a rational is defined as a cut in which one part contains a smallest or a largest. Dedekind would therefore define the square root of 2 as the unique number dividing the continuum into two collections of numbers such that all the members of one collection are greater than those of the other, or that cut, or division, separating a series of numbers into two parts such that one collection contains all the numbers whose squares are larger than 2 and the other contains all the numbers whose squares are less than 2.

Dedekind developed his arithmetical rendering of irrational numbers in 1872 in his *Stetigkeit und Irrationale Zahlen* (Eng. trans., "Continuity and Irrational Numbers," published in *Essays on the Theory of Numbers*). He also proposed, as did the German mathematician Georg Cantor (*q.v.*), two years later, that a set—a collection of objects or components—is infinite if its components may be arranged in a one-to-one relationship with the components of one of its subsets. By supplementing the geometric method in analysis, Dedekind contributed substantially to the modern treatment of the infinitely large and the infinitely small.

While vacationing in Interlaken, Switz., in 1874, Dedekind met Cantor. Dedekind gave a sympathetic hearing to an exposition of the revolutionary idea of sets that Cantor had just published, which later became prominent in the teaching of modern mathematics. Because both mathematicians were developing highly original concepts, such as in number theory and analysis, which were not readily accepted by their contemporaries, and because both lacked adequate professional recognition, a lasting friendship developed.

Continuing his investigations into the properties and relationships of integers—that is, the idea of number—Dedekind published *Über die Theorie der ganzen algebraischen Zahlen* (1879; "On the Theory of Algebraic Whole Numbers"). There he proposed the "ideal" as a collection of numbers that may be separated out of a larger collection, composed of algebraic integers that satisfy polynomial equations with ordinary integers as coefficients. The ideal is a collection of all algebraic integer multiples of a given algebraic integer. For example, the notation (2) represents such a particular collection, as $\ldots -8, -6, -4, -2, 0, 2, 4, 6, 8 \ldots$. The sum of two ideals is an ideal that is composed of all the sums of all their individual members. The product of two ideals is similarly defined. Ideals, considered as integers, can then be added, multiplied, and hence factored. By means of this theory of ideals, he allowed the process of unique factorization—that is, expressing a number as the product of only one set of primes, or 1 and itself—to be applied to many algebraic structures that hitherto had eluded analysis.

BIBLIOGRAPHY. There is no full-length treatment of Dedekind's life and work in English. Concise surveys are found in E.T. Bell, *Men of Mathematics* (1937, reissued 1986); Carl B. Boyer, *A History of Mathematics*, 2nd ed., rev. by Uta C. Merzbach (1989); and Kurt R. Biermann, "Dedekind," pp. 1–5 in vol. 4 of *Dictionary of Scientific Biography*, ed. by Charles Coulston Gillispie (1971).

Dedham, town, seat (1793) of Norfolk county, eastern Massachusetts, U.S., on the Charles River, just southwest of Boston. One of the oldest inland settlements of the Massachusetts Bay Colony, it was founded in 1635 and named for Dedham, in Essex, Eng., and incorporated in 1636. Its Fairbanks House (1636) is believed to be the oldest existing frame dwelling in the United States. A convention to draw up the Suffolk Resolves (protesting the Intolerable Acts of Britain against the colonists) met in September 1774 in the Woodward (Fisher) Tavern (commemorated by a tablet on the County Registry building). The Norfolk County Courthouse was the scene of the famous Nicola Sacco and Bartolomeo Vanzetti murder trial of the 1920s. The town is primarily residential, with some light industry. Pop. (1990) 23,782.

Dedication, Feast of (Judaism): *see* Ḥanukka.

deduction, in logic, a rigorous proof, or derivation, of one statement (the conclusion) from one or more statements (the premises)—*i.e.*, a chain of statements, each of which is either a premise or a consequence of a statement occurring earlier in the proof. This usage is a generalization of what the Greek philosopher Aristotle called the syllogism, but a syllogism is now recognized as merely a special case of a deduction. Also, the traditional view that deduction proceeds "from the general to the specific" or "from the universal to the particular" has been abandoned as incorrect by most logicians. Some experts regard all valid inference as deductive in form and, for this and other reasons, reject the supposed contrast between deduction and induction. *See also* axiomatic method; formal system; inference.

Dedza, town, central Malaŵi, at the foot of Dedza Mountain (7,211 feet [2,198 m]). Situated in an area with a cool, healthy climate and a perennial supply of mountain water, the town is near the Mozambique border, on the traditional route between Ntcheu and Lilongwe, and is the trade centre for a fertile

agricultural area (rice and potatoes). Extensive softwood plantations cover Dedza Mountain; there are sawmills in the town and a forestry training school nearby. The region was sparsely inhabited until the 1920s and '30s brought an influx of refugees, mostly emigrants evading taxation in Mozambique. Pop. (1977) 5,578.

Dee, John (b. July 13, 1527, London, Eng.—d. December 1608, Mortlake, Surrey), English alchemist, astrologer, and mathematician who contributed greatly to the revival of interest in mathematics in England.

After lecturing and studying on the European continent between 1547 and 1550, Dee returned to England in 1551 and was granted a pension by the government. Dee became astrologer to the queen, Mary Tudor, and shortly thereafter was imprisoned for being a magician but was released in 1555. Besides practicing astrology and horoscopy in the court of Elizabeth I, whose favour he enjoyed, he also gave instruction and advice to pilots and navigators who were exploring the New World. He was asked to name a propitious day for Elizabeth's coronation, and he gave her lessons in the mystical interpretation of his writings.

In 1570 the first English translation of Euclid's work appeared, and, although it is credited to Sir Henry Billingsley, who became sheriff and later lord mayor of London, Dee probably wrote part or all of it. In addition, he wrote the preface, which encouraged the growing interest in the mathematical arts.

Dee later toured Poland and Bohemia (1583–89), giving exhibitions of magic at the courts of various princes. He became warden of Manchester College in 1595.

Consult the INDEX *first*

Dee, River, river in Grampian region, Scotland, rising above 4,000 feet (1,250 m) in the Cairngorm Mountains and flowing for about 90 miles (145 km) in an easterly course to the North Sea at Aberdeen. Its headwaters flow turbulently in highland glens, set amid grouse moorland; but the main valley widens below Aboyne, and the river flows through well-farmed country. The river is famed for its salmon.

Dee, River, Welsh AFON DYFRDWY, river in northern Wales and England, approximately 70 miles (110 km) long. It rises in the county of Gwynedd on the slopes of Ddualllt, in Snowdonia National Park, and falls rapidly to Bala Lake. Its valley then runs northeast to Corwen and eastward past Llangollen. The Vale of Llangollen contains Thomas Telford's aqueduct (1805) for the Shropshire Union Canal. Leaving the mountains, the Dee meanders northward across the rich pastureland of the Cheshire plain; below Chester it is confined in a straight, artificial channel. Its estuary, 12 miles (19 km) long by 5 miles (8 km) wide at its mouth and very shallow, has expanses of sand and marsh; the main town on the estuary is Flint.

Deeds of the Romans (book): *see* Gesta Romanorum.

deep-scattering layer, horizontal zone of living organisms, usually schools of fish, occurring below the surface in many ocean areas, so called because the layer scatters or reflects sound waves, causing echoes in depth sounders. Originally mistaken by some for the ocean bottom, the deep-scattering layer was later observed to rise toward the surface in the evening and to sink again at dawn, thus leading to a theory that it was composed of living organisms. Net tows through the layer and direct observation from submersibles confirmed the theory.

deep-sea fish, in general, any species of fishes (class Osteichthyes) that are found at extreme ocean depths, usually more than 600 m and even to as much as 2,700 m (2,000 to 9,000 feet). The species, which represent more than a dozen families of marine fishes, are characterized by huge mouths, enlarged eyes, and the presence of luminous organs on some or several parts of the body. The light-producing organs serve to attract either prey or potential mates. These and other peculiar traits of deep-sea fishes represent evolutionary adaptations to the extreme pressure, cold, and particularly the darkness of their environment. The fish life of the deep-sea habitat is among the most specialized of any habitat in the world. Because competition is less intense in the deep sea than in shore or shallow waters, many primitive types and groups still persist there.

The most important groups of deep-sea fishes are the deep-sea angler fishes (belonging to the suborder Ceratioidei), which lure prey within reach by dangling their extended dorsal fin spines as bait; the viperfishes (family Chauliodontidae), whose numerous fanglike teeth make them awesome predators; and the bristlemouths (family Gonostomatidae), which are among the most abundant fishes in the world.

deep-sea trench, also called OCEANIC TRENCH, any long, narrow, steep-sided depression in the ocean bottom in which maximum oceanic depths (approximately 7,300 to more than 11,000 m [24,000 to 36,000 feet]) occur. The deepest known depression of this kind is the Mariana Trench, which lies east of the Mariana Islands in the western North Pacific Ocean.

A brief treatment of deep-sea trenches follows. For full treatment, *see* MACROPAEDIA: Oceans.

Trenches generally lie seaward of and parallel to adjacent island arcs or mountain ranges of the continental margins. Of the Earth's 20 major trenches, 17 are found in the Pacific. The only Atlantic trenches are the Puerto Rico Trench north of the Caribbean islands and the South Sandwich Trench east of Drake Passage between South America and Antarctica. The single major Indian Ocean trench is the Java Trench south of Indonesia.

The cross sections of trenches generally are V-shaped with steeper landward sides. Typical slopes range between 4° and 16°, although slopes as steep as 45° have been measured in the Tonga Trench of the equatorial South Pacific. Narrow, flat abyssal plains of ponded sediment generally occupy trench axes.

Geophysical data provide important clues concerning the origin of trenches. No abnormalities in the flow of internal Earth heat or variations in the Earth's magnetic field occur at trenches. Precision measurements reveal that the force of gravity generally is lower than normal, however. These negative gravity anomalies are interpreted to mean that the segments of the lithosphere (crust and upper mantle comprising the rigid, outermost shell of the Earth) which underlie trenches are being forced down against buoyant isostatic forces.

This interpretation of gravity data is substantiated by seismological studies. All trenches are associated with zones of earthquake foci. Along the periphery of the Pacific Ocean, earthquakes occur close to and landward of the trenches, at depths within the Earth of 55 km (34 miles) or less. With increased landward distance away from the trenches, earthquakes occur at greater and greater depths—500 km or more. Seismic foci thus define tabular zones approximately 20 km thick that dip landward at about 45° beneath the continents. Analyses of these seismic zones and of individual earthquakes suggest that the seismicity results from the descent of a lithospheric plate with its associated crust into the asthenospere (the partially molten layer beneath the lithosphere); oceanic trenches are topographic expressions of this movement.

The sinking of oceanic lithosphere helps to explain the relative scarcity of sediment that has accumulated within the trenches. Small quantities of brown or red clay, siliceous organic remains, volcanic ash and lapilli, and coarse, graded layers that result from turbidity (sediment-laden) currents and from the slumping of the trench walls occur at trench axes. Sediments on trench walls shallower than 4,500 m are predominantly calcareous foraminiferal oozes. Large quantities of sediment cannot accumulate because they either are dragged into the Earth's interior by the plunging oceanic lithosphere or are distorted into folded masses and molded into new material of the continental periphery.

deer (family Cervidae), any of the ruminant mammals (order Artiodactyla) having two large and two small hooves on each foot and having antlers in the males of most species and in the females of some species. Indeed, the feature most commonly associated with deer is the presence of antlers. Deer occur mainly in forests but may be found in habitats as diverse







Development of deer antlers
Male (from top) roe deer (*Capreolus capreolus*) in velvet; wapiti (*Cervus canadensis*) shedding velvet; moose (*Alces alces*) with fully developed antlers

(From top) Hans Reinhard/Bruce Coleman Ltd.; Wayne Lankinen/Bruce Coleman Inc. © Tom & Pat Leeson from The National Audubon Society Collection/Photo Researchers



Rival European red deer stags (*Cervus elaphus*) fighting for possession of a hind in the rutting season

Stefan Meyers GDT/Ardea London

as deserts, tundra, swamps, and high mountainsides. They are native to Europe, Asia, North America, South America, and northern Africa, and they have been introduced into such areas as the Hawaiian Islands, Australia, and New Zealand. There are about 16 genera and about 30 species. Although they are variously classified by different authorities, they are often divided into four subfamilies: Moschinae (musk deer), Muntiacinae (muntjacs), Odocoileinae (hollow-toothed deer), and Cervinae (true deer).

The popular English terminology associated with the sexes of various deer is an outgrowth of their importance as game: female deer are usually called does, but the female of the European red deer is a hind, and of the moose or elk a cow; males generally are called bucks, but the male of the red deer is a stag, or, especially when mature, a hart, and of the moose or elk a bull. Several names are used for the fawns of various ages—*e.g.*, yearling, knobber, brocket, staggard (especially applied to male red deer). Fawns of moose or elk are called calves.

Deer range in shoulder height from about 30 cm (12 inches) in the pudu (genus *Pudu*) to 2 m (6.5 feet) or more in the moose (species *Alces alces*). Deer characteristicly have lithe but compact bodies and short tails. The ears are large but usually slender. The legs are usually long and slender and are provided with paired hooves. Generally the fur is slightly harsh but has a smooth appearance. Some deer possess a shaggier coat, especially in the cold seasons. The colour is usually brownish to tawny, often with white on the chest and throat. In most kinds the coat of the young, or fawn, is spotted; and in some, especially the smaller species, the spotting may be retained by the adult.

Antlers, their most outstanding feature, are borne by adult males in all but two species—the musk deer (*Moschus moschiferus*) and the Chinese water deer (*Hydropotes inermis*)—and are borne by both male and female reindeer, or caribou (*Rangifer tarandus*). The antlers, which are solid bony outgrowths that arise from the frontal bones, are shed and produced anew each year. The antlers originate as simple knobs covered with a soft skin, the so-called "velvet" of the antlers. The growth of antlers is rapid, and, as growth continues, a heavy deposit of bone at the base of the antler constricts the circulation, finally stopping it entirely and drying the skin covering. The skin is subsequently rubbed off, and the hardened antler is fully developed as the rutting (breeding) season begins.

The general form of the antler is characteristic of the various species; some species have a main beam with one or more subsidiary tines, whereas others show a dichotomous or even more complex branching. Maximum size and complexity of antlers is usually attained when the animal is in its prime; they tend to degenerate in older animals. Shedding of the antlers is caused by a resorption of bony material at their bases. This process of resorption, which irritates the animal, induces it to respond by rubbing the antlers against trees or other hard objects. When the base has been sufficiently weakened, the antler is shed.

The musk and Chinese water deer, as well as the muntjacs (*Muntiacus*) and tufted deer (*Elaphodus cephalophus*) have long, tusklike upper canine teeth.

As herbivorous animals, deer feed on grass, twigs, bark, and shoots. They are usually gregarious, and some make long annual migrations. They are most active in early morning and late afternoon, resting at midday and at night. Most live in small bands comprising a family group, though the males are prone to be solitary seasonally. In warm climates breeding takes place at any time of the year; in colder climates, in autumn or winter. Gestation ranges from about 5 months in the musk deer to about 10 months in the roe deer (*Capreolus capreolus*). One or two young (as many as seven in the water deer) are born. Most deer are polygamous, the bucks collecting harems and battling other males for possession of the does. Especially in the rutting season, deer are likely to be unpredictable. The North American moose is known for its irascible disposition. Deer attack with either antlers or hooves, impaling with the former and slashing with the latter. Occasionally the antlers of two fighting bucks become so firmly engaged that the struggle ends in both combatants dying of starvation.

Deer are hunted for their meat and hides and for their antlers, which are kept as trophies and, in China, have long been used for medicinal purposes. Reindeer are kept as domestic animals in some areas. The flesh, or venison, of most deer is esteemed as food. The hides, when properly tanned, produce a soft leather. The domesticated deer, notably the Laplander's reindeer, produce a beeflike meat, leather, and milk and serve also as draft and riding animals.

Deer, The Book of, illuminated manuscript written in Latin, probably in the 9th century, at a monastery founded by St. Columba at Deer Abbey (now Deer district, Grampian Region Scot.) and containing 12th-century additions in Latin and Scots Gaelic. The Book of Deer includes the whole of the New Testament Gospel of St. John and parts of the other three Gospels, an early version of the Apostles' Creed, and a later charter granted to the monks by King David I of Scotland. The illuminations—capitals, borders, and pictures of the Evangelists—resemble those in earlier Irish Gospels. The version of the Gospels is that used in Ireland (combining the Vulgate with earlier readings): the manuscript is clearly a careless transcript of a corrupt text. It was discovered in 1860 in the library of the University of Cambridge.

The 12th-century Gaelic memorandums (the earliest extant Gaelic written in Scotland) provide information on a little-known period of Scottish history—the end of the Celtic period. They give details of clan organization, land divisions, and monastic land tenure and an account of the monastery's foundation.

deer mouse: *see* white-footed mouse.

deer tiger: *see* puma.

Deere, John (b. Feb. 7, 1804, Rutland, Vt., U.S.—d. May 17, 1886, Moline, Ill.), pioneer American inventor and manufacturer of agricultural implements.

Apprenticed to a blacksmith at age 17, Deere set up his own smithy trade four years later and, for 12 years, did work in various towns of his native Vermont. In 1837, when 33 years old, he headed west and eventually settled in Grand Detour, Ill., where he set up a blacksmith's shop, and sent for his wife and children the following year. He joined in a partnership with Major Leonard Andrus.

In his work, Deere found, through the frequent repairs that he had to make, that the wood and cast-iron plow, used in the eastern United States from the 1820s, was not suited to the heavy, sticky soils of the prairies. He began experimenting, and by 1838 he and his partner had sold three newly fashioned plows. He kept experimenting, producing 10 improved plows in 1839 and 40 new plows in 1840. By 1846 the annual output was about a thousand plows. Deciding that Grand Detour was not well situtated in regard to transportation and resources, Deere sold his interest in the shop to Andrus in 1847 and moved to Moline, Ill. There he began using imported English steel with great success and soon negotiated with Pittsburgh manufacturers for the development of comparable steel plate. By 1857 Deere's annual output of plows had risen to 10,000.

In 1858 Deere took his son Charles into partnership and in 1863 his son-in-law, Stephen H. Velie; in 1868 the firm was incorporated as Deere & Company. Deere remained president of the company for the rest of his life. Gradually Deere & Company began manufacturing cultivators and other agricultural implements.

Deere & Company, major American manufacturer of farm machinery and industrial equipment. It is headquartered in Moline, Ill.

The company's origin dates to 1836, when John Deere (*q.v.*) invented the first steel plow that could till American Midwest prairie soil without clogging. The following year, Deere established a business to manufacture and market the plow, and his own company was incorporated as Deere & Company in 1868. The present firm was incorporated in 1958 as John Deere–Delaware Company; it assumed the current company name later that year after merging with the older Deere & Company and its subsidiaries. Since its inception, Deere & Company has witnessed five generations of Deere family leadership.

Generally, in agriculture, the 1960s and '70s were a period of accelerating technological change that encouraged farmers to employ significantly larger economies of scale to ensure profitability. This trend had great impact on Deere & Company and was reflected by a corresponding growth in the company's business as it focused increasingly on the manufacture of farm equipment intended for expanding enterprises—giant tractors, balers, and seeding and harvesting machinery. In order, however, to maintain production of a wide range of agricultural products for small- and medium-sized operations while responding to shifting demand toward larger machinery, Deere & Company became a major proponent of the "flexible-manufacturing" system of production. Under this system, Deere in 1981 built a factory in Iowa costing over $1.5 billion that made extensive use of computers and robots and thus enabled the company to run numerous small assembly lines simultaneously for different products and turn a profit even at low levels of output. Largely as a result

of this strategy, Deere & Company became the biggest American manufacturer of farm equipment in the late 20th century.

In addition to manufacturing farm machinery, Deere plants in the United States, Canada, western Europe, Argentina, and South Africa produce industrial equipment such as forklifts, bulldozers, and industrial tractors, as well as such consumer goods as chain saws and lawn-care equipment.

Deering, William (b. April 25, 1826, South Paris, Maine, U.S.—d. Dec. 9, 1913, Coconut Grove, Fla.), American businessman and philanthropist whose company was at one time the largest agricultural-implement manufacturer in the world.

Deering helped manage his family's woolen mill in South Paris in western Maine. About 1850 he went to Illinois and Iowa to invest in farmland, but he returned to South Paris in 1856 and set up a dry-goods store that later, in 1865, became Deering, Milliken & Company, a wholesale house.

About 1870 Deering left the business to become a partner with Elijah H. Gammon, who had just bought the manufacturing rights to a horse-drawn grain harvester, and set up a plant in Plano, Ill. After Deering bought out Gammon in 1875 and moved to Chicago, he undertook the manufacture of a twine binder for use with the harvester. He incorporated his business in 1883 as William Deering & Company (later renamed the Deering Manufacturing Company) and exhibited the first self-propelled harvester in 1900. After he retired in 1901, his company merged with the International Harvester Company.

Deeside (Scotland): *see* Kincardine and Deeside.

Deeside (Wales): *see* Alyn and Deeside.

defamation, in law, attacking another's reputation by a false publication (communication to a third party) tending to bring the person into disrepute. The concept is an elusive one and is limited in its varieties only by human inventiveness.

Although defamation is a creation of English law, similar doctrines existed several thousand years ago. In Roman law abusive chants were capitally punishable. In early English and Germanic law insults were punished by cutting out the tongue.

As late as the 18th century in England, only imputation of crime or social disease and casting aspersions on professional competence constituted slander, and no offenses were added until the Slander of Women Act in 1891 made imputation of unchastity illegal. French defamation laws historically have been more severe. An act of 1881, which inaugurated modern French defamation law, required conspicuous retraction of libelous material in newspapers and allowed truth as a defense only when publications concerned public figures. Modern German defamation is similar but generally allows truth as a defense. In Italy truth seldom excuses defamation, which is criminally punishable there.

Generally defamation requires that the publication be false and without the consent of the allegedly defamed person. Words or pictures are interpreted according to common usage and in the context of publication. Injury only to feelings is not defamation; there must be loss of reputation. The defamed person need not be named but must be ascertainable. A class of persons is considered defamed only if the publication refers to all its members—particularly if the class is very small—or if particular members are specially imputed.

Libel and slander are the legal subcategories of defamation. Generally libel is defamation in print, pictures, or any other visual symbols. Slander is spoken defamation. The advent of electronic communications has complicated the classification somewhat. Some countries treat radio defamation as libel, others as slander. Television presents similar problems.

Although both libel and slander embrace the essentials of defamation, classifications are important because different liabilities arise under each. These differences generally reflect a policy of holding people less stringently to what they say than to what they write—so as to discourage trivial lawsuits—and a policy of preserving the credibility of the printed word by stiffer penalties. The law also recognizes that printed defamation is more likely to be injurious than "just talk."

The damages recoverable in libel and slander are also different. Libel lawsuits undertake redress for all injurious consequences of the defamation—called general damages if they involve loss of reputation and called special damages if they involve specific economic loss. In a slander action one can recover only special damages; however, some jurisdictions do not make this distinction.

Defamation is criminally punishable under various statutes, but, to be criminally punishable, it must be such as would provoke a breach of the peace or in some other way directly prejudice the public interest.

Usually, liability for a defamation falls on everyone involved in its publication whose participation relates to content. Thus editors, managers, and even owners are responsible for libelous publications by their newspapers, whereas vendors and distributors are not.

Actual truth of the publication is usually a defense to a charge of defamation. Legal privilege arising from a special relationship or position also relieves liability (U.S. senators, for example, cannot be prosecuted for anything they say on the floor of the Senate). In certain areas the mass media have broad discretion under the doctrine of "fair comment and criticism," but such comment must pertain to a person's work—not private affairs—and must be factually accurate.

defecation, also called BOWEL MOVEMENT, the act of eliminating solid or semisolid waste materials (feces) from the digestive tract. In human beings, wastes are usually removed once or twice daily, but the frequency can vary from several times daily to three times weekly and remain within normal limits; in cattle the rate may be as high as once every hour. Muscular contractions (peristaltic waves) in the walls of the colon move fecal material through the digestive tract to the rectum.

The rectum is a distensible muscular tube that acts as a temporary reservoir for the waste material. As the rectal walls expand with filling, stretch receptors from the nervous system, located in the rectal walls, stimulate the desire to defecate. The urge passes within one to two minutes if not relieved, and the material in the rectum is then often returned to the colon where more water is absorbed. If defecation is continuously delayed, constipation and hardened feces result.

When the rectum is filled, pressure within it is increased. This increased intrarectal pressure initially forces the walls of the anal canal apart and allows the fecal material to enter the canal; as material is entering, muscles attached to the pelvic floor help further to pull the anal canal walls apart. The rectum shortens as it expels material into the anal canal, and peristaltic waves propel the feces out of the rectum. In the anus there are two muscular constrictors, the internal and external sphincters, that allow the feces to be passed or retained. As feces exit, the anus is drawn up over the passing mass by muscles of the pelvic diaphragm to prevent prolapse (pushing out of the body) of the anal canal.

While defecation is occurring, the excretion of urine is usually stimulated. The chest muscles, chest diaphragm, abdominal-wall muscles, and pelvic diaphragm all exert pressure on the digestive tract. Respiration temporarily ceases as the filled lungs push the chest diaphragm down to exert pressure. Blood pressure rises in the body, and the amount of blood pumped by the heart decreases. Death has been known to occur during defecation if the blood pressure rises enough to cause the rupture of an aneurysm (weak spot in a blood vessel wall) or to dislodge any blood clots that may be located in the vessels.

Defecation can be totally involuntary, or it may be under voluntary control. Incontinence—the loss of control over the evacuative process—can result from spinal or other bodily injuries; it may also develop with senescence. Defecation may also be influenced by pain, fear, temperature elevation, and psychological or neurological complications. Diarrhea, or abnormally frequent defecation, is a characteristic symptom of many diseases and disorders—most strikingly in such diseases as cholera and dysentery.

defender of the faith, Latin FIDEI DEFENSOR, a title belonging to the sovereign of England in the same way as *Christianissimus* ("most Christian") belonged to the king of France. The title was first conferred by Pope Leo X on Henry VIII (Oct. 11, 1521) as a reward for the king's pamphlet *Assertio septem sacramentorum adversus Martinum Lutherum* ("Declaration of the Seven Sacraments Against Martin Luther"), written against Luther. When Henry broke with the papacy, Pope Paul III deprived him of his designation, but the title was restored to the king by Parliament in 1544 and is still used by his successors on the English throne. The abbreviation Fid. Def. or the letters F.D. have been regularly on the coinage from the time of George I.

Defenestration of Prague (May 23, 1618): *see* Prague, Defenestration of.

defense economics, field of national economic management concerned with the economic effects of military expenditure, the management of economics in wartime, and the management of peacetime military budgets.

A brief treatment of defense economics follows. For full treatment, *see* MACROPAEDIA: War, Theory and Conduct of.

The field of defense economics arose in response to the vastly increased scale on which warfare was waged and armed forces were maintained in the 20th century. The increasing expense of military technology also greatly enhanced the impact of war and defense preparedness on national economies.

War is inevitably costly. Its costs include the foregone earnings of those killed or injured in it; the lifetime medical care devoted to those permanently incapacitated by it; the physical capital destroyed or damaged in a conflict; the cost of supplying the armed forces with the weapons of war; the cost of sustaining those armed forces; and the losses to the economy caused by the diversion of resources from peaceful investments in future economic capacity. To avoid the costs of war, most countries seek to deter aggression by allocating resources for a minimum level of military capability, so that the cost to an aggressor of initiating a war will far exceed any likely gains. Those nations that do become involved in a war must devote a far higher proportion of their total economic production and government budgets to military expenditures than they did even while following policies of deterrence in peacetime. The fiscal and monetary policies that a government uses to finance its conduct of war are collectively known as war finance (*q.v.*), which constitutes a branch of defense economics.

Aside from war finance, the prime concern of defense economics has been directed to-

ward the issues of the allocation of resources between the military and civilian sectors and toward the possible effects of this allocation on the national economy. In the nuclear age, economists have also become concerned with the question of allocation within the armed forces—*i.e.*, with the size and character of the armed forces and with the choice and design of their weapons. In fact, modern defense planning and weapons development pose extremely complex problems, and efforts to rationalize the decision-making processes in these fields in the post-World War II decades have led to the creation of many new management techniques that have rapidly spread into civilian use.

defense mechanism, in psychoanalytic theory, any of a group of mental processes that enables the mind to reach compromise solutions to problems that it is unable to resolve. The process is usually unconscious, and the compromise generally involves concealing from oneself internal drives or feelings that threaten to lower self-esteem or provoke anxiety. The concept derives from the psychoanalytic hypothesis that there are forces in the mind that oppose and battle against each other. The term was first used in Sigmund Freud's paper "The Neuro-Psychoses of Defence" (1894).

Some of the major defense mechanisms described by psychoanalysts are the following:

1. Repression is the withdrawal from consciousness of an unwanted idea, affect, or desire by pushing it down, or repressing it, into the unconscious part of the mind. An example may be found in a case of hysterical amnesia, in which the victim has performed or witnessed some disturbing act and then completely forgotten the act itself and the circumstances surrounding it.

2. Reaction formation is the fixation in consciousness of an idea, affect, or desire that is opposite to a feared unconscious impulse. A mother who bears an unwanted child, for example, may react to her feelings of guilt for not wanting the child by becoming extremely solicitous and overprotective to convince both the child and herself that she is a good mother.

3. Projection is a form of defense in which unwanted feelings are displaced onto another person, where they then appear as a threat from the external world. A common form of projection occurs when an individual, threatened by his own angry feelings, accuses another of harbouring hostile thoughts.

4. Regression is a return to earlier stages of development and abandoned forms of gratification belonging to them, prompted by dangers or conflicts arising at one of the later stages. A young wife might retreat to the security of her parents' home, for example, after her first quarrel with her husband.

5. Sublimation is the diversion or deflection of instinctual drives, usually sexual ones, into noninstinctual channels. Psychoanalytic theory holds that the energy invested in sexual impulses can be shifted to the pursuit of more acceptable and even socially valuable achievements, such as artistic or scientific endeavours.

6. Denial is the conscious refusal to perceive that painful facts exist. In denying latent feelings of homosexuality or hostility, or mental defects in one's child, an individual can escape intolerable thoughts, feelings, or events.

7. Rationalization is the substitution of a safe and reasonable explanation for the true (but threatening) cause of behaviour.

Although psychoanalysts view defense mechanisms as part of every neurotic structure, defensive activity is in itself considered no sign of pathology.

Defense of Rights, Associations for the, Turkish MÜDAFAA-I HUKUK CEMİYETLERİ, patriotic league formed in Anatolia and in Thrace in 1918, after the defeat of the Ottoman Empire in World War I. Its purposes were to defend Turkey against foreign occupation and to preserve its territorial integrity, and it served as the political instrument of the Turkish struggle for independence (1918–22).

The league was actually a coalition of middle-class organizations, composed of town notables, ulama (men of religious learning), landlords, merchants, and petty government officials (many of whom were members of the Committee of Union and Progress, which was dissolved in 1918). In 1919 Mustafa Kemal (later Atatürk) arrived in Anatolia as inspector general of the 3rd Army and established contacts with the groups there. Mustafa Kemal resigned his post that July and persuaded the Association for the Defense of Rights of Eastern Anatolia to call a congress, which met in Erzurum July 23–August 7. At a second congress, in Sivas on September 4–11, the nationwide Association for the Defense of the Rights of Anatolia and Rumelia (Ottoman provinces in the Balkans) was formed, with a permanent representative committee under Mustafa Kemal.

In December the associations controlled the elections, and the resultant parliament adopted a resolution (Jan. 28, 1920) accepting the goals that had been formulated as the National Pact at the league's two congresses—goals of national independence, territorial integrity, and armed resistance to foreign occupation. After Allied forces occupied Istanbul (March 1920) and Mustafa Kemal convened the Grand National Assembly (GNA) in Ankara on April 23, two factions of the defense associations clashed in the Assembly: the modernists supported a republican regime, and the conservatives favoured the monarchy. Mustafa Kemal then formed his own defense-of-rights group, and the national elections of 1923 (held after successes in the war of independence) not only unseated the parliamentary opposition but also sanctioned the transformation of Mustafa Kemal's group into a political party. That September the Association for the Defense of the Rights of Anatolia and Rumelia was succeeded by the People's Party (later the Republican People's Party), which ruled Turkey uninterruptedly from 1923 to 1950.

Deffand, Marie de Vichy-Chamrond, Marquise du (b. 1697, Château of Chamrond, Burgundy, Fr.—d. Sept. 23, 1780, Paris), woman of letters and a leading figure in French society.



Madame du Deffand, engraving by Forshel after a portrait by Louis Carrogis Carmontelle
J.E. Bulloz

She was born of a noble family, educated at a convent in Paris, and married at 21 to her kinsman Jean-Baptiste de La Lande, Marquis du Deffand, from whom she separated in 1722. She was by that time taking part in the extremely dissipated life that characterized the entourage of the regent, Philippe II, Duke d'Orléans, whose mistress she became. She was frequently seen at Sceaux, where the Duchess du Maine held court amid a brilliant company that included Fontenelle, the Marquise de Lambert, Voltaire, and Jean-François Hénault, president of the Parlement of Paris, with whom she lived on intimate if not always friendly terms until his death in 1770. When she set up her own salon, she attracted scientists, writers, wits, and all who were of any consequence in the world of letters and in society.

By 1754 Mme du Deffand had lost her sight and engaged Julie de Lespinasse to help her in entertaining. The wit and charm of the latter made some of the guests prefer her society to Mme du Deffand's, and Mme du Deffand dismissed her (1764). As a result, the salon was broken up, for Mademoiselle de Lespinasse took with her many of its patrons.

The principal friendships of Mme du Deffand's later years were with the Duchess de Choiseul and Horace Walpole. Her letters to the duchess are full of life and have great charm. Those to Voltaire, extending over 43 years, contain great wit. Among the best are her letters to Walpole, 20 years her junior, for whom she had developed a passion. Her prose developed qualities of style and eloquence of which her earlier writings had given little promise, and her chronicle of events at court and at home form a fascinating and valuable document.

Defferre, Gaston (b. Sept. 14, 1910, Marsillargues, near Marseille, Fr.—d. May 7, 1986, Marseille), French politician, Socialist Party leader, and longtime mayor of Marseille (1944–45, 1953–86).

Son of a lawyer (*avocat*), Defferre studied at the Faculty of Law in Aix-en-Provence and practiced law from 1931. During World War II he served in the resistance and was briefly mayor of Marseille near war's end. He was deputy to the National Assembly almost continuously from 1945 until his death. He favoured independence for France's overseas territories, including Algeria. When Charles de Gaulle came to power in 1958, Defferre was without a parliamentary seat until 1962, when he returned and rallied the Socialist Party's opposition to de Gaulle's presidency. Standing as the Socialist presidential candidate in 1969, however, Defferre received only 5 percent of the vote.

A combative politician (he fought a fencing duel with a Gaullist deputy in 1967), he supported François Mitterrand's presidential ambitions in the 1970s and, later as interior minister, was responsible in 1982 for the decentralization measures that were among the most significant administrative reforms of the Socialist government under Mitterrand's presidency. His most formidable power base, however, was in the town hall at Marseille, where for 33 years he managed to hold off the challenge from the right and presided over the creation of a modern city, built up its social and cultural amenities, and tried to ameliorate the city's problems of finance, housing, and influx of emigrants from Algeria in 1962.

Defiance, city, seat (1845) of Defiance county, northwestern Ohio, U.S., where the Auglaize and Tiffin rivers meet the Maumee, 60 miles (97 km) southwest of Toledo. Laid out in 1822, Defiance became a market for the farm produce of the Maumee valley and developed industrially after the completion of the Miami and Erie Canal (1845). Manufactures now include screw machine products, hand tools, ferrous castings, and glass fibre. Defiance City Park marks the site of Fort Defiance, built in 1794 by General "Mad" Anthony Wayne for operations against the Indians. Fort Winchester Memorial Bridge (1936), which spans

the Auglaize, commemorates the fort built in 1812 by General William Henry Harrison (later U.S. president). The probable birthplace (*c.* 1720) of the Indian chief Pontiac is nearby on the north bank of the Maumee. John Chapman (Johnny Appleseed), the orchardist, established a nursery (1811) in Defiance. Defiance College (1850) is affiliated with the United Church of Christ. Inc. 1836. Pop. (1990) 16,768.

deficit financing, practice in which a government spends more money than it receives as revenue, the difference being made up by borrowing or minting new funds. Although budget deficits may occur for numerous reasons, the term usually refers to a conscious attempt to stimulate the economy by lowering tax rates or increasing government expenditures. The influence of government deficits upon a national economy may be very great. It is widely believed that a budget balanced over the span of a business cycle should replace the old ideal of an annually balanced budget. Some economists have abandoned the balanced budget concept entirely, considering it inadequate as a criterion of public policy.

Deficit financing, however, may also result from government inefficiency, reflecting widespread tax evasion or wasteful spending rather than the operation of a planned countercyclical policy.

Where capital markets are undeveloped, deficit financing may place the government in debt to foreign creditors. In addition, in many less-developed countries, budget surpluses may be desirable in themselves as a way of encouraging private saving.

definite proportions, law of, statement that every chemical compound contains fixed and constant proportions (by weight) of its constituent elements. Although many experimenters had long assumed the truth of the principle in general, the French chemist Joseph-Louis Proust first accumulated conclusive evidence for it in a series of researches on the composition of many substances, especially the oxides of iron (1797). Another French chemist, Claude Berthollet, who held for indefinite proportions, contested Proust's findings, but the Scottish chemist Thomas Thomson confirmed some of them and wrote in his article "Chemistry" in the *Supplement* to the *Encyclopædia Britannica* (1801) that Proust had definitely proved "metals are not capable of indefinite degrees of oxidation." The principle was then concretely formulated by the English chemist John Dalton in his chemical atomic theory (1808).

deflation, in geology, erosion of loose material from flat areas of dry, uncemented sediments such as those occurring in deserts, dry lake beds, floodplains, and glacial outwash plains. Clay and silt-sized particles are picked up by turbulent eddies in wind and may be carried for hundreds of kilometres; they later settle to form loess deposits. Local areas subjected to deflation may result in deflation hollows or blowouts. These may range from 3 m (10 feet) in diameter and less than a metre deep to several kilometres in diameter and several hundred metres in depth. The Big Hollow in Wyoming was formed by deflation and is 14.5 km (9 miles) long and 50 m (165 feet) deep. If an area is eroded down to the water table, further deflation is prevented unless the water table is also lowered by evaporation. Some oases in the Sahara were formed in this manner and may be below sea level. Dune deposits are formed on the leeward sides of the basins from which the sand was blown.

Defoe, Daniel (b. 1660, London, Eng.—d. April 24, 1731, London), English novelist, pamphleteer, and journalist, author of *Robinson Crusoe* (1719–22) and *Moll Flanders* (1722).

Early life. Defoe's father, James Foe, was a hard-working and fairly prosperous tallow chandler (perhaps also, later, a butcher), of Flemish descent. By his middle 30s, Daniel was calling himself "Defoe," probably reviving a variant of what may have been the original family name. As a Nonconformist, or Dissenter, Foe could not send his son to the University of Oxford or to Cambridge; he sent him instead to the excellent academy at Newington Green kept by the Reverend Charles Morton. There Defoe received an education in many ways better, and certainly broader, than any he would have had at an English university. Morton was an admirable teacher, later becoming first vice president of Harvard College; and the clarity, simplicity, and ease of his style of writing—together with the Bible, the works of John Bunyan, and the pulpit oratory of the day—may have helped to form Defoe's own literary style.



Defoe, engraving by M. Van der Gucht, after a portrait by J. Taverner, first half of the 18th century
By courtesy of the National Portrait Gallery, London

Although intended for the Presbyterian ministry, Defoe decided against this and by 1683 had set up as a merchant. He called trade his "beloved subject," and it was one of the abiding interests of his life. He dealt in many commodities, traveled widely at home and abroad, and became an acute and intelligent economic theorist, in many respects ahead of his time; but misfortune, in one form or another, dogged him continually. He wrote of himself:

> No man has tasted differing fortunes more,
> And thirteen times I have been rich and poor.

It was true enough. In 1692, after prospering for a while, Defoe went bankrupt for £17,000. Opinions differ as to the cause of his collapse: on his own admission, Defoe was apt to indulge in rash speculations and projects; he may not always have been completely scrupulous, and he later characterized himself as one of those tradesmen who had "done things which their own principles condemned, which they are not ashamed to blush for." But undoubtedly the main reason for his bankruptcy was the loss that he sustained in insuring ships during the war with France—he was one of 19 "merchants insurers" ruined in 1692. In this matter Defoe may have been incautious, but he was not dishonourable, and he dealt fairly with his creditors (some of whom pursued him savagely), paying off all but £5,000 within 10 years. He suffered further severe losses in 1703, when his prosperous brick-and-tile works near Tilbury failed during his imprisonment for political offenses, and he did not actively engage in trade after this time.

Soon after setting up in business, in 1684, Defoe married Mary Tuffley, the daughter of a well-to-do Dissenting merchant. Not much is known about her, and he mentions her little in his writings, but she seems to have been a loyal, capable, and devoted wife. She bore eight children, of whom six lived to maturity, and when Defoe died the couple had been married for 47 years.

Mature life and works. With Defoe's interest in trade went an interest in politics. The first of many political pamphlets by him appeared in 1683. When the Roman Catholic James II ascended the throne in 1685, Defoe—as a staunch Dissenter and with characteristic impetuosity—joined the ill-fated rebellion of the Duke of Monmouth, managing to escape after the disastrous Battle of Sedgemoor. Three years later James had fled to France, and Defoe rode to welcome the army of William of Orange—"*William,* the Glorious, Great, and Good, and Kind," as Defoe was to call him. Throughout William III's reign, Defoe supported him loyally, becoming his leading pamphleteer. In 1701, in reply to attacks on the "foreign" king, Defoe published his vigorous and witty poem *The True-Born Englishman,* an enormously popular work that is still very readable and relevant in its exposure of the fallacies of racial prejudice.

Foreign politics also engaged Defoe's attention. Since the Treaty of Rijswijk (1697), it had become increasingly probable that what would, in effect, be a European war would break out as soon as the childless king of Spain died. In 1701 five gentlemen of Kent presented a petition, demanding greater defense preparations, to the House of Commons (then Tory-controlled) and were illegally imprisoned. Next morning Defoe, "guarded with about 16 gentlemen of quality," presented the speaker, Robert Harley, with his famous document "Legion's Memorial," which reminded the Commons in outspoken terms that "Englishmen are no more to be slaves to Parliaments than to a King." It was effective: the Kentishmen were released, and Defoe was feted by the citizens of London. It had been a courageous gesture and one of which Defoe was ever afterward proud, but it undoubtedly branded him in Tory eyes as a dangerous man who must be brought down.

What did bring him down, only a year or so later, and consequently led to a new phase in his career, was a religious question—though it is difficult to separate religion from politics in this period. Both Dissenters and "Low Churchmen" were mainly Whigs, and the "highfliers"—the High-Church Tories—were determined to undermine this working alliance by stopping the practice of "occasional conformity" (by which Dissenters of flexible conscience could qualify for public office by occasionally taking the sacraments according to the established church). Pressure on the Dissenters increased when the Tories came to power, and violent attacks were made on them by such rabble-rousing extremists as Dr. Henry Sacheverell. In reply, Defoe wrote perhaps the most famous and skillful of all his pamphlets, "The Shortest-Way With The Dissenters" (1702). His method was ironic: to discredit the highfliers by writing as if from their viewpoint but reducing their arguments to absurdity. The pamphlet had a huge sale, but the irony blew up in Defoe's face: Dissenters and High Churchmen alike took it seriously, and—though for different reasons—were furious when the hoax was exposed. Defoe was prosecuted for seditious libel and was arrested in May 1703. The advertisement offering a reward for his capture gives the only extant personal description of Defoe—an unflattering one, which annoyed him considerably: "a middle-size spare man, about 40 years old, of a brown complexion, and dark-brown coloured hair, but wears a wig, a hooked nose, a sharp chin, grey eyes, and a large mole near his mouth." Defoe was advised to plead guilty and rely on the court's mercy, but he received harsh treatment, and, in addition to being

fined, was sentenced to stand three times in the pillory. It is likely that the prosecution was primarily political, an attempt to force him into betraying certain Whig leaders; but the attempt was evidently unsuccessful. Although miserably apprehensive of his punishment, Defoe had spirit enough, while awaiting his ordeal, to write the audacious "Hymn To The Pillory" (1703); and this helped to turn the occasion into something of a triumph, with the pillory garlanded, the mob drinking his health, and the poem on sale in the streets.

Triumph or not, Defoe was led back to Newgate, and there he remained while his Tilbury business collapsed and he became ever more desperately concerned for the welfare of his already numerous family. He appealed to Robert Harley, who, after many delays, finally secured his release—Harley's part of the bargain being to obtain Defoe's services as a pamphleteer and intelligence agent.

Defoe certainly served his masters with zeal and energy, traveling extensively, writing reports, minutes of advice, and pamphlets. He paid several visits to Scotland, especially at the time of the Act of Union in 1707, keeping Harley closely in touch with public opinion. These trips bore fruit in a different way two decades later: in 1724–26 the three volumes of Defoe's admirable and informative *Tour Through the Whole Island of Great Britain* were published, in preparing which he drew on many of his earlier observations.

Perhaps Defoe's most remarkable achievement during Queen Anne's reign, however, was his periodical, the *Review*. He wrote this serious, forceful, and long-lived paper practically single-handedly from 1704 to 1713. At first a weekly, it became a thrice-weekly publication in 1705, and Defoe continued to produce it even when, for short periods in 1713, his political enemies managed to have him imprisoned again on various pretexts. It was, effectively, the main government organ, its political line corresponding with that of the moderate Tories (though Defoe sometimes took an independent stand); but, in addition to politics as such, Defoe discussed current affairs in general, religion, trade, manners, morals, and so on, and his work undoubtedly had a considerable influence on the development of later essay periodicals (such as Richard Steele and Joseph Addison's *The Tatler* and *The Spectator*) and of the newspaper press.

Later life and works. With George I's accession (1714), the Tories fell. The Whigs in their turn recognized Defoe's value, and he continued to write for the government of the day and to carry out intelligence work. At about this time, too (perhaps prompted by a severe illness), he wrote the best known and most popular of his many didactic works, *The Family Instructor* (1715). Not all the writings so far mentioned, however, would have procured literary immortality for Defoe; this he achieved when in 1719 he turned his talents to an extended work of prose fiction and (drawing partly on the memoirs of voyagers and castaways such as Alexander Selkirk) produced *Robinson Crusoe*. A German critic has called it a "world-book," a label justified not only by the enormous number of translations, imitations, and adaptations that have appeared but by the almost mythic power with which Defoe creates a hero and a situation with which every reader can in some sense identify himself.

Here (as in his works of the remarkable year 1722, which saw the publication of *Moll Flanders, A Journal of the Plague Year,* and *Colonel Jack*) Defoe displays his finest gift as a novelist—his insight into human nature. The men and women he writes about are all, it is true, placed in unusual circumstances; they are all, in one sense or another, solitaries; they all struggle, in their different ways, through a life that is a constant scene of jungle warfare; they all become, to some extent, obsessive. They are also ordinary human beings, however, and Defoe, writing always in the first person, enters into their minds and analyzes their motives. His novels are given verisimilitude by their matter-of-fact style and their vivid concreteness of detail; the latter may seem unselective, but it effectively helps to evoke a particular, circumscribed world. Their main defects are shapelessness, an overinsistent moralizing, occasional gaucheness, and naiveté. Defoe's range is narrow, but within that range he is a novelist of considerable power, and his plain, direct style, as in almost all of his writing, holds the reader's interest.

In 1724 he published his last major work of fiction, *Roxana,* though in the closing years of his life, despite failing health, he remained active and enterprising as a writer.

Assessment. A man of many talents and author of an extraordinary range and number of works, Defoe remains in many ways an enigmatic figure. A man who made many enemies, he has been accused of double-dealing, of dishonest or equivocal conduct, of venality. Certainly in politics he served in turn both Tory and Whig; he acted as a secret agent for the Tories and later served the Whigs by "infiltrating" extremist Tory journals and toning them down. But Defoe always claimed that the end justified the means, and a more sympathetic view may see him as what he always professed to be, an unswerving champion of moderation. At the age of 59 Defoe embarked on what was virtually a new career, producing in *Robinson Crusoe* the first of a remarkable series of novels and other fictional writings that resulted in his being called the father of the English novel.

Defoe's last years were clouded by legal controversies over allegedly unpaid bonds dating back a generation, and it is thought that he died in hiding from his creditors. His character Moll Flanders, born in Newgate Prison, speaks of poverty as "a frightful spectre," and it is a theme of many of his books.

(R.P.C.M./Ed.)

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defoliant, a chemical dust or spray applied to plants to cause their leaves to drop off prematurely. Defoliants sometimes are applied to crop plants such as cotton in order to facilitate harvesting. They are also used in warfare to eliminate enemy food crops and potential areas of concealment by enemy forces. Defoliants were employed for these purposes by South Vietnamese and U.S. forces in the Vietnam War; among the more controversial of these substances was the chemical compound known as Agent Orange (*q.v.*).

deforcement, in English property law, wrongful taking and possession of land belonging to another. Deforcement had its primary legal significance in feudal England. Deforcement arose particularly in cases in which land possessed by a tenant escheated (was forfeited) to his lord (either for reason of the tenant's wrongful act against the manor or for nonpayment of rent due the lord), in which the occurrence of some other event carried the penalty of forfeiture of the tenant's land to his lord, and in which the tenant or some other person wrongfully withheld possession of the land from the lord.

As a general concept, deforcement included the more specific act of disseisin (*see* adverse possession). It also included ouster, the act by a stranger of forcing a lawful heir from his inherited land. Unlike disseisin and ouster, however, deforcement did not require that the person against whom the land was wrongfully withheld once had possession of the land. Thus, deforcement also embraced the acts of intrusion and abatement, the wrongful entry and occupation by a stranger of vacant land belonging to another.

The term deforcement has waned in legal significance in modern times, having been replaced in usage by more specific terminology such as adverse possession.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

DeForest, John William (b. May 31, 1826, Humphreysville, Conn., U.S.—d. July 17, 1906, New Haven, Conn.), American writer of realistic fiction, author of a major novel of the American Civil War—*Miss Ravenel's Conversion from Secession to Loyalty* (1867).

The son of a prosperous cotton manufacturer, DeForest did not go to college, owing to poor health, but traveled (1848–49) in the Middle East. He returned home to write a scholarly *History of the Indians in Connecticut* (1851) before setting out for Europe, where he lived from 1851 to 1854, reading widely in continental literature, particularly French. Two travel books came out of these experiences abroad: *Oriental Acquaintance* (1856) and *European Acquaintance* (1858).

When the American Civil War broke out, DeForest organized a company of New Haven volunteers and served as captain in the Federal campaigns in Louisiana and the Shenandoah valley. When the war was over, he was district commander of the Freedmen's Bureau in Greenville, S.C. (1866–67). His experiences in war and its aftermath, which he wrote about in detailed letters to his wife and in magazine articles, were published posthumously as *A Volunteer's Adventures* (1946) and *A Union Officer in the Reconstruction* (1948).

Two years after publication of *Miss Ravenel's Conversion,* he wrote a highly significant article, "The Great American Novel" (*The Nation,* Jan. 9, 1869), in which he called for a full-bodied realism in American fiction but said it was hard to achieve because American society was changing too rapidly to be comprehended as a whole.

His experiences in South Carolina were the basis of two novels: *Kate Beaumont* (1872),

which depicts the social life of the state before the war; and *The Bloody Chasm* (1881), after the war. Two other novels deal with corruption in Washington, D.C., during the administration of President Ulysses S. Grant: *Honest John Vane* (1875) and *Playing the Mischief* (1875). His last novel, *A Lover's Revolt* (1898), is a romance of the American Revolution.

deformation and flow, in physics, alteration in shape or size of a body under the influence of mechanical forces. Flow is a change in deformation that continues as long as the force is applied.

A brief treatment of deformation and flow follows. For full treatment, *see* MACROPAEDIA: Mechanics.

Everyday substances are ordinarily classed as either solids, liquids, or gases, and, under normal circumstances, gases and liquids flow relatively freely and solids deform when they are subjected to forces. Most solids initially deform elastically; that is to say, they return to their original shape when the load is removed. Rigid materials such as metals, concrete, or rocks sustain large forces while undergoing little deformation, but if sufficiently large forces are applied, the materials can no longer sustain them by elastic deformation alone. What happens then depends upon the internal structure of the material. As greater and greater force is applied to a brittle substance, such as a block of rock or concrete, a point will be reached at which the internal structure can no longer sustain the applied load by elastic deformation alone. Thereupon, the specimen will quite suddenly fracture. This behaviour is characteristic of brittle materials: the transition from an integral specimen to a broken one occurs almost instantaneously and with little or no warning.

For a ductile material, such as mild steel or aluminum, after the initial period of elastic deformation, the same critical point—the specimen's limit of elastic deformability—is reached. In this case, however, the material, instead of fracturing, accommodates itself to the applied forces by rearranging its internal structure. The result is plastic deformation, which will continue as long as the forces are applied. The material gives the impression of flowing under the applied loads, and this flow is plastic, since, if the load is removed, the specimen retains its deformation. Eventually, plastic flow will come to an end: deformation will ultimately tend to concentrate in one area, which will break.

This ability of ductile materials to flow plastically under load is fundamental to their usefulness in engineering. As a consequence, an understanding of plastic flow is vital in technology, particularly in the production of large numbers of objects in a variety of complex shapes. Plastic flow is also a central factor in the attempts to understand the movement and flow of rocks under conditions of high temperature and pressure that make them behave like ductile materials. Such processes have shaped the surface of the Earth, although the time scale (millions of years) is quite different from that of ordinary interest to engineers.

The simple classification of materials as solids, liquids, or gases can now, on the basis of correlating submicroscopic structure with mechanical properties, be expanded into a more sophisticated set of structural types, as follows:

Gases have randomly moving molecules that do not attract one another, whose velocity is dependent upon the gas temperature, and that collide as if they were elastic spheres of negligible volume. These assumptions are the basis of the kinetic theory of gases, which predicts that the product of the pressure and the volume, divided by the absolute temperature, is a constant. Most gases conform quite well to this relationship over a remarkably wide range of conditions.

Liquids have molecules that are in contact but are capable of sliding over one another effortlessly. No shear stresses can exist in such a "perfect fluid." (Shear stresses involve the energy dissipated as adjacent planes of molecules slide across one another, as in the action of a card player spreading a pack of cards across a table.) Water, the most common liquid of all, has properties quite close to those of a perfect fluid.

Viscous liquids consist of molecules that, like those of the perfect fluid, are in contact with one another but do exert forces on one another so that shearing motions within the liquid are resisted. These internal shearing forces produce the characteristic behaviour of liquids such as treacle, heavy oils, or molten plastics. This characteristic motion, known as shearing flow, is an energy-dissipative process. For comparison, the viscosity of glycerine (a viscous fluid) at room temperature is 15 poise (the unit of viscosity), compared with 0.01 for water and 1.8×10^{-4} for air.

Linearly elastic solids have molecules envisaged as being locked together by spring-like elastic forces. For small deformations, a graph of deformation as a function of the applied load is a straight line. This type of deformation is an energy-storing process, as exemplified by the compression of a spring. Under greater deformation, such elastic solids exhibit either brittleness (in which the internal elastic forces are broken down) or ductility (in which certain internal mechanisms permit shearing displacements to occur within the atomic structure). For materials with a crystalline structure, these shearing displacements are usually associated with defects within the crystal lattice. Such defects are called dislocations, and they give a crystalline structure the ability to sustain plastic deformations without fracturing. In materials science, a study of the role of dislocations in plastic flow constitutes a major research activity.

Viscoelastic solids have molecules in which the load-deformation relationship is time-dependent. If a load is suddenly applied to such a material and then kept constant, the resulting deformation is not achieved immediately. Rather, the solid gradually deforms and attains its steady-state deformation only after a significant period of time. This behaviour is called creep. Conversely, the sudden application of a fixed deformation to such a material produces initial stresses that can be very large; these stresses then slowly relax to a steady-state value as the material accommodates itself to the applied deformation. Such a procedure is known as a stress-relaxation test. The physical reasons for this behaviour are too complex to be explained by any simple molecular model. Such behaviour is characteristic of glass, rubber, many plastics, and some metals.

Plastic solids are materials, such as lead, in which the extent of elastic behaviour is either minute or nonexistent. In such materials, any deformation induced is permanent.

The above categories cover the behaviour of most engineering and naturally occurring materials, although it may sometimes be difficult to place a given substance in any one category. Alternatively, a material may be allocated to one category at room temperature and to another at higher temperatures. Time scales are also relevant to the categorization of materials. For example, rocks, which may be effectively characterized as elastic solids for normal engineering purposes, would have to be reclassified as viscoelastic solids in geologic studies in which the time scale may be millions of years.

Finally, there are a growing number of very odd, synthetic substances exhibiting extraordinary properties that do not accord with any of the categories described above.

Degas, (Hilaire-Germain-) Edgar (b. July 19, 1834, Paris, Fr.—d. Sept. 27, 1917, Paris), French artist, acknowledged as the master of drawing the human figure in motion. Degas worked in many mediums, preferring pastel to all others. He is perhaps best known for his paintings, drawings, and bronzes of ballerinas and of race horses.



Degas, self-portrait, oil on paper applied to canvas, *c.* 1857–58; in the Sterling and Francine Clark Art Institute, Williamstown, Mass.

Sterling and Francine Clark Art Institute, Williamstown, Mass.

Degas came of the powerful upper bourgeoisie, his family having banking and business connections both in Italy and in the United States, and he was intended for the law, which he studied for a time after leaving the Lycée Louis-le-Grand. In 1855, however, he enrolled at the École des Beaux-Arts and entered the studio of Louis Lamothe, a pupil of the painter Jean-Auguste-Dominique Ingres, whose long-established position as defender of academic orthodoxy in draftsmanship and subject matter was being challenged by the realism of Gustave Courbet as well as by the romanticism of Eugène Delacroix.

It seems likely that as a young man Degas wished to succeed along orthodox lines as a painter of historical subjects in the grand French tradition. To further his aim he augmented his studies by visiting Florence, Assisi, Rome, and Naples and by closely observing and copying the works of Andrea Mantegna, Sandro Botticelli, Hans Holbein the Younger, and Nicolas Poussin, all notable for their scrupulousness in figure draftsmanship. Before 1860 Degas had produced some splendid family portraits in which the effect of this discipline, though clear, is heightened by a taut, alert urbanity that belongs unmistakably to the mid-19th century. The "Portrait of the Duchess of Morbilli" is typical of this group. It is broadly designed with large, simple surfaces rather flatly modeled in the manner of Ingres; the paint is solid, yet delicate, and the colours cool and restrained, with many black and neutral passages. In 1860 Degas made his debut as a painter of classical subjects with his "Young Spartans Exercising"; but here the nude figures, though arranged in balanced groups, are those of real adolescents in a natural landscape instead of idealized nudes in an Arcadian setting.

After 1861, when Degas painted "Semiramis Founding Babylon," again with academic intentions, he seems to have abandoned historical painting and begun to seek his subject matter in the fast-moving city life of Paris. In this he was probably inspired by contemporaries like Courbet and Édouard Manet (whom he met in 1862), by contemporary novelists, and by the discovery, late in the 1850s, of the astonishing formal yet documentary quality of Japanese graphic art. Nor did he overlook the brilliant work of contemporary French graphic artists such as Paul Gavarni and Honoré Daumier. It is not surprising that by 1862

he was painting the riders, their mounts, and the smart spectators at Longchamp racecourse, soon afterward beginning the portrait groups of musicians and stage subjects, which, like all subjects in which the sitters were absorbed in practiced movement, fascinated him throughout his life. Among the first of the latter is the "Mlle Fiocre in the Ballet 'La Source'." His portraits of the 1870s show greater ease and naturalism than the very first group but are still based on a discipline traceable to Holbein and the great north Italian portraitists.

Degas served in the artillery during the Franco-German War of 1870–71. On his return, he began to undertake ambitious figure groups, seen informally and in movement, and continued his studies of stage and orchestral groups. From these he passed to instantaneous renderings of both outdoor and indoor scenes, using displaced figure grouping and unorthodox cutting and perspective rather in the manner of a cameraman. Yet his magnificent formal sense and skill is always present to provide an equilibrium, however momentary, to these exacting subjects. The "Place de la Concorde (Vicomte Lepic and His Daughters)" is a fine example and an outdoor counterpart to the ballet subjects that gave Degas endless scope for multifigure groups seen in fast intercepted movement. Degas visited the United States in October 1872, staying for five months and painting one of his best-known scenes of figures in absorbed "occupational" movement. This was the "New Orleans Cotton Office" of 1873; it shows that although Degas had completely abandoned his early ambition of historical figure painting, he had, nevertheless, put to full use the structural principles of the formal tradition.

During the 1870s, most of Degas's figure groups were arranged against fairly extended background space, in which the figures themselves were given plenty of room. By the end of the decade, however, he was becoming interested in the pictorial possibilities of more closely juxtaposed and superimposed groups and giving more attention to the formal qualities of the voids between them. The famous "Repasseuses" ("Two Laundresses") of 1884 shows this tendency at an advanced stage, with an artificially shallow picture space and a reconciliation of solid form and surface reminiscent of Venetian mid-16th-century art in method but here applied with a documentary eye to a casual workaday subject. By this time Degas had begun to work in pastel, sometimes using a mixed technique with volatile oil mediums, and his indoor series of women at their ablutions carries on the researches mentioned above. Some of the later ones reach an astonishing compromise between plasticity and surface pattern, the flesh colours being built up of strips of pure colour more closely knit than the *taches* of the Impressionists but, like them, merging at a certain distance to give the illusion of solid modeling.

After 1880 Degas was practicing occasionally as a sculptor, and a group of small bronzes deriving from his models of dancers, bathing women, and horses again show his power of revealing the potentialities of the ordinary unobserved movements of human beings and animals. Degas, in fact, perhaps for the first time in history, viewed his animal and human models with the same dispassionate eye when making these studies. He was interested in photography, and there is an affinity between his vision and that of a high-speed camera. Degas's eyesight failed in later life; he became completely blind in one eye and nearly so in the other. At his death he left an important collection of the drawings and paintings of his contemporaries and a notebook of poetic compositions, mostly in sonnet form.

(D.C.Th.)

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Degema, town and river port, Rivers state, southern Nigeria, on the Sambreiro River (an outlet of the Niger). A traditional market centre (fish, cassava, taro, palm produce, plantains, and yams) of the Ijaw people, it became a major exporter of palm oil and kernels after the decline of the slave trade in the early 19th century. The Degema-Abonnema port (boats now anchor near the palm-oil plant at Abonnema downstream) has been eclipsed by the success of Port Harcourt, 17 miles (27 km) east; but vessels of 16-foot (5-metre) draft still navigate the 42 miles (68 km) to the port from Bonny via the Boler Creek, the New Calabar River, and Kra-kra Creek.

Degema is located in an area of swamps and mangrove and tropical rain forests; its many rivers led to the growth of several fishing and oil-palm ports: Abonnema, Bonny, Buguma, Degema, and Okrika. Both Bonny and Okrika have grown in significance with the exploitation of oil and natural gas in the Niger delta. Degema is served by a general hospital. Pop. (1971 est.) 8,693.

Degenerate Art, German ENTARTETE KUNST, propagandistically designed Nazi exhibition of modern art held in Munich in 1937 and advertised as "culture documents of the decadent work of Bolsheviks and Jews." The works on exhibit included only a small segment of the almost 20,000 works of modern art confiscated from German museums on the orders of Joseph Goebbels, the minister of propaganda.

So-called degenerate works by Pablo Picasso, Wassily Kandinsky, Ernst Ludwig Kirchner, Emile Nolde, and other major artists of the 20th century were juxtaposed with paintings by psychotic patients and were subjected to vicious ridicule by the press and the German people. This exhibit was designed to contrast with a simultaneous exhibition of art approved by the leading Nazis, made up of works executed in an academic style and dealing with typical Nazi themes of heroism and duty.

degenerate gas, in physics, a particular configuration, usually reached at high densities, of a gas composed of subatomic particles with half-integral intrinsic angular momentum (spin). Such particles are called fermions, because their microscopic behaviour is regulated by a set of quantum mechanical rules—Fermi-Dirac statistics (*q.v.*). These rules state, in particular, that there can be only one fermion occupying each quantum-mechanical state of a system. As particle density is increased, the additional fermions are forced to occupy states of higher and higher energy, because the lower-energy states have all been progressively filled. This process of gradually filling in the higher-energy states increases the pressure of the fermion gas, termed degeneracy pressure. A fermion gas in which all the energy states below a critical value (designated Fermi energy) are filled is called a fully degenerate, or zero-temperature, fermion gas. Such particles as electrons, protons, neutrons, and neutrinos are all fermions and obey Fermi-Dirac statistics. The electron gas in ordinary metals and in the interior of white dwarf stars constitute two examples of a degenerate electron gas.

Deggendorf, city, Bavaria *Land* (state), southeastern Germany, on the Danube River, 2.5 miles (4 km) above its confluence with the Isar River. It lies at the western foot of the Bavarian and Bohemian forests, east of Straubing. Founded about 750, it passed to the dukes of Bavaria in 1242 and was chartered in 1316. The river and the forested mountains form a picturesque setting for the city, which retains its medieval pattern and parts of its fortifications. Notable buildings are the town hall (1335), the Baroque parish church, and the Heilige Grab Church (1337), built in atonement for a violation of the consecrated Host and the scene of an annual pilgrimage. The history museum has notable archaeological displays. The nearby Benedictine abbeys of Metten and Niederalteich are known for their book and art collections. Deggendorf is a market centre with textile and metalworking industries,



"Waiting: Dancer and Woman with Umbrella on a Bench (L'Attente)," pastel on paper by Degas, *c.* 1882; jointly owned by the Norton Simon Art Foundation and the J. Paul Getty Museum, Malibu, Calif. (48.2 × 61 cm)

Norton Simon Art Foundation and the J. Paul Getty Museum

breweries, and a shipyard. Pop. (1992 est.) 30,445.

degree, also called ACADEMIC DEGREE, in education, any of several titles conferred by colleges and universities to indicate the completion of a course of study or the extent of academic achievement.

The hierarchy of degrees dates back to the universities of 13th-century Europe, which had faculties organized into guilds. Members of the faculties were licensed to teach, and degrees were in effect the professional certifications that they had attained the guild status of a "master." There was originally only one degree in European higher education, that of master or doctor. The baccalaureate, or bachelor's degree, was originally simply a stage toward mastership and was awarded to a candidate who had studied the prescribed texts in the trivium (grammar, rhetoric, and logic) for three or four years and had successfully passed examinations held by his masters. The holder of the bachelor's degree had thus completed the first stage of academic life and was enabled to proceed with a course of study for the degree of master or doctor. After completing those studies, he was examined by the chancellor's board and by the faculty and, if successful, received a master's or doctor's degree, which admitted him into the teachers' guild and was a certificate of fitness to teach at any university.

The terms master, doctor, and professor were all equivalent. The degree of doctor of civil law was first awarded at the University of Bologna in the second half of the 12th century, and similar degrees came to be awarded in canon law, medicine, grammar, logic, and philosophy. At the University of Paris, however, the term "master" was more commonly used, and the English universities of Oxford and Cambridge adopted the Parisian system. In many universities, the certified scholar in the faculties of arts or grammar was called a master, whereas in the faculties of philosophy, theology, medicine, and law he was called a doctor. Perhaps because it was necessary to become a master of arts before proceeding to the other studies, the doctorate came to be esteemed as the higher title. (The common Anglo-American degrees "master of arts" and "doctor of philosophy" stem from this usage.) In German universities, the titles master and doctor were also at first interchangeable, but the term doctor soon came to be applied to advanced degrees in all faculties, and the German usage was eventually adopted throughout the world.

In the United States and Great Britain, the modern gradation of academic degrees is usually bachelor (or baccalaureate), master, and doctor. The bachelor's degree marks the completion of undergraduate study, usually amounting to four years. The master's degree involves one to two years' additional study, while the doctorate usually involves a lengthier period of work. British and American universities customarily grant the bachelor's as the first degree in arts or sciences. After one or two more years of coursework, the second degree, M.A. or M.S., may be obtained by examination or the completion of a piece of research. At the universities of Oxford and Cambridge, holders of a B.A. can receive an M.A. six or seven years after entering the university simply by paying certain fees. The degree of doctor of philosophy (Ph.D.) is usually offered by all universities that admit advanced students and is granted after prolonged study and either examination or original research. A relatively new degree in the United States is that of associate, which is awarded by junior or community colleges after a two-year course of study; it has a relatively low status.

Some common academic degrees

B.A., or A.B.	Bachelor of Arts
B.Acct.	Bachelor of Accounting
B.Agri.	Bachelor of Agriculture
B.Comm.	Bachelor of Commerce
B.E., or B.Ed.	Bachelor of Education
B.F.A.	Bachelor of Fine Arts
B.L.S.	Bachelor of Library Science
B.S.	Bachelor of Science
M.A., or A.M.	Master of Arts
M.B.A.	Master of Business Administration
M.L.S.	Master of Library Science
M.S.	Master of Science
D.D.S.	Doctor of Dental Science
J.D.	Doctor of Jurisprudence
M.D.	Doctor of Medicine
Ph.D.	Doctor of Philosophy

The rapid expansion of specialization produced a growing variety of specific academic degrees in American, British, and other English-speaking higher education systems in the 20th century. More than 1,500 different degrees are now awarded in the United States, for example, with the largest number in science, technology, engineering, medicine, and education. The commonest degrees, however, are still the B.A. and the B.S., to which the signature of a special field may be added (*e.g.,* B.S.Pharm., or Bachelor of Science in Pharmacy). These special fields have their corresponding designations at the graduate levels. *See* table for some common Anglo-American degrees.

With some exceptions, intermediate degrees, such as those of bachelor and master, have been abandoned in the universities of continental Europe. In the second half of the 20th century, the French degree system was undergoing change as part of a major university reform. The *baccalauréat* is conferred upon French students who have successfully completed secondary studies and admits the student to the university. Students who obtain the *licence,* which is awarded after three or four years of university study, are qualified to teach in secondary schools or to go on to higher-level studies. Currently, *maîtrise* (master's) degrees are also being awarded. *Maîtrise* holders who pass a competitive examination receive a certification known as the *agrégation* and are permitted to teach university undergraduates. *Doctorats* are awarded in both arts and sciences.

In Germany the doctorate is the only degree granted, but there is a tendency to add signatures such as Dr.rer.nat. (*Doktor rerum naturalium*) in natural sciences and Dr.Ing. (Doktor-Ingenieur) in engineering. For students who do not wish to meet the doctoral requirements, diploma examinations are offered.

In Russia diplomas are awarded on completion of a four- or five-year university course. The candidate of science (*kandidat nauk*) degree is awarded after several years of practical and academic work and completion of a thesis and is comparable to the American Ph.D. Doctor of science (*doktor nauk*) degrees are awarded only by a special national commission, in recognition of original and important research.

In Japan the usual degrees are the *gakushi* (bachelor), granted after four years of study, and *hakushi* (doctor), requiring from two to five years of additional study. A master's degree (*shushi*) may also be granted.

In addition to earned degrees, universities and colleges award honorary degrees, such as L.H.D. (Doctor of Humanities), Litt.D. (Doctor of Literature), and D.C.L. (Doctor of Civil Law), as a recognition of distinction without regard to academic attainment.

degree of freedom (mathematics): *see* freedom, degree of.

Degrelle, Léon (b. June 15, 1906, Bouillon, Belg.—d. March 31, 1994, Málaga, Spain), founder and leader of the Rexist Party of Belgium, who collaborated with the Germans during World War II.

After failing three times to pass his final law exams at the University of Louvain, Degrelle, who was a dynamic orator, entered politics. Using banking scandals and the corruption of national parties as issues, he organized the Rexist Movement in 1930, allegedly to cleanse the Roman Catholic religion of political contamination. Though originally a wing of the ruling Catholic Party, the Rexist Movement became an opposition party and, under Degrelle's guidance, elected 21 deputies to the Belgian Parliament in 1936. Subsidized by the Italian dictator Benito Mussolini, Degrelle turned the Rexists into a fascist organization. In alliance with the 16 deputies of the separatist Flemish Nationalist Party, the Rexists forced the formation of weak coalition governments in the late 1930s.

During World War II Degrelle collaborated with the German occupation forces. In August 1941 he formed and later commanded the Walloon and Flemish storm-trooper brigades that fought on the Russian front. Under his guidance the Rexists took control of local governments and newspapers in Belgium. After Belgium was liberated (September 1944) he was sentenced in absentia to death as a collaborator. Degrelle flew to Spain in the last days of the war after fighting the Soviet advance into eastern Germany. In Spain he was protected by Francisco Franco and became a Spanish citizen.

degu (species *Octodon degus*), the sole diurnal rodent in the family Octodontidae (order Rodentia), found in the grasslands of Peru and Chile. The degu is about 23 to 36 cm (10 to 13 inches) long, including the black-tipped tail, and weighs from 170 to 300 g (6 to 10.5 ounces). Its brownish gray fur is tinted with orange, and a pale yellow spot surrounds its eye. Degus construct and share complex burrow systems; several females may raise their precocial young in one nest. The degu is often an agricultural pest.

Dehiwala–Mount Lavinia, urban area on the southwestern coast of Sri Lanka (Ceylon). The area lies south of Colombo, of which it is a residential suburb. It comprises Dehiwala, Galkissa, Mount Lavinia, and other communities, all governed by a single urban council. Mount Lavinia is a seaside resort known for its beaches, and Dehiwala is noted for its zoological garden. The area grew rapidly in the mid-20th century. Pop. (1990 est.) 196,000.

Dehmel, Richard (b. Nov. 18, 1863, Wendisch-Hermsdorf, Brandenburg, Prussia [Germany]—d. Feb. 8, 1920, Blankenese, near Hamburg), German poet who exerted a major influence on young writers through his innovations in form and content.

After completing his studies in 1887, Dehmel worked as an insurance official and then, in



Dehmel
Bavaria-Verlag

1895, became a freelance writer. He chose naturalistic social themes for his early works and was one of the first major poets to write about the misery of the working classes. Influenced by Friedrich Nietzsche, he extolled individualism and a life of uninhibited instincts and passion, but at the same time he felt drawn to self-sacrifice and the search for harmonious ethical ideas. This conflict shaped both his tempestuous personal life and the content and style of his work. The latter is characterized by passionate and vigorous expression and by an ecstatic rhetoric that can be sensitive at its finest and sensational at its worst. In his first collection of poems, *Erlösungen* (1891; "Redemptions"), the conflict is expressed in the opposition of unbridled sensuality and ascetic self-discipline. Dehmel found a resolution of the conflict through his belief in the mystical power of love and sex. He came to view the sensual relations between a man and a woman as the basis for a full development of the human personality and for a higher spiritual life. This is the theme of his cyclical epic poem, *Zwei Menschen* (1903; "Two People"). His treatment of sexual themes was not only passionate but, for the times, shockingly frank.

Dehmel volunteered for service in World War I. His immediate disillusionment, however, was expressed in his last work, a war diary, *Zwischen Volk und Menschheit* (1919; "Between People and Humanity"). His other major works were *Weib und Welt* (1896; "Woman and World"), *Die Verwandlungen der Venus* (1907; "The Transformations of Venus"), and *Schöne wilde Welt* (1913; "Beautiful, Wild World").

Dehmelt, Hans Georg (b. Sept. 9, 1922, Görlitz, Ger.), German-born American physicist who shared one-half of the Nobel Prize for Physics in 1989 with the German physicist Wolfgang Paul. (The other half of the prize was awarded to the American physicist Norman F. Ramsey.) Dehmelt received his share of the prize for his development of the Penning trap, an electromagnetic device that can hold small numbers of ions (electrically charged atoms) and electrons for periods of time long enough to allow their properties to be studied with unprecedented accuracy.

Dehmelt served in the German army from 1940 until he was captured by U.S. forces in 1945. Having studied physics during the war under an army technical program, he resumed his studies thereafter at the University of Göttingen, graduating with a doctoral degree in physics in 1950. He went to the United States in 1952 and began teaching at the University of Washington in 1955. He became a full professor there in 1961, the year in which he also became a U.S. citizen.

Dehmelt's Penning trap, which he developed in 1955, can confine electrons and ions in a small space for long periods of time in relative isolation. In 1973 Dehmelt used his device to isolate a single electron for observation, an unprecedented feat that opened the way for the precise measurement of key properties of electrons. Dehmelt and his colleagues went on to develop methods for measuring atomic frequencies and individual quantum jumps—the transitions between atomic energy levels—with unprecedented precision. In the 1970s Dehmelt used his trap to measure an electron's magnetic moment to an accuracy of four parts in a trillion, the most precise measurement of that quantity at the time.

Dehon, Léon-Gustave, byname JOHN OF THE HEART OF JESUS, French JEAN DU COEUR DE JÉSUS (b. March 14, 1843, La Capelle-en-Thiérache, France—d. Aug. 12, 1925, Brussels, Belg.), French Roman Catholic priest who founded the Congregation of the Priests of the Sacred Heart of Jesus, a congregation of priests and brothers dedicated to spreading the apostolate of the Sacred Heart.

Educated at the Sorbonne, Dehon was ordained priest in 1868 at Rome. After attending the first Vatican Council (1869–70), he returned to France, where, at Saint-Quentin, he became curate (1871). Thereafter, he engaged in social work until 1877, when he founded his diocesan congregation as the Oblates of the Sacred Heart.

Dehon's congregation was recognized in 1883, under its present name, by Pope Leo XIII. In 1886 Dehon was elected the congregation's first superior general, an office he held for life. In 1906 Dehon transferred his congregation's motherhouse to Brussels. Pope Benedict XV gave the Priests of the Sacred Heart their final approbation in 1923. The congregation spread to five continents and to several states in the United States.

Dehra Dūn, city, northwestern Uttar Pradesh state, northern India. It lies in the Himalayan foothills, at an elevation of 2,200 feet (670 m). Dehra Dūn was founded in 1699, when the heretical Sikh Gurū Rām Rāi, driven out of the Punjab, built a temple there. During the 18th century, the area succumbed to successive invaders, the last of whom were the Gurkhas. When the Gurkha War ended in 1816, the area was ceded to the British. Dehra Dūn is now a hill resort and the terminus of a road and a rail line from the south. Tea processing is the main industry. Dehra Dūn is also the headquarters of the Survey of India and of the forest department; it houses the Forest Research Institute, the Archaeological Survey Laboratory, and several military academies. The city also has colleges and museums. A few miles northeast is a sulphur spring used for bathing.

In the surrounding area peaks rise to 8,000 feet (2,500 m). The section called the Dūn is a valley between the Himalayan foothills and the Siwālik Range. Rice, wheat, millet, tea, and other crops are grown; and the locality produces valuable timber. Mussoorie, a hill station north of Dehra Dūn city, is a popular summer resort; and Rishikesh is an important pilgrimage centre. Pop. (1991 prelim.) city, 270,028; metropolitan area, 367,411.

Dehri, city, western Bihār state, northeastern India, west of the Son River. It has major road and rail connections and houses railway workshops. Dehri is the headworks of the Son canal system and the site of a hydroelectric dam. Its industries include sugar production, sawmilling, ghee processing, and varied manufactures. Nearby, on the Son, lies the ancient Rohtās fortress. Pop. (1991 prelim.) 94,526.

dehydration, the loss of water from the body; it is almost invariably associated with some loss of salt (sodium chloride) as well. The treatment of any form of dehydration, therefore, requires not only the replacement of the water lost from the body but also the restoration of the normal concentration of salt within the body fluid.

Dehydration may be caused by restriction of water intake or by excessive water loss. The commonest cause of dehydration is failure to drink liquids. The deprivation of water is far more serious than the deprivation of food. The average person loses approximately 2.5 percent of total body water per day (about 1,200 millilitres [1.25 quarts]) in urine, in expired air, by insensible perspiration, and from the gastrointestinal tract. If, in addition to this loss, the loss through perspiration is greatly increased—as is demonstrated in the case of the shipwrecked sailor in tropical seas or the traveler lost in the desert—within only a few hours the dehydration may result in shock and death. When swallowing is difficult in extremely ill persons, or when people cannot respond to a sense of thirst because of age or illness or dulling of consciousness, the failure to compensate for the daily loss of body water will rapidly result in dehydration and its consequences.

In vomiting or diarrhea large volumes of water may be lost from the body, always with an associated loss of electrolytes (*e.g.*, sodium, potassium). The exact nature of the resultant electrolyte deficit will depend in part on the site of the lesion causing symptoms and in part on whether the ill person is receiving other fluids. In uncomplicated, untreated vomiting or diarrhea, the dehydration that results is ordinarily a balanced loss of electrolytes (salt) and water.

The symptoms of dehydration depend in part on the cause and in part on whether there is associated salt deprivation as well. When loss of water is disproportionately greater than loss of electrolytes, the osmotic pressure of the extracellular fluids becomes higher than in the cells. Since water passes from a region of lower to a region of higher osmotic pressure, water flows out of the cells into the extracellular fluid, tending to lower its osmotic pressure and increase its volume toward normal. As a result of the flow of water out of the cells, they become dehydrated. This results in the thirst that always accompanies "pure" water depletion.

In those diseases in which there is loss of salt in excess of water, the decreased concentration of sodium in the extracellular fluid and in the blood serum results in decreased osmotic pressure, and water therefore enters the cells to equalize the osmotic pressure. Thus there is extracellular dehydration and intercellular hydration—and no thirst.

Water deprivation produces distinctive symptoms in human beings. Gradual weight loss occurs, amounting to two to three pounds per day. Thirst is the most prominent symptom, along with dryness of the mouth, a craving for fluid, decreased production of saliva, and impaired swallowing. It is probable that thirst is the result of this subsequent intracellular dehydration and increased intracellular osmotic pressure. Experimentally, thirst can be produced when the cells have lost about 1 percent of their intracellular water.

As dehydration progresses, the tissues tend to shrink, the skin becomes dry and wrinkled, and the eyes become shrunken and the eyeballs soft. Fever develops, which may be mild but may become marked as dehydration progresses. Dehydration itself probably affects the temperature regulatory centres in the brain. As dehydration and salt loss progress, however, the plasma volume and the output of the heart decrease, with consequent decrease of the blood supply to the skin. Sweating decreases and may stop completely, and the main avenue for heat loss is closed. The body temperature may then rise precipitously.

There are marked changes in the volume of the extracellular and intracellular fluids, but the blood plasma volume changes the last and the least. The plasma volume is maintained more or less constant at the expense of the tissue fluids. If, however, the plasma volume does fall, the output of the heart also fails, and the pulse rate climbs, indicative of a dangerous physical state.

The renal (kidney) changes that occur in humans during prolonged water depletion similarly tend to maintain a normal balance. If water deprivation continues and the plasma volume falls, however, the output of urine will be drastically reduced. As long as urine output of more than 30 millilitres per hour is maintained, the kidney can excrete nitrogenous and nonnitrogenous solids with maximum efficiency. Once the urine flow is decreased below this level, the kidney is unable to function efficiently, the substances are retained in the body, and their concentration in the blood rises.

The final result of prolonged dehydration is now apparent. The normal distribution of

salt and water in the body is destroyed, the plasma volume decreases, and the blood viscosity increases. As a result of these changes renal function is impaired, the urinary output falls, and waste products accumulate. Far more life-threatening, however, is decreased loss of moisture from the skin, with the subsequent rise in temperature, and the fall in cardiac output with the attendant irreversible shock.

Once renal failure occurs, about 8 percent of the total body water has been lost (4 litres). When 5 to 10 litres of body water have been lost a person is acutely and severely ill, with a contracted plasma volume, increased concentration and viscosity of the blood, renal failure and excessive urea in the blood, and a falling blood pressure. In a previously healthy adult, death follows the loss of 12–15 litres of body water. In the very young, the very old, or the debilitated, death occurs at a lower level of dehydration.

The treatment of any form of dehydration depends not only on restoring the depleted water but also on the reestablishment of normal levels of body electrolytes (salt) and limitation of the production of nitrogenous waste products. Before any of these therapeutic measures can be applied, however, the initiating cause must be removed. The sailor or the desert traveler must be rescued, the vomiting infant must be cured, or the underlying disease must be treated. Then, after accurate biochemical determinations of the levels of various electrolytes and other blood components have been made and the plasma volume has been measured, the physician may give measured quantities of the appropriate mixtures of salt and water. Given the right amounts of salt and water, the human body will gradually restore the normal relationships between the cells, the extracellular fluid, and the plasma volume. That done, the complicated functions of the kidney will clear the circulating blood of the retained waste products, and the body will have restored its own normal balance.

dehydration, in food processing, means by which many types of food can be preserved for indefinite periods by extracting the moisture, thereby inhibiting the growth of microorganisms. Dehydration is one of the oldest methods of food preservation and was used by prehistoric peoples in sun-drying seeds. The North American Indians preserved meat by sun-drying slices, the Chinese dried eggs, and the Japanese dried fish and rice.

Hot-air dehydration was developed in France in 1795. Modern dehydration techniques have been largely stimulated by the advantages dehydration gives in compactness; on the average, dehydrated food has about $^1/_{15}$ the bulk of the original or reconstituted product. The need to transport large shipments of food over great distances during World War II provided much of the stimulus to perfect dehydration processes. The advantages of reduced bulk later came to be appreciated by campers and backpackers and also by relief agencies that provide food in times of emergency and disaster.

Dehydration equipment varies in form with different food products and includes tunnel driers, kiln driers, cabinet driers, vacuum driers, and other forms. Compact equipment suitable for home use is also available. A basic aim of design is to shorten the drying time, which helps retain the basic character of the food product. Drying under vacuum is especially beneficial to fruits and vegetables. Freeze-drying benefits heat-sensitive products by dehydrating in the frozen state without intermediate thaw. Freeze-drying of meat yields a product of excellent stability, which on rehydration closely resembles fresh meat.

The dairy industry is one of the largest processors of dehydrated food, producing quantities of whole milk, skim milk, buttermilk, and eggs. Many dairy products are spray dried—that is, atomized into a fine mist that is brought into contact with hot air, causing an almost instant removal of moisture content. *See also* food preservation.

Deighton, Len (b. Feb. 18, 1929, Marylebone, London, Eng.), English author, journalist, film producer, and a leading writer of spy stories, his best-known being his first, *The Ipcress File* (1962), an account of deception and betrayal in an espionage agency.

Deighton was educated at St. Martin's School of Art, London, and the Royal College of Art. He worked at a number of jobs after graduation, including pastry cook, syndicated cooking columnist, manager of a dress factory, and news photographer.

In *Funeral in Berlin* (1964), his second novel, he continued his blend of espionage and suspense. *The Billion Dollar Brain* (1966), another suspense spy story, shows Deighton's craftsmanship and mastery of plot. Some critics consider *An Expensive Place to Die,* published in 1967, one of his best novels because of its crisp prose style and fast-moving, plausible plot. In *Only When I Larf* (1968), Deighton moved from the subject of spies to confidence tricksters. In the suspense novel *Bomber* (1970), he treated a misdirected bombing mission of World War II. In 1972, with *Close-Up,* Deighton abandoned the suspense theme and chose instead to explore Hollywood's film industry. He returned to the espionage genre in 1974 with *Spy Story.* Later novels include *Yesterday's Spy* (1975), *XPD* (1981), *Goodbye, Mickey Mouse* (1982), and *Winter* (1987).

Many of his books were adapted for the screen, including *The Ipcress File, Funeral in Berlin, The Billion Dollar Brain, Only When I Larf,* and *An Expensive Place to Die.* Deighton also wrote several historical accounts of World War II (*e.g., Blitzkrieg: From the Rise of Hitler to the Fall of Dunkirk* [1979]) and a number of cookbooks.

Deimos, the outer of the two satellites of Mars. Both these moons were discovered by the American astronomer Asaph Hall in 1877. A small, irregular, cratered body approximately $15 \times 12 \times 11$ km ($9 \times 7 \times 7$ miles) across, Deimos circles the planet every 30.3 hours at a distance of 23,459 km (14,545 miles) in a circular orbit that lies within 2° of Mars's equatorial plane. The satellite's longest axis is always directed toward Mars, making the spin period synchronous with the orbital one. The largest crater, located near the satellite's south pole, is about 2.5 km wide. Like that of its companion, Phobos, the surface of Deimos is gray and very dark (reflectance is only 7 percent, or about one-half that of the lunar surface). These facts and the satellite's low mean density (less than two grams per cubic centimetre) indicate a carbonaceous composition and suggest that Deimos may be a captured asteroid-like object. In spite of its tiny gravity (about 10^{-3} g), Deimos has retained considerable amounts of regolith on its surface.

Deinocrates: *see* Dinocrates.

Deinonychus, genus of theropod dinosaurs that flourished in western North America during the Early Cretaceous Period (144 to 97.5 million years ago). A member of the dromaeosaur (*q.v.*) family, *Deinonychus* walked and ran on two legs, yet its killing devices, large sicklelike talons 13 cm (5 inches) long on the second toe of each foot, required it to stand on one foot while slashing at its prey with the other. The long, outstretched tail was enclosed in bundles of bony rods that grew out of the tail vertebrae, making it very rigid and thus an ideal balancing rod while the animal was running or attacking prey. *Deinonychus* measured about 2.4–4 m (8–13 feet) in length and weighed 45–68 kg (100–150 pounds). It was evidently a fast, agile predator whose large brain enabled it to perform relatively complex movements during the chase and kill.

Deioces (fl. late 8th and early 7th centuries BC), petty Median chieftain subject to the kingdom of Mannai in modern Iranian Azerbaijan; later tradition made him the founder of the Median empire.

According to the 5th-century-BC Greek historian Herodotus, Deioces was the first king of the Medes. Herodotus claimed that the Median tribes at first lived in villages without any political organization; when they decided to elect a king, they chose Deioces, a village judge renowned for the justice of his decisions. Deioces united all the Median tribes, built Ecbatana (modern Hamadan, Iran) as their capital, and ruled for 53 years (728–675 BC). Modern scholarship has shown that Herodotus probably confused Deioces with Phraortes, who established a kingdom in Media and ruled from about 675 to about 653 BC.

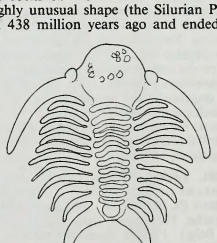
Deiotarus (d. 40 BC), tetrarch of the Tolistobogii (of western Galatia, now in western Turkey), later king of all Galatia, who, as a faithful ally of the Romans, became involved in the struggles between the Roman generals that led to the fall of the republic.

At the beginning of the Third Mithradatic War (74), Deiotarus drove the invading troops of Mithradates VI of Pontus from Phrygia. For this support, Pompey (Gnaeus Pompeius) rewarded him in 64 with the title of king and with part of eastern Pontus. In addition, the Senate granted him Lesser Armenia and most of Galatia.

Siding with Pompey and the Optimates against Julius Caesar in the Civil War (49–45), Deiotarus escaped with his ally to Asia after the defeat at Pharsalus in 48. The next year the king was pardoned by Caesar. As a consequence of the complaints of certain Galatian princes, however, Deiotarus was deprived of part of his dominions.

In 45, Deiotarus was accused at Rome of having attempted to murder Caesar when the dictator was his guest in Galatia. Cicero undertook Deiotarus' defense, but the assassination of Caesar in 44 prevented a verdict. Then Mark Antony, bribed with a large sum of money, announced that Caesar had left instructions that specified Deiotarus was to resume rule of his former possessions. Nevertheless, Deiotarus continued to support the anti-Caesarian party until its defeat at Philippi (42), when he went over to the triumvirs. He remained in possession of his kingdom until his death.

Deiphon, genus of trilobites (extinct arthropods) easily recognized in fossil form in Silurian rocks in North America because of its highly unusual shape (the Silurian Period began 438 million years ago and ended 408



Deiphon forbesi

From C. Dunbar and K. Waage, *Historical Geology,* copyright 1969, John Wiley & Sons, Inc.; by permission of John Wiley & Sons, Inc.

million years ago). The pleural lobes (at the sides of the body axis) are reduced except for the development of spiny segments. Strongly developed spines occur at the margins of the anterior region as well as at the posterior margin of the small tail region. The head region is strongly globose, with many small nodes on its surface.

Deir el Bahri (Egypt): *see* Dayr al-Baḥrī.

Deir ez-Zor (Syria): *see* Dayr az-Zawr.

Deira, a northern Anglo-Saxon kingdom in Britain which, by the last quarter of the 7th century AD, had been united with its neighbour Bernicia (*q.v.*) to form the kingdom of Northumbria. Deira stretched from the Humber to the Tees River. There is a tradition that its first recorded king, Aelle, reigned from 560 and that, on his death in 588 or 590, Deira was seized by Aethelric of Bernicia, whose son Aethelfrith ruled both kingdoms until 616, as did Aelle's son Edwin from 616 to 632. Edwin's cousin Osric ruled Deira from 632 to 633, but the two kingdoms were again united, under Aethelfrith's son Oswald, from 633 to 641. While Oswald's brother Oswiu ruled Bernicia from 641 to 670, Deira was ruled until 651 by Oswine, a son of Osric; after his death, members of the Bernician royal house ruled in Deira until 678.

Deirdre, Old Irish DEIRDRIU, in early Irish literature, the gentle and fair heroine of *The Fate of the Sons of Usnech* (*Oidheadh Chloinne Uisneach*), the great love story of the Ulster cycle. First composed in the 8th or 9th century, the story was revised and combined in the 15th century with *The Fate of the Children of Tuireann* (*Oidheadh Chloinne Tuireann*) and *The Fate of the Children of Lir* (*Oidheadh Chloinne Lir*) into *The Three Sorrows of Storytelling* (*Tri Truaighe Scéalaigheachta*). The older version, preserved in *The Book of Leinster* (*c.* 1160), is more starkly tragic, less polished, and less romantic than the later version. It describes a Druid's foretelling, at Deirdre's birth, that many men would die on her account. Raised in seclusion, she grew to be a woman of astonishing beauty. King Conor (Conchobar mac Nessa) fell in love with her, but Deirdre fell in love with Noísi (Old Irish Noísiu), son of Usnech. They eloped and fled to Scotland with Noísi's two brothers, where they lived idyllically until they were lured back to Ireland by the treachery of Conor. The sons of Usnech were slain, causing revolt and bloodshed in Ulster. Deirdre took her own life by shattering her head against a rock to avoid falling into the hands of Conor. The later version omits the first half of the story and expands the tragic ending by making Deirdre live for a year with Conor, never smiling, before killing herself.

The story was immensely popular in Ireland and Scotland and survived to the 20th century in Scottish oral tradition; its literary influence continued into the early 20th century, when the Anglo-Irish writers, notably William Butler Yeats and John Millington Synge, dramatized the theme.

Deirgeirt, Loch (Ireland): *see* Derg, Lough.

Deisenhofer, Johann (b. Sept. 30, 1943, Zusamaltheim, Ger.), German biochemist who, along with Hartmut Michel and Robert Huber, received the Nobel Prize for Chemistry in 1988 for their determination of the structure of certain proteins that are essential to photosynthesis.

Deisenhofer earned his doctorate from the Max Planck Institute for Biochemistry in Martinsried, W.Ger., in 1974. He conducted research there until 1987, when he joined the scientific staff at the Howard Hughes Medical Institute in Dallas, Texas.

Together with Michel and Huber, Deisenhofer set out to study the structure of a protein complex found in certain photosynthetic bacteria. This protein, called a photosynthetic reaction centre, was known to play a crucial role in initiating a simple type of photosynthesis. Between 1982 and 1985, the three scientists used X-ray crystallography to determine the exact arrangement of the more than 10,000 atoms that make up the protein complex. Their research increased the general understanding of the mechanisms of photosynthesis and revealed similarities between the photosynthetic processes of plants and bacteria.

Consult the INDEX *first*

Deism, an unorthodox religious attitude that found expression especially among a group of English writers beginning with Edward Herbert in the first half of the 17th century and ending with Henry St. John, 1st Viscount Bolingbroke, in the middle of the 18th century. In general, it refers to what can be called natural religion, the acceptance of a certain body of religious knowledge that is inborn in every person or that can be acquired by the use of reason, as opposed to knowledge acquired through either revelation or the teaching of any church.

A brief treatment of Deism follows. For full treatment, *see* MACROPAEDIA: Religious and Spiritual Belief, Systems of.

The proponents of natural religion were strongly influenced by three intellectual concerns: a growing faith in human reason, a distrust of religious claims of revelation that lead to dogmatism and intolerance, and, finally, an image of God as the rational architect of an ordered world.

Renaissance humanism had rejected the orthodox Christian emphasis upon the corruption of reason through sin and had affirmed a general faith that human reason could discern universal religious and moral truths apart from any supernatural revelation or specific church teachings. Similarly, Deists argued that behind the vast differences in modes of worship, piety, and doctrine of the world's religions and the Christian churches lay a common rational core of universally accepted religious and moral principles. The early Deists asserted that superficial differences of ritual and dogma were insignificant and should accordingly be tolerated.

By the turn of the 17th century, however, a number of Deists, notably John Toland, the Earl of Shaftesbury, Matthew Tindal, Thomas Woolston, and Anthony Collins, turned more militant, beginning to apply the scalpel of reason to much of the piety and practice of orthodox Christianity itself. They rejected the elaborate liturgical practices and complex institutional trappings of Roman Catholicism as analogous to ancient pagan superstition. In place of the noxious "enthusiasm" and strict individual piety of the Protestant sects, they sought to promote the sober moral striving and tolerance of the religion of reason.

The chief debate between the militant Deists and the orthodox Christian thinkers concerned the proper role of appeals to divine revelation as a disclosure of ultimate religious truth. Many orthodox thinkers argued that, while natural reason did provide access to religious truths, supernatural revelation was necessary as a supplement to teach these same truths more clearly and effectively. Indeed, the Roman Catholic tradition since Thomas Aquinas esteemed right reason as always in harmony with revealed truth and capable of disclosing God's natural moral laws. Deists countered that natural religion alone was certain and free of corruption, and they launched a vigorous attack upon all of the Christian additions to the simple moral truths affirmed by reason.

In place of the orthodox Judeo-Christian conception of God as involved actively in shaping and sustaining human history, the Deists argued that after God's initial work of creation, He withdrew into detached transcendence, leaving the world to operate according to rational natural rules. Borrowing upon the general prestige of Isaac Newton's vision of the universe as a mechanism obeying stable rational laws, they propounded variations on the classic argument from design wherein the existence of a rational creator is inferred from the evidence of the rational ordering of the world.

In England and later in Germany the Deists' attack upon Christian doctrines remained moderate, but in France, where the political influence of corrupt Roman Catholic prelates had spawned a strong anticlerical reaction, the attack became exceedingly impassioned and bitter. In the view of Voltaire, "every man of sense, every good man, ought to hold the Christian sect in horror." For many other French Philosophes, Deism was simply a station upon the road to complete atheism.

By the end of the 18th century, in addition to becoming a dominant religious attitude among English, French, and German intellectuals, Deism had crossed the Atlantic to shape the religious views of upper-class Americans. The first three presidents of the United States all subscribed to Deist beliefs.

Deivas (Baltic deity): *see* Dievs.

deivė (Baltic folklore): *see* lauma.

Déjerine-Roussy syndrome, also called THALAMIC SYNDROME, neural disorder caused by a lesion, usually vascular, in the posterior portion of the thalamus. It is marked by superficial but persistent loss of sensation, mild paralysis, and mild lack of coordination, all on one side of the body; complete or almost complete loss of ability to recognize objects; severe and continuing pains on the side affected by paralysis; and involuntary and uncontrollable (choreoathetoid) movements of the arm and leg on the affected side. The disorder is often accompanied by emotional stress and fatigue. The disorder is named for two French neurologists, Jules Déjerine and Gustave Roussy.

Dekabrist (Russian revolutionary): *see* Decembrist.

Dekéleia (Cyprus): *see* Dhekélia.

Deken, Aagje, byname of AGATHA DEKEN (b. Dec. 10, 1741, Amstelveen, Neth.—d. Nov. 14, 1804, The Hague), writer and collaborator with Betje Wolff (*q.v.*) on the first Dutch novel, *De historie van mejuffrouw Sara Burgerhart,* 2 vol. (1782; "The History of Miss Sara Burgerhart").



Agatha Deken, detail of an engraving by L. Portman after a drawing by A. Teerlink after a painting by P. Groenia

By courtesy of the Iconografisch Bureau, The Hague

Deken had written a little-known volume of devotional poetry by the time she met Betje Wolff in 1776. The next year, following the death of Wolff's husband, the two set up

house together and began collaborating on fiction. With their third book, *Sara Burgerhart,* they changed the direction of Dutch writing. By developing the epistolary technique, which had been introduced by Samuel Richardson in England, Deken and Wolff produced a realistic novel of subtle characterizations that was free of sentimentality and unnatural motivations. Deken's contribution to the plot was her experience, as a girl, of orphanage life and domestic service.

Further though less notable collaborations in the epistolary style followed, including *De historie van den heer Willem Leevend,* 8 vol. (1784–85; "The History of Mr. William Leevend"), and *De historie van mejuffrouw Cornelia Wildschut,* 6 vol. (1793–94; "The History of Miss Cornelia Wildschut").

During the Prussian invasion of 1788, Deken and Wolff moved to Trévoux, Fr., where they lived for 10 years. Their book *Wandelingen door Bourgogne* (1789; "Strolling Through Burgundy") related their impressions of the French countryside.

Although Deken wrote an additional four volumes of instructional verse, she is chiefly remembered for her association with Wolff.

Dekker, Eduard Douwes: *see* Multatuli.

Dekker, Thomas (b. *c.* 1572, London, Eng.—d. *c.* 1632), English dramatist and writer of prose pamphlets, memorable for his lively depictions of London life.

Few facts of Dekker's life are certain, and he is first mentioned as a playwright in 1598. He wrote to support himself and had a hand in at least 42 plays written in the next 30 years. Dekker's ability to construct dramatic action was defective; in the dispute known as "the poets' war," or "the war of the theatres," he was satirized in Ben Jonson's *Poetaster* (1601) as Demetrius Fannius, "a very simple fellow. . . a dresser of plays." This precipitated Dekker's own attack on Jonson in the play *Satiro-mastix,* written with John Marston (1602). Eleven more plays survive in which Dekker collaborated with such figures as Thomas Middleton, John Webster, Philip Massinger, John Ford, and William Rowley.

Of the five plays that are entirely Dekker's work, probably the best known are *The Shomakers Holiday* (1600) and *The Honest Whore, Part 2* (1630). These plays are typical of his work in their use of the moralistic tone of traditional drama, in the rush of their prose, in their boisterousness, and in their mixture of realistic detail with a romanticized plot. Dekker had an ear for colloquial speech and vividly portrayed the daily round of life in London.

There is a similar vigour in his prose pamphlets, begun in 1603 with "The Wonderfull yeare," the first concerning London and the Plague. Such works as "The Belman of London" (1608) make use of material on roguery and crime borrowed from Robert Greene and others. "The Guls Horne-booke" (1609) is especially valuable for its account of behaviour in the London theatres.

Between 1613 and 1619 Dekker was in prison for debt. This firsthand experience may be behind his six prison scenes included in the collection of *Characters* published anonymously in 1616 by Sir Thomas Overbury (*q.v.*). Dekker was partly responsible for devising the street entertainment to celebrate the entry of James I into London in 1603; he provided the lord mayor's pageant in 1612.

Del Castillo, Michel: *see* Castillo, Michel del.

Del Monte Corporation, American corporation engaged primarily in processing, canning, and distributing food. It is a major grower and distributor of bananas and pineapples, and it owns subsidiaries engaged in trucking, public warehousing, institutional food service and vending, building maintenance, and security services. Support activities include farming, cattle ranching, fishing, packaging, and printing. In 1979 Del Monte (headquartered in San Francisco) was merged into R.J. Reynolds Industries, Inc., headquartered in Winston-Salem, N.C.

In the 1870s and '80s California became a major producer of fruits and vegetables; and, in 1899, 11 of the state's biggest canners merged under the name California Fruit Canners Association. In 1916 CFCA drew in two more canners and a food brokerage house, incorporated itself as California Packing Corporation, or Calpak, and began marketing its products under the Del Monte brand. The new company then operated more than 60 canneries, some in Washington, Oregon, Idaho, and Alaska. In 1917 it acquired pineapple lands and a cannery in Hawaii and, in the 1920s, added canneries in Florida, the Midwestern United States, and the Philippines. After World War II more facilities were constructed or purchased in several foreign countries. These multinational operations made the name California Packing Corporation obsolete, and in 1967 the name Del Monte Corporation was adopted.

Del Rio, city, seat (1885) of Val Verde county, southwestern Texas, U.S. It lies along the Rio Grande, there bridged to Ciudad Acuña, Mex., 145 miles (233 km) west of San Antonio. The original Spanish mission of San Felipe del Rio (*c.* 1675) on the site was destroyed by Indians, but the name survived until 1833, when it was shortened to avoid confusion with San Felipe de Austin. The present community was founded in 1872. Remnants of an old canal system, which carried water from the prolific San Felipe Springs, survive. A port of entry with a busy tourist trade, Del Rio is also a marketing centre for an extensive ranching area. Laughlin Air Force Base lies immediately to the east. The international Amistad Dam with its 84,000-acre (34,000-hectare) lake and recreation area is 12 miles (19 km) upstream. Inc. 1911. Pop. (1991 est.) 31,360.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

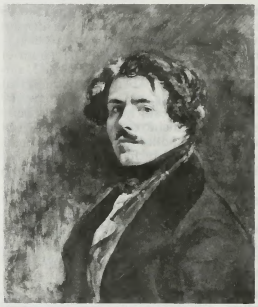
Delacour, Jean Theodore (b. Sept. 26, 1890, Paris, Fr.—d. Nov. 5, 1985, Los Angeles, Calif., U.S.), French-American aviculturist known for discovering and rearing some of the world's rarest birds.

As a boy, Delacour collected more than 1,300 live birds, which were destroyed, along with the area they inhabited, during World War I. He later made expeditions to Asia, Africa, and South America and assembled a second collection, more than twice as large as the first, at the Château de Clères in Normandy. In the 1920s he brought the first live specimens of Edwards' pheasants to England. In 1924 he brought a pair of unidentified dark blue pheasants from northern Vietnam, named them imperial pheasants, and later succeeded in breeding them in captivity. Many other new species and subspecies of birds and mammals were discovered and named by him.

In 1920 he founded an avicultural magazine called *L'Oiseau* (subsequently merged with *Revue Française*). Later he wrote his *Oiseaux de l'Indochine Française* (1931; "The Birds of French Indochina"), which became a standard work on the birds of that region.

During World War II, when the Germans again destroyed his aviary, Delacour left France for the United States. He became a U.S. citizen in 1946 but returned to Clères to reestablish the aviary and zoo, which was later donated to the French nation. He was director of the Los Angeles County Museum from 1951 to 1960.

Delacroix, Eugène, in full FERDINAND-VICTOR-EUGÈNE DELACROIX (b. April 26, 1798, Charenton-Saint-Maurice, Fr.—d. Aug. 13, 1863, Paris), the greatest French Romantic painter, whose use of colour was influential in the development of both Impressionist and Postimpressionist painters. His inspiration came chiefly from historical or contemporary events or literature, and a visit to Morocco in 1832 provided him with further exotic subjects.



Delacroix, self-portrait, oil on canvas, about 1837; in the Louvre, Paris
Giraudon—Art Resource

Early life. Delacroix was the fourth child of Victoire Oeben, a descendant of the Oeben-Riesener family, which had created furniture for the king and court in the 17th and 18th centuries, and of Charles Delacroix, a government official who was ambassador to Holland in 1798 and who died in 1805 while prefect of Bordeaux. One tradition attributes Eugène's true paternity to the statesman Charles-Maurice de Talleyrand-Périgord. This belief is strengthened both by Delacroix's strong physical resemblance to Talleyrand and by the fact that the future painter would consistently receive important patronage from the French government despite the nonconformist character of his art. Whatever the truth of his parentage, Delacroix's childhood was untroubled, and he would always maintain great affection and admiration for his father. Up to the age of 17 he pursued classical studies. Within his distinguished and artistic family he formed a passion for music and the theatre. In 1815 he became the pupil of a renowned academic painter, Baron Pierre-Narcisse Guérin. He knew the historical painter Antoine-Jean Gros, and as a young man he visited the salon of the royalist and painter Baron François Gérard. As early as 1822 he received the backing of Louis Thiers, the statesman and historian, who, as interior minister in the 1830s, put Delacroix in charge of architectural decorations.

A child of his century, Delacroix was affected by the Romanticism of the painter Théodore Géricault and of his friends the English painter Richard Parkes Bonington, the Polish-born composer and pianist Frédéric Chopin, and the French writer George Sand. He did not, however, take part in the battles of the Romantic movement waged by Victor Hugo, Hector Berlioz, and others.

Development of mature style. Delacroix's debut at the Paris Salon of 1822, in which he exhibited his first masterpiece, "Dante and Virgil in Hell" (Louvre Museum, Paris), is one of the landmarks in the development

of French 19th-century Romantic painting. "Dante and Virgil in Hell" was inspired by Dante's *Divine Comedy*, but its tragic feeling and the powerful modeling of its figures are reminiscent of Michelangelo, and its rich colour shows the influence of Peter Paul Rubens. Among Delacroix's contemporaries, the influence of Géricault, who was the young painter's best friend until his sudden death in 1824, was also important.

In his subsequent choice of subjects, Delacroix showed an affinity with Lord Byron and other Romantic poets of his time, and also drew subjects from Dante, William Shakespeare, and medieval history. In 1824, however, he exhibited at the Salon the "Massacre at Chios" (Louvre), a large canvas depicting the dramatic contemporary massacre of Greeks by Turks on the island of Chios. The haughty pride of the conquerors, the horror as well as despair of the innocent Greeks, and the splendour of a vast sky create an expressive unity in which the nature of his genius is evident.



"Liberty Leading the People," oil on canvas by Eugène Delacroix, 1830; in the Louvre, Paris

Giraudon/Art Resource, New York City

Delacroix had already become interested in the delicate technique of his English painter friends Richard Parkes Bonington and the Fielding brothers (Thales, Copley, Theodore, and Newton), and he also admired the English landscapes of John Constable, which were exhibited in Paris in 1824. Indeed, the luminous tonalities evident in the "Massacre at Chios" are said to have been inspired by Constable's style. To round out his technical and cultural education, Delacroix left for London in 1825. There, his technique, developed by contact with Turner, Constable, and Sir Thomas Lawrence, acquired the freedom and suppleness that until then he had been seeking in Rubens.

Between 1827 and 1832, masterpieces appeared in quick succession. Chief among them is "The Death of Sardanapalus" (1827; Louvre), a violent and voluptuous Byronic subject in which women, slaves, animals, jewels, and rich fabrics are combined in a sensuous but somewhat incoherent scene. One of his finest paintings on historical subjects, "The Execution of the Doge Marino Faliero" (1826–27; Wallace Collection, London), dates from this period, as do two works on medieval history, "The Battle of Nancy" (1831) and "The Battle of Poitiers" (1830; Louvre). He also painted the typically Byronic subject of "Combat Between the Giaour and the Pasha" (1827; Art Institute of Chicago). Like Géricault, Delacroix explored the newly invented medium of lithography and made a set of 17 lithographs (1827) illustrating a French edition of J.W. von Goethe's *Faust*. In 1830 Delacroix painted "Liberty Leading the People" (Louvre) to commemorate the July Revolution that had just brought Louis-Philippe to the French throne. This large canvas mixes allegory with contemporary realism in a highly successful and monumental manner and is still perhaps the most popular of all Delacroix's paintings. The relatively subdued manner of "Liberty Leading the People" also reflects a change in Delacroix's style, which became somewhat quieter while still retaining elements of animation and grandeur.

From January to July 1832 Delacroix toured in Algeria, Spain, and Morocco with the Count de Mornay, King Louis-Philippe's diplomatic representative to the sultan. Morocco proved to be a revelation to Delacroix, who found in its people and way of life the Homeric nobility and beauty that he had never seen in French academic Neoclassicism itself. The sights of exuberant nature and the beauty of the horses, the Arabs, and their flowing costumes would henceforth inspire his visual memory, even in his last works. Delacroix made copious sketches and notes during the trip that he used to good effect upon his return to Paris. After Morocco, his drawing and paint handling became freer and his use of colour even more sumptuous. The first fruits of his Moroccan impressions are collected in "Women of Algiers in Their Apartment" (1834; Louvre), in which three sumptuously costumed Arab women and their surroundings are portrayed in a blaze of exquisitely warm colour harmonies. Delacroix's other recapitulations of his North African experiences include "Fanatics of Tangier" (1838) and "Jewish Wedding" (1839; Louvre). He continued to paint Arab subjects almost to the end of his life.

Building decoration. In the latter part of his career Delacroix was favoured with a string of important commissions to decorate government buildings. His first commission, in 1833–36, was to paint a group of murals for the Salon du Roi at the Palais-Bourbon. He was subsequently commissioned to decorate the ceiling of the Library of the Palais-Bourbon (1838–47), the Library of the Palais Luxembourg (1840–47), the ceiling of the Galerie d'Apollon at the Louvre (1850), the Salon de la Paix at the Hotel de Ville (1849–53; burned in 1871), and the Chapel of the Holy Angels in the Church of Saint-Sulpice (1849–61). His murals represent the last great effort of this kind in the tradition of the Baroque ceiling painters.

During this period Delacroix also painted several canvases on the largest scale, notably two for the museum of history at Versailles: "The Battle of Taillebourg" (1837; Louvre) and "Entry of the Crusaders into Constantinople" (1840; Louvre). Among his later easel paintings are ones on Arab, religious, and classical subjects and several superb scenes of wild animals and hunts, among them the "Lion Hunt" of 1858 (Museum of Fine Arts, Boston) and the "Lion Hunt" of 1861 (Art Institute of Chicago). Delacroix painted several notable self-portraits during the course of his long career and occasionally produced portraits of such friends as Frédéric Chopin (1838; Louvre) and George Sand (1838; Øregaard Museum, Copenhagen).

Delacroix died in 1863, leaving more than 6,000 drawings, watercolours, and prints to be sold. His *Journals* are among the most penetrating of artists' notebooks since those kept by Leonardo da Vinci. A selective edition of them in English by Hubert Wellington was published in 1951 as *The Journal of Eugène Delacroix*.

With the English painter J.M.W. Turner, Delacroix was the forerunner of the bold technical innovations that culminated in Impressionism and subsequent modernist movements. The uninhibited expression of energy and movement in his works; his fascination with violence, destruction, and the more tragic aspects of life; and the sensuous virtuosity of his colouring have helped make him one of the most fascinating and complex artistic figures of the 19th century.

BIBLIOGRAPHY. *Critical and biographical works.* Among the famous 19th-century writers and critics who have comprehended and analyzed the art of Delacroix, the poet Charles Baudelaire was the most perspicacious. See *Curiosités esthétiques* (1868) and *L'Art romantique* (1868). The basic and indispensable work for any scientific study of the ensemble of paintings, drawings, engravings, and lithographs was compiled from primary sources by Alfred Robaut and Ernest Chesneau, *L'Oeuvre complet d'Eugène Delacroix* (1885, reprinted 1969), containing numerous sketches, addenda, and an analytical table. The memorial booklet of the exhibition organized at the Louvre on the occasion of the centenary of the death of the artist, Maurice Serullaz, *Mémorial de l'exposition Eugène Delacroix* (1963), is an excellent tool for analytic study. Most important for the life and history of the works are Étienne Moreau-Nelaton, *Delacroix raconté par lui-même*, 2 vol. (1916); and Raymond Escholier, *Delacroix peintre, graveur, écrivain*, 3 vol. (1926–29). The pointillist painter Paul Signac, *D'Eugène Delacroix au néoimpressionnisme*, 4th ed. (1939), demonstrates the importance of Delacroix for modern art. René Piot, a disciple and collaborator of Delacroix in the large decorations, has provided important details on his technique in *Les Palettes de Delacroix* (1931). Raymond Regamey, *Eugène Delacroix: l'époque de la Chapelle des Saints-Anges, 1847–1863* (1931), analyzes the thinking of the painter's later style. A work that assigns Delacroix a place in the individualism of the 19th century is Lucien Rudrauf, *Eugène Delacroix et le problème du romanticisme artistique* (1942). Jean Cassou, *Delacroix* (1947), has chosen beautiful photographic details to explain the force of the "fauve" (wild beast) art. Maurice Sérullaz, *Les Peintures murales de Delacroix* (1963), is a systematic study of the decorations, from the classical attempts at the Abbaye de Valmont to the chapel of Saint-Sulpice. Philippe Jullian, *Delacroix* (1963), is essentially a study of the environment and the friends of the painter. The best British specialist on the master is Lee Johnson, *Delacroix* (1963). René Huyghe, *Delacroix* (1963), uses analytical and psychological methods in his critical technique, and his *Delacroix and Greece* (Eng. trans. 1971) seeks to determine the manner in which the symbol of the liberation of Greece, through Eugène Delacroix, was of prime importance in the thought and art of the early 19th century.

Delafosse, Charles (Baroque painter): *see* La Fosse, Charles de.

delafossite, metallic, black copper and iron oxide ($CuFeO_2$) that is found as a secondary mineral associated with other oxide minerals of copper and iron in Sonora, Mex.; Pedroso, Spain; and Pfaffenreuth, Ger. It is abundant in Bisbee, Ariz., and also occurs in Nevada and Idaho. For detailed physical properties, *see* oxide mineral (table).

Delage, Yves (b. May 13, 1854, Avignon, Fr.—d. Oct. 7, 1920, Sceaux), French zoologist known for his research and elucidation of invertebrate physiology and anatomy. He also discovered the equilibrium-stabilizing function of the semicircular canals in the inner ear (1886).

Delage became a member of the zoology staff at the Sorbonne in 1880 and at Caen, Fr., in 1881; he became director of the zoological station at Luc in 1884, titular professor of zoology at the Sorbonne in 1886, and director of the marine zoological station at Roscoff in 1878 and 1902.

Delage studied circulation in crustaceans, made important discoveries in the embryology of sponges (such as *Sacculina*), and investigated the nervous system of barnacles (*Peltogaster*) and flatworms (*Convoluta*). He developed a method for culturing sea urchins following artificial fertilization of the eggs with chemicals. Turning late in his career to more general problems of biology, he considered how life in individual organisms and species is manifested through cytoplasm, and he examined mechanical problems of the cell. His writings include *La Structure du protoplasma, les théories sur l'hérédité et les grands problèmes de la biologie générale* (1895; "The Structure of Protoplasm, the Theories of Heredity and the Great Problems of General Biology") and *Traité de zoologie concrète*, 6 vol. (1896–1903; "Treatise of Pure Zoology").

Delagoa Bay, Portuguese BAÍA DE LOURENÇO MARQUES, bay on the southeast coast of Mozambique, East Africa, near the South African border. The name probably derives from Baía da Lagoa (Bay of the Lagoon). It is 19 mi (31 km) long and 16 mi wide, with Inhaca Island, a tourist resort, at its mouth and the port of Maputo, capital of Mozambique, near its head. Discovered by António do Campo, a member of Vasco da Gama's expedition (1502), it was first explored by



Delagoa Bay from Marine Drive, Maputo, Mozambique
Transafrica—FPG/EB Inc.

Lourenço Marques, a Portuguese trader, in 1544. It was important as an outlet for ivory and slaves, as a way station for Indian Ocean trade, and as an avenue of approach to South African diamond fields and goldfields. Ownership was contested by the Portuguese, Dutch, English, and Boers until by arbitration (1875) it was awarded to Portugal. Its inner bay receives the Matola, Tembe, and Umbelúzi rivers, which meet in the Espírito Santo, an estuary formerly known as the English River. The larger Maputo and Komati rivers discharge into its outer bay.

delaine (French: "of wool"), any high-grade woolen or worsted fabric made of fine combing wool. Delaine was originally a high-quality women's wear dress material.

The word delaine is still applied to a staple all-wool fabric made in plain weave and of compact structure. Delaine sheep, a Merino type, are raised in the United States, Australia, New Zealand, Germany, Poland, and to a lesser extent in France.

Delalande, Michel-Richard, Delalande also spelled DE LALANDE (b. Dec. 15, 1657, Paris—d. June 18, 1726, Versailles, Fr.), leading composer of sacred music in France in the early 18th century, one of the few composers



Michel-Richard Delalande, detail of a crayon drawing by J.-B. Santerre
The Andre Meyer Collection—J.P. Ziolo

who asserted any influence while Jean-Baptiste Lully lived.

He became a chorister at Saint-Germain l'Auxerrois and learned to play several instruments. An organist at four Paris churches, he was asked to direct the musical education of the daughters of Louis XIV. In 1683 he became a superintendent of the Chapel Royal, and he was in sole control of all sacred music at court by 1704. He was also in charge of the royal chamber music.

Delalande's fame rests upon his 42 motets for chorus and orchestra written for the chapel at Versailles. His counterpoint is firm, his handling of the texts masterly, and his admixture of French and Italian styles well contrived; what Lully did for opera in France, Delalande did for sacred music. Of his instrumental music the *Symphonies pour les soupers du roi* was so appreciated by Louis XIV that he ordered André Philidor to copy the complete set in 1703. Delalande also wrote secular cantatas and pastorals and music for dramatic presentations of the sacred tragedies produced by the Jesuit College in Paris.

Delambre, Jean-Baptiste-Joseph (b. Sept. 19, 1749, Amiens, Fr.—d. Aug. 19, 1822, Paris), French astronomer who prepared tables that plot the location of Uranus.

In 1771 Delambre became tutor to the son of M. d'Assy, receiver general of finances. In 1788 d'Assy built an observatory for Delambre's use. There he observed and computed almost uninterruptedly and in 1792 published *Tables du Soleil, de Jupiter, de Saturne, d'Uranus et des satellites de Jupiter* ("Tables of the Sun, Jupiter, Saturn, Uranus, and Jupiter's Satellites"). He was admitted to the Institut de France upon its organization in 1795 and became, in 1803, perpetual secretary to its mathematical section. He served from 1795 on the bureau of longitudes. From 1792 to 1799 he was occupied with the measurement of the arc of the meridian extending from Dunkirk, Fr., to Barcelona, and published a detailed account of the operations in *Base du système métrique* (3 vol., 1806, 1807, 1810; "Basis of the Metric System"). In 1807 he became professor of astronomy at the Collège de France in Paris and was treasurer to the Imperial University from 1808 until its suppression in 1815. Delambre also wrote histories of ancient, medieval, and modern astronomy. His *Tables écliptiques des satellites de Jupiter* ("Ecliptic Tables of Jupiter's Satellites") was republished by the bureau of longitudes in 1817. A large crater on the Moon is named in his honour.

Delamere (of Dunham Massie), George Booth, 1st Baron, also called (1636–61) SIR GEORGE BOOTH, 2ND BARONET (b. August 1622—d. Aug. 8, 1684, Dunham Massey, Cheshire, Eng.), English politician who led an abortive Royalist revolt against the Commonwealth government in August 1659. His insurrection foreshadowed the Royalist upsurge that resulted in the restoration of the Stuart monarchy in 1660.

Booth sat in the Long Parliament in 1645 and, during Oliver Cromwell's Protectorate, in the Parliaments of 1654 and 1656. In 1655 he was appointed military commissioner for Cheshire and treasurer at war. But after a group of army officers seized power from Cromwell's son and successor, Richard, in May 1659, Booth was barred from Parliament. He therefore joined the Presbyterian Royalists in plotting widespread revolts in England. On August 19 he seized Cheshire, but by this time the uprisings elsewhere had already failed. Gen. John Lambert then defeated his forces at Nantwich Bridge, and Booth fled, disguised as a woman. He was discovered and apprehended on August 23 and committed to the Tower of London. After the defeat of Lambert by the Royalists in January 1660, Booth was released. He sat in the Convention Parliament that invited Charles II to return from exile (May 1660) to assume the English throne, and in 1661 he was made Baron Delamere. Booth thereafter participated in local politics and in national issues that came before the House of Lords. He was concerned with the rights of Protestant Nonconformists.

Delamere (of Vale Royal), Hugh Cholmondeley, 3rd Baron (b. April 28, 1870, Vale Royal, Cheshire, Eng.—d. Nov. 13, 1931, Loresho, Kenya), a leader of European colonists in British East Africa Protectorate (now Kenya). Controversial and outspoken, Delamere was the central figure of the white community in Kenya. He believed that civilization could be brought to Africa only by European settlement and was the constant champion of white supremacy.

Having come to Kenya originally as a hunter, Delamere settled there in 1903. He was granted 100,000 acres by the colonial commissioner and immediately began experimenting with livestock and crops to discover the most suitable use of the land. Elected (1903) the first president of the Farmers' and Planters' Association (which became the Colonists' Association in 1904), he was a member of the first legislative council (1907). He was elected a member of Parliament for the Rift Valley in 1920, a seat he held until his death. From 1920, when the Colonial Office declared that the interests of native Africans should be supreme in Kenya, Delamere was in continuous opposition to the British government. In 1925 he organized, at his own expense, a conference of delegates from Kenya, Tanganyika, Northern Rhodesia, and Nyasaland to consider how to solidify white control in Africa. In 1923 and 1930 he headed delegations to London in support of the settlers' goals.

DeLancey, James (b. Nov. 27, 1703, New York City—d. July 30, 1760, New York City), lieutenant governor and chief justice of the British colony of New York.

The eldest son of Stephen DeLancey, a prominent New York merchant-politician, James was sent to Cambridge and later studied law in London. He returned to New York, where he became a member of the Governor's Council in 1729 and a second judge of the

colony's Supreme Court in 1731; in 1733 the royal governor appointed him chief justice.

While in the council, he strongly defended royal prerogative and was presiding judge at the libel trial of John Peter Zenger (*q.v.*). During the administration of Gov. George Clinton (1743–53), DeLancey reversed his earlier political tenets and opposed the programs of the royal governor. When DeLancey used his influence in England to obtain Clinton's recall in 1753, he was appointed lieutenant governor of the colony until 1755. He served again as lieutenant governor from 1757 to 1760, and despite pressures from England and Gov. Sir Danvers Osborne to expand royal authority, DeLancey worked to maintain the dominant status of the colonial assembly within the New York government.

In 1754 he signed the charter for the establishment of King's College (later Columbia University). He presided over the intercolonial Albany Congress and in 1755 attended a wartime conference of colonial governors with Gen. Edward Braddock in Alexandria, Va.

Delane, John Thadeus (b. Oct. 11, 1817, London—d. Nov. 22, 1879, in Ascot, Berkshire, Eng.), editor of *The Times* of London for 36 years.

The second son of a distinguished barrister and author, Delane was reared in Easthampstead, Berkshire, where his family was neighbour to John Walter II, of *The Times*. Walter knew young Delane and marked the boy as a likely prospect for a newspaper career. After two years at King's College, London, Delane went up to Oxford, where he earned his degree in 1839. He had, in his college days, written several articles for the press, and he went to work for *The Times*. His father had become the paper's financial manager, but John's bent was editorial. Hardly had he started working there when the editor, Thomas Barnes, died, and John Walter made young Delane editor at the age of 23. In his long career Delane built the paper's prestige to unprecedented heights. He had been born into the ruling establishment, and he was a frequent confidant of cabinet ministers and others high in government. Under his editorship *The Times* increased its circulation, which reached about 70,000 in the mid-1800s. Delane was sometimes accused of subservience to the government, but he denied this vigorously. *The Times* under his editorship consistently influenced government policies.

In his editorial policies, Delane tried to remain impartial even though he privately favoured liberal causes. In 1845 he organized a special "*Times* express" that carried mail—including dispatches from *Times* correspondents—from Alexandria to London, reaching London two weeks before regular mail. He retired in 1877, aware that his mind was failing.

Consult the INDEX *first*

Delaney, Shelagh (b. Nov.25, 1939, Salford, Lancashire, Eng.), British playwright who, at the age of 19, won critical acclaim and popular success with the London production of her first play, *A Taste of Honey* (1958). Two years later, Delaney received the Drama Critics' Circle Award for the play's New York City production.

By her own account, Delaney wrote *A Taste of Honey* after seeing a play by Terence Rattigan and deciding that she could write a better one. Set in the bleak industrial north country of the author's birth, the play blends humour and pathos in its vivid account of an illegitimate pregnancy. It was made into a notable film in 1961.

A second play, *The Lion in Love* (1961), was received less favourably. Delaney later produced a volume of short stories, *Sweetly Sings the Donkey* (1963). She won wide praise in 1968 for her screenplay *Charlie Bubbles*. Her third play, *The House That Jack Built* (1977), was first produced for television. During the 1970s and '80s she wrote primarily for radio and television.

Delano, Jane A(rminda) (b. March 12, 1862, Montour Falls, N.Y., U.S.—d. April 15, 1919, Savenay, Fr.), U.S. nurse and educator who made possible the enlistment of more than 20,000 U.S. nurses for overseas duty during World War I.

After graduating from the Bellevue Hospital School of Nursing in New York City in 1886, she became superintendent of nurses (1887–



Jane Delano
By courtesy of the American National Red Cross

88) in Jacksonville, Fla., where she insisted on the use of mosquito netting to prevent the spread of yellow fever at a time when the mosquito was not known to be a carrier of the disease. In Bisbee, Ariz., she established a hospital for the care of miners suffering from scarlet fever.

While serving as chairman of the Red Cross national committee on nursing service and as superintendent of the Army Nurse Corps (1909–12), Delano carried out a plan to make the Red Cross Nursing Service the reserve for the corps. As a result, 8,000 nurses were ready for overseas duty when the U.S. entered World War I. In 1918 she became director of the wartime organization, the Department of Nursing, which supplied nurses to the Army, Navy, and Red Cross.

Delano served three terms as president of the American Nurses Association (1900–12) and one as president of the Board of Directors of the *American Journal of Nursing* (1908–11). She wrote, with Isabel McIsaac, the *American Red Cross Textbook on Elementary Hygiene and Home Care of the Sick* (1913).

Delany, Martin R(obison) (b. May 6, 1812, Charles Town, Va., U.S.—d. Jan. 24, 1885, Xenia, Ohio), U.S. black Abolitionist, physician, and editor in the pre-Civil War period; his espousal of black nationalism and racial pride anticipated expressions of such views a century later.

In search of quality education for their children, the Delanys moved to Pennsylvania when Martin was a child. At 19, while studying nights at a Negro church, he worked days in Pittsburgh. Embarking on a course of militant opposition to slavery, he became involved in several racial improvement groups. Under the tutelage of two sympathetic physicians he achieved competence as a doctor's assistant as well as in dental care, working in this capacity in the South and Southwest (1839).

Returning to Pittsburgh, Delany started a weekly newspaper, the *Mystery,* which publicized grievances of blacks in the U.S. and also championed women's rights. The paper won an excellent reputation, and its articles were often reprinted in the white press. From 1846 to 1849 he worked in partnership with the Abolitionist leader Frederick Douglass in Rochester, N.Y., where they published another weekly, the *North Star.* After three years Delany decided to pursue formal medical studies; he was one of the first blacks to be admitted to the Harvard Medical School and became a leading Pittsburgh physician.

In the 1850s Delany developed an overriding interest in foreign colonization opportunities for his people, and in 1859–60 he led an exploration party to West Africa to investigate the Niger Delta as a location for settlement.

In protest against oppressive conditions in the United States, Delany moved in 1856 to Canada, where he continued his medical practice. At the beginning of the Civil War (1861–65) he returned to the U.S. and helped recruit troops for the famous 54th Massachusetts Volunteers, for which he served as a surgeon. To counter a desperate Southern scheme to impress its slaves into the military forces late in the war, in February 1865, Delany was made a major (the first black man to receive a regular army commission) and was assigned to Hilton Head Island, S.C., to recruit and organize former slaves for the North. When peace came in April he became an official in the Freedmen's Bureau, serving for the next two years.

In 1874 Delany ran unsuccessfully for lieutenant governor as an Independent Republican in South Carolina; thereafter his fortunes declined. He was the author of *The Condition, Elevation, Emigration, and Destiny of the Colored People of the United States Politically Considered* (1852).

Delaroche, (Hippolyte-)Paul (b. July 17, 1797, Paris—d. Nov. 4, 1859, Paris), painter whose painstakingly realistic historical subjects made him one of the most successful academic artists of mid-19th-century France. Delaroche's father was an art expert, his uncle was curator of the Cabinet des Estampes, and his brother was the painter Jules-Hippolyte Delaroche. In 1832 he became a professor at



"Children of Edward," oil painting by Paul Delaroche, 1830; in the Louvre, Paris
Giraudon—Art Resource/EB Inc.

the École Nationale Supérieure des Beaux-Arts and was made a member of the institute.

Delaroche's pictures were painted with a firm, solid, smooth surface, which gave an appearance of the highest finish. Often in developing his compositions he first made wax models of them. He held a course midway between the Classicists and the Romantics. His long series of historical pictures had a great popular success, and the availability of engraved reproductions made his work familiar in thousands of homes. One of the most popular of his scenes was the "Children of Edward" (1830; Louvre, Paris), a depiction of the imprisonment of Edward IV's sons in the Tower of London.

delator, plural DELATORS, or DELATORES, ancient Roman prosecutor or informer. The role of the informer in matters of criminal law and fiscal claims was of singular importance to the maintenance of order in Roman so-

ciety, which was without an adequate police force or public prosecutor. Rewards ranged from pecuniary awards and public praise for citizens to freedom for slaves and citizenship for foreigners.

Delation under the empire consequently became a lucrative, though disreputable, profession. Abusers were punishable by *infamia* (loss of many civil rights), branding, flogging, or banishment. Because their activities could be of singular utility to the emperor, especially one who was untrusting of his subordinates or in need of funds, some unscrupulous delators escaped punishment and even acquired political power.

Delaunay, Charles-Eugène (b. April 9, 1816, Lusigny-sur-Barse, Fr.—d. Aug. 5, 1872, near Cherbourg), French mathematician and astronomer whose theory of lunar motion advanced the development of planetary-motion theories.

Delaunay was educated as an engineer at the École des Mines from 1836, becoming an engineer in 1843 and chief engineer in 1858. He studied mathematics and astronomy with Jean-Baptiste Biot at the Sorbonne (1841–48). He taught mechanics at the École Polytechnique from 1850 and also later taught at the École des Mines. He was made a member of the Académie des Sciences in 1855; and in 1870 he succeeded U.-J.-J. Le Verrier as director of the Paris Observatory.

He wrote *Cours élémentaire de mécanique* (1850; 8th ed., 1874; "Elementary Course of Mechanics"), *Cours élémentaire d'astronomie* (1853; 5th ed., 1870; "Elementary Course of Astronomy"), *La Théorie du mouvement de la lune,* 2 vol. (1860–67; "The Theory of Lunar Motion"), *Traité de mécanique rationnelle* (1856; 4th ed., 1873; "Treatise of Theoretical Mechanics"), *Ralentissement de la rotation de la terre* (1866; "Slowing of the Rotation of the Earth"), and *Rapport sur les progrès de l'astronomie* (1867; "Report on the Progress of Astronomy").

Delaunay, Robert (b. April 12, 1885, Paris—d. Oct. 25, 1941, Montpellier, Fr.), French painter who first introduced vibrant colour into Cubism and thereby originated the trend in Cubist painting known as Orphism (*q.v.*). He was one of the earliest completely nonrepresentational painters, and his work affected the development of abstract art based on the compositional tensions created by juxtaposed planes of colour.



"La Tour Eiffel," oil on canvas by Robert Delaunay, 1910–11; in the Kunstmuseum, Basel, Switz.

Deposited by Emanuel Hoffmann-Foundation in Kunstmuseum Basel, Switz. photograph Hans Hinz

Delaunay was at first a theatre designer and painted only part-time. But he soon came under the influence of the Neo-Impressionists' use of colour. By 1910 he had made his own contribution to Cubism in two series of paintings, cathedrals and the "Eiffel Tower," which combined fragmented Cubist form with dynamic movement and vibrant colour. This new and individual use of pictorial rhythms and colour harmonies had an immediate appeal to the senses and, combined with poetic subject matter, distinguished him from the more orthodox Cubist painters. His Orphic style, adopted also by his wife, the painter Sonia Terk Delaunay (1885–1979), had an immediate influence on the work of Der Blaue Reiter (The Blue Rider), a Munich-based group of Expressionist painters.

Two years later he found his way toward completely nonobjective painting when he made his "Colour Disks" and "Windows" series of paintings. Together with his wife, Delaunay worked on large and impressive abstract mural decorations for the Paris Exposition of 1937. Delaunay continued to paint works that restated his Orphic theories.

Delaunay, Sonia, née SOFIA ILINITCHNA TERK (b. Nov. 14, 1885, Gradizhsk, Ukraine, Russian Empire—d. Dec. 5, 1979, Paris), painter, illustrator, and textile designer who was a pioneer of abstract art in the years before World War I. She was the wife and collaborator of the French painter Robert Delaunay.

She grew up in St. Petersburg, studied drawing in Karlsruhe, and then moved to Paris, where she was influenced by the Post-Impressionists and the Fauvists. She married Robert Delaunay in 1910, by which time she was painting in the style known as Orphism, which involved the harmonious juxtaposition of areas of pure colour. She extended Orphist principles to the design of fabrics, pottery decoration, theatrical design, and other applied arts. Among her most important works were her Orphist illustrations for a poem by Blaise Cendrars entitled *La Prose du Transsibérien;* the resulting volume was a landmark in modern book production.

During the 1920s Delaunay designed textiles and dresses, and her use of abstract colour harmonies had a strong influence on international fashions. She returned to painting in the 1930s, and with her husband she designed vast murals for the Paris Exposition of 1937. After her husband's death in 1941, Delaunay continued to work as a painter and designer, and she lived to see the mounting of retrospectives of her work by major museums from the 1950s on. In 1964 she became the only woman to have had an exhibition at the Louvre Museum in her own lifetime.

Delaware, also called LENNI LENAPE, a confederation of Algonquian-speaking North American Indians who occupied the Atlantic seaboard from Cape Henlopen, Delaware, to western Long Island. They were especially concentrated in the Delaware River valley, for which the confederation was named.

The Delaware depended primarily on agriculture, with hunting and fishing as important additions to their economy. Summer communities numbered several hundred persons, but in winter smaller family bands traveled throughout their own hunting territories.

The Delaware were grouped in three clans based on maternal descent; these were in turn divided into lineages, whose members generally lived together in a longhouse. Bands of lineages formed autonomous communities, of which there were probably 30 or 40 in 1600. A council consisting of lineage sachems (chiefs) and other distinguished men decided the public affairs of the community. The eldest woman of the lineage appointed and dismissed the sachem.

The Delaware were the Indians most friendly to William Penn; they were rewarded by the infamous Walking Purchase, a treaty that deprived them of their own lands and forced them to settle on lands assigned to the Iroquois. Encroached on by whites and dominated by the Iroquois after 1690, they drifted westward in stages, stopping on the Susquehanna, the Allegheny, and the Muskingum rivers in Ohio and the White River in Indiana. After 60 years of displacement, their remnants and accretions living beyond the Ohio River rekindled a tribal alliance, asserted their independence of the Iroquois, and opposed the advancing whites. They defeated the British general Edward Braddock in the French and Indian War and at first supported the Americans in the Revolution. In the Treaty of Greenville (1795) they ceded their Ohio lands. Many of the bands dispersed, but by 1835 some had gathered again in Kansas; most of these were removed to Oklahoma in 1867. In the late 20th century the Delaware numbered about 3,000, living in Oklahoma, Wisconsin, and Ontario.

Delaware, constituent state of the United States of America, lying in the South Atlantic region of the eastern U.S. The state is bounded on the north by Pennsylvania; on the east by New Jersey, Delaware Bay, and the Atlantic Ocean; and on the south and west by Maryland. The capital is Dover.

A brief treatment of Delaware follows. For full treatment, *see* MACROPAEDIA: United States of America: *Delaware.*

Delaware's first permanent white settlement was made by a group of Swedes at Fort Christina, now Wilmington, in 1638. In 1655 New Sweden was taken by the Dutch of New Amsterdam and then in 1664 by the English. Delaware was thereafter a part of New York until 1682, when it was ceded to William Penn, who wanted an outlet to the ocean for his colony of Pennsylvania. Pennsylvania gave Delaware its own assembly in 1704; in 1787 that colony became the first state to ratify the U.S. Constitution. Delaware was a border state during the American Civil War; slavery was legal, but secession was never an issue.

Delaware is a part of the Atlantic Coastal Plain and, except for Florida, is the most lowlying state in the United States. Most of the coastal plain is fertile and level, seldom more than 60 feet (18 m) above sea level. It becomes increasingly sandy to the south. The climate of Delaware is humid and temperate. The average daily temperature in northern Delaware varies from 86° F (30° C) in July to 23° F (−5° C) in January. The annual average precipitation is nearly 45 inches (1,140 mm).

Delaware is the nation's second smallest state but one of its most densely populated. By 1980 more than half the state's population lived outside of the city of Wilmington but within 15 miles (24 km) of it.

Poultry raising is the major agricultural activity, though soybeans, corn (maize), lima beans, and asparagus are also grown. There is some fishing of coastal and inland waters.

Manufacturing is the major enterprise, with heavy concentration in chemicals. Chief chemical products are pigments, nylon, and petrochemicals.

Delaware's most important transportation artery is the Chesapeake and Delaware Canal, which has been deepened and straightened for ocean shipping. It shortens the water route between Philadelphia and Baltimore by several hundred miles. The canal is popularly considered to be the boundary between agricultural "downstate" Delaware and the northern industrial region. Northwestern Delaware lies in

the important New York–Philadelphia–Baltimore–Washington, D.C., corridor.

The state abounds in historical sites, including a 1698 Swedish Lutheran church (now Episcopalian). The Wilmington area has several museums, including the Delaware Art Museum. The University of Delaware is the major institution of higher learning. Area 2,045 square miles (5,294 square km). Pop. (1994 est.) 709,000.

Delaware, city, seat (1808) of Delaware county, central Ohio, U.S. It lies along the Olentangy River, 25 miles (40 km) north of Columbus. The Delaware Indians had a village in the vicinity before Moses Byxbe settled on the east bank of the river in 1804. The town was laid out in 1808 and became a popular health resort. Ohio Wesleyan University (1842) was built around the town's Mansion House (now Elliot Hall). The Methodist Theological School in Ohio was opened in Delaware in 1960. Perkins Observatory, jointly maintained by Ohio Wesleyan and Ohio State universities, is 4 miles (6 km) south of the city. A stone monument marks the birthplace (Oct. 4, 1822) of President Rutherford B. Hayes. After World War II there was some industrial growth, and the city's manufactures now include truck bodies, tools and dies, cranes, building materials, thermostats, and chemicals. Since 1946 the Little Brown Jug, the annual harness-racing classic, has been held in September at the Delaware County Fair. Inc. town, 1815; city, 1903. Pop. (1993 est.) 21,289.



Gray Chapel, Ohio Wesleyan University, Delaware, Ohio
Mitt and Joan Mann from CameraMann

Delaware, Lackawanna and Western Railroad Company, American railroad built to carry coal from the anthracite fields of northeastern Pennsylvania. Originally known as Ligget's Gap Railroad, it was chartered in 1851 as the Lackawanna and Western. Eventually it ran from the Lackawanna Valley in Pennsylvania west to Buffalo, N.Y., north to Lake Ontario, and east to Hoboken, N.J.

The Lackawanna prospered in the early 20th century, but with the decline of coal heating and the rise of competing modes of transportation, its revenues fell. In 1960 it merged with the Erie Railroad Company, which had many miles of parallel trackage, to become the Erie Lackawanna Railway Company. In 1972 the Erie Lackawanna became bankrupt, and in 1976 it was taken over by the Consolidated Rail Corporation (Conrail) (*q.v.*).

Delaware, Thomas West, 12th Baron: *see* De La Warr, Thomas West, 12th Baron.

Delaware Aqueduct, circular tunnel, part of the system that supplies water to New York City from the Delaware River near its source and from other streams in the Catskill Mountains. Running deep in bedrock for its original length of 85 miles (137 km) from Rondout Reservoir in the Catskills to the Hill View Reservoir in southern Westchester county, the aqueduct has been extended to a total distance of 105 miles (170 km). The aqueduct was built between 1937 and 1953, with extensions continuing until 1965. It runs in some places to a depth of about 2,500 feet (750 m) below the surface and reaches a maximum diameter of 19.5 feet (6 m) in its last 13 miles (21 km).

Delaware Bay, inlet of the North Atlantic Ocean, on the east coast of the United States, forming part of the New Jersey–Delaware state border. The bay extends southeastward for 52 miles (84 km) from the junction of the Delaware River with the Alloway Creek to the entrance (12 miles [19 km] wide) between Cape May, N.J., and Cape Henlopen, Del. Bordered mainly by marshy lowlands, the bay is an important link in the Atlantic Intracoastal Waterway. It serves Philadelphia to the north by means of a channel in the Delaware River that is 32 feet (10 m) deep and 600 feet (180 m) wide.



Lighthouse at Cape Henlopen, Del., in Delaware Bay
Photri

Delaware River, river of the Atlantic slope of the United States, meeting tidewater at Trenton, N.J., about 130 miles (210 km) above its mouth. Its total length (including the longest branch) is about 405 miles (650 km), and the river drains an area of 11,440 square miles (29,630 square km). The river constitutes in part the boundary between Pennsylvania and New York, the boundary between New Jersey and Pennsylvania, and, for a few miles, the boundary between Delaware and New Jersey. The river's course is basically to the south.

The main, or west, branch rises in Schoharie county, N.Y., at a point 1,886 feet (575 m) above sea level. The river cuts deeply through a plateau until it emerges from the Catskill Mountains. Leaving the mountains and plateau, the river flows down Appalachian valleys, skirts the Kittatinny Mountains, which it crosses at Delaware Water Gap (a national recreation area) between nearly vertical walls of sandstone, and passes through an area of farms and forests until it enters hills again at Easton, Pa. From this point, it is flanked at intervals by hills and in places by cliffs, including the Nockamixon Rocks, 3 miles (5 km) long and more than 200 feet (60 m) high. At Trenton there is a fall of 8 feet (2 m).



The Delaware River at Tocks Island, N.J.
By courtesy of the National Park Service; photograph, Albert Dillahunty

Below Trenton the river becomes a broad, sluggish inlet of the sea, with many marshes along its side, widening into its estuary, Delaware Bay. Its main tributaries in New York are the Mongaup and Neversink rivers; in Pennsylvania, the Lehigh and Schuykill rivers; and in New Jersey, the Musconetcong and Maurice rivers. Major cities along the Delaware include Port Jervis (N.Y.); Easton, Philadelphia, and Chester (Pa.); Trenton and Camden (N.J.); and Wilmington (Del.).

Commerce was important on the upper course of the river before the beginning of railway competition (1857). Of the various early canals only two continued to be of any importance—the canal from Trenton to New Brunswick, uniting the Delaware and Raritan rivers, and the canal joining the Delaware River with Chesapeake Bay. The Interstate Commission on the Delaware River Basin was formed in 1936 by the four states in the watershed of the river (New York, New Jersey, Pennsylvania, and Delaware) to control and prevent water pollution, plan the conservation of water supply for the use of the cities, and plan development along the course of the entire river. To facilitate traffic on the river, channels have been dredged from the deep water in Delaware Bay to Philadelphia and from Philadelphia to Trenton.

On Christmas night of 1776, George Washington and about 2,400 of his soldiers crossed the Delaware from Pennsylvania to New Jersey 9 miles (14 km) above Trenton and successfully surprised British Hessian troops in their winter quarters at Trenton.

Delblanc, Sven (b. May 26, 1931, Swan River, Manitoba, Can.—d. Dec. 15, 1992, Uppsala, Sweden), important Swedish novelist of the 1960s and '70s.

In his first novel, *Eremitkräftan* (1962; "The Hermit Crab"), Delblanc explored the problem of human freedom and the roles of love and mysticism in human existence. In *Prästkappan* (1963; "The Cassock"), a picaresque novel set in Germany during the 1780s, *Kastrater* (1975; *The Castrati*), and *Gunnar Emannuel* (1978), Delblanc pursued the same themes in a historical framework. The same dilemma is posed in a Swedish setting in the four Hedeby novels, *Aminne* (1970; "Remembrance"), *Stenfågel* (1973; "Bird of Stone"), *Vinteride* (1974; "The Winter Lair"), and *Stadsporten* (1976; "The Gates to the City"). Delblanc's command of language exerted an important influence on many younger writers. Alternating between the grotesque, the visionary, and the mythical, Delblanc incorporated detailed descriptions of society in his work. In 1970 he received both the Great Novel Prize and the Zorn Prize.

Delbrück, Berthold (b. July 26, 1842, Putbus, Prussia [Germany]—d. Jan. 3, 1922, Jena, Ger.), German linguist who addressed himself to the problems of syntax (the patterning of words into meaningful phrases and sentences). He is credited with having founded the study of the comparative syntax of the Indo-European languages.

Delbrück was professor of Sanskrit and comparative linguistics at the University of Jena (1870–1912). In 1871 he published his classic study of the subjunctive and optative moods in Sanskrit and Greek (*Syntaktische Forschungen*), which was the first thoroughly methodical and complete treatment of a problem in comparative syntax. His great achievement, however, was preparing the three volumes on syntax in *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen,* 5 vol.

(1886–93; *Outline of the Comparative Grammar of the Indo-Germanic Languages,* 1888). This work, with two volumes on grammar contributed by Karl Brugmann, was enlarged between 1897 and 1916.



Berthold Delbrück
By courtesy of Dr. Wilhelm Rau, Marburg

Delbrück's method of comparing, contrasting, and classifying large numbers of similar utterances, although extended and refined, has never been fundamentally superseded. He also wrote *Einleitung in das sprachstudium* (1919; *Introduction to the Study of Language,* 1974).

Delbrück, Max (b. Sept. 4, 1906, Berlin—d. March 9, 1981, Pasadena, Calif., U.S.), German–born U.S. biologist, a pioneer in the study of molecular genetics who, with Alfred Day Hershey and Salvador Luria, was awarded the 1969 Nobel Prize for Physiology or Medicine for work on bacteriophages—viruses that infect bacteria.

Delbrück received a Ph.D. in physics (1930) from the University of Göttingen. His interest in bacteriophages was aroused while he was a research assistant at the Kaiser Wilhelm Institute for Chemistry in Berlin (1932–37). A refugee from Nazi Germany, Delbrück went to the United States in 1937, serving as a faculty member of the California Institute of Technology (1937–39; 1947–81) and of Vanderbilt University (1940–47). He became a U.S. citizen in 1945.

In 1939 Delbrück discovered a one-step process for growing bacteriophages that, after a one-hour latent period, would multiply to produce several hundred thousands of progeny. He and Hershey also independently discovered (1946) that the genetic material of different kinds of viruses can combine to create new types of viruses. This process was previously believed to be limited to higher, sexually reproducing forms of life.

Delbrück, (Martin Friedrich) Rudolph von (b. April 16, 1817, Berlin—d. Feb. 1, 1903, Berlin), statesman and chief executor of Bismarck's free-trade policy for Prussia and then for imperial Germany. He entered government service in 1837 and in 1848 was transferred to the ministry of commerce. Realizing the influence of commerce on political union, Delbrück induced Hanover, Oldenburg, and Schaumburg-Lippe to join the Zollverein (customs union) in 1851; he convinced the South German states in 1853 to renew their old union, from which Austria was excluded.

With Bismarck's support, Delbrück began to apply the principles of free trade to Prussian fiscal policy, and in 1862 he concluded an important commercial treaty with France. He then successively became first president of the chancery of the North German Confederation (1867), Bismarck's representative on the federal tariff council (Zollbundesrat), and Prussian minister without portfolio (1868). In October 1870, when the union of Germany under Prussia became a practical possibility, Delbrück went on a mission to the South German states and contributed greatly to the Versailles agreements concluded in November. In 1871 he became head of the newly constituted Reichskanzleramt (Chancellery).

A strong advocate of free trade, Delbrück disagreed with Bismarck's later leanings toward protection and state control; he resigned, pleading ill health, in June 1876, after Bismarck introduced a plan for state acquisition of the railways. He later (1879) opposed in the Reichstag the new protectionist tariff and then retired from public life.

Delcassé, Théophile (b. March 1, 1852, Pamiers, Fr.—d. Feb. 22, 1923, Nice), French foreign minister (1898–1905 and 1914–15) who was a principal architect of the new system of European alliances formed in the years preceding World War I.

Delcassé was a journalist who vigorously supported the moderate republican programs of Léon Gambetta and the colonial expansionist policies of Jules Ferry. Delcassé was elected to the Chamber of Deputies in 1885; in 1893 he joined Alexandre Ribot's Cabinet as under secretary of commerce, industry, and colonies and in 1894–95 served as minister of colonies. In 1898 he was given the post of foreign minister in the government of Henri Brisson. He remained in charge of foreign affairs in six successive governments, a seven-year tenure unprecedented in the Third Republic.

Fearing the Triple Alliance of Germany, Italy, and Austria-Hungary, Delcassé concluded that France's best interest lay in a continuing friendship with Russia and a new understanding with Britain. In 1904 he reached agreement with the British on a broad range of questions, establishing the basis for the Anglo-French Entente Cordiale (April 8, 1904), which remained a factor in European affairs until 1940. At the same time he paved the way for the Anglo-Russian agreement of 1907, thus bringing the three powers together in the Triple Entente that was to be the nucleus of the Allied coalition in World War I.

Opposition to his policies by Prime Minister Maurice Rouvier led to Delcassé's resignation in 1905, but because his downfall was attributed to German influence, it was followed by an anti-German reaction in France, and the ties he had forged were strengthened. Delcassé returned to prominence in 1909 as chairman of a commission appointed to investigate French naval weakness. As minister of marine (1911–13), he arranged for cooperation between the British and French fleets in case of war; this arrangement was a crucial factor in leading Britain to declare war against Germany in support of France when World War I began. During the war he served as foreign minister in the government of Renê Viviani until his retirement in 1915.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

Deledda, Grazia (b. Sept. 27, 1875, Nuoro, Sardinia, Italy—d. Aug. 15, 1936, Rome), novelist, a writer of the *verismo* (*q.v.*; naturalistic) school in Italian literature, who was awarded the Nobel Prize for Literature in 1926.

She married very young and moved to Rome, where she lived quietly, frequently visiting her native Sardinia, the setting of most of her fiction. Almost without formal schooling, Deledda wrote her first stories at 17, based on sentimental treatment of folklore themes; but with *Il vecchio della montagna* (1900; "The Old Man of the Mountain") she began to write about the tragic effects of temptation and sin among primitive human beings. Her most important works are *Dopo il divorzio* (1902; *After the Divorce,* 1905); *Elias Portolu* (1903), the story of a mystical former convict in love with his brother's bride; *Cenere* (1904; *Ashes,* 1910), in which an illegitimate son causes his mother's suicide (Eleonora Duse starred in the film version in 1916); and *La madre* (1920; *The Woman and the Priest,* 1922; U.S. title, *The Mother,* 1923), the tragedy of a mother who realizes her dream of her son's becoming a priest only to see him yield to the temptations of the flesh. Deledda developed similar themes in nearly 50 other novels. *Cosima,* an autobiographical novel, was published posthumously in 1937.

Delehaye, Hippolyte (b. Aug. 19, 1859, Antwerp, Belg.—d. April 1, 1941, Brussels), Belgian scholar who was the foremost exponent of biographical church history based on archaeological and documentary work.

He became a Jesuit in 1879 and was ordained priest in 1890, later identifying himself with the work of the Bollandists (*q.v.*) and becoming their head in 1912.

Delehaye took a decisive part in the census of extant lives of saints, specializing in the early Christian centuries. He edited the *Bibliotheca Hagiographica Graeca* (1895; "Library of Greek Hagiographies"), but his fame rests on those books directed to historians in general on the critical method as applied to the lives of saints, of which the best known are: *Les Légendes hagiographiques* (1905; *The Hagiographical Legends,* 1962); *Les Origines du culte des martyrs* (1912); *Les Passions des martyrs et les genres littéraires* (1921); and *Sanctus* (1927). He edited the Constantinople *Synaxarium* (1902), explained verbatim the *Martyrologium Hieronymianum* (1931; "The Martyrology of Jerome"), and took the leading part in the Bollandists' commentary on the *Martyrologium Romanum* (1940). He was a constant contributor to *Acta Sanctorum* ("Acts of the Saints"), *Analecta Bollandiana,* ("The Bollandists' Collection"), and other learned journals.

Delémont (French), German DELSBERG, capital of Jura canton, northwestern Switzerland, situated in a wide valley at the confluence of the Sorne and Birse rivers. First mentioned in historical records in 727, Delémont was annexed by the prince-bishops of Basel in the 11th century for use as a summer residence. Seized by France in 1793, the town was given to Bern in 1815. Delémont became the capital of the newly formed Jura canton in 1979. Landmarks include the bishop's castle (1721), the town hall (1745) with its outside staircase, 16th-century Renaissance fountains, and the church of St. Marcel (1766). Watches and precision instruments are manufactured, and the town has road and major rail connections with Basel and Biel and with Belfort, Fr. The population is primarily French speaking and Roman Catholic. Pop. (1983 est.) 11,400.

Delescluze, (Louis-)Charles (b. Oct. 2, 1809, Dreux, Fr.—d. May 25, 1871, Paris), French revolutionary figure who participated in the uprisings of 1830 and 1848 and who was an important leader in the Paris Commune (1871).

Delescluze, an ardent radical republican, was still a student during the popular uprisings of 1830. As an activist in the secret republican society Amis du Peuple (Friends of the People), he was implicated in an abortive attempt to assassinate King Louis-Philippe (1832) and was forced to flee to Brussels, where he remained until 1841.

Upon his return to France, Delescluze settled in Valenciennes and edited a radical journal, *L'Impartial du Nord* ("The Impartial of the North"). When the July Monarchy fell in 1848, he was active in the revolutionary movements in the north. He went to Paris soon after and founded the journal *La Révo-*

lution Démocratique et Sociale, which he used as a forum for attacks on Louis-Napoléon. Implicated in the radical uprising of June 13, 1849, he again became an exile, this time in England. He slipped back into France in 1853 but was arrested and sent to the prison colony in French Guiana. He recorded these experiences in *De Paris à Cayenne, journal d'un transporté* (1869; "From Paris to Cayenne, Journal of a Convict").

After his release from prison Delescluze continued his journalistic attacks on the Second Empire. He escaped a brief imprisonment and, after the emperor abdicated in 1870, was elected to the new National Assembly of 1871. Inspired by the revolt of the Paris Commune of 1871, Delescluze was quick to join it. After heroic but fruitless attempts to sustain the revolt, he was killed on the barricades.

Delft, *gemeente* (commune), Zuidholland *provincie,* western Netherlands. It lies along the canalized Schie River between Rotterdam and The Hague. Founded in 1075 and chartered in 1246, it was severely damaged by fire in 1536 and by the explosion of a powder



Old Church by a canal in the old inner town of Delft, Neth.
J. Allen Cash

magazine in 1654. Delft was a trade centre in the 16th and 17th centuries and was famous for its tin-glazed earthenware, or delftware, but was superseded by Rotterdam in the 18th century. Principal manufactures are now ceramics, spirits, oils, penicillin, and machinery.

Delft has a technical university, founded in 1842 as the Royal Academy, and hydraulic laboratories where the Delta Plan was designed for the closure of the Rhine and Meuse estuaries. The medieval Old Church (a Gothic church) contains memorials to the admirals Maarten Tromp and Piet Hein and to Antonie van Leeuwenhoek, a native of Delft. The Gothic New Church (formerly St. Ursula's; 1381–1496) contains tombs of the members of the house of Orange-Nassau (that of William I the Silent is by Hendrick de Keyser and his son Pieter) and of the jurist Hugo Grotius, whose statue is in the marketplace. The Prinsenhof, where William the Silent was assassinated (1584), was a convent before it became his residence; it is now the town museum. Other landmarks include the Renaissance-style town hall (1618; around a medieval tower), the Armamentarium (a 17th-century armoury), the Paul Tetar van Elvan Museum, and the Huis Lambert van Meerten Museum, with an international collection of earthenware tiles. Jan Vermeer is the best known of the many painters born in Delft. Pop. (1991 est.) 89,365.

delftware, also called DELFT, tin-glazed earthenware first made early in the 17th century at Delft, Holland. Dutch potters later brought the art of tin glazing to England along with the name delft, which now applies to wares manufactured in The Netherlands and England, as distinguished from faience, made in France, Germany, Spain, and Scandinavia, and maiolica, made in Italy. *See* tin-glazed earthenware; Dutch ware.

Delhi, city and union territory, north-central India. The union territory comprises the cities of Delhi (which encompasses the area popularly known as Old Delhi) and New Delhi (India's capital from 1912), to the south, and adjacent rural areas. The area's economy and population centre mainly in Old Delhi, while government is concentrated in New Delhi; the territory as a whole is a focus of transportation for north-central India. Delhi has been the capital city of a succession of empires and kingdoms, and, according to tradition, the city has had various sites, all within a zone called the Delhi triangle.

A brief treatment of Delhi follows. For full treatment, *see* MACROPAEDIA: Delhi.

The union territory is situated on the western bank of the Yamuna River, a tributary of the Ganges River, and is bounded by the states of Uttar Pradesh (east) and Haryana (north, west, and south). To the west of Delhi is a northern extension of the Arāvalli Range called the Delhi Ridge. The city and ridge stand about 100 miles (160 km) to the south of the Himalayas. The climate is extremely dry, with intensely hot summers, cold winters, and a post-summer monsoon season.

In the union territory of Delhi, government and administrative service is the chief employer, and services generally are the most important sector of the economy; the industrial sector is second, and the commercial sector is third. In modern times, Delhi has also become a manufacturing centre with small- and medium-scale industries producing electronics and engineering goods, automobile parts, and electrical appliances. Traditional handicrafts, such as ivory carving, painting, brassware, and copperware, continue to be important, as are handloomed products and garments. Delhi has been the dominant trading and commercial centre of northern India for centuries. It is the headquarters of several commercial banks and a major stock-exchange centre. Transportation, storage, and the wholesale and distributive trades are also vital activities.

The contrast between the convoluted street plan of Old Delhi and the orderly, diagonal traffic pattern in New Delhi is striking. In relation to Old Delhi, which has twice (in some places, five times) the population density, New Delhi exudes a feeling of openness and quiet, as do the Civil Lines upper-income residential areas to the north. In the old city there is a strong *mohalla* ("neighbourhood") feeling in some quarters, though overall the social structure has become more heterogeneous owing to an influx of immigrants from other Indian states and adjacent countries.

The most prominent nonarchitectural feature of New Delhi is Central Vista Park, the main east-west axis, along which are located governmental buildings, museums, and research centres. The thoroughfare divides the city in two, with the major shopping centre, Connaught, to the north and residential districts to the south. Delhi's striking architectural monuments are from virtually all periods of Indian history, especially emphasizing Indo-Muslim style; they include the intricate Qutb Minar and the Qūwat-ul-Islām mosque, both of the Pashtun style; the Red Fort (Lāl Qal'ah) and the Principal Mosque (Jama Masjid) are fine examples of Mughal architecture. The Parliament House (Sansad Bhavan) is an example of British-period architecture. Institutions of higher learning include the University of Delhi (founded 1922); Jawaharlal Nehru University (1969); institutes for agricultural, technological, and medical studies; and arts academies.

Delhi lacks adequate mass-transit facilities; intracity transportation is a congested tangle of bullock carts, bicycles, automobiles, and trucks. Because of Delhi's geographic location, all land routes from northwestern India to the eastern plain must pass through the city; five national highways and several railway lines converge there. The Indira Gandhi International Airport and the adjacent Pālam domestic airport serve this important air-traffic centre. Area Old Delhi, 360 square miles (932 square km); New Delhi, 169 square miles (438 square km); union territory, 572 square miles (1,483 square km). Pop. (1991 prelim.) Old Delhi, 7,174,755; New Delhi, 294,149; union territory, 9,370,475.

Delhi, University of, state-controlled institution of higher education located at Delhi, India. Founded in 1922 as a residential university, it developed into a teaching and affiliating body and is now designated as one of India's federal universities, with jurisdiction over numerous colleges scattered throughout the metropolitan area of Greater Delhi. There are numerous institutions affiliated to it, including schools of medicine, nursing, education, agriculture, and technology, as well as the Institute of Economic Growth, the Delhi School of Social Work, and the School of International Studies for women. The university has faculties of arts, education, applied sciences, law, medicine, Indian medicine, mathematics, management, music and fine arts, sciences, social sciences, and technology. Instruction is in English and Hindi.

Delhi boil (infection): *see* Oriental sore.

Delhi Pact (1950), also called NEHRU–LIAQAT PACT, pact made on April 8, 1950, following the state of tension that had arisen between India and Pakistan in East Pakistan (now Bangladesh) after economic relations between the two countries had been severed in December 1949. An estimated 1,000,000 people—Hindus from East Pakistan and Muslims from West Bengal—crossed the borders during 1950.

In spite of the opposition of his colleague Vallabhbhai Patel, Jawaharlal Nehru, prime minister of India, concluded a pact with Liaqat Ali Khan, prime minister of Pakistan, whereby refugees were allowed to return unmolested to dispose of their property, abducted women and looted property were to be returned, forced conversions were unrecognized, and minority rights were confirmed. Minority commissions were established to implement these terms, and confidence was, in fact, restored for a time.

Delhi sultanate, principal Muslim sultanate in North India from the 13th to the 16th century. Its creation owed much to the campaigns of Muḥammad of Ghūr (brother of Sultan Ghiyās-ud-Dīn of Ghūr) and his lieutenant Quṭb-ud-Dīn Aybak between 1175 and 1206 and particularly to victories at the battles of Taraōrī in 1192 and Chandawar in 1194.

The Ghūrid soldiers of fortune in India did not sever their political connection with Ghūr until Sultan Iltutmish (reigned 1211–36) had made his permanent capital at Delhi, repulsed rival attempts to take over the Ghūrid conquests in India, and withdrawn his forces from contact with the Mongol armies, which by the 1220s had conquered Afghanistan. Iltutmish also gained firm control of the main urban strategic centres of the North Indian plain, from which he could keep in check the refractory Rājput chiefs. After Iltutmish's death, a decade of factional struggle was followed by nearly 40 years of stability under Ghiyās-ud-Dīn Balban, sultan in 1266–87. During this period Delhi remained on the defensive against the Mongols and undertook only holding actions against the Rājputs.

Under the sultans of the Khaljī dynasty (1290–1320), the Delhi sultanate became an

imperial power. 'Alā'-ud-Dīn (reigned 1296–1316) conquered Gujarāt (*c.* 1297) and the principal fortified places in Rājasthān (1301–12) and reduced to vassalage the principal Hindu kingdoms of southern India (1307–12). His forces also defeated serious Mongol onslaughts by the Chagatais of Transoxania (1297–1306).

Muḥammad ibn Tughluq (reigned 1325–51) attempted to set up a Muslim military, administrative, and cultural elite in the Deccan, with a second capital at Daulatābād, but the Deccan Muslim aristocracy threw off the overlordship of Delhi and set up (1347) the Bahmani sultanate. Muḥammad's successor, Fīrūz Shāh Tughluq (reigned 1351–88), made no attempt to reconquer the Deccan.

The power of the Delhi sultanate in North India was shattered by the invasion (1398–99) of Timur, who sacked Delhi itself. Under the Sayyid dynasty (*c.* 1414–51) the sultanate was reduced to a country power continually contending on an equal footing with other petty Muslim and Hindu principalities. Under the Lodī (Afghan) dynasty (1451–1526), however, with large-scale immigration from Afghanistan, the Delhi sultanate partly recovered its hegemony, until the Mughal leader Bābur destroyed it at the First Battle of Pānīpat on April 21, 1526. After 15 years of Mughal rule, the Afghan Shēr Shāh Sūr reestablished the sultanate in Delhi, which fell again in 1555 to Bābur's son and successor, Humāyūn, who died in January 1556. At the Second Battle of Pānīpat (Nov. 5, 1556) Humāyūn's son Akbar definitively defeated the Hindu general Hemū, and the sultanate became submerged in the Mughal Empire.

The Delhi sultanate made no break with the political traditions of the later Hindu period, namely, that rulers sought paramountcy rather than sovereignty. It never reduced Hindu chiefs to unarmed impotence or established an exclusive claim to allegiance. The sultan was served by a heterogeneous elite of Turks, Afghans, Khaljīs, and Hindu converts; he readily accepted Hindu officials and Hindu vassals. Threatened for long periods with Mongol invasion from the northwest and hampered by indifferent communications, the Delhi sultans perforce left a large discretion to their local governors and officials.

Delhi Zoological Park, zoo founded in 1957 in New Delhi, India. Its facilities are funded and administered by the national government. More than 1,700 specimens representing at least 185 species are exhibited and bred in the 97-hectare (240-acre) park.

The collection includes good breeding groups of white tigers and brow-antlered deer. Many of the animals are displayed in barless, moated enclosures, while a colony of lion-tailed macaques is allowed to move freely about the premises.

Delia, ancient quadrennial festival of the Ionians, held on Delos (hence the name) in honour of the Greek god Apollo. The local title was Apollonia, which seems always to have been used for the corresponding yearly festival. It later declined along with the political importance of Ionia but was revived in 426 BC by the Athenians as part of their imperial policy.

Delian League, confederacy of ancient Greek states under the leadership of Athens, with headquarters at Delos, founded in 478 BC during the Greco-Persian wars. The original organization of the league, as sketched by Thucydides, indicates that all Greeks were invited to join to protect themselves from Achaemenian Persia. In fact, Athens was interested in further supporting the Ionians in Anatolia and exacting retribution from the Persians, whereas Sparta was reluctant to commit itself heavily overseas. The Athenians were to supply the commanders in chief and to decide which states were to provide ships or money; money was to be received and controlled by 10 Athenian treasurers (*hellēnotamiai*). Representatives of all member states, each with equal vote, met annually at Delos, where the league's treasury was kept in the temple of Apollo. The original membership probably included most of the Aegean islands, except Aegina, Melos, and Thera, most of the cities of Chalcidice, the shores of the Hellespont and Bosporus, some of Aeolia, most of Ionia, and a few eastern Dorian and non-Greek Carian cities.

Action taken against Persia in the first 10 years was scattered: the Persian garrison was expelled from Eion, Thrace; an Athenian settlement (cleruchy) sent to that district was destroyed by the natives, but one sent to the island of Scyros was successful; the cities of the Thracian coast were won over; and Doriscus, unsuccessfully attacked, remained the only Persian garrison left in Europe. A major victory was achieved *c.* 467–466 when the Athenian commander, Cimon, heading a large confederate fleet along the southern coast of Anatolia, drove out Persian garrisons and brought the coastal cities into the league. He then defeated the Persian fleet on the Eurymedon at Pamphylia, sacked their army camp, and routed their Cyprian reinforcements.

League policy entered a new phase as relations between Athens and Sparta broke down in 461. The Athenians committed themselves to war with the Peloponnesian League (460–446), at the same time launching a large-scale eastern offensive that attempted to secure control of Cyprus, Egypt, and the eastern Mediterranean. While the Athenians and allies were campaigning successfully against the Spartans, subjugating Aegina, Boeotia, and central Greece, further expansion was checked when the league fleet was virtually destroyed in Egypt. Fearing the Persians would mount an offensive following such a naval defeat, the Athenians transferred the league treasury to Athens (454). Within the next five years, with the resolution of difficulties with Sparta (five-year truce, 451) and Persia (Peace of Callias, *c.* 449/448), the league became an acknowledged Athenian empire.

Athenian imperialism had been evident as early as *c.* 472, when Carystus, in Euboea, was forced into the league, and Naxos, wishing to secede, was reduced and subjugated. A Thasian revolt was crushed in 463, and during the 450s there were anti-Athenian movements in Miletus, Erythrae, and Colophon. The allies' independence was progressively undermined, as Athenians interfered in their internal politics (imposing democracies and garrisons) and in their legal jurisdictions. League council meetings finally ceased, and the Athenians proceeded to use the league reserves to rebuild the Athenian temples destroyed by the Persians. Athenian participation in the Peloponnesian War (431–404) placed further strains on the allies: increased tribute to finance the war and increased military support to replace Athenian losses were demanded. But despite revolts at Mytilene (428–427) and Chalcidice (424) and widespread uprisings following Athenian defeat in Sicily (413), Athens was still supported by the democratic parties in most of the cities. After defeating the Athenians at Aegospotomi (405), Sparta imposed peace terms that disbanded the league in 404.

Ineffectual Spartan management of the former empire after 404 aided the revival of Athenian influence. By 377 Athens, with Cos, Mytilene, Methymna, Rhodes, and Byzantium, formed the nucleus of a new naval league, whose objective was to preserve peace and prevent Spartan aggression. Membership had grown to at least 50 states at the time of the defeat of the Spartans by the Boeotians in 371, but with the elimination of the common fear of Sparta that had kept the allies together, the league declined. It was effectively crushed by Philip II of Macedon at Chaeronea in 338.

Delibes, (Clément-Philibert-)Léo (b. Feb. 21, 1836, Saint-Germain-du-Val, Fr.—d. Jan. 16, 1891, Paris), French opera and ballet composer who was the first to write music of high quality for the ballet. His pioneering symphonic work for the ballet opened up a field for serious composers, and his influence



Delibes, drawing by L. Abbéma

can be traced in the work of Tchaikovsky and others who wrote for the dance. His own music—light, graceful, elegant, with a tendency toward exoticism—reflects the spirit of the Second Empire in France.

Delibes studied at the Paris Conservatoire under the influential opera composer Adolphe Adam and in 1853 became accompanist at the Théâtre-Lyrique. He became accompanist at the Paris Opéra in 1863, professor of composition at the Conservatoire in 1881, and a member of the French Institute in 1884. His first produced works were a series of amusing operettas, parodies, and farces in which Delibes was associated with Offenbach and other light-opera composers. He collaborated with Ludwig Minkus in the ballet *La Source* (1866), and its success led to commissions to write his large-scale ballets, *Coppélia* (1870), based on a story of E.T.A. Hoffmann, and *Sylvia* (1876), based on a mythological theme. In the meantime, he developed his gifts for opera. The opéra comique *Le Roi l'a dit* (1873; *The King Said So*) was followed by the serious operas *Jean de Nivelle* (1880) and *Lakmé* (1883), his masterpiece. Known for its coloratura aria "Bell Song," *Lakmé* contains Oriental scenes illustrated with music of a novel, exotic character. Delibes also wrote church music (he had worked as a church organist) and some picturesque songs, among which "Les Filles de Cadiz" ("The Girls of Cadiz") suggests the style of Bizet.

delict, in Roman law, an obligation to pay a penalty because a wrong had been committed. Not until the 2nd and 3rd centuries AD were public crimes separated from private crimes and removed to criminal courts; from that time, civil action remained the remedy for private abuses. In modern usage in countries that derive their law from the Roman, delict signifies a wrong in its civil aspects, corresponding to tort in Anglo-American law.

The Roman civil law of delict was essentially punitive, although fines were understood as compensation, often at double and triple damages, and were paid to the injured person rather than to the state. There were four major types of delict: *furtum* (theft), *rapina* (robbery), *injuria* (injury), and *damnum injuria datum* (loss caused by damage to property).

In the treatment of *injuria* the Twelve Tables, the earliest codification of Roman law (451–450 BC), showed the law in a state of transition from a system of private vengeance to one in which the state insisted that the person wronged must accept compensation instead of taking vengeance and fixed its amount. If a

man broke another's limb, *talion*, by which the person wronged could inflict the same injury, was still permitted, but only if no settlement was agreed upon. It is doubtful if retaliation was ever used. In early times damages for each offense were set by law, but changes in the value of money made these obsolete. Later, some leeway was allowed in the determination of damages in each case. Further, *injuria* no longer included just physical assault but also defamation and insulting behaviour.

The provisions of the Twelve Tables concerning *damnum injuria datum* (property loss) are not known, but in any case they were superseded by the Lex Aquila in the early 3rd century BC. This law covered slaves and animals as well as buildings. If a slave or a grazing animal was unlawfully killed, the damages were equal to the highest value of the slave or animal in the preceding year; the burning, breaking, or destruction of other kinds of property brought compensation amounting to the highest value in the last 30 days. In either case, the damage must have been caused by a wrong or negligent act.

Delilah, also spelled DALILA, in the Old Testament, the central figure of Samson's last love story (Judges 16). She was a Philistine who, bribed to entrap Samson, coaxed him into revealing that the secret of his strength was his long hair, whereupon she took advantage of his confidence to betray him to his enemies. Her name has since become synonymous with a voluptuous, treacherous woman.

Delille, Jacques, byname ABBÉ DELILLE (b. June 22, 1738, Aigueperse, France—d. May 1, 1813, Paris), poet and classicist who enjoyed an impressive reputation in his day as the "French Virgil."

Aided by scholarships, Delille was a brilliant student and taught Latin poetry at the Collège



Delille, detail of an engraving by Antoine Cardon after a painting by J.-L. Monnier
The Mansell Collection

de France. His reputation was established with a verse translation of Virgil's *Georgics* (1770). Delille entered the French Academy at 36, translating the *Aeneid* in 1804 and Milton's *Paradise Lost* in 1805.

His own rather artificial poetry (*Les Jardins,* 1782; *Les Trois Règnes de la nature,* 1809) is dedicated to nature. Delille was supported for a period by the Abbey of Saint-Séverin but was an abbot in title alone; he actually married and traveled to Germany, England, and Switzerland. He was greatly honoured at his death with an impressive funeral, but his fame did not survive long afterward.

delimitation, legislative: *see* legislative apportionment.

delinquency, criminal behaviour, especially that carried out by a juvenile. Depending on the nation of origin, a juvenile becomes an adult anywhere between the ages of 15 to 18, although the age is sometimes lowered for murder and other serious crimes. Delinquency implies conduct that does not conform to the legal or moral standards of society; it usually applies only to acts that, if performed by an adult, would be termed criminal. It is thus distinguished from a status offense, a term applied in the United States and other national legal systems to acts considered wrongful when committed by a juvenile but not when committed by an adult.

A brief treatment of delinquency follows. For full treatment, *see* MACROPAEDIA: Crime and Punishment.

In Western countries, delinquent behaviour is most common in the 14- to 15-year-old age group. At age 14, most delinquent conduct involves minor theft. By age 16 or 17, more violent and dangerous acts, including assault and the use of a weapon, become prevalent. Most delinquents do not continue this behaviour into their adult life, for, as the circumstances of their lives change and they get a job, marry, or simply mature out of their turbulent adolescence, their conduct usually falls in line with societal standards. Although the evidence is ambiguous, most delinquents adjust to a noncriminal life, yet the proportion of delinquents who become criminals is higher than that of nondelinquents. In the United States, boys make up 80 percent of the delinquent population, and this rate is similar throughout Europe and Japan.

Schools are often the forum in which delinquent behaviour originates. Most delinquents perform poorly in school and are unhappy in the school environment. Many delinquents are dropouts who leave school at an early age but have no job opportunities. Juvenile gangs often perform delinquent acts, not solely out of frustration with society but also out of a need to attain status within their group. A gang can provide the rewards a juvenile cannot get from his school or other institution.

Efforts have been made to identify potential delinquents at an early age in order to provide preventive treatment. Such predictions of delinquency generally depend not only on the child's behaviour in school but also on the quality of the child's home life. There are many elements that delinquents share in their home lives. Their parents are frequently heavy drinkers who are involved in crime themselves and are unable to provide emotional or financial support for their children. Discipline is inconsistent and often relies on physical force. Most attempts to detect future delinquents have failed, however. Indeed, it has been found that the stigma of being identified as a potential delinquent often causes the child to commit delinquent acts.

It is the responsibility of the state to deal with delinquent offenders. Probation, the most commonly used method of handling delinquents, is an arrangement whereby the delinquent is given a suspended sentence and in return must live by a prescribed set of rules under the supervision of a probation officer. Probation is most frequently granted to first offenders and delinquents charged with minor offenses. Probation can be a mandate of law, or it can be left to the court's discretion. Probation requires the delinquent to lead a moderate, productive lifestyle, with financial responsibilities. If these requirements are not met, the delinquent may be placed in an institution. A delinquent will sometimes be placed in the foster care of a stable family, as a final method of keeping a juvenile out of an institution.

The treatment of delinquents on probation and in institutions ranges from a strict disciplinarian method to a more psychological approach, centring on psychoanalysis and group therapy. The probation officer must attempt to combine authority and compassion in the twin role of enforcer and social worker. This makes the role of the probation officer extremely difficult, while the responsibilities are great. Despite the problems of the probation system, studies have indicated that probation is effective in a majority of all cases.

deliquescence, the process by which a substance absorbs moisture from the atmosphere until it dissolves in the absorbed water and forms a solution. Deliquescence occurs when the vapour pressure of the solution that is formed is less than the partial pressure of water vapour in the air. All soluble salts will deliquesce if the air is sufficiently humid. A substance that absorbs moisture from the air but not necessarily to the point of dissolution is called hygroscopic.

The effectiveness of calcined calcium chloride in settling road dust is a result of its deliquescence. When spread in the form of a powder or flakes, it absorbs more than its own weight of water and forms a liquid that keeps the road wet. *See also* efflorescence.

delirium, a mental disturbance marked by disorientation and confused thinking in which the patient incorrectly comprehends his surroundings. The delirious person is drowsy, restless, and fearful of imaginary disasters. He may suffer from hallucinations, seeing terrifying imaginary animals or thinking the building is on fire. Maniacal excitement may follow.

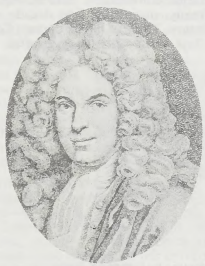
Delirium usually results from some intoxication or other physical disorder that affects the brain, such as fever, heart failure, or a blow on the head. It often results from an overdose of sedatives, especially bromide, and can be provoked by the too-abrupt discontinuance of barbiturates in addicts. Alcoholic delirium—called delirium tremens because of the characteristic tremor—is a result not merely of excessive consumption of alcohol but of a complicating exhaustion, lack of food, and dehydration; prior to the outbreak of delirium, the patient has usually been deteriorating physically because of vomiting and restlessness.

Bewildering changes of scene facilitate the onset of delirium. When a patient is on the verge of delirium, transfer from home to hospital is therefore a threat, which can be lessened if members of his family stay with him.

Delirium usually clears up soon after the physical causes have been checked. Recovery, however, depends not only on riddance of poisons but also on the extent of the damage done to the brain and on the capacity of the body's reparative mechanisms to undo it.

Delisle, Guillaume (b. Feb. 28, 1675, Paris, France—d. Jan. 25, 1726, Paris), mapmaker who led the reform of French cartography.

A brother of the astronomer Joseph-Nicolas Delisle and a student of the astronomer Jean-Dominique Cassini, Delisle learned to fix accurate positions by astronomical observation.



Guillaume Delisle, engraving
H. Roger-Viollet

The accuracy of his continental outlines and his reduction of gross errors in determining lines of longitude were considerable improvements over earlier maps. His earliest works, published in 1700, were a pair of globes (terrestrial and celestial), maps of the continents, and a world map in hemispheres. He prepared about 100 maps and wrote on mensuration and ancient geography. In 1718 he was the first to become chief geographer to the king.

Delisle, Joseph-Nicolas (b. April 4, 1688, Paris, France—d. Sept. 11, 1768, Paris), French astronomer who proposed that the series of coloured rings sometimes observed around the Sun is caused by diffraction of sunlight through water droplets in a cloud. He also worked to find the distance of the Sun from the Earth by observing transits of Venus and Mercury across the face of the Sun.

In 1725 Delisle went to St. Petersburg to establish an astronomical institute. Intending to be there only 4 years, he stayed for 22 and trained the first generation of Russian astronomers. His *Mémoires pour servir à l'histoire et au progrès de l'astronomie* (1738; "Memoirs Recounting the History and Progress of Astronomy") gave the first method for determining the heliocentric (Sun-centred) coordinates of sunspots. He returned to Paris in 1747, was appointed geographic astronomer to the naval department, and installed an observatory in the Hôtel Cluny. In 1753 he organized a worldwide study of a transit of Venus (1761), the first such systematic study to be made.

délit: *see* crime, délit, and contravention.

Delius, Frederick (Theodore Albert) (b. Jan. 29, 1862, Bradford, Yorkshire, Eng.—d. June 10, 1934, Grez-sur-Loing, France), composer, one of the most distinctive figures in the revival of English music at the end of the 19th century.

The son of a German manufacturer who had become a naturalized British subject in 1860, Delius was educated at Bradford Grammar School and the International College, Isleworth, London. After working as a traveler for his father's firm, he went in 1884 to Florida, U.S., as an orange planter and devoted his spare time to musical study. In 1886 he left Florida for Leipzig and there underwent a more or less regular musical training and became a friend of the Norwegian composer Edvard Grieg. Two years later he went to live in Paris, and from 1897 he made his home at Grez-sur-Loing (Seine-et-Marne), near Paris, with the painter Jelka Rosen, whom he married in 1903. Some songs, an orchestral suite (*Florida*), and an opera (*Irmelin*) were all written before he had a work published, that being *Legend* for violin and orchestra (1893). These were followed by more ambitious works that aroused considerable interest, especially in Germany, during the first decade of the 20th century. Three of his six operas (*Koanga*, 1895–97; *A Village Romeo and Juliet*, 1900–01; and *Fennimore and Gerda*, 1908–10) and several of his larger choral and orchestral works (*Appalachia*, 1902; *Sea Drift*, 1903; *Paris: the Song of a Great City*, 1899) were first heard in Germany. Later his reputation spread to England, mainly through the persuasive advocacy of Sir Thomas Beecham, who was his finest interpreter.



Delius, drawing by Edmond X. Kapp, 1932

Edmond X Kapp

Even after he was stricken blind and paralyzed in his early 60s, Delius continued to compose, working with an amanuensis, Eric Fenby. Other major works include *A Mass of Life* (1904–05) and a *Requiem* (1914–16), both to texts by Friedrich Nietzsche; *Brigg Fair* (1907) for orchestra; four concerti for various instruments; three sonatas for violin and piano; and many smaller orchestral pieces and songs. He was created a Companion of Honour in 1929.

In distinction and originality of idiom, Delius' music can hold its own with that of his contemporary Edward Elgar, and for a time he was considered by many to be a composer of equal stature. But Delius' expressive range was more limited and his invention less vigorous than Elgar's. Works that continue to be performed and recorded include the tone poem *Over the Hills and Far Away* (1895); the two *Dance Rhapsodies* for orchestra (1908 and 1916); *Two Pieces for Small Orchestra: On Hearing the First Cuckoo in Spring* (1912); *Summer Night on the River* (1911); and *Songs of Sunset* for orchestra, chorus, and solo voices (1906–07).

Dell, Floyd (b. June 28, 1887, Barry, Ill., U.S.—d. July 23, 1969, Bethesda, Md.), novelist and radical journalist whose fiction examined the changing mores in sex and politics among American bohemians before and after World War I.

A precocious poet, Dell grew up in an impoverished family and left high school at age 16 to work in a factory. Moving to Chicago in 1908, he worked as a newspaperman and soon was a leader of the city's advanced literary movement. He became assistant editor of the *Friday Literary Review* of the *Evening Post* in 1909 and editor in 1911, making it one of the most noted American literary supplements. As a critic, he furthered the careers of Sherwood Anderson and Theodore Dreiser.

A socialist since his youth, he moved to New York in 1914 and was associate editor of the left-wing *The Masses* until 1917. Dell was on the staff of *The Liberator*, which succeeded *The Masses*, from 1918 to 1924. His first and best novel, the largely autobiographical *Moon-Calf*, appeared in 1920, and its sequel, *The Briary-Bush*, in 1921. *Homecoming*, an autobiography taking him to his 35th year, was published in 1933. His other novels on life among the unconventional include *Janet March* (1923), *Runaway* (1925), and *Love in Greenwich Village* (1926). His nonfiction includes *Were You Ever a Child?* (1919), on child-rearing; the biography *Upton Sinclair: A Study in Social Protest* (1927); and *Love in the Machine Age* (1930), which presented his views on sex. *Little Accident*, a play written with Thomas Mitchell and based on Dell's novel *An Unmarried Father* (1927), was successfully produced in 1928.

Dell joined the Federal Writers Project and moved to Washington, D.C., in the late 1930s as an official for the project. He continued in government work after the project ended, until his retirement in 1947.

Della Casa, Giovanni: *see* Casa, Giovanni Della.

Della Falls, series of three cascades from Della Lake to the valley of Drinkwater Creek on Vancouver Island, B.C., Can. They are located approximately 37 miles (60 km) northwest of the mill town of Port Alberni and about the same distance southwest of the town of Courtenay.

With a nearly vertical drop of 1,445 feet (440 m), Della Falls constitute the highest waterfalls in Canada. Named for the wife of Joe Drinkwater, a trapper and prospector who first visited the falls in 1899, Della Falls are formed by the glacier-fed lake. At an elevation of about 3,545 feet (1,080 m), Della Lake lies deep within the mountainous Strathcona Provincial Park. The falls are surrounded by Big Interior Mountain (6,103 feet [1,860 m]), Mount Rosseau (6,437 feet [1,962 m]), Mount Septimus (6,398 feet [1,950 m]), and Nine Peaks (6,044 feet [1,842 m])—four of the highest peaks on the island.

della Porta, Giacomo (architect): *see* Porta, Giacomo della.

della Porta, Giambattista (philosopher): *see* Porta, Giambattista della.

Della Robbia, Andrea, in full ANDREA DI MARCO DI SIMONE DELLA ROBBIA (b. Oct. 20, 1435, Florence [Italy]—d. Aug. 4, 1525), Florentine sculptor who was the nephew of Luca Della Robbia and assumed control of the family workshop after his uncle's death in 1482.

Like Luca, Andrea Della Robbia was apparently trained as a marble sculptor. His best-known works are 10 roundels of foundlings in swaddling clothes on the facade of the Ospedale degli Innocenti in Florence (*c.* 1463). Andrea's interest in narrative sculpture led him to develop from the reliefs of Luca a class of large polychrome reliefs, of which characteristic examples exist at numerous churches in Italy, including Santa Maria degli Angeli at Assisi and Santa Croce in Florence, as well as many museums outside Italy. The development of Andrea's style between 1475 and 1522 can be followed through a sequence of dated or documented works. Many of his smaller reliefs exist in a quantity of versions turned out from the Della Robbia studio.

Della Robbia, Giovanni (b. May 19, 1469, Florence [Italy]—d. 1529), Florentine sculptor, son of Andrea Della Robbia and grandnephew of Luca Della Robbia who, upon the death of his father in 1525, assumed control of the family workshop.

Giovanni's early works, of which the most remarkable are a lavabo in Santa Maria Novella, Florence (1497), and medallions in the Loggia de San Paolo (1490–95), were executed in collaboration with or under the strong influence of his father. His most ambitious work is a frieze with representations of the works of mercy on the Ospedale del Ceppo at Pistoia (1525–29), in which he was assisted by his pupils Benedetto Buglioni (1461–1521) and Santi Buglioni (1494–1576).

Giovanni's younger brother, Girolamo (1488–1566), was trained in Andrea's studio and collaborated with his father and brother until he moved to France (*c.* 1527–28), where he was employed on the terra-cotta decoration of the demolished Château de Madrid. After the death of Francis I (1547), Girolamo returned to Florence, but some years later (1559) he resumed his work at the Château de Madrid and at Fontainebleau and was employed on the monuments of Francis II and Catherine de Médicis at Saint-Denis.

Della Robbia, Luca, in full LUCA DI SIMONE DI MARCO DELLA ROBBIA (b. 1399/1400, Florence [Italy]—d. Feb. 10, 1482), sculptor, one of the pioneers of Florentine Renaissance style, who was the founder of a family studio primarily associated with the production of works in enameled terra-cotta.

Before developing the process with which his family name came to be associated, Luca apparently practiced his art solely in marble. In 1431 he began what is probably his most important work, the *cantoria*, or "singing gallery," that was originally over the door of the northern sacristy of the Cathedral of Flor-

ence. Taken down in 1688 and reassembled in the Opera del Duomo Museum, it consists of 10 figurated reliefs: two groups of singing boys; trumpeters; choral dancers; and children playing on various musical instruments. The panels owe their great popularity to the innocence and lack of artifice with which the children are portrayed. The most important of Luca's other works in marble are a tabernacle at Peretola, near Florence (carved for Santa Maria Nuova in Florence in 1441), and the tomb of Benozzo Federighi, bishop of Fiesole (1454–57; Santa Trinita, Florence).

The earliest documented work in polychrome enameled terra-cotta, executed wholly in that medium, is a lunette of the Resurrection over the door of the northern sacristy of the cathedral (1442–45). According to the art historian Giorgio Vasari, the glaze with which Luca covered his terra-cotta sculptures consisted of a mixture of tin, litharge antimony, and other minerals. The Resurrection lunette in the cathedral was followed by a corresponding relief of the Ascension over the southern sacristy door, in which a wider range of colour is employed.

Of the many decorative schemes for which enameled terra-cotta was employed by Luca Della Robbia, some of the most important are the roundels of Apostles in Filippo Brunelleschi's Pazzi Chapel in Florence (soon after 1443); the roof of Michelozzo's Chapel of the Crucifix in San Miniato al Monte, Florence (*c.* 1448); and a lunette over the entrance of San Domenico at Urbino (*c.* 1449). Luca's last major work in this medium is an altarpiece in the Palazzo Vescovile at Pescio (after 1472). There are also many notable works by Luca outside Italy.

della Scala FAMILY, also called SCALIGER, Italian SCALIGERI, Latin SCALIGERUS, noted family that ruled Verona during the late 13th and the 14th centuries. Although the family had been prominent in Verona since the 11th century, the founder of the ruling dynasty was Mastino I della Scala (d. 1277), who became podesta (chief magistrate) shortly after the defeat and death (1259) of Ezzelino da Romano, tyrant of Verona. A new election in 1262 gave Mastino the added authoritative office of captain of the people. He was succeeded in 1277 by his brother Alberto (d. 1301), who was followed by his son Bartolomeo (d. 1304), the "gran Lombardo" (Dante, *Paradiso*), in whose reign (according to tradition) Romeo Montague and Juliet Capulet loved and died.

Bartolomeo's brother Can Francesco, called Cangrande I (d. 1329), was the greatest figure of the family and protector of the exiled Dante. He first ruled Verona jointly with his brother Alboino, and together they gained the title of imperial vicar from the Holy Roman emperor Henry VII (1311). After Alboino's death (Oct. 28, 1311), Cangrande became the sole ruler and began a series of successful wars against Vicenza (1312–14) and Padua (1317–18). In 1318 he became captain general of the Ghibelline League and extended his control over Fetre and Belluno. In 1327 he was named imperial vicar of Mantua, reaching the apex of his power. His successor and nephew, Mastino II (who ruled with his brother Alberto II), tried to continue the expansionist policies of his uncle. His aggressiveness, however, provoked a rival Florentine-Venetian coalition and the loss of allies and territories, and by the end of his reign he was left with only Verona and Vicenza.

The della Scala rule in Verona finally came to a close after the brief successive reigns of Mastino's sons and grandsons, ending in 1387 with the annexation of the city by the Visconti, under Gian Galeazzo Visconti, duke of Milan.

Della Valle, Federico (b. *c.* 1560, Asti, Piedmont [Italy]—d. 1628, Milan), Italian dramatist and poet, recognized in the 20th century as a major literary figure. Little is known of his life at the Savoy court in Turin and in Milan, where in 1628 three of his tragedies were published.

The intensely lyrical *La reina di Scozia* (written in 1591; "The Queen of Scotland") centres on Mary Stuart's last hours, when, despite her longing to see again her native Scotland, she resigns herself to martyrdom. Against similar backgrounds of corrupt and ferocious courts, the biblical heroines of his other two tragedies, *Judit* ("Judith") and *Ester* ("Esther"), also fight uncompromisingly for their faith in a world where the only redemption is offered by God in heaven. Della Valle's tragic outlook also underlies his tragicomedy *Adelonda di Frigia* (1595; "Adelonda of Phrygia"), in which the heroine's ideals are contrasted with a barbarous reality.

Dello Joio, Norman (b. Jan. 24, 1913, New York, N.Y., U.S.), American composer in the neoclassical style.

A member of a musical family, Dello Joio studied organ under his father. He attended the Institute of Musical Art and the Juilliard Graduate School and later studied composition under Paul Hindemith. As a neoclassical composer he frequently combined old forms (*e.g.*, ricercari, variations, sonata, chaconne) with contemporary musical techniques. His music, harmonically conservative, has melodic appeal and rhythmic liveliness. He is particularly noted for his choral music.

In 1957 Dello Joio received the Pulitzer Prize in music for *Meditation on Ecclesiastes,* for string orchestra. Other compositions include the operas *The Trial at Rouen* (1955; rev. 1959 and retitled *The Triumph of St. Joan*) and *Blood Moon* (1961); *A Psalm of David* (1950), for mixed chorus; *Antiphonal Fantasy on a Theme by Vincenzo Albrici* (1965), for organ, brass, and strings; *Evocations* (1970), for chorus and orchestra; *Mass in Honor of Pope John XXIII* (1975), for organ, brass, strings, and chorus; *As of a Dream* (1978), for orchestra, soloists, chorus, narrator, and dancers; *Hymns Without Words* (1979), for chorus and piano; as well as chamber music and several ballets. From 1972 to 1978 he served on the faculty of Boston University.

Delmarva Peninsula, portion of the Atlantic Coastal Plain of the United States, extending southward between the Chesapeake Bay (west) and the Delaware River, Delaware Bay, and Atlantic Ocean (east). Encompassing parts of the states of Delaware, Maryland, and Virginia (hence its name), the peninsula is approximately 180 miles (290 km) long and up to 70 miles (110 km) wide. The Chesapeake Bay Bridge-Tunnel links Cape Charles, at the peninsula's southern tip, to Norfolk, Va. The William Preston Lane, Jr., Memorial Bridge crosses Chesapeake Bay, linking the peninsula with Annapolis, Md., to the west, and the Chesapeake and Delaware Canal cuts across its narrow isthmus in the north. Fishing, tourism, poultry raising, and market gardening are the main industries. The commercial centre is Salisbury, Md.

Delmas, Jacques (-Pierre-Michel): *see* Chaban-Delmas, Jacques (-Pierre-Michel).

Delmenhorst, city, Lower Saxony *Land* (state), northwestern Germany, on the Delme River, just west of Bremen. First mentioned in 1254, it developed around a moated castle belonging to a branch of the family of the dukes of Oldenburg and was chartered in 1371. Industrialization in the late 19th century caused rapid growth. The city is now a manufacturing centre specializing in linoleum; other products include wool, jute, cork, metalwork, cosmetics, clothing, paper, and chemicals. Pop. (1991 est.) 75,154.

delomorphous cell (anatomy): *see* parietal cell.

Deloney, Thomas (b. 1543?, Norwich?, Eng.—d. 1600), writer of ballads, pamphlets, and prose stories that form the earliest English popular fiction.

By trade a silk weaver, probably of Norwich, Deloney wrote topical ballads and, through his pamphlets, took part in religious controversy. He was proscribed in London for alleged sedition but, as an itinerant weaver and ballad seller, collected material in the provinces for his prose stories. His "many pleasant songs and pretty poems to new notes" appeared as *The Garland of Good Will* (1593). His *Jacke of Newberie* (1597), *The Gentle Craft,* parts i and ii (1597–*c.* 1598), and *Thomas of Reading* (1599?) furnished plots for such dramatists as Thomas Dekker. *The Gentle Craft* is a collection of stories, each devoted to glorifying one of the crafts: the clothiers, the shoemakers, the weavers.

Though widely read, Deloney was condemned by the university-educated writers as a mere ballad maker and purveyor of plebeian romance, and his literary merits went unrecognized until the 20th century.

Delorme, Marion (b. Oct. 3, 1613, Paris, France—d. July 2, 1650, Paris), celebrated French courtesan.



Marion Delorme, portrait by an unknown artist, 17th century; in the Bibliothèque Nationale, Paris
Giraudon —Art Resource

She was the daughter of Jean de Lon, Sieur de Lorme, and became the lover of the poet and freethinker Jacques Vallée, Sieur des Barreaux. She soon left him, however, for Louis XIII's young favourite, the Marquis de Cinq-Mars, whom she almost married. The fashionable salon she established in the Place Royale (now the Place des Vosges) in Paris attracted a number of leading literary and political figures. After Cinq-Mars was executed for treason (1642), she had many lovers, including the Duke d'Enghien (later known as the Great Condé), the skeptic Saint-Évremond, and the superintendent of finances Michel Particelli d'Émery. It was maliciously rumoured that she had had an affair with the powerful Cardinal de Richelieu, King Louis XIII's chief minister. During the uprising known as the Fronde (1648–53), her salon became a meeting place for bourgeois and aristocratic rebels. Forced by the government to leave the Place Royale, she died in poverty. The 19th-century French writer Alfred de Vigny included her in his novel *Cinq-Mars,* and Victor Hugo made her a heroine of one of his dramas.

Delorme, Philibert, Delorme also spelled DE L'ORME (b. between 1510 and 1515, Lyon, France—d. Jan. 8, 1570, Paris), one of the great Renaissance architects of the 16th century and, possibly, the first French architect to possess some measure of the universal outlook of the Italian masters but without merely imitating them. Mindful that French architec-

tural requirements differed from Italian, and respectful of native materials, he founded his designs on sound engineering principles. He assimilated the orders of classical architecture and mastered their use; but, being a man with an independent, logical turn of mind and a vigorous personality, he fused the orders with a delicacy of invention, restraint, and harmony characteristic of purest French classicism.



Entrance portal of the Château d'Anet by Philibert Delorme, *c.* 1552
J.E. Bulloz

Delorme, the son of a master stonemason, lived at Rome (*c.* 1533–36), where he excavated and studied classical antiquities. It was very likely through a compatriot whom he met there, Cardinal Jean du Bellay, that he cultivated his broad and ardent humanist outlook. While building a château at Saint-Maur-des-Fossés for Cardinal du Bellay (*c.* 1541–47), he was appointed architect to the dauphin (who became Henry II in 1547 and named him abbé of Ivry in 1549). For Henry's mistress Diane de Poitiers, he designed the magnificent château at Anet (1547–56) and a bridge for the château of Chenonceaux (1556–59). Appointed overseer of buildings (1548), he created a number of important works, including the tomb of King Francis I at Saint-Denis (1547), additions to the palace of Fontainebleau (1548–58), and the new château at Saint-Germain-en-Laye. Unfortunately, most of his buildings have been destroyed and are known only from engravings.

Following Henry's death (1559), Delorme fell from royal favour and turned to writing *Nouvelles Inventions pour bien bastir et à petits fraiz* (1561) and *Le Premier Tome de l'architecture de Philibert de L'Orme* (1567, revised 1568), two architectural treatises expounding the theories behind his practices. These works also attest to the way in which Delorme successfully grafted the spirit of Renaissance new learning onto the classic French tradition. In 1564 the queen mother, Catherine de Médicis, recalled him to begin his last major work, the palace of the Tuileries, Paris.

Delors, Jacques (Lucien Jean) (b. July 20, 1925, Paris, France), French statesman who was president of the European Commission, the executive body of the European Community (EC), from 1985.

The son of a courier at the Banque de France, Delors himself joined the bank in 1945, later earning a degree in economics from the Sorbonne. He became active in the Christian Trade Union Confederation (renamed the Democratic Trade Union Condederation in 1964) and was named its economic adviser in 1950. In 1962 he left the Banque de France, where he had quickly risen to an executive position, to head the social-affairs division of the state's General Planning Commission. From 1969 to 1972 he served as chief adviser on social affairs to Prime Minister Jacques Chaban-Delmas's "new society" program.

Delors joined the Socialist Party in 1974 and in 1976 became the party's national delegate for international economic relations. In 1979 he was elected to the European Parliament, where he served as chairman of the economic and monetary committee. In 1981 François Mitterrand, the newly elected Socialist president, appointed Delors minister of economics and finance. The French economy was then in recession, and Delors initially carried out the Socialist recovery plan of increasing government controls and spending. He eventually convinced Mitterrand to accept his program of austerity, however, which succeeded in restoring relative economic stability.

Delors left government to become the president of the European Commission in 1985. He revitalized the long-stalled EC, pushing through reforms and persuading the member states to agree to the creation of a single market, to take effect from Jan. 1, 1993, the first step toward full economic and political integration.

Delos, Modern Greek DHÍLOS, island, one of the smallest of the Cyclades, Greece, an ancient centre of religious, political, and commercial life in the Aegean Sea. Now largely uninhabited, it is a rugged granite mass about 1.3 square miles (3.4 square km) in area. Also called Lesser Delos, it lies between Rinía (Rhenea), or Megáli Dhílos (Greater Delos), to the west and Míkonos Island to the east.

Since 1873 the École Française d'Athènes ("French School of Athens") has been excavating the island, the complex of buildings of which compares with those of Delphi and Olympia. Among Delos' most noted sculptural artifacts are fragments of a colossal Apollo and nine marble lions. Four main groups of ruins are distinguishable on the west coast: the commercial port and small sanctuaries; the religious city of Apollo, a *hieron* (sanctuary); the sanctuaries of Mount Cynthos and the theatre; and the region of the Sacred Lake.

Behind the Sacred Harbour begins the paved Sacred, or Processional, Way, 42 feet (13 m) wide. To the west stood a sacred precinct, or shrine, and on the east a terrace with three important temples. The Doric temple of Apollo (mid-5th to 3rd century BC) has plain frieze motifs, scant sculptural decoration, and no interior colonnade. Adjoining it is a Doric Athenian temple (425–417 BC); the third is the Porinos Naos. Beyond this complex is a sanctuary, an unusual elongated structure in two sections. At the north end was an altar built of the horns of animal sacrifices.

Other features of the precinct included a broad road flanked with votive offerings and the precinct of Artemis, with three temples superimposed on one another, perhaps the oldest edifice of pre-Hellenic times. Outside the precinct of Apollo, on the south, was an open space; between this and the precinct was a house for priests; and within it, the tombs of the Hyperborean Maidens, worshipers of Artemis. To the east was the temple of Dionysus, on the other side a large commercial exchange that had a temple of Aphrodite and Hermes.

Behind the commercial harbour were docks and warehouses; behind them lay the private houses of the 3rd and 2nd centuries BC, each featuring a court surrounded by columns and many paved with mosaic. The theatre (early 3rd century BC) lay beyond the commercial harbour, on the lower slope of Mount Cynthus; its summit has remains of ancient Cycladic dwellings (3rd millennium BC) and a small precinct of Kýnthios Zeus (Cynthian Zeus) and Athena. Down the slope lay a sanctuary for foreign gods; the southern section reserved for Egyptian gods, the northern for Syrian.

To the north, on the south side of the Sacred Lake (now drained), was the Agora of Italians, with entrance arches of Doric columns, the most spacious structure in Delos. Nearby, between the lake and the Sacred Harbour, was the Agora of Theophrastos (late 2nd century BC). North of the lake was the Palaestra (gymnasium), a large court with Ionic peristyle, and a stadium about 540 feet (165 m) long.

There are many traditional accounts of Delos' origin. It was inhabited in the late 3rd millennium BC. In the 9th–10th century BC, Ionians brought the cult of Leto, who in legend gave birth there to Artemis and Apollo. The island was already a flourishing port and cult centre, famous for references to it in the *Odyssey*. After the Persian Wars, in 478 BC the Delian Confederacy was established there under the leadership of Athens, but at the close of the Peloponnesian War Sparta briefly gave Delos its independence.

For 150 years after the breakup of Alexander the Great's empire, Delos was independent. Under Rome after 166 BC, Delos became a free port. In 88 BC Menophaneses, a general of Mithradates VI of Pontus, sacked the island for remaining faithful to Rome; thousands of people were slaughtered. A pirate attack followed (69 BC), and, though Athenian control



The theatre on the island of Delos, Greece
J. Allan Cash

was restored by Rome in 42 BC, the Greek geographer Pausanias records that the island remained almost uninhabited. By the end of the 1st century AD, changes in trade routes ensured the commercial demise of Delos, and its cults were then or soon thereafter abandoned. Its structures were quarried for building material by the Venetians and Turks in the European Middle Ages. Pop. (1981) 16.

Delphi, seat of the most important ancient Greek temple and oracle of Apollo. It lay in the territory of Phocis on the steep lower slope of Mount Parnassus, about 6 miles (10 km) from the Gulf of Corinth. Delphi was considered by the ancient Greeks to be the centre of the world. According to ancient myth, Zeus released two eagles, one from the east, the other from the west, and caused them to fly toward the centre. They met at Delphi, and the spot was marked by a stone in the temple; this stone was known as the omphalos (navel). According to legend, the oracle at Delphi originally belonged to Gaea, the Earth goddess, and was guarded by her child the serpent Python; later, Apollo slew Python and founded his own oracle there.

Excavations have shown that Delphi has been continuously inhabited from late Mycenaean times (14th century BC), but its history really begins in the 6th century BC, when the Sacred War of about 590 BC destroyed the nearby town of Crisa, which had been taxing pilgrims, and opened free access to Delphi. Delphi joined the Amphictyonic League and became one of its chief centres. The Panhellenic Pythian Games, reorganized in 582, were held there quadrennially. By this time the prestige of the Delphic oracle was at its height. It was consulted not only on private matters but also on affairs of state, and its utterances often swayed national policy. It was also consulted whenever a colony was to be sent out from Greece proper, and so its fame spread to the limits of the Greek-speaking world.



The theatre and the temple of Apollo at Delphi, Greece; both 4th century BC, with Roman restorations

S Vidler/Superstock

In early Roman times Delphi was frequently pillaged; Nero is said to have removed 500 statues from the vicinity. With the spread of Christianity, the old pagan sanctuary of Delphi fell into decay. Julian the Apostate attempted to restore the temple in the mid-4th century AD, but the oracle responded to the emperor's enthusiasm with nothing but a wail over the glory that had departed.

The site of Delphi was occupied by the modern village of Kastrí until 1890, when the village was moved to a site nearby and renamed Delphi. Excavations, begun in 1892, revealed the plan of the ancient site, and the remains of its buildings can be further identified in the 2nd-century-AD writings of the geographer Pausanias. The temple sanctuary was a large, roughly rectangular area enclosed by a wall. A sacred way lined with monuments and treasuries wound up through the sanctuary to the temple of Apollo itself. The monuments along the way were offerings to Apollo erected by states or individuals in thanks for favours bestowed by the god. At the heart of the sanctuary was the great temple of Apollo; the existing temple, of which only the foundation and some steps and a few columns are preserved, was built in the 4th century BC. The Delphic oracle was in a chamber at the rear of the temple. Two earlier temples of Apollo on the site are known from their actual remains. Of the first, dating from about 600 BC, some archaic capitals and wall blocks are preserved. This temple was burned in 548 BC. Of the second temple, built at the end of the 6th century BC, many wall blocks and some pediment sculptures are extant. Of the site's once-numerous treasuries, the one of Athens has been rebuilt with the original blocks and has a famous wall inscribed with musically notated hymns to Apollo. *See also* oracle.

Delphinium, any of several tall garden flowers often called larkspur (*q.v.*).

Delray Beach, city, Palm Beach county, southeastern Florida, U.S. It lies along the Atlantic Ocean about 15 miles (24 km) south of West Palm Beach. Settlers from Michigan arrived by boat in 1895, when the Atlantic Intracoastal Waterway reached the site. The town was laid out in 1896 and about 1901 took the name Delray, after a district of Detroit. The part on the west (mainland) side of the waterway was incorporated as a town in 1911, while the area along the east (beach) side remained unincorporated until 1923, when it became the town of Delray Beach. The two communities were amalgamated in 1927 as Delray Beach. The automotive industry is the city's largest employer, and tourism, based on extensive public beaches, is also a major industry. Other economic activities include commercial flower growing and the cultivation of citrus fruits and vegetables. Pop. (1992 est.) 49,186.

Delsberg (Switzerland): *see* Delémont.

Delta, district municipality, southwestern British Columbia, Canada. It is situated in the southern Vancouver metropolitan area, between the Fraser River delta and Boundary Bay (an arm of the Strait of Georgia). Though its northern section is primarily residential, much of its area is devoted to dairying, truck gardening, and farming cash crops. Delta's industries, which are mainly concentrated on Annacis Island in the Fraser River, include fishing and fish canning, food processing, and paper milling. Robert Bank, a superport built for the bulk handling of coal and completed in 1970, occupies a 55-acre (22-hectare) man-made island in the Strait of Georgia off the suburb's western shore. Delta has several fine beaches and ferry service to Vancouver Island. Inc. 1879. Pop. (1991) 88,978.

Delta, state, southern Nigeria. It is bounded by Edo state to the north, Anambra state to the east, Rivers state to the southeast and south, the Bight of Benin of the Atlantic Ocean to the west, and Ondo state to the northwest. On the east and south the state is bounded by the lower course and delta of the Niger River. Delta was created in 1991 from the southern half of former Bendel state. Asaba on the Niger River is the state capital.

Most of the state lies at an elevation below 500 feet (150 m) in the Niger River delta. Mangrove swamps predominate in the delta and merge with freshwater swamps to the north. A maze of interconnected waterways and the Forcados and Escravos rivers, which empty into the Bight of Benin, are used for transportation. The state is inhabited by the Igbo (Ibo) people in the east, the Edo (Bini) in the north, and the Itsekiri, Urhobo, Isoko, and Ijaw in the south and west.

Agriculture is the mainstay of the state's economy; yams, cassava, oil palm produce, rice, and corn (maize) are grown for local consumption. Delta is a major exporter of petroleum, rubber, timber, and palm oil and kernels via the Niger delta ports of Burutu, Forcados, Koko, Sapele, and Warri. Petroleum is exported by pipeline from the Ughelli fields, and other major oil fields exist near Warri (which possesses an oil refinery), Koko, Escravos, and offshore. The state's industries include glass and bottle factories; textile mills; and plastics, rubber, plywood, natural gas, boatbuilding, sawmilling, and furniture industries. A major steel-producing complex is at Aladja, adjacent to Warri. A bridge crosses the Niger from Asaba to Onitsha. Pop. (1991) 2,570,181.

delta, low-lying plain that is composed of stream-borne sediments deposited by a river at its mouth.

A brief treatment of deltas follows. For full treatment, *see* MACROPAEDIA: Rivers.

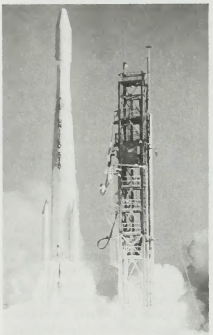
Some 2,500 years ago, Herodotus recognized that the land bounded by the seaward-diverging distributary branches of the Nile and the sea was deltoid in shape and so used the Greek letter Δ (delta) to describe it. Although many of the world's deltas are deltoid, or triangular, in shape, notable exceptions exist. In most cases, the delta shape is controlled by the outline of the water body being filled by sediments. For this reason, the term delta is now normally applied, without reference to shape, to the exposed and submerged plain formed by a river at its mouth.

Deltas have been important to humankind since prehistoric times. Sands, silts, and clays deposited by floodwaters were extremely productive agriculturally; and major civilizations flourished in the deltaic plains of the Nile and Tigris-Euphrates rivers. In recent years geologists have discovered that much of the world's petroleum resources are found in ancient deltaic rocks.

Deltas display much variation in size, structure, composition, and origin. These differences result from sediment deposition taking place in a wide range of settings. Numerous factors influence the character of a delta, the most important of which are: climatic conditions, geologic setting and sediment sources in the drainage basin, tectonic stability, river slope and flooding characteristics, intensities of depositional and erosional processes, and tidal range and offshore energy conditions. Combinations of these factors and time give

rise to the wide variety of modern deltas. The presence of a delta represents the continuing ability of rivers to deposit stream-borne sediments more rapidly than they can be removed by waves and ocean currents.

Delta, American three-stage space-launch vehicle; its development began in 1959. The first version was capable of placing a 480-pound (220-kilogram) payload into a 300-mile (480-kilometre) orbit. In the early 1960s, Delta launched TIROS weather satellites, Echo 1,



Thrust-Augmented Improved Delta launch vehicle, 1966, used in the biological satellite space research program

By courtesy of the National Aeronautics and Space Administration

and the Telstar, Relay, and Syncom communication satellites. An improved Delta with a more powerful first stage and capable of placing 1,000 pounds (450 kg) into a 500-mile (800-kilometre) orbit put the Syncom 3 communication satellite into orbit on Aug. 19, 1964. Several Long Tank Deltas were also built; an advanced version has an inertial guidance system and can be flown with either two or three stages. The two-stage version is capable of placing a 3,600-pound (1,630-kilogram) payload into a 230-mile (370-kilometre) orbit.

Delta Air Lines, Inc., American airline incorporated on Dec. 31, 1930, as Delta Air Corporation, which adopted the current name in 1945. Engaged initially in agricultural dusting operations in the southern United States and in Mexico, it progressed, especially after 1934, to transporting passengers and cargo throughout the southeastern United States, with links elsewhere in the continental United States and overseas. Headquarters are at Atlanta, Ga.

The Southern crop-dusting service began in 1924 as an operation of a New York airplane manufacturer. In 1928 the operation was sold to a group of Louisiana businessmen and became Delta Air Service, which inaugurated passenger service the following year and in 1930 incorporated as Delta Air Corporation. The man most responsible for guiding the company was Collett Everman Woolman, who was vice president and general manager (1928–45), president (1945–65), and chief stockholder (at his death in 1966).

During the 1930s two other airline companies arose that would one day merge with Delta: Chicago and Southern Air Lines, Inc. (C&S), and Northeast Airlines, Inc. C&S was founded in 1933 as Pacific Seaboard Air Lines. In 1934 it secured a U.S. mail-carrying route from Chicago to New Orleans and was thus incorporated on Dec. 3, 1935, as Chicago and Southern Air Lines. Expanding its routes throughout the Mississippi River valley and to the Caribbean, it merged in 1953 with Delta.

Northeast Airlines was founded in 1933 as Boston and Maine Airways, and in 1940 the airline was renamed Northeast Airlines. By 1944 it was flying the important New York–Boston route, along with other routes in the Northeast. It merged with Delta in 1972.

In 1987 Delta acquired Western Air Lines, Inc., which had a strong route system in California and the far western United States. In 1991 Delta became part owner of bankrupt Pan American World Airways, acquiring the latter's routes to Europe, the Middle East, and South Asia in the process.

Delta Amacuro, *estado* ("state"), northeastern Venezuela. It is bounded by the Atlantic Ocean on the northeast, Guyana on the southeast, and the Venezuelan states of Bolívar on the south and Monagas on the west. The state consists of the swampy delta through which the 26 distributaries of the Orinoco River empty into the sea. Long inhabited principally by Indians who collected gum, balata, dividivi (a source of tannin), and mangrove bark, Delta Amacuro has experienced profound changes since the 1960s. Reclaimed land has been brought under cultivation and now produces bananas, cotton, peanuts (groundnuts), rice, sugarcane, and other crops. Petroleum found in the region near Tucupita, the capital. Travel is almost entirely by water, although a highway reaches Tucupita. Area 15,500 square miles (40,200 square km). Pop. (1990) 91,085.

Delta Cephei, prototype star of the class of Cepheid variables, in the constellation Cepheus. Its apparent visual magnitude at minimum is 4.34 and at maximum about 3.6, changing in a regular cycle of about five days and nine hours. Its variations in brightness were discovered in 1784 by the English amateur astronomer John Goodricke, and periodic changes in radial velocity (now attributed to pulsation) were established in 1894.

Delta Project, also called DELTA WORKS, Dutch DELTAWERKEN, in the southwestern Netherlands, a giant flood-control project that closed off the Rhine, Maas, and Schelde estuaries with dikes linking the islands of Walcheren, Noord-Beveland, Schouwen, Goeree, and Voorne and created what amounts to several freshwater lakes that are free of tides. Devised by the Dutch engineer Johan van Veen, the plan acquired great urgency after a catastrophic North Sea flood on Feb. 1, 1953, killed 1,835 persons and devastated 800 square miles (2,070 square km) of land in the southwestern Netherlands. Work on the Delta Project began shortly thereafter and was completed in 1986.

Four barrier and six secondary dams were built to close off the mouths and inner reaches of the broad, long, interconnected inlets that for centuries had exposed the region to the destructive power of the North Sea. When the dams were completed, fresh water from the Rhine and from other rivers gradually replaced the entrapped salt water. Total length of the dams is 18.5 miles (about 30 km).

The last barrier dam to be completed was that stretching across the three channels of the Eastern Schelde, or Oosterschelde. This dam consists of several strings of gates and their massive supporting piers and totals about 1.75 miles (2.8 km) in length. It differs from its predecessors because it has adjustable gates that, in normal weather, allow tidal seawaters to ebb and flow in the Oosterschelde estuary, thus benefiting the fish and bird life and the local fisheries. During a severe storm, however, of the type that caused the 1953 flood, the gates can be dropped to keep out high tides and storm surges and prevent them from inundating the adjacent lowlands.

New roadways and connecting bridges were built over several of the Delta Project's dams and dikes, thus ending the historic isolation of the area from the rest of The Netherlands.

delta ray, in physics, any atomic electron that has acquired sufficient energy by recoiling from a charged particle passing through matter to force, in turn, some dozens of electrons out of other atoms along its own trajectory.

The charged particle giving rise to delta rays generally is relatively large, such as an alpha particle (composed of two protons and two neutrons), but may also be a high-speed electron. This particle, as it slows down in matter, forces thousands of electrons out of atoms by ionization, producing a wake of electrons and positive ions (electron-deficient atoms) that can be detected. The detached electrons are usually of such low energy that they cannot produce further ionization. But periodically, a relatively large amount of energy is transferred to an electron by a nearly head-on collision along the path of the primary ionizing particle. These are the energetic electrons that cause secondary ionization and are referred to as delta rays. On a developed photographic emulsion, in which strongly ionizing particles have left dense tracks, delta rays appear as thin wavy spurs or branches. The term delta ray, first used by the British physicist J.J. Thomson, is sometimes extended to any recoil particle that causes secondary ionization.

Deltatheridium, primitive genus of extinct mammals found as fossils in Late Cretaceous rocks (66.4 to 97.5 million years old) of Mongolia. *Deltatheridium,* a tiny animal, was an insectivore and represents a stage of development from which the modern insectivores and perhaps the modern placental mammals as a group may have been derived. The skull was only about 5 cm (2 inches) long. *Deltatheridium* had a blend of primitive and advanced dental features.

deltoideus muscle, large, triangular muscle that covers the shoulder and serves mainly to raise the arm laterally. The deltoid, as it is commonly known, originates on the outer front third of the clavicle (collarbone) and the lower margin of the spine of the scapula (shoulder blade). Its fibres unite to form a thick tendon that inserts at the deltoid tuberosity, a rough spot above the middle of the outer surface of the humerus (upper arm bone).

Deluc, Jean André (b. Feb. 8, 1727, Geneva, Switz.—d. Nov. 7, 1817, Windsor, Berkshire, Eng.), Swiss-born British geologist and meteorologist whose theoretical work was influential on 19th-century writing about meteorology.

Deluc was educated in mathematics and the natural sciences. He engaged in business, and on his business travels around Europe he collected mineral and plant specimens.

Deluc suffered business reverses in 1773 and left Geneva for England. He devoted himself to his scientific interests and was made a fellow of the Royal Society. He became a reader to Queen Charlotte, which allowed him much time and the means to travel on the European continent. He studied the effects of heat and pressure on the mercury barometer and, as a pioneer in scientific mountaineering, published the first correct rules for using the barometer to find the heights of mountains.

Deluc discovered that water attains its maximum density at 39° F (4° C), and he developed the theory that the quantity of water vapour in any given space is independent of the density of the air in which it is diffused. As an amateur physicist, he constructed an "electric column" of zinc and silvered paper similar to the galvanic pile of Alessandro Volta, which was in vogue for electrical experimentation for some time. Deluc's keenest personal interest was his quest to reconcile the Creation story of Genesis with the evidence of geology, and to this end he interpreted each day of the Creation as an epoch.

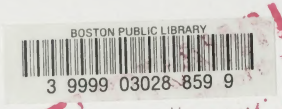
List of Abbreviations

A.B.	Bachelor of Arts (Latin *Artium Baccalaureus*); Army Base
Ac	actinium
AC	alternating current
A.C.T.	Australian Capital Territory
AD	in the year of the Lord (Latin *anno Domini*)
A.F.B.	Air Force Base
Afg.	Afghanistan
A.F.S.	Air Force Station
Ag	silver (Latin *argentum*)
AG	Limited-liability Company (German *Aktiengesellschaft*)
AH	in the year of the Hegira, or Muslim era (Latin *anno Hegirae*)
Al	aluminum, aluminium
Ala.	Alabama
Alb.	Albania
Alg.	Algeria
Alta.	Alberta
Am	Americium
AM	before noon (Latin *ante meridiem*)
AM	amplitude modulation
A.M.	Master of Arts (Latin *Artium Magister*)
Amer.	American
Ant.B.	Antigua and Barbuda
Ar	argon
Arg.	Argentina
Ariz.	Arizona
Ark.	Arkansas
Arm.	Armenia
Arpt.	Airport
As	arsenic
A.S.	Air Station
A.S.S.R.	Autonomous Soviet Socialist Republic
At	astatine
Au	gold (Latin *aurum*)
Aug.	August
Austl.	Australia
Av.	Avenida (Spanish: "Avenue")
Ave.	Avenue
Azer.	Azerbaijan
b.	born
B	boron
Ba	barium
B.A.	Bachelor of Arts
Bah.	The Bahamas
Bangl.	Bangladesh
Barb.	Barbados
BC	before Christ
B.C.	British Columbia
BCE	before the Common Era, or Christian era
Be	beryllium
B.Ed.	Bachelor of Education
Bela.	Belarus
Belg.	Belgium
Bfld.	Battlefield
Bge.	Bridge
Bi	bismuth
Bk	berkelium
Bldg.	Building
Bldgs.	Buildings
Blvd.	Boulevard
Bol.	Bolivia
Bos.-Her.	Bosnia and Hercegovina
Bots.	Botswana
BP	before the present
Br	bromine
Braz.	Brazil
Brit.	British
B.S.	Bachelor of Science
B.Sc.	Bachelor of Science
Bulg.	Bulgaria
Burk.	Burkina Faso
c.	about, approximately (Latin *circa*)
C	carbon; Celsius
C.	Cape
Ca	calcium
C.A.R.	Central African Republic
Calif.	California
Camb.	Cambodia
Camer.	Cameroon
Can.	Canada
Cay.Is.	Cayman Islands
Cb	columbium
Cd	cadmium
C.d'I.	Côte d'Ivoire
Ce	cerium
CE	Common era, Christian era
cf.	compare (Latin *confer*)
Cf	californium
cg	centigram(s)
Cia.	Company (Italian *Compagnia*; Portuguese *Companhia*; Spanish *Compañia*)
Cie.	Company (French *Compagnie*)
Cl	chlorine
cm	centimetre(s)
Cm	curium
CMSA	consolidated metropolitan statistical area
Co	cobalt
Co.	Company; County
Colo.	Colorado
Colom.	Colombia
Conn.	Connecticut
Cord.	Cordillera
Corp.	Corporation
cos	cosine
cot	cotangent
Cr	chromium
C.Rica	Costa Rica
Cro.	Croatia
Cs	cesium
csc	cosecant
Cu	copper (Latin *cuprum*)
Czech.	Czechoslovakia
Cz.Rep.	Czech Republic
d.	died
DC	direct current
D.C.	District of Columbia
Dec.	December
Del.	Delaware
Den.	Denmark
Dept.	Department
D.F.	Federal District (Spanish *Distrito Federal*)
Djib.	Djibouti
D.Litt.	Doctor of Letters (Latin *Doctor Litterarum*)
Dom.Rep.	Dominican Republic
Dr.	Doctor; Drive
Dy	dysprosium
E	east
Ecua.	Ecuador
ed.	edited; edition; editor
Ed.	*Britannica* editor, or editors
eds.	editors
e.g.	for example (Latin *exempli gratia*)
E.Ger.	East Germany
El Salv.	El Salvador
Eng.	England; English
Eq.Guin.	Equatorial Guinea
Er	erbium
Es	einsteinium
est.	estimate; estimated
Est.	Estonia
et al.	and others (Latin *et alli*, or *aliae*)
et seq.	and following page(s) (Latin *et sequens*, *sequentese*, or *sequentia*)
etc.	and so forth (Latin *et cetera*)
Eth.	Ethiopia
Eu	europium
Expwy.	Expressway
F	Fahrenheit; fluorine
Fe	iron (Latin *ferrum*)
Feb.	February
ff.	and following pages
Fig.	Figure
Fin.	Finland
fl.	flourished (Latin *floruit*)
Fm	fermium
Fla.	Florida
FM	frequency modulation
Fr	francium
Fr.	France
Fr.Guia.	French Guiana
Fr.Poly.	French Polynesia
Ft.	Fort
g	gram(s)
Ga	gallium
Ga.	Georgia (U.S.)
Gd	gadolinium
Ge	germanium
Geo.	Georgia (country)
Ger.	Germany
Gib.	Gibraltar
GmbH	Company with Limited Liability (German *Gesellschaft mit beschränkter Haftung*)
Green.	Greenland
Gren.	Grenada
Guad.	Guadeloupe
Guat.	Guatemala
Guin.Bis.	Guinea-Bissau
h	hour(s)
H	hydrogen
Ha	hahnium
Hbr.	Harbour
He	helium
Hf	hafnium
Hg	mercury (Latin *hydrargyrum*)
H.K.	Hong Kong
HMS	His, or Her, Majesty's Ship, or Service
Ho	holmium
Hond.	Honduras
Hosp.	Hospital
Hung.	Hungary
Hwy.	Highway
I	iodine
I.	Island
ibid.	in the same place (Latin *ibidem*)
Ice.	Iceland
i.e.	that is (Latin *id est*)
Ill.	Illinois
In	indium
Inc.	Incorporated
Ind.	Indiana
Ind. Res.	Indian Reservation
Indon.	Indonesia
Inst.	Institute
Intl.	International
Ir	iridium
Ire.	Ireland
Is.	Islands
Jam.	Jamaica
Jan.	January
Jr.	Junior
K	potassium (Latin *kalium*); Kelvin; Köchel catalog number
Kazakh.	Kazakhstan
Kan.	Kansas
kg	kilogram
KG	Limited Partnership (German *Kommandit Gesellschaft*)
Kiri.	Kiribati
Kitts/N.	Saint Kitts and Nevis
KK	Limited-liability Company (Japanese *Kabushiki Kaisha*)
km	kilometre(s)
Kr	krypton
Ky.	Kentucky
Kyrgyz.	Kyrgyzstan
L.	Lake
La	lanthanum
La.	Louisiana
Leb.	Lebanon
Leso.	Lesotho
Liech.	Liechtenstein
Lith.	Lithuania
LL.B.	Bachelor of Laws (Latin *Legum Baccalaureus*)
LL.D.	Doctor of Laws (Latin *Legum Doctor*)
log	logarithm
Lr	lawrencium
Ltd.	Limited
Lu	lutetium
Lucia	Saint Lucia
Lux.	Luxembourg
m	metre(s)
MA	metropolitan area
M.A.	Master of Arts
Maced.	Macedonia
Madag.	Madagascar
Malay.	Malaysia
Mald.	Maldives
Man.	Manitoba
Marsh.Is.	Marshall Islands
Mart.	Martinique
Mass.	Massachusetts
Maurits.	Mauritius
mbH	Limited; with Limited Liability (German *mit beschränkter Haftung*)
Md.	Maryland
M.D.	Doctor of Medicine (Latin *Medicinae Doctor*)
Mem.	Memorial
Mex.	Mexico
mg	milligram(s)
Mg	magnesium
Mich.	Michigan
Micron.	Micronesia
Mil.	Military
min	minute(s)
Minn.	Minnesota
Miss.	Mississippi
Mlle	Mademoiselle
mm	millimetre(s)
Mme	Madame
Mn	manganese
Mo	molybdenum
Mo.	Missouri
Moldv.	Moldova
Mon.	Monument
Mong.	Mongolia
Mont.	Montana
Monts.	Montserrat
Mor.	Morocco
Mozam.	Mozambique
MP	member of Parliament
Mr.	Mister
Mrs.	"Missus"
M.S.	Master of Science
MSA	metropolitan statistical area
M.Sc.	Master of Science
Mt.	Mount
Mtania.	Mauritania
Mtn.	Mountain
Mts.	Mountains
mun.	municipality
Mus.	Museum
MV	Motor Vessel
Myan.	Myanmar
N	nitrogen; north
Na	sodium (Latin *natrium*)
NA	National Association
Namib.	Namibia
Natl.	National
Natl. Pk.	National Park
Nat. Res.	Nature Reserve
Nb	niobium
N.B.	New Brunswick; Naval Base
N.C.	North Carolina
Nd	neodymium
N.D.	North Dakota
Ne	neon
NE	northeast

Neb.	Nebraska
NECMA	New England county metropolitan area
Neth.	The Netherlands
Neth.Ant.	Netherlands Antilles
Nev.	Nevada
New Cal.	New Caledonia
Nfd.	Newfoundland
N.H.	New Hampshire
Ni	nickel
Nic.	Nicaragua
N.Ire.	Northern Ireland
N.J.	New Jersey
N.Kor.	North Korea
N.M.	New Mexico
no.	number
No	nobelium
Nor.	Norway
Nov.	November
Np	neptunium
NS	Nuclear Ship
N.S.	New Style (calendar)
N.S.W.	New South Wales
N.Terr.	Northern Territory
NV	Limited-liability Company (Dutch *Naamloze Vennootschap*)
NW	northwest
N.W.Terrs.	Northwest Territories
N.Y.	New York
N.Y.C.	New York City
N.Z.	New Zealand
O	oxygen
Oct.	October
Okla.	Oklahoma
Ont.	Ontario
op.	opus
Ore.	Oregon
Os	osmium
O.S.	Old Style (calendar)
p.	page
P	phosphorus
pA	Limited (Italian *per Azioni*)
Pa	protactinium
Pa.	Pennsylvania
Pak.	Pakistan
Pal.	Palace
Pan.	Panama
Para.	Paraguay
Pb	lead (Latin *plumbum*)
Pd	palladium
P.E.I.	Prince Edward Island
Pen.	Peninsula
perf.	performed; performance
pH	potential of hydrogen (acidity-alkalinity factor)
Ph.D.	Doctor of Philosophy (Latin *Philosophiae Doctor*)
Phil.	Philippines
Pk.	Park; Peak
Pkwy.	Parkway
Pl.	Place
Plat.	Plateau
PLC	Public Limited Company
Pm	promethium
PM	afternoon (Latin *post meridiem*)
PMSA	primary metropolitan statistical area
P.N.G.	Papua New Guinea
Po	polonium
Pol.	Poland
pop.	population
Port.	Portugal
pp.	pages
Pr	praseodymium
P.R.	Puerto Rico
prelim.	preliminary (census)
Prov.	Province
Prov. Pk.	Provincial Park
Pt	platinum
Pt.	Point
Pu	plutonium
qq.v.	which see (plural; Latin *quae vide*)
Que.	Quebec
Queen.	Queensland
q.v.	which see (singular; Latin *quod vide*)
R	Rankine
R.	River
Ra	radium
Rb	rubidium
Rd.	Road
Re	rhenium
Res.	Reservoir; Reservation
rev.	revised; revision
Rf	rutherfordium
Rh	rhodium
R.I.	Rhode Island
Rn	radon
Rom.	Romania
Ru	ruthenium
s	second(s)
S	South; sulfur
SA	Limited-liability Company (French *Société Anonyme*; Italian *Società Anônima*; Portuguese *Sociedade Anônima*; Spanish *Sociedad Anônima*)
S.Af.	South Africa
Sask.	Saskatchewan
Saud.Ar.	Saudi Arabia
S.Aus.	South Australia
Sb	antimony (Latin *stibium*)
Sc	scandium
S.C.	South Carolina
Scot.	Scotland
SCSA	standard consolidated statistical area
S.D.	South Dakota
Se	selenium
SE	southeast
sec	secant; second(s)
Seneg.	Senegal
Sept.	September
Seych.	Seychelles
S.F.S.R.	Soviet Federated Socialist Republic
Si	silicon
sin	sine
Sing.	Singapore
S.Kor.	South Korea
Slvk.	Slovakia
Slvn.	Slovenia
Sm	samarium
Sn	tin (Latin *stannum*)
Solo.Is.	Solomon Islands
Som.	Somalia
SpA	Limited-liability Company (Italian *Società per Azioni*)
Spr.	Spring
Sprs.	Springs
Sq.	Square
Sr	strontium
Sr.	Senior
Sri L.	Sri Lanka
SS	Steamship
SS.	Saints
S.S.R.	Soviet Socialist Republic
St.	Saint; State; Street
St. Pk.	State Park
Ste.	Saint (French *Sainte*)
S.Tomé/P.	São Tomé and Príncipe
Str.	Strait
Strs.	Straits
Suri.	Suriname
SW	southwest
Swaz.	Swaziland
Swed.	Sweden
Switz.	Switzerland
Ta	tantalum
Tajik.	Tajikistan
tan	tangent
Tanz.	Tanzania
Tas.	Tasmania
Tb	terbium
Tc	technetium
Te	tellurium
Tenn.	Tennessee
Terr.	Territory; Terrace
Terrs.	Territories
Th	thorium
Thai.	Thailand
Ti	titanium
Tl	thallium
Tm	thulium
Tpk.	Turnpike
trans.	translated; translation; translator(s)
Trin.	Trinidad
Trin./Tob.	Trinidad and Tobago
Tun.	Tunisia
Tur.	Turkey
Turkm.	Turkmenistan
U	uranium
U.A.E.	United Arab Emirates
Ugan.	Uganda
U.K.	United Kingdom
Ukr.	Ukraine
UN	United Nations
Univ.	University
Uru.	Uruguay
U.S.	United States
USGPO	United States Government Printing Office
USS	United States Ship
U.S.S.R.	Union of Soviet Socialist Republics
Uzbek.	Uzbekistan
v.	versus
V	vanadium
Va.	Virginia
var.	variant
Venez.	Venezuela
Vic.	Victoria
Viet.	Vietnam
Vinc./G.	Saint Vincent and the Grenadines
Vir.Is.	Virgin Islands
vol.	volume(s)
Vol.	Volcano
Vt.	Vermont
W	west; tungsten (wolfram)
Wash.	Washington
W.Aus.	Western Australia
W.Ger.	West Germany
Wis.	Wisconsin
W.Samoa	Western Samoa
W.Va.	West Virginia
Wyo.	Wyoming
Xe	xenon
Y	yttrium
Yb	ytterbium
Yugos.	Yugoslavia
Zamb.	Zambia
Zimb.	Zimbabwe
Zn	zinc
Zr	zirconium

Table of Measurement Conversions

To convert	Into	Multiply by
acres	hectares	0.40468564
Celsius (centigrade)	Fahrenheit	(C° × 9/5) + 32
centimetres	inches	0.3937008
cubic feet	cubic metres	0.028316847
cubic metres	cubic feet	35.31467
Fahrenheit	Celsius (centigrade)	5/9(F° − 32)
feet	metres	0.3048
gallons (U.S. liquid)	litres	3.785412
grams	ounces (troy)	0.032150747
hectares	acres	2.471054
inches	centimetres	2.54
inches	millimetres	25.4
kilograms	pounds	2.2046226
kilometres	miles (nautical)	0.5399568
kilometres	miles (statute)	0.6213712
litres	gallons (U.S. liquid)	0.26417205
metres	feet	3.2808399
metres	yards	1.093613298
miles (nautical)	kilometres	1.852
miles (statute)	kilometres	1.609344
millilitres	ounces (U.S. fluid)	0.03381402
millimetres	inches	0.03937008
newtons	pounds (of force)	0.224809
ounces (troy)	grams	31.1034768
ounces (U.S. fluid)	millilitres	29.57353
pounds	kilograms	0.45359237
pounds (of force)	newtons	4.44822
square kilometres	square miles	0.38610216
square miles	square kilometres	2.58998811
yards	metres	0.9144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